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PATU LAKE AREA

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GEOLOGICAL EXPLORATION SERVICE

GEOLOGY

of the

PATU LAKE AREA

NEW QUEBEC TERRITORY

INTERIM REPORT

by

Burkhard Dressler

Québec

1972

Interim Geological Report

on

PATU LAKE AREA

New Quebec Territory

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INTRODUCTION

Location and Access

The Patu Lake map-area is in central New Quebec, about 145 miles north-northwest of Schefferville. It is bounded by longitudes 68°30' and 69°00' and latitudes 56°30' and 56°45' and covers approximately 330 square miles.

Access to the area is by aircraft from Schefferville. All the larger lakes in the area are accessible to float- or ski-equipped planes. Canoe travel is feasible only on the lakes. Travel on foot is quite easy.

Topography and Drainage

Most of the area is hilly and rugged. The highest point, about 4 miles north of Hematite lake, has an elevation of 1816 feet above sealevel; the lowest, Le Moyne lake, lies at only 250 feet.

All the area drains northward to Ungava Bay. Swampy Bay river is the only major river.

Fauna and Flora

The area lies in a subarctic to hemiarctic bioclimatic zone. Spruce and tamarack are the most common trees in the subarctic, the lower parts of the region, whereas arctic birch and "Labrador Tea" cover the higher, the hemiarctic parts of the map-area. "Caribou moss", a lichen (Cladonia) forms extensive whitish carpets in both bioclimatic zones. Almost all hilltops are barren, though slopes are covered by thick alders. Birch are only found in few sheltered places.

Caribou, bear, wolf and porcupine are common, otter and beaver were also observed. Water fowl, especially goose, duck and loon, are plentiful. Trouts are abundant.

Natural Resources

Hydroelectric power sufficient for local developments could be developed at the falls on Swampy Bay river between Patu and Le Moyne lakes, where the river drops 260 feet in about 2½ miles. A sufficient amount of hydroelectric energy for mining developments would be available at Shale falls, on Caniapsiscau river, just one mile northwest of the area.

The woodland is not suited for economic exploitation or mining purposes.

Previous Work

The area lies within a region mapped by Roscoe (1957)* at the scale of 1 inch = 4 miles. Parts of the area have been studied by geologist of different mining companies. The region

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* See list of "References" at the end of the report.

south of the present area was mapped by Dimroth (1969) at the scale of 1 inch = 1 mile. His stratigraphic nomenclature is used in this report.

Field Work

The field work was carried out during the summer of 1971. (June 19 - September 11). Ground traverses were made at half-mile intervals or less, wherever outcrops were plentiful. Complex structural geology often made it necessary to follow stratigraphic contacts. Small, flat areas near Shale falls (outside the map-area) and near Doutreleau lake, which showed no rock exposures on air photos, were examined from airplane and, if promising, traversed on foot.

GENERAL GEOLOGY

The map-area lies almost entirely within the "Labrador Trough". The western boundary of the Trough cuts the very extreme southwestern corner of the present area.

All bedrock, except possibly the post-Kaniapiskau volcanics, is Precambrian in age. The oldest rocks, Archean granites, are overlain by sedimentary and volcanic rocks of the Kaniapiskau Supergroup.

In the map-area the Kaniapiskau Supergroup is subdivided into a lower sedimentary sequence cycle (Seward, Pistolet and Swampy Bay Subgroups) and an upper sequence (Ferriman Subgroup and Menihek Formation), which overlies the lower one unconformly. The rocks of these two sedimentary cycles include arkoses, sandstones, siltstones, shales, dolomites, ironstones and cherts.

The Montagnais group, consisting of metagabbros, metabasalts and minor hyaloclastites, intrude as sills, and in places as dikes, the rocks of the Seward and Pistolet Subgroup. The age of the intrusions is unknown.

The youngest rocks in the map-area are a carbonatite - meimechite suite of volcanic rocks, which is possibly of post-Kaniapiskau age. These volcanics show no evidence of any deformation and intrude the Kaniapiskau Supergroup.

Table I: Table of Formations

<table>
<tr><td>Pleistocene and Recent</td><td colspan="4">Moraine deposits, sand, gravel</td></tr>
<tr><td colspan="5">— Unconformity —</td></tr>
<tr><td rowspan="17">Early Proterozoic (Aphebian)</td><td colspan="4">Post-Kaniapiskau Volcanics</td></tr>
<tr><td colspan="4">— Intrusive Contacts —</td></tr>
<tr><td rowspan="15">Kaniapiskau Supergroup</td><td colspan="3">Montagnais Group</td></tr>
<tr><td colspan="3">— Intrusive Contacts —</td></tr>
<tr><td rowspan="13">Knob Lake Group</td><td></td><td>Menihek Formation</td></tr>
<tr><td rowspan="3">Ferriman Subgroup</td><td>Sokoman Formation</td></tr>
<tr><td>Ruth Formation</td></tr>
<tr><td>Wishart Formation</td></tr>
<tr><td colspan="2">— Unconformity —</td></tr>
<tr><td rowspan="3">Swampy Bay Subgroup</td><td>Otelnuk Formation*</td></tr>
<tr><td>Savigny Formation</td></tr>
<tr><td>Hautes Chutes Formation*</td></tr>
<tr><td rowspan="3">Pistolet Subgroup</td><td>Uvé Formation</td></tr>
<tr><td>Alder Formation</td></tr>
<tr><td>Lace Lake Formation</td></tr>
<tr><td rowspan="2">Seward Subgroup</td><td>Du Portage Formation - Dunphy Formation</td></tr>
<tr><td>Chakonipau Formation</td></tr>
<tr><td colspan="5">— Unconformity —</td></tr>
<tr><td>Archean</td><td colspan="4">Ashuanipi Complex (Superior Province)</td></tr>
</table>

* Not observed in the map-area.

Precambrian

Archean

Ashuanipi Complex

Granites form the Archean basement in the region. They underlie the southwestern corner of the map-area west of the Trough. Three inliers of this granite underlie areas southwest of Hematite lake, at Patu lake and about 2 miles southwest of Le Moyne lake.

The granites are pink, mostly coarse grained, massive or rarely weakly foliated. All show normal mineralogy: quartz, microcline, plagioclase, biotite, secondary chlorite, and the normal accessory minerals.

Quartz makes up about 25% of the rock. Generally it is fractured and has a wavy extinction.

Microcline makes up 35-45% of the granite. It is xenomorphic or hypidiomorphic and often twinned (Carlsbad twins). It contains such inclusions as plagioclase, biotite and chlorite. Myrmekite replaces the potassium feldspar and makes up about 3% of the rock.

Plagioclase makes up 20-25% of the rock. The composition of the plagioclase is about 15% An. An accurate determination of this feldspar is not possible because of its high saussuritization. The inclusions in plagioclase are biotite, apatite, zircon and opaque ore.

Biotite makes up about 5% of the rock. Pleochroism is light, somewhat greenish brown to dark greenish brown. The biotite is mostly chloritized and includes apatite, zircon and opaque ore minerals.

Chlorite occurs as alteration product in biotite. The chloritisation of the mica begins in stripes parallel (001).

Accessory minerals include apatite, zircon, opaque ore minerals.

Just west of the Trough, and southwest of Hematite lake, the granites are somewhat less altered than those at the other occurences. They show a weaker chloritisation of biotite and only somewhat saussuritized plagioclase.

The granite at Patu lake is sheared in places. It is exposed where the Kaniapiskau rocks have been eroded away. Both the granite and the overlying sedimentary rocks are somewhat metamorphosed (greenschist facies). No contact was found there, but in places thin, aplitic, veins cut the sediments. They are believed to be the result of this metamorphism.

A radiometric age determination on zircons of the Patu lake granite was done by Dr. Tom Krogh of Carnegie Institution of Washington D.C. The resulting age of

Early Proterozoic (Aphebian)

Kaniapiskau Supergroup

Knob Lake Group

Seward Subgroup

Chakonipau Formation

Southwest of Hematite lake the granite of the Ashuanipi Complex is covered by the Chakonipau Formation.

This formation consists of white or medium-grained arkosic sandstone. According to Dimroth's (1969) description of the Chakonipau Formation in the map-area just to the south this medium-grained rock represents only part of the highest member of the Chakinipau Formation.

Quartz in poorly rounded or subangular grains makes up 65-90% of the rock.

Feldspar in white, pink or rarely red subangular grains makes up 10-35% of the rock.

The source-area for the arkosic sandstone of the Chakonipau Formation is believed to be the granites of the Ashuanipi Complex. Poor rounding and sorting prove that the rock forming detritus was not transported long distances.

Du Portage and Dunphy Formations

Rocks of the Du Portage Formation crop out in an area between the south end of Le Moyne lake and Patu lake.

They consist of gray, green and red argillite; gray, red and purple, often laminated siltstone; white, pink or red, in places dolomitic arkose and sandstone; and rarely of pink dolomite.

The argillites occur mostly as interbeds in the siltstones.

The siltstones consist of subangular and poorly rounded grains of quartz and minor feldspar. The rocks are compacted and contain some clay and carbonate matrix.

The sandstones and arkoses are mostly fine to medium-grained. They are composed of quartz and feldspar in a somewhat clayey or dolomitic groundmass. Most grains are angular or poorly rounded. In places a coarse, quarzitic sandstone contains green, chlorite rich patches and discontinuous bands.

The pink dolomite is similar to that of the Dunphy Formation.

The classification of all these rocks as Du Portage Formation is based only on lithologic evidence, and on the comparison of these rocks with the descriptions given by Dimroth (1969).

Moreover, the dolomites and limestones east of Patu lake and on the northern shoreline of Le Moyne lake, mapped as Dunphy Formation, correspond to the descriptions of rocks so mapped by Dimroth (1969).

The Dunphy dolomite and limestone are pink or whitish pink. At Le Moyne lake a limestone outcrop close to gabbro is somewhat metamorphosed and has a patchy and banded appearance in which translucent, white, contorted discontinuous bands, 1 mm to 1 cm thick, alterate with brownish-red bands.x) The white translucent limestone occurs also in small irregular patches and shoot irregular crosscutting veins.

x) The rock contains 0.5% SO_4^{2-}.

Pistolet Subgroup

Lace Lake Formation

In this map-area the Lace Lake Formation of Perrault (1955) crops out north and northeast of Doutreleau lake. It consists of dark-gray siltstone, argillite and shale. Typical interbeds of gray, brown-weathering dolomite; and shaly or sandy dolomite are between 2 inches and, rarely, 4 feet thick.

The siltstone is dark-gray and weathers light-gray. It is commonly laminated, with laminae 2mm to 10mm thick. It consists of quartz and some feldspar set in a matrix of chlorite, sericite and clay minerals.

The shales and argillites are gray and laminated. They consist of chlorite and clay minerals.

The dolomite interbeds are gray and weather light-brown. Fine lamination is common. In places the dolomite is sandy or shaly. Secondary chalcedonic chert commonly forms very thin laminae, a few mm apart, perpendicular to bedding and lamination.

