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PRELIMINARY REPORT, GEOLOGY OF MONTAGNES LAKE AREA, MISTASSINI TERRITORY

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GEOLOGY

OF

MONTAGNES LAKE AREA

MISTASSINI TERRITORY

PRELIMINARY REPORT

BY

GUY VALIQUETTE



QUEBEC

1963

PRELIMINARY REPORT
on
MONTAGNES LAKE AREA*
Mistassini Territory

by
Guy Valiquette

INTRODUCTION

The Montagnes Lake area was mapped during the summer of 1962. It covers about 370 square miles between latitudes $51^{\circ}30