The occurrence of the Lace Lake Formation in this map-area is continuous with a zone to the south (Dimroth, 1969), where it is below typical Alder Formation.

Alder Formation

The Alder Formation is characterized by extreme facies changes. It consists of arkoses and sandstones, quartzitic sandstones, dolomitic sandstone, conglomerates, siltstones and argillites. These rocks outcrop west of Patu lake and south of Edgar lake.

Lack of continuous exposure does not permit the establishment of a stratigraphic sequence. The reasons for including these rocks within the Alder Formation are mostly lithologic. Correlation is possible only at Edgar lake, where the Alder Formation underlies Uvé Dolomite in a large anticline ("Edgar lake anticline"). West of Patu lake, map unit 4b is lithologically typical of the Alder Formation. Map unit 4c is composed of the Pistolet Subgroup but contains interbedded white or gray sandstone which is characteristic of the Alder Formation. Map unit 4d is also lithologically indistinct but like unit 4c it contains interbedded gray sandstone.

Arkoses and sandstones of the Alder Formation are fine - or medium - grained. Most of the medium-grained sandstones are white or light gray, whereas the fine-grained rocks are gray. South of Edgar lake, however, sandstones and arkoses are either pink, red or white.

Quartzitic sandstones are massive rocks which are gray on the fresh surface and light gray or white on the weathered surface. Locally they contain minor amounts of feldspar.

Dolomitic sandstones are gray rocks which weather brown. They are bedded and in places cross-bedded. They are composed of quartz, minor amounts of feldspar and locally dolomitic intraclasts. These minerals and intraclasts rest in a dolomitic matrix.

Conglomerates outcrop west of Patu lake. They overlie granites and consist of angular or subangular granite fragments. The matrix is fine- to medium-grained arkose which is commonly colored dark brown by hematite.

The siltstones and associated minor argillites are red or green. South of Edgar lake and north of Sur les Montagnes lake red siltstones are interlayered with red and white sandstones, but form mainly the upper part of the Alder Formation.

Uvé Formation

The Uvé Formation is a dolomite which outcrops in the Edgar lake anticline and about 3.5 miles west of Patu lake.

The Uvé dolomite occurs in a recrystallized and in a non-recrystallized variety. The weathered surface of the recrystallized, light-gray, fine- to medium-grained dolomite is light brown or buff . The more or less non-recrystallized dolomite is very fine-grained, gray and weathers chocolate brown.

Black chert, appearing as lenses bands or blobs, occurs mainly in the recrystallized dolomite.

No stromatolites were observed in the Uvé dolomite.

In the type section the lower member of the Uvé Formation consists of red and green argillite and siltstone with interbedded layers of gray, brown-weathering dolomite or dolomitic sandstone which are 4 to 6 inches thick (Dimroth, 1969). Elsewhere, in Dimroth's area, the basal member is made up solely of gray siltstone. The red and green member has not been seen in the Patu lake area. The red siltstones and argillites, mapped as upper member of the Alder Formation, contain no interbedded dolomite or dolomitic sandstone and were therefore, arbitrarily, included in the Alder Formation. Gray argillites and siltstones appear to be the lowest member of the Uvé Formation about three miles southeast of Edgar lake.

Non-subdivided Pistolet Subgroup

Map units 4f and 4g are lithologically indistinct. They consist of gray shales and siltstones with subordinate green and purple sandstones and siltstones. Dolomite is rare. These rocks are correlated with the Pistolet Subgroup because map unit 4g is a continuation of a zone of similar rocks which overlies the Dunphy Dolomite (Seward Subgroup), therefore map unit 4g is correlated with the Lace Lake Formation. Map unit 4f is correlated with the Pistolet Subgroup because it is associated with map unit 4e, the Uvé Dolomite.

Swampy Bay Subgroup

Only the Savigny Formation of the Swampy Bay Subgroup has been found within the map-area. The Hautes Chutes and Otelnuk Formations are absent.

Savigny Formation

The Savigny Formation is composed of slates and argillites. It outcrops in the northern Edgar lake syncline above the Uvé Formation. Just west of Doutreleau lake lithologically indistinct argillites (map unit 4f or 5) appear; they belong either to the Pistolet or the Swampy Bay Subgroup. Dimroth (1969) mapped them as Savigny Formation (Swampy Bay) in a continuous zone just to the south.

The argillites are black and weather rusty-brown or, in places, light gray. Commonly they are finely laminated.

Dimroth (1969) described greywacke beds and a graphitic dolomite interlayered with the Savigny slate. None of these two rock types has been found in the Savigny Formation of the Patu lake map-area.

Ferriman Subgroup

An almost complete stratigraphic section through the Ferriman Subgroup is exposed on a cliff about one mile northeast of Edgar lake (Table II).

Rest of Upper Hematite Iron-formation and the Upper Silicate-carbonate Iron-formation are absent at this cliff.		
Upper Hematite Iron-formation	+ 16'	Sokoman Formation ++ 150'
Lower Silicate-carbonate Iron-formation	38'	
Intermediate Hematite Iron-formation, jasper bands + interclasts	8'	
Lower Silicate-carbonate Iron-formation	4'	
Lower Hematite Iron-formation; "banded jaspilite"	88'	
Argillite and siltstone: upper parts - dark red and brown, laminated; lower parts - brown, greenish gray, laminated	55'	Ruth Formation 78'
Gray and red laminated siltstone and argillite	3'	
Fine-grained, leached, white sandstone (in places still with brown spots)	18'	
Black, white or reddish brown chert	2'	
Fine-grained, greenish gray sandstone	11'	Wishart Formation 56'
Gray, medium-grained sandstone and arkose	45'	
Unconformity		
Dark gray shale	+100'	Savigny Formation + 100' (Swampy Bay Subgroup)

Table II: Almost complete section of the Ferriman Subgroup near Edgar lake.

Wishart Formation

The Wishart Formation is composed mainly of sandstone and some arkose and in places includes siltstones and argillites. Locally dolomite-rich sandstone and pebble conglomerate occur.

The formation unconformably overlies the Chakonipau Formation west of Magnetite lake, the Alder Formation one mile north of Sur les Montagnes lake, and the Savigny Formation around Edgar lake (Fig. 1).

Most sandstones and arkoses of the Wishart Formation are medium-to coarse-grained. They are gray and consist of rounded or angular grains of quartz and minor feldspar (up to 10%). In places argillite fragments or chert fragments have been found in the sandstone. In general the upper sandstone member of the Wishart Formation is somewhat dark greenish-gray and finer-grained than the lower sandstone member.

Crossbedding is common. In places fine pyrite specks have been observed.

Siltstones and argillites are gray or dark gray. In places they form interbeds, one inch to one footthick, in the sandstones.

Locally the base of the formation is composed of a dolomitic sandstone. It is medium-grained, gray and weathers dark-brown. One mile north of Sur les Montagnes lake this dolomitic sandstone contains well rounded pebbles, up to 10 cm. in diameter, of the underlying pink and white sandstone of the Alder Formation.

DP- 116

Fig. 1. Sandstone of Wishart Formation on top of argillite of Savigny Formation. - Cliff 1 mile northeast of Edgar lake.

Ruth Formation

The Ruth Formation is composed of chert, iron-rich shales, argillites and siltstones and, in some places, sandstones. Like all formationsof the Ferriman Subgroup it crops out mainly in the western half of the map-area.

A bed of black, light gray or reddish brown chert, 2-10 feet thick, marks the base of the formation. Mostly it is homogeneous. In places it is intraclastic; chert fragments are cemented by chert.

The chert is overlain by an argillite. It is dark gray, brownish or greenish and well laminated. Fine argillite bands, some 2 to 10 mm. thick, alternate with silty beds of about the same thickness.

At Edgar lake the chert and the argillite are separated by a formerly dark brown, now almost completely leached (Fig. 2), white, fine- to medium-grained sandstone.

The upper Ruth Formation is composed mainly of siltstones with subordinate, laminated argillite. Both rock types are dominantly brown, though green and dark gray varieties are also present.

The siltstones grade upwards into the banded jaspilite of the Sokoman Formation. The contact between the two formations has been drawn where no more silty bands were observed.

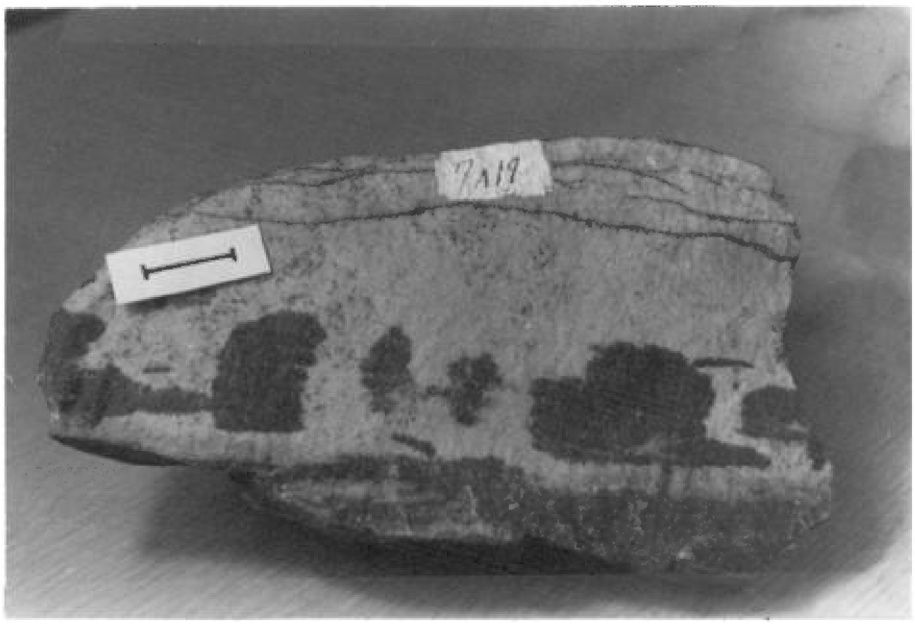


Fig. 2. Sandstone of Ruth Formation.

Partly leached sandstone. - Cliff 1 mile northeast of Edgar lake. - Scale 2 cm.

Sokoman Formation

Distribution and general description:

The Sokoman Formation (Sokoman is the Montagnais word for iron) crops out over much of the western half of the area. It is roughly subdivided into four members, from the base upwards:

a) Lower hematite iron-formation

b) Lower silicate-carbonate iron-formation

c) Upper hematite iron-formation

d) Upper silicate-carbonate iron-formation

The contacts between these units are gradational. The hematite iron-formation may contain carbonate and iron-silicate minerals. The silicate-carbonate iron-formation may include iron oxides. Interbeds of the hematite iron-formation occur in the silicate-carbonate members and vice versa.

Macroscopic description:

The hematite iron-formation is composed mainly of a dark brown-red, oolitic and finely intraclastic, hematite ironstone, alternating with laminated, brick-red jasper. The jasper bands (Fig. 3) range in thickness from a few mm. to about 5 cm., whereas the thickness of the oolitic interbeds varies from about 1 mm. to 30 cm. In the lower hematite iron-formation in general the oolitic beds are thinner than those of the upper zone. The individual members vary in thickness. The intraclasts in the oolitic beds are discs or shards of brick-red or pink-yellowish jasper, which are up to 5 cm. in diameter.

Fig. 3. Hematite iron-formation ("Lower jaspilite"). Jasper beds (gray on photo) and ironstone (darker gray on photo). - 1 mile north of Magnetite lake. - Scale 2 cm.

The silicate-carbonate iron-formation is composed mainly of silicate-carbonate ironstone and of laminated or massive chert.

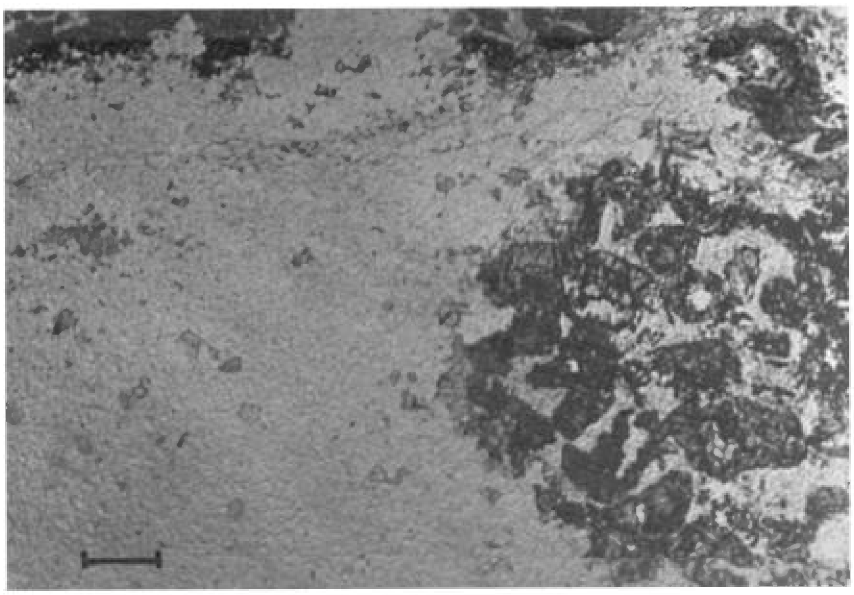
The most common rock type of this member is a very fine-grained, compact cherty ironstone. Fresh surfaces are gray-green; weathered surfaces are rusty-brown and less commonly light orange. This rock is generally interlayered with dark gray, black or dull green chert. However there are places where the ironstone is interlayered with beds of pinkish-brown carbonate rock, black iron-rich shale or iron-rich siltstone, none of which exceeds 15 cm. in thickness.

Cherty ironstone and chert of the silicate-carbonate iron-formation in many places show small clusters of carbonate crystals (Fig. 4). They give the rock a typical spotted appearance. The carbonate weathers out easily leaving a rather pock-marked rock suface (Fig. 5). All transitions occur between an almost pure "lean chert" and a very carbonate-rich or very iron-silicate-rich rock. The pure chert is most common in the uppermost parts of the Sokoman Formation.

Mineralogy

Hematite iron-formation: In thin-section, the hematite iron-formation is seen to be mainly composed of quartz, magnetite and hematite. Minnesotaite, greenalite, siderite, calcite and stilpnomelane were observed in places.

Quartz: It forms a polygonal mosaic. In the cherty ironstone individual grains range in size from 0.01 to 0.6 mm., with the



Thin-section 5B2

Fig. 4. "Spotty" silicate-carbonate iron-formation. Blobs (right half of photo) of carbonate and iron ore minerals in a cherty groundmass. - ½ mile north of Magnetite lake. - Ordinary light; scale 0.4 mm.

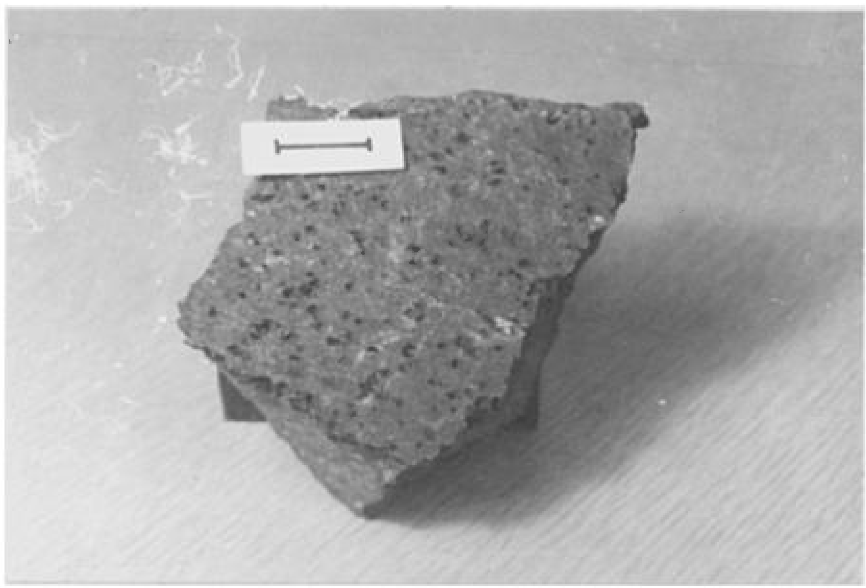


Fig. 5. Silicate-carbonate iron-formation.
Pock-marked, weathered surface. - Eastern shoreline of Hematite lake. - Scale 2 cm.

most common value being near 0.05 mm. In the jasper interbeds quartz is nearly cryptocrystalline.

Hematite: In the jasper bands it is finely dissiminated around particles of chert. In the ironstone it forms small xenomorphic grains, which are very scarcein the five studied polished sections. Hematite is believed to be the primary diagenetic iron-oxide in the ironstones.

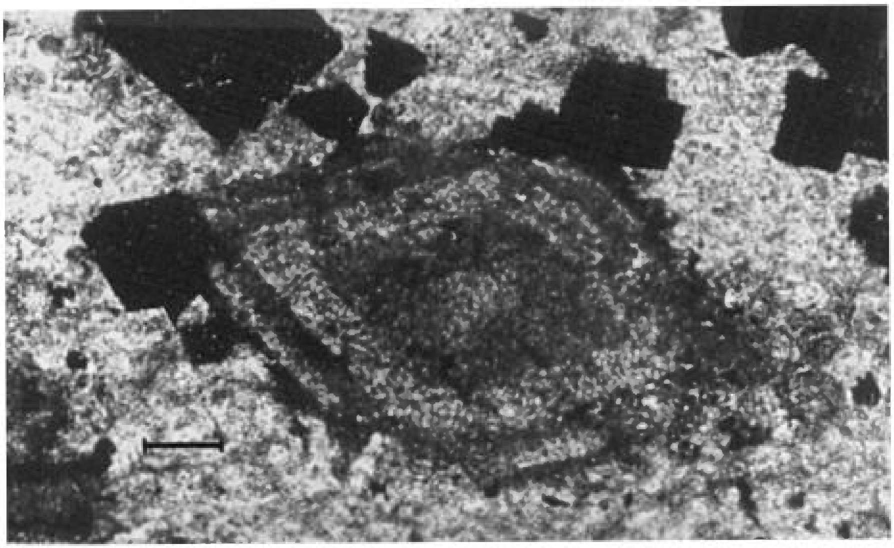
Magnetite: It is the most common ore mineral in the studied polished sections and forms small single xenomorphic grains or idiomorphic grains up to 0.3 mm. (mostly 0.05-0.1 mm.) in diameter. These bigger grains are formed by concretionary recrystallization. Wedge-shaped aggregates of idiomorphic or xenomorphic grains are common and in places form thin discontinuous bands which are a few millimetres long and 0.1-0.5 mm thick.

Minnesotaite: This mineral is rare in the hematite iron-formation. The fine needles are found in or around recrystallized ooides or around iron-oxides. (See description: silicate-carbonate iron-formation).

Greenalite: This mineral was observed in very few thin-sections of the hematite iron-formation. (See description: greenalite; silicate-carbonate iron-formation).

Carbonate minerals: Carbonates, siderite and calcite are scarce in the hematite iron-formation.

In one thin-section, idiomorphic and zoned carbonate crystals were found (Fig. 6). They are up to 0.4 mm. in diameter



Thin-section 43A4

Fig. 6. Hematite iron-formation.

Idiomorphic, zoned carbonate crystal. Magnetite, few minnesotaite. - ½ mile north of Hematite lake. - Ordinary light; scale 0.005 mm.

and show up to 6 zones of calcite and siderite. The centres of the grains contain either coloured and dichroitic siderite or colourless calcite. The relative dark colour of the siderite is probably caused by oxidation of the siderite (siderite → calcite + Fe OOH).

Silicate-carbonate iron-formation:

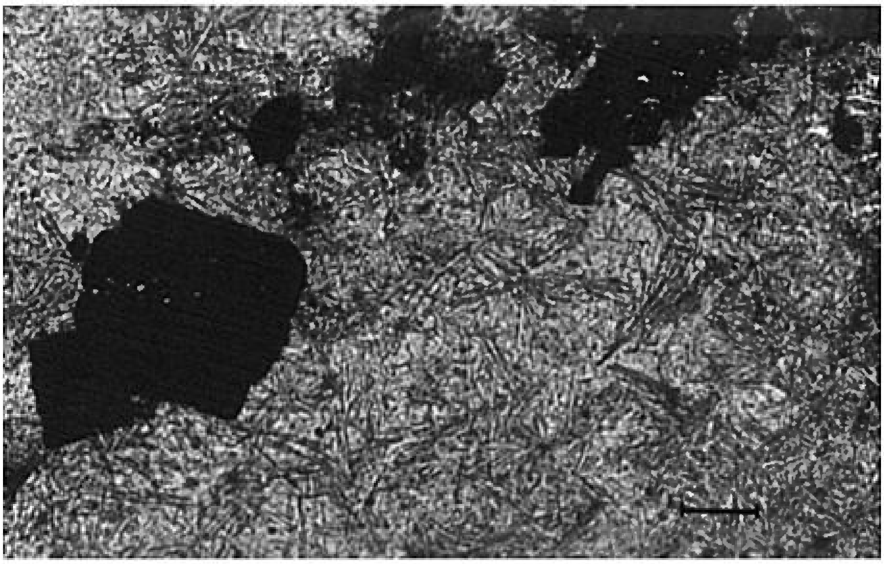
The silicate-carbonate iron-formation is mainly composed of quartz, minnesotaite, carbonates, magnetite (hematite) and stilpnomelane.

Quartz: The quartz content of the different beds in the silicate-carbonate iron-formation vary from nearly 0% in pure carbonate rocks to almost 100% in pure "lean cherts". It forms polygonal mosaics and it ranges in grain size from almost cryptocrystalline to about 0.5 mm.

Minnesotaite: Minnesotaite is variable in occurrence making up 0-55% of the total rock volume. Its fine needles form sheaves, spherulites or dense felts (Fig. 7). The minnesotaite is often concentrated in former ooides or grows around and perpendicular to iron oxides.

The very thin needles (0.01 - 0.06 × 0.05 - 0.18 mm.) are weakly pleochroic : α = almost colourless, faintly yellow; Y = Z = light green.

Carbonate minerals: The grain size of the carbonate minerals ranges in general from about 0.02 to 0.5 mm. The following carbonates were recognized by J.-J. Chauvel (Dimroth and Chauvel; in preparation; oral communication): siderite, ankerite and calcite.



Thin-section 3014

Fig. 7. Silicate-carbonate iron-formation.
(Hyp) idiomorphic magnetites in a fine felt of minnesotaite. - Eastern shoreline of Hematite lake. - Ordinary light; scale 0.05 mm.

In thin-section, the siderite is seen to be - at least in places - the primary carbonate mineral. It forms small, somewhat oxidized and therefore strongly dichroitic, rhombic relicts in more or less colourless, somewhat light brownish and dichroitic porphyroblasts of Fe-ankerité.

Magnetite and hematite: In the few studied polished sections no hematite was noted. In general magnetite is less abundant than in the rocks of the hematite iron-formation.

Stilpnomelane: In only few thin-sections stilpnomelane was observed. The small thin sheets and needles form strands or sheaves and are highly pleochroitic: NX = yellow; NY = NZ = dark golden-brown.

Greenalite: This mineral is fairly uncommon. It forms very small green, almost isotropic, round aggregates.

Talc: Like greenalite talc, too, is uncommon. It forms small sheets or flakes.

ROCK TEXTURES

In both the hematite iron-formation and silicate-carbonate iron-formation many sedimentary, diagenetic and metamorphic textures have been observed. A brief enumeration of these features is presented here. (For further information see: Dimroth and Chauvel, in preparation).

Sedimentary textures: Ooides (Fig. 8), pisolites, pellets and intraclasts are the principal primary textures. Bedding, cross-bedding (Fig. 9), imbrication (Fig. 10) and fine lamination have also been recognized.

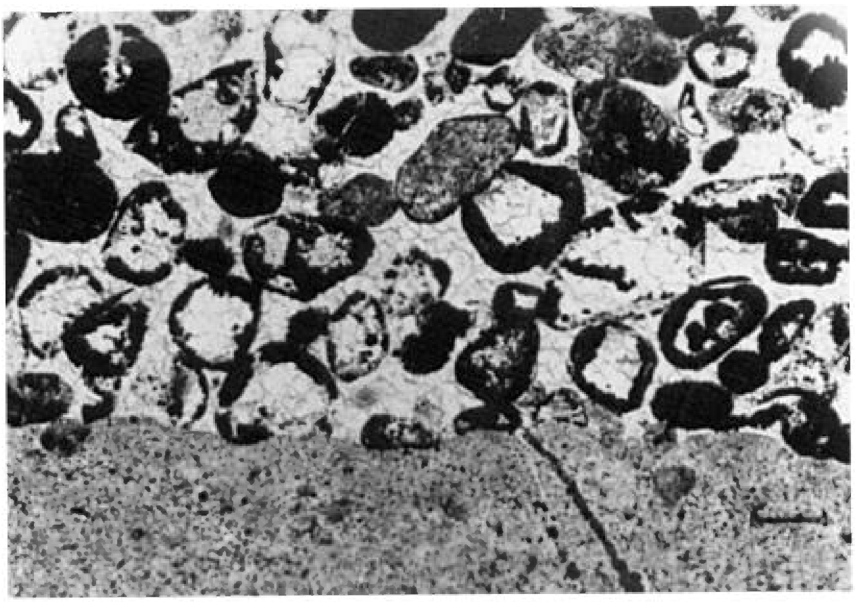
Diagenetic textures: In thin-sections deformed ooides (Fig. 11) and dessication cracks in ooides were observed. A migration of matter (magnetite) is quite apparent in Fig. 12.

Metamorphic features: Growth of minnesotaite, stilpnomelane and greenalite, the congretionary recrystallization of carbonate minerals and iron oxides and also the migration of matter (Fig. 12) are signs of the beginning of metamorphism.

Origin of the Iron-Formation

In the preceding section the hematite-iron members and the silicate-carbonate-iron members were shown to have similar sedimentary and diagenetic textures. Furthermore both types underlie portions of the miogeosyncline in the western Labrador Trough. Because of similar textural features and geographic distribution the hematite-iron members and the silicate-carbonate-iron members are considered to have originated both in an environment of low and, in places turbulent, water.

The source for the iron in the iron-formation was also the source for the silica and the carbonate. The iron-bearing sediments lie west of the volcanic rocks of the Montagnais Group and east of the igneous and metamorphosed rocks of the Superior Province. Thus, the iron, silica and carbonate probably originated



Thin-section 3C15

Fig. 8. Hematite iron-formation.

Recrystallized, oolitic ironstone, contact to jasper interbed. Eastern shoreline of Hematite lake. - Ordinary light; scale 0.37 mm.

Fig. 9. Silicate-carbonate iron-formation.
Crossbedding in ironstone. - 1 mile north of Magnetite lake.

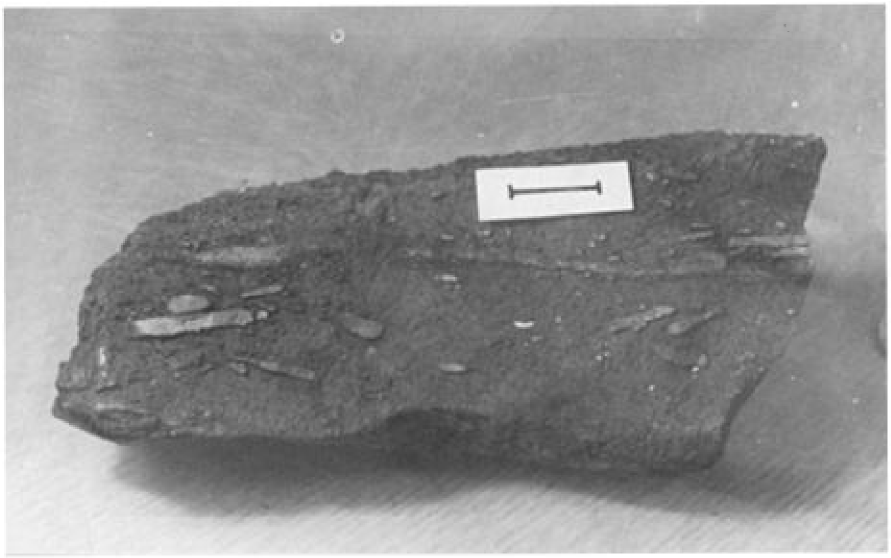
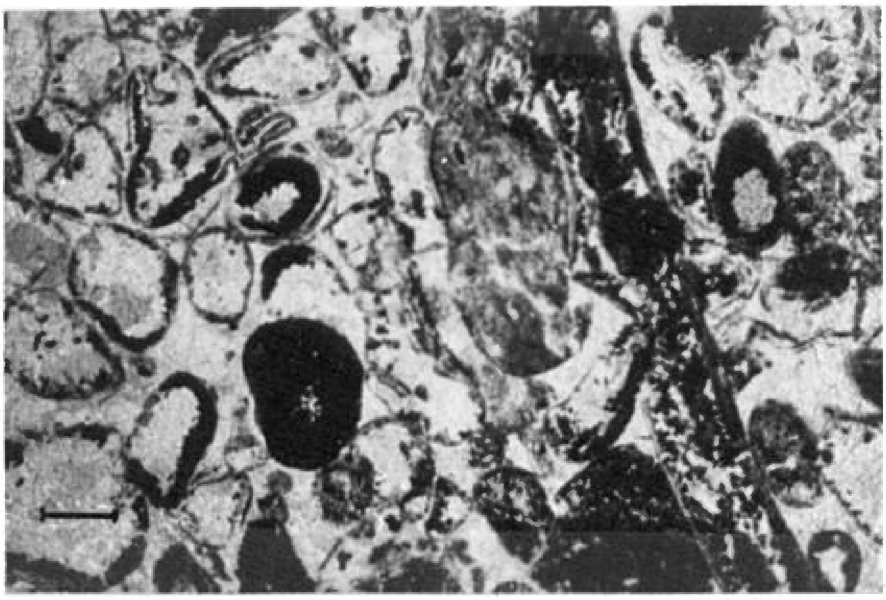


Fig. 10. Silicate-carbonate iron-formation.

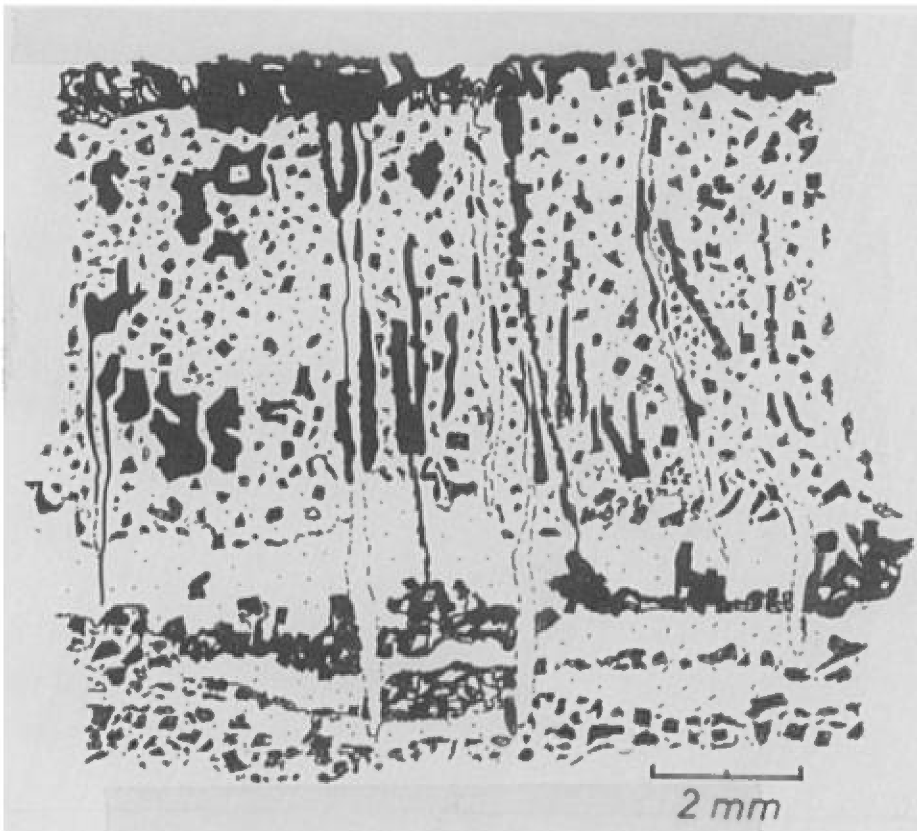
Imbrication in ironstone. - ¾ mile northeast of Magnetite lake. - Scale 2 cm.



Thin-section 3C15

Fig. 11. - Hematite iron-formation.

Deformed ooides. - Eastern shoreline of Hematite lake. - Ordinary light; scale 0.30 mm.



Thin-section 43A4

Fig. 12. Hematite iron-formation.

"Migration of matter" (magnetite, black on sketch) perpendicular to bedding. - ½ mile north of Hematite lake.

from either the Superior Province by weathering, or from the Montagnais Group, by volcanic emanations.

Thus far, however, the writes has been unable to find any evidence supporting either of these hypotheses. (Gross, 1965, gives summeries of the most important published theories).

Menihek Formation

The Menihek Formation consists of shales, siltstones and sandstones. It is exposed at four places within the map-area. The first exposure is on a big peninsula in Magnetite lake (shales). The second is found about 2 miles east of Magnetite lake (shales). The third occurs 3 miles north of Edgar lake (shales and siltstones) and the fourth in a large syncline about 4 miles northwest of Hematite lake (shales, siltstones and sandstones). No contact between the Sokoman Formation and the Menihek Formation has been found in the area.

Formation	Member	Thickness
Menihek	Sandstone	> 140'
	Siltstone	± 315'
	Shale, silty and marly Shale	± 35' > 100'
Sokoman	Upper silicate-carbonate iron-formation	

Table III: Menihek Formation in the Patu lake area.

The shale of the Menihek Formation is dark gray and laminated. Upwards it grades into gray, silty and marly shale.

The siltstone is gray and weathers pale yellowish-brown. It is somewhat dolomitic and in places laminated or crossbedded. It grades into the overlying sandstone.

In thin-section, the rock consists of angular fragments of quartz, plagioclase, microcline, biotite, muscovite and opaque ore minerals. These fragments are set in a matrix of fine, light green-brownish green chlorite and minor carbonate.

The sandstone of the Menihek Formation crops out around Chocolate lake. It is a fine-grained, very homogeneous chocolate-brown coloured rock.

The rock consists of angular quartz, microcline, plagioclase, very small fragments of highly altered pyroxene, muscovite, carbonate and very fine hematite dust. The hematite is responsible for the chocolate-brown colour of the sandstone.

Montagnais Group

The Montagnais Group consists of metagabbros, metabasalts and minor hyaloclastites. It underlies the northeastern and eastern parts of the map-area. Some of the rocks of the Montagnais Group intrude the Kaniapiskau Supergroup whereas others form extrusive masses. The hyaloclastites were only found in the southeastern part of the map-area.

The more common, type I, metagabbro, is a medium- to coarse-grained ophitic gabbro with a typical greasy, light green colour on the fresh surface. It crops out in large separate masses west of Le Moyne lake and north and northeast of the southern end of this lake. It forms high hills in an otherwise more or less flat terrane covered by moraine deposits. In places this type I gabbro is pegmatitic and contains visible quartz.

The type II metagabbro is dark green, fine- to medium-grained, aphanitic at contacts with sediments, and is intercalated with metabasalts. It forms long, continuous ridges east of Patu lake and east of Le Moyne lake, just at the border of the map-area. In places the metabasalts feature pillow structures.

Texturally the gabbros are mostly ophitic or even-grained. The upper part of some sills contain irregular isolated patches of pegmatitic gabbro. These coarse grained bodies are up to several few feet wide.

Both types of gabbro, as well as the basalt are metamorphosed. Mineralogically they consist of pyroxene, hornblende, actinolite, plagioclase, epidote, chlorite, opaque minerals, leucoxene and in places, quartz and stilpnomelane.

Pyroxene is rarely preserved as relicts. It is a very light brown-green, weakly pleochroitic augite. Commonly it is twinned along (100). A herringbone pattern ((001) exsolution striation in twinned augites) is scarce.

$2VZ = 50\text{-}54^\circ$; $Z \wedge c = 45\text{-}47^\circ$;

Hornblende was only found in two thin-sections. It is almost completely replaced by actinolite.

NX = light green; NY = green; NZ = olive-green;

Actinolite is the most common amphibole in the metagabbros and metabasalts. It forms big tabular crystals (up to 1.2 x 0.5 cm) or a fine-grained felt. The long laths are generally twinned parallel to (100). Actinolite replaces pyroxene and hornblende.

NX = light yellowish green; NY = green; NZ = somewhat blueish olive-green.

$2V_x = 76°, 78°$; $Z \wedge C = 14°, 15°$.

Plagioclase, An_{20}-An_{35}, is mostly strongly saussuritized. It is present as laths or less commonly as small xenomorphic grains. Albite also was observed but no relicts of a primary basic plagioclase.

The matrix containing crystals of pyroxene, amphibole and plagioclase is composed of epidote, chlorite, minor primary, strained quartz (pegmatitic phase), leucoxene and xenomorphic or hypidiomorphic opaque minerals. Stilpnomelane was observed in one thin-section.

Table IV: Chemical Analyses of Gabbros and Basalts of Montagnais Group.

	Gabbros[x]		Basalts		
Specimen	32A5B	35A4B	31A17	41B1A	41B2[xx]
SiO_2	49.30	49.55	49.50	50.50	51.50
TiO_2	0.74	0.85	1.25	1.03	1.05
Al_2O_3	10.75	13.50	12.00	11.20	8.25
Fe_2O_3	2.37	3.46	1.50	3.13	3.71
FeO	9.08	7.46	7.75	8.85	6.38
MnO	0.27	0.26	0.30	0.30	0.26
MgO	9.75	7.55	7.50	7.78	5.88
CaO	11.20	10.10	8.45	12.00	15.90
Na_2O	2.05	3.10	3.35	1.74	0.10
K_2O	1.15	0.93	0.30	0.03	0.03
P_2O_5	0.07	0.09	0.12	0.83	0.10
S	0.16	0.20	0.05	0.07	0.07
CO_2	0.06	0.11	2.70	0.05	1.22
H_2O^+	2.90	2.90	4.60	2.96	5.55
H_2O^-	0.10	0.18	0.10	0.06	0.15

x) Type I

xx) Pillowed basalt

C.I.P.W. - Norms

Specimen	32A5B	35A4B	31A17	41B1A	41B2
Quartz	0.00	0.00	3.67	6.52	18.76
Orthoclase	6.80	5.50	1.77	0.18	0.18
Plagioclase	34.08	46.41	45.17	37.38	22.82
Nepheline Leucite Kaliophyllite Acmite Na-Metasilicate K-Metasilicate Corundum Wollastonite	0.00	0.00	0.00	0.00	0.00
Diopside	30.86	23.20	5.90	23.39	39.29
Hypersthene	11.19	7.89	27.19	19.37	2.88
Olivine	8.54	6.65	0.00	0.00	0.00
Ca-Orthosilicate	0.00	0.00	0.00	0.00	0.00
Magnetite	3.44	5.02	2.17	4.54	5.38
Hematite	0.00	0.00	0.00	0.00	0.00
Ilmenite	1.41	1.61	2.37	1.96	1.99
Sphene Perowskite Rutile Chromite	0.00	0.00	0.00	0.00	0.00
Apatite	0.17	0.21	0.28	1.96	0.24
Fluorite	0.00	0.00	0.00	0.00	0.00
Pyrite	0.30	0.37	0.09	0.13	0.13
Na-Carbonate	0.00	0.00	0.00	0.00	0.00
Calcite	0.14	0.25	6.14	0.11	2.77
Thenardite Halite Zircon	0.00	0.00	0.00	0.00	0.00
H_2O^+	2.90	2.90	4.60	2.96	5.55
H_2O^-	0.10	0.18	0.10	0.06	0.15
TOTAL	99.91	100.19	99.46	100.55	100.14

The hyaloclastites are dark greenish-gray, rocks on the fresh surface and gray on the weathered surface. They are fine-grained or aphanitic. On the weathered surface light gray, angular fragments are easily seen. They consist of recrystallized glass and are up to 2 cm. in diameter.

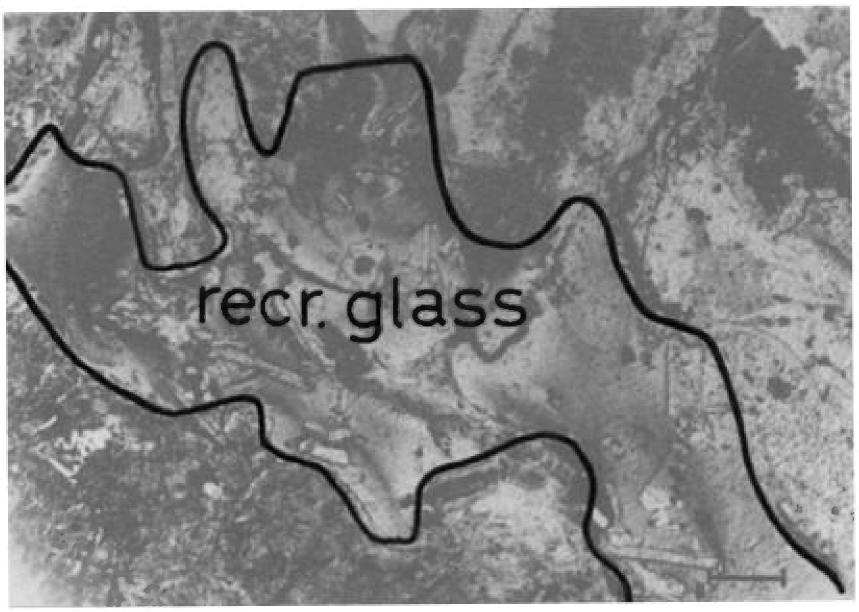
In thin-section, the hyaloclastite is composed of a very fine groundmass of talc, grammatite, some carbonate, albite and opaque minerals. The "glassy" shards are brownish and weakly recrystallized. Very small spherulites were observed. Schlieren are common. The glass has inclusions of idiomorphic plagioclase laths (An 30-35%), (Fig. 13), xenomorphic epidote, some carbonate and chlorite. The feldspars appear as bent or broken or weakly corroded grains.

A detailed petrologic study of basaltic rocks of a part of the Labrador Trough is given by Baragar (1967).

Post-Kaniapiskau Volcanic Rocks

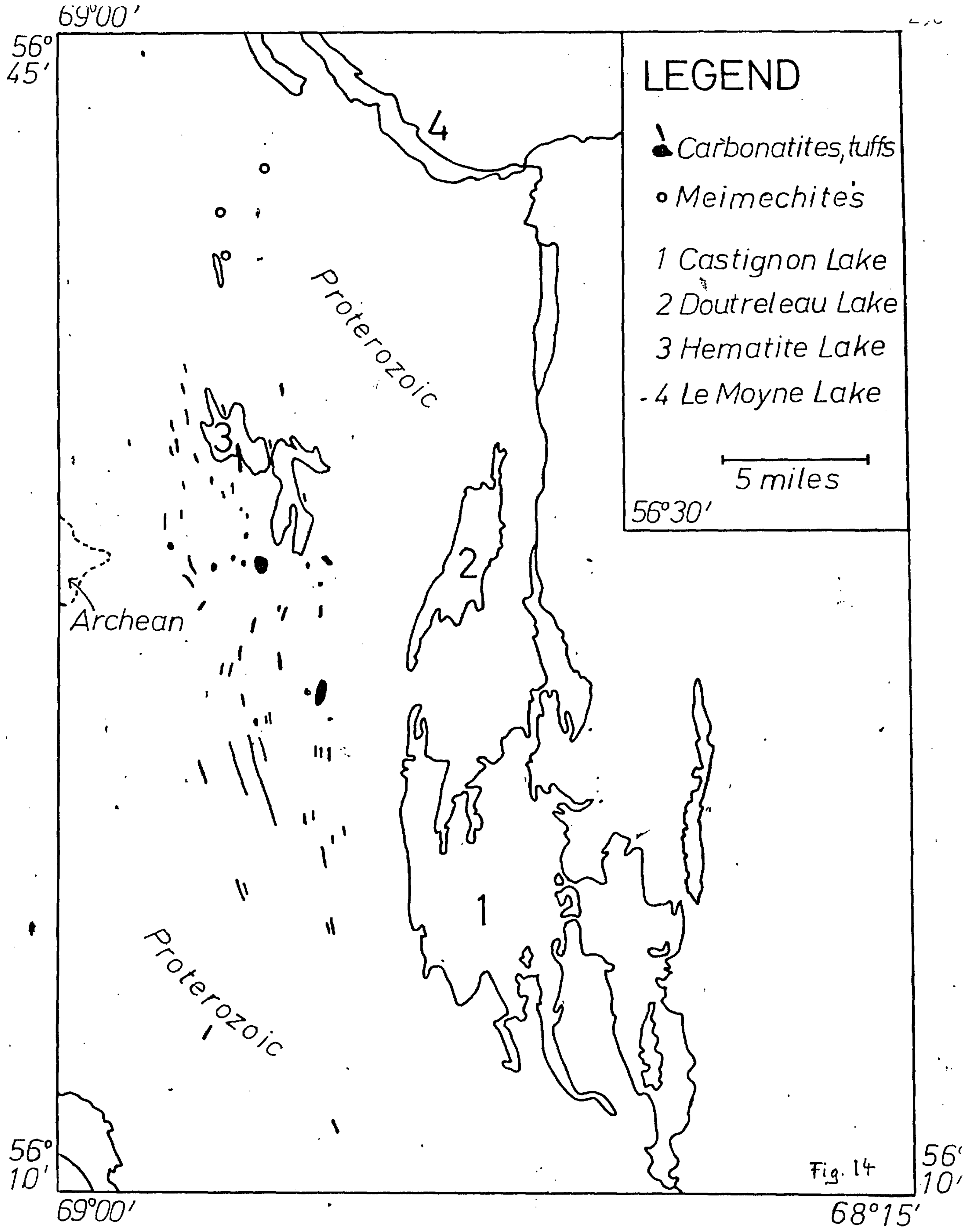
Carbonatites, carbonatite breccias, olivine-melilitite tuffs, meimechite, barite

These rocks occur in the western part of the map-area, mainly west of Hematite and Magnetite lakes. Their occurrence is a continuation of a zone of similar rocks mapped and described by Dimroth (1969 and 1970) south of the 56°30' parallel (Fig. 14). All of these rocks are undeformed. The results of radiometric age determinations of two meimechite specimens are (GSC, Ottawa):



Thin-section 2B4A

Fig. 13. Hyaloclastite.
Shards of recrystallized glass, including idiomorphic plagioclase laths, in a very fine-grained groundmass. - ¾ mile east of Doutreleau lake. - Scale 0.45 mm.


69°00′
56° 45′
LEGEND
Carbonatites, tuffs
Meimechites
1 Castignon Lake
2 Doutreleau Lake
3 Hematite Lake
4 Le Moyne Lake
5 miles
56°30′
4
Proterozoic
3
2
Archean
1
Proterozoic
56° 10′
56° 10′
69°00′
68°15′
Fig. 14

Carbonatites are rare. They consist of coarse-grained carbonate. Fluidal texture and flow layering are generally visible. The rocks include very fine-grained, rock fragments (0.1 mm. - 2 cm. in diameter).

In thin-section, these fragments appear as small shards and are composed of an almost aphanitic, optically indeterminable, dark greenish-brown mineral. Less commonly the shards are optically isotropic and brown in colour and may consist of glass.

Table V: Analyses of Carbonatites

specimen	6A13B1	6A13B2	Mean values
SiO_2	12.35	13.10	12.72
TiO_2	0.00	0.00	0.00
Al_2O_3	1.35	1.30	1.33
Fe_2O_3	0.72	1.12	0.92
FeO	1.83	1.67	1.75
MnO	0.27	0.21	0.24
MgO	1.58	1.49	1.54
CaO	44.30	44.00	44.15
Na_2O	0.07	0.05	0.06
K_2O	0.28	0.19	0.23
H_2O^+	1.10	1.08	1.09
H_2O^-	0.11	0.16	0.14
CO_2	35.50	35.00	35.25
S	0.03	0.02	0.02
P_2O_5	0.06	0.08	0.07
BaO	0.02	0.04	0.03
SrO	0.03	0.03	0.03

Trace Elements

	6A13B1	6A13B2
F	0.02%	0.05%
Cl	0.07%	0.05%
	(ppm)	(ppm)
Ni	22	19
Zn	------	------
Cr	42	38
Nb	<100	<100
Ta	< 50	< 50
Th	<100	<100
Zr	< 50	< 50
La	------	< 100
Rb	36	28
Y	< 50	< 50
Ce	<100	<100

Carbonatite breccias occur in small masses and dykes. No vertical contacts were seen in the area.

The groundmass of these rocks consists of carbonate, serpentine and chlorite in varying amounts. Carbonate however predominates in most places. Few carbonate phenocrysts and very fine opaque minerals occur.

The fragments in the breccia are from 1 mm. to about 10 cm. in length. They were derived from the host iron-formation and underlying sediments (Fig. 15). A big boulder (about 2 feet in diameter) of carbonatite breccia, found close to Hematite lake, contains fragments of the Archean basement rock. Rarely observed were fragments of sandstones of the Chakonipau or Wishart Formation, olivine melilitite lapilli and the same small, often optically isotropic inclusions which have been also found in the "pure" carbonatites.

The olivine-melilitite tuff is the most common type within this group of rocks. It occurs mainly west of Hematite and Magnetite lakes, where it forms dykes, up to 1.5 miles long, which parallel the strike of the host Sokoman Formation.

The tuff is greenish-black and consists of pea-sized lapilli cemented together by varying amounts of calcite. In few places aphanitic pitch black angular fragments (some mm. to 4 cm. in length) were observed. Some of these contain small pearls of a light green spherulitic mineral. In places the tuff shows a weak stratification (Fig. 16).

Thin-section 4A1

Fig. 15. Carbonatite breccia.

Inclusion of oolitic ironstone in carbonate groundmass. - ½ mile west of Hematite lake. - Ordinary light; scale 0.40 mm.

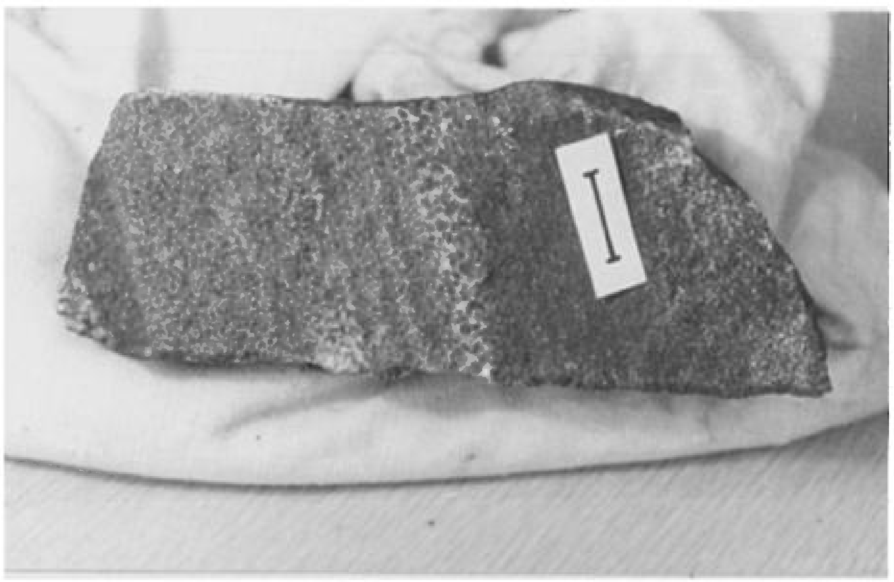
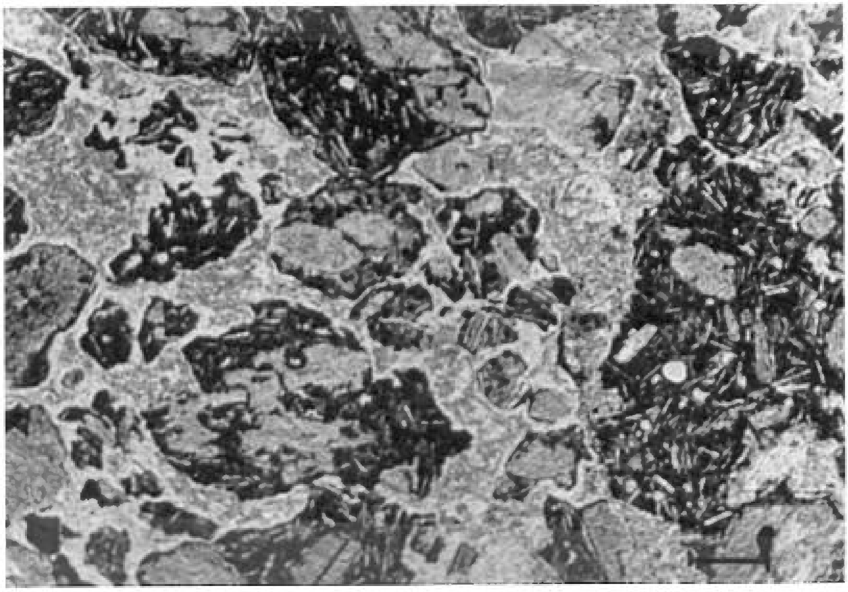


Fig. 16. Olivine-melilitite tuff.
Layering. - Northern shoreline of Hematite lake. -
Scale 2 cm.

In thin-section, the lapilli are composed of serpentinized or, in places, carbonatized idiomorphic olivine surrounded by pseudomorphosed melilite laths, by opaque ore and by minor carbonate (Fig. 17). The melilite laths alter either to carbonate or more commonly to a colourless chlorite mineral. Stilpnomelane was observed in only one thin-section and appears mostly in the carbonate cement.

The above mentioned spherulitic mineral in the pitch black fragments was determined as datolite by X-ray methods. The aphanitic black fragments are composed of serpentine.

Dimroth (1969) showed the intrusive nature of the lapilli tuff at a locality just south of Magnetite lake. The field observations made in the present map-area show no clear evidence for or against intrusive and crosscutting, or synsedimentary volcanism. The rock always occurs in areas underlain by the iron-formation. The common dyke-shape west of Hematite and Magnetite lakes, and the stratification (Fig. 16) in an outcrop at the eastern shoreline of Hematite lake, are evidence that the tuff is in places intrusive, in places extrusive.



Thin-section 44A9

Fig. 17. Olivine-melilitite tuff.

Lapilli, showing pseudomorphosed hypidiomorphic olivine phenocrysts, pseudomorphosed melilite laths and opaque minerals, are inbedded in carbonate. - Eastern shoreline of Magnetite lake. - Half-crossed nicols; scale 0.45 mm.

Table VI: Analyses of Olivine-Melilitite Tuffs

Specimen	3C-11	17A29	44A9	mean values
SiO_2	28.00	29.50	35.10	30.86
TiO_2	4.15	4.35	4.00	4.16
Al_2O_3	1.70	2.20	1.75	1.88
Fe_2O_3	9.45	10.76	11.45	10.53
FeO	8.30	8.92	7.04	8.08
MnO	0.38	0.49	0.33	0.40
MgO	21.00	22.64	21.05	21.56
CaO	9.90	8.30	8.70	8.96
Na_2O	0.06	0.05	0.06	0.06
K_2O	0.03	0.04	0.04	0.04
H_2O^+	5.70	5.88	8.26	6.61
H_2O^-	0.40	0.67	0.54	0.54
CO_2	9.20	4.60	0.40	4.73
S	0.32	0.11	0.14	0.19
P_2O_5	0.62	0.87	0.83	0.78
BaO	0.007	0.006	0.01	0.008
SrO	0.001	0.002	0.001	0.001

Trace Elements

	3C11	17A29	44A9
F	n.d.	-----	n.d.
Cl	n.d.	-----	n.d.
	(ppm)	(ppm)	(ppm)
Ni	200	600	200
Zn	n.d.	-----	n.d.
Cr	340	310	400
Nb	<100	<100	<100
Ta	< 50	< 50	< 50
Th	<100	<100	<100
Zr	110	160	110
La	<100	<100	<100
Rb	49	63	50
Y	< 50	< 50	< 50
Ce	n.d.	-----	-----

Meimechites were found at three localities in the Patu lake map-area. The meimechite close to the north end of Sur les Montagnes lake forms a pipe about 10 to 20 m. thick and pierces rocks of the Ruth Formation. The other two meimechites are dikes. They crop out about 1.5 miles north of Sur les Montagnes lake and 1.5 miles southeast of Edgar lake. Southeast of Edgar lake the rock is in contact with dolomites of the Uvé Formation. One and a half miles north of Sur les Montagnes lake it crops out in an area underlain by ironstones of the Sokoman Formation.

Two specimens dated by the Geological Survey of Canada, yielded K/Ar ages of .

The meimechite close to Sur les Montagnes lake (type I) is different from those of the two other occurrences (type II).

The type I meimechite is a massive, fine- to medium-grained dark, greasy, greenish-gray rock. Small sulfide specks- mostly pyrite - are up to 5 mm. across and are commonly surrounded by dark gray aphanitic rims of serpentine. The rock has a high specific gravity ($3.07 \frac{g}{cm^3}$).

In thin-section, the rock is composed of serpentinized olivine and chloritized pyroxene, both hypidiomorphic or idiomorphic, and phlogopite-biotite set in a fine-grained groundmass of garnet, chlorite minerals and opaque minerals (Modal analysis, Table VII). Some talc is pseudomorphic after olivine. Apatite and titanite occur as minor constituents. The ore minerals are ilmenite, magnetite, pyrite, chalcopyrite, awaruite and hematite.

Table VII shows chemical analyses, and ClPW - norms of this rock.

The type II meimechite is a gray, very fine-grained porphyritic rock. Black phlogopite-biotites are up to 2 mm. long and define a flow structure.

In thin-section, the rock consists of large phlogopites and pseudomorphosed olivine crystals that are fluidally arranged and set in a fine, panxenomorphic matrix of sphene, phlogopite, opaque ore minerals, serpentine, garnet.

Phlogopite is hypidiomorphic, generally corroded and kinked. It is almost colourless, showing only a very faint brown. It is highly poikiloblastic and includes such minerals as sphene, garnet and opaque ore minerals.

Xenomorphic olivines have been totally replaced by serpentine or carbonate, and sphene and opaque ore minerals.

Sphene is highly altered in the matrix of the rock, but rather fresh in the pseudomorphosed olivines. The unaltered sphene is pleochroic (light brown-light pinkish brown).

Garnet forms very small, pale greenish xenomorphic grains. It is in phlogopite or in the groundmass.

Table VII: Chemical analyses and modal composition of meimechite

Specimen	19A9[x]	11A19[xx]	21A23[xx]
SiO_2	31.70	28.80	29.00
TiO_2	4.30	3.66	4.20
Al_2O_3	3.65	3.35	2.30
Fe_2O_3	13.95	17.75	17.85
FeO	4.10	4.12	2.45
MnO	0.30	0.35	0.41
MgO	17.25	16.04	19.70
CaO	0.20	14.80	15.00
Na_2O	0.09	0.07	0.07
K_2O	0.60	1.50	0.20
H_2O^+	7.40	5.60	6.67
H_2O^-	0.10	0.27	0.23
CO_2	0.20	2.80	0.28
S	0.06	0.06	0.05
P_2O_5	0.40	0.78	0.60
BaO	n.d.	0.12	0.02
SrO	n.d.	0.12	0.02

Modal composition, specimen 19A9:

Garnet (+ isotropic groundmass)	48.0
Pseudomorphs (olivine and pyroxene)	28.4
including 6.1% opaque ore minerals	
4.2% talc	
Biotite-phlogopite	6.6
Opaque ore minerals (total 12.4%)	6.3
Pennine	9.2
Apatite	0.8
Titanite	0.7
	100.0%

Trace elements

	19A9[x]	11A19[xx]	21A23[xx]
F	0.20%	0.20%	0.20%
Cl	0.08%	0.05%	0.07%
	(ppm)	(ppm)	(ppm)
Ni	600	480	650
Zn	---	---	---
Cr	460	460	380
Nb	<100	<100	<100
Ta	< 50	< 50	< 50
Th	<100	<100	<100
Zr	140	150	150
La	<100	<100	<100
Rb	82	120	50
Y	< 50	< 50	< 50
Ce	<100	<100	<100

[x] Meimechite Type I; [xx] Type II.

C.I.P.W. - Norms

Specimen	19A9	11A19	21A23
Quartz	0.00	0.00	0.00
Orthoclase	0.00	0.00	0.00
Plagioclase	7.78	4.40	5.37
Nepheline	0.41	0.32	0.32
Leucite	2.78	6.95	0.93
Kaliophyllite			
Acmite			
Na-Metasilicate	0.00	0.00	0.00
K-Metasilicate			
Corundum			
Wollastonite			
Diopside	25.17	21.39	17.68
Hypersthene	0.00	0.00	0.00
Olivine	21.93	21.05	28.64
Ca-Orthosilicate	9.47	5.97	11.45
Magnetite	1.51	3.60	0.00
Hematite	12.91	15.27	17.85
Ilmenite	8.17	6.95	5.93
Sphene			0.00
Perowskite	0.00	0.00	1.83
Rutile			0.00
Chromite			0.00
Apatite	0.94	1.84	1.42
Fluorite	0.00	0.00	0.00
Pyrite	0.11	0.11	0.09
Na-Carbonate	0.00	0.00	0.00
Calcite	0.45	6.37	0.64
Thenardite			
Halite	0.00	0.00	0.00
Zircon			
H_2O^+	7.40	5.60	6.67
H_2O^-	0.10	0.27	0.23
TOTAL	99.13	100.08	99.04

Barite veins up to 1 inch thick were noted in the Uvé Dolomite about 1.5 miles south of Edgar lake. They may belong to the volcanic suite described in this section. The rock is dark gray and fibrous.

Paleogeography of the Kaniapiskau Supergroup

At present a paleogeographic interpretation of the distribution of the different sedimentary rocks and of the different formations is impossible. The map-area alone is too small for this purpose. Figure 18, which shows the surface distribution of some Kaniapiskau formations prior and after folding and erosion, could be interpretated with success only together with similar sketches of futur mapping in adjacent areas.

Only two paleogeographic phenomena are evident:

a) The sketch B in figure 18 shows, that the Savigny Formation was only deposited in the northern part of the map-area (and possibly in a small area in the south). That is, in the centre of the region, the Wishart Formation transgresses on the Alder Formation.

b) Transgression of the Wishart Formation (see adjoining geological map):

In the southern part of the map-area the Wishart sandstones transgress the basement or Chakonipau Formation. In the centre of the area they transgress the Alder and Uvé Formation and in the northern part they overlap the Savigny Formation. Thus the Wishart Formation overlies rocks of different age.

STRUCTURAL GEOLOGY

Almost the entire map-area lies in the western part of the Labrador Trough, within a north-northwest-trending structural zone. Two very small areas having an abnormal tectonic pattern - due to volcanic forces - were observed.

In general the area consists of a large syncline and synclinorium northwest and north of Hematite lake, the Sur les Montagnes lake thrust zone, and the Edgar lake anticline. East of this anticline the structural pattern is not clear because of scarcity of outcrop. However, the dark green metagabbros and metabasalts east of this zone again show the general north-northwest-trending structure.

At the western margin of the Trough, the Kaniapiskau rocks rest little disturbed on the rocks of the Ashuanipi basement. Here they dip gently east - or northeastward, however within less than four miles the deformation becomes pronounced and reaches a high degree of distortion in the Sur les Montagnes lake thrust zone (see crossections AA and BB, Fig. 19).

In this zone the rocks are tightly folded, in places overturned and cut by mostly NNW striking thrust faults, which dip 40° to 60° east. In a minor, flat gently rolling synclinorium (see crossection CC, Fig. 19) north and northeast of Edgar lake the deformation is similar in style but less obvious.

At present the writer cannot prove whether folding - and thrust faulting - belong to the same orogenic event. The structures are too different in these zones. In some cases however, the thrust faults are probably extensions of folding (see again the crossections Fig. 19).

Small, abnormal, heavily faulted areas occur at two places within the map-region. They are independant of the general trend, showing for instance high angle cross faults. They are probably due to explosive extrusions of meimechites or to meimechites that did not reach the surface. The displacement along these cross faults is mostly too small to appear on the map.

A compact green meimechite forms the core of one of these small faulted zones, just north of Sur les Montagnes lake. The core is only about 40 feet across.

At the other occurrence - 1.3 miles north of Edgar lake - a meimechite that failed to pierce the surface is believed to lie below the strongly faulted area.

ECONOMIC GEOLOGY

The map-area is of great economic interest, and considerable prospecting work has been carried out during the past several years. The region is favourable for prospecting, especially for iron, copper and perhaps rare earth elements and barite.

In the iron-formation the economically interesting zones, mainly around Hematite lake, were prospected without success for direct-shipping ore in the 1950's and early 1960's. More recently large amounts of potential taconite [x)] ore led to more prospecting work. Large areas were sampled by trenching and claims were staked.

x) Taconite: very fine grained ironstone "that must be ground finer than 100 mesh screen size to liberate the bulk of the iron minerals". (Gross, 1965).

Due to the intense tectonic deformation in the economically interesting zones, the complex stratigraphy of the iron-formation and the limited time one can spend on a special problem in a general mapping program, an evalution of the ore potential is not possible. Special laboratory studies on concentration and special measuring surveys in the field are necessary, besides chemical studies, to evaluate the iron-ore deposits around Hematite lake and of the Sur les Montagnes lake thrust zone.

Minor, copper showings in sedimentary rocks and in metagabbros close to Patu lake led to exploration work by different mining companies. During the course of the present field work, some more small mineralized zones were noted in a black, fissile argillite at Le Moyne lake and in metagabbros not far from this lake. The following analysis gives the very low tenors of the interesting elements in the above mentioned argillite: S 6.45%; Fe (tot) 7.02%; Cu 0.07%; V 0.08%; Zn 130 ppm; Pb 30 ppm; Ag 1 ppm; Mo 1 ppm.

Chemical studies on carbonatites and meimechites have not raised hopes of finding economic tenors of rare earth elements in these rocks (Table V, page 31a).

Minor barite showings have already been mentioned in the chapter on "Post-Kaniapiskau Volcanic Rocks".

GEOCHEMISTRY

Concurrently with the geologic mapping, about 160 stream-sediment samples carrying abundant organic material were collected from the active zones of streams encountered on land traverses. The samples were sent to the Department's Laboratories Services and being analyzed for Cu, Zn, Pb, Mo, Ni, Co, W, Mn, Sn, Ag, Au and Sb.

REFERENCES

BARAGAR, W.R.A. (1967): Wakuach lake map-area, Quebec-Labrador (23.0)-Geol. Survey Can.; Memoir 344.

DIMROTH, E. (1969): Geology of the Castignon lake area. New Quebec Territory. - Que. Dept. Nat. Res., P.R. 571.

DIMROTH, E. (1970): Meimechites and Carbonatites of the Castignon lake complex, New Quebec - N. Jb. Miner. Abh. 112, 3.

DIMROTH, E. and CHAUVEL, J.-J. (1972): Petrography of the Sokoman Iron-Formation in part of the Central Labrador Trough. (In preparation).

GROSS, G.A., (1965): Geology of Iron Deposits in Canada. Volume 1; General Geology and Evaluation of Iron Deposits - Geol. Survey Can., Econ. Geol. Rep. No 22.

HENDERSON, E.P. (1959): A Glacial Study of Central Quebec - Labrador. - Geol. Survey Can. Bull. 50.

PERRAULT, G. (1955): Geology of the Western Margin of the Labrador Trough - Unpubl. Ph. D. Thesis, University of Toronto.

ROSCOE, S.M. (1957): Cambrian Lake (East Half): New Quebec - Geol. Survey Can.; Paper 57-6.

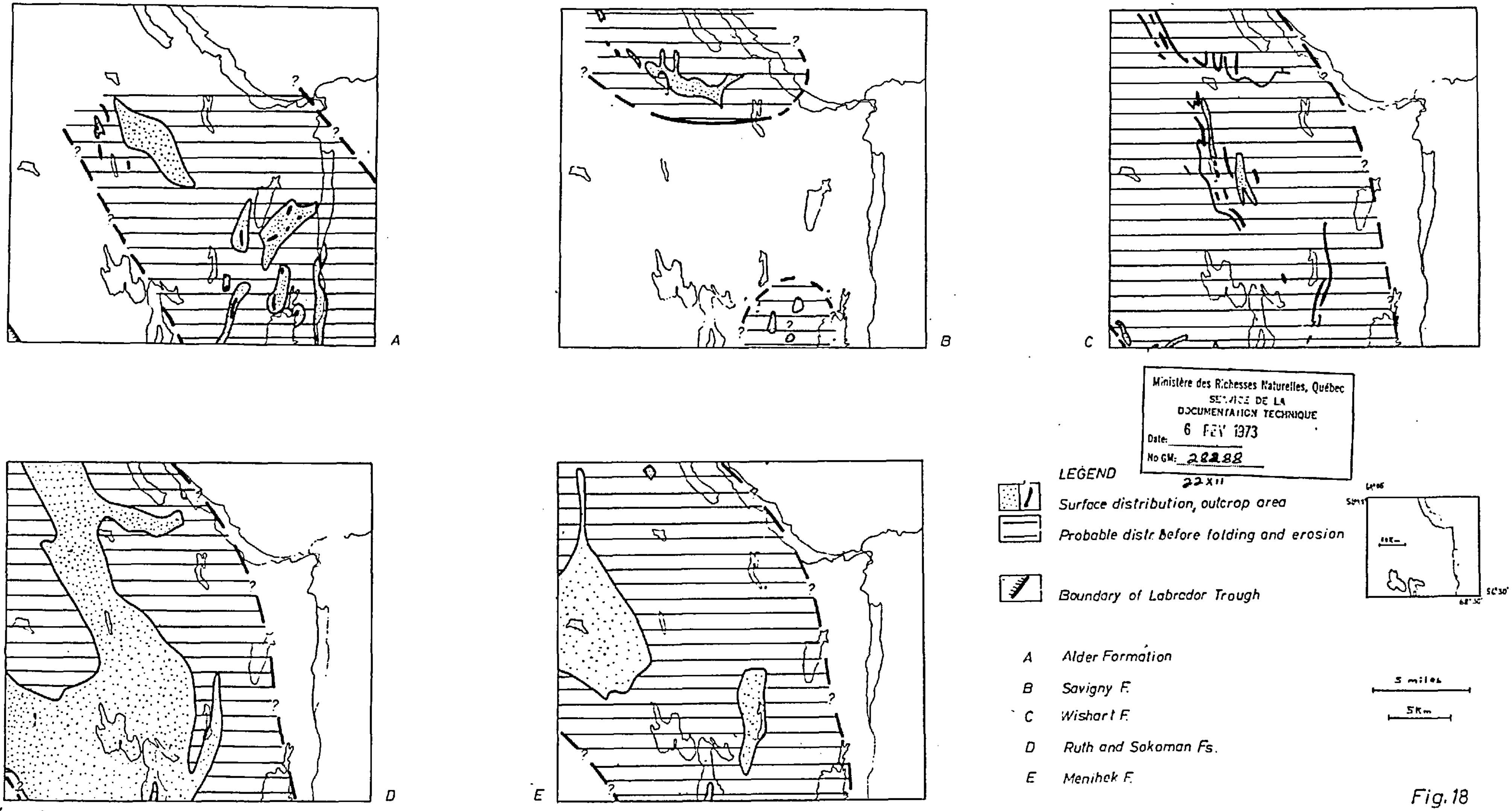


Fig. 18

Fig. 18
DP-116

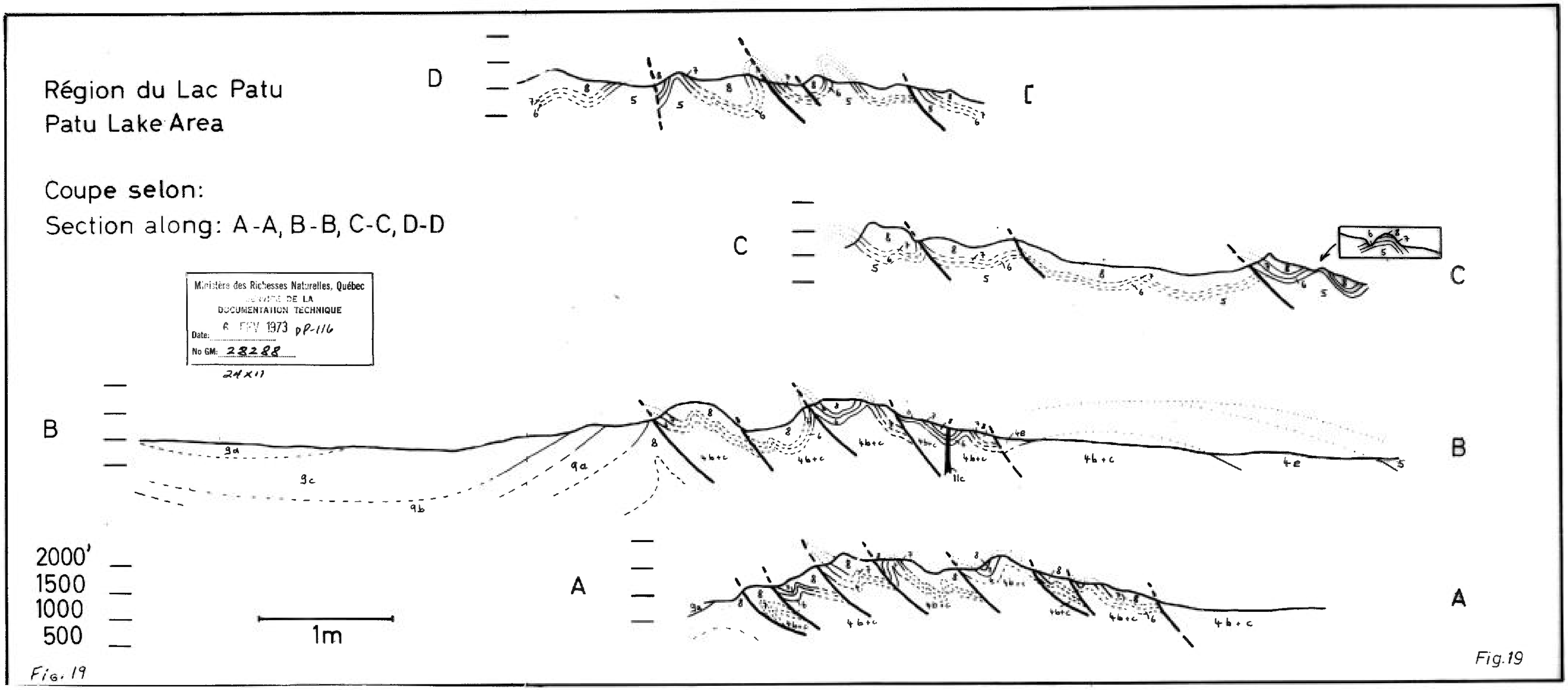

Région du Lac Patu
Patu Lake Area
Coupe selon:
Section along: A-A, B-B, C-C, D-D
D
C
B
A
9a
9c
9b
4b+c
4e
11c
2000'
1500
1000
500
1m

Fig. 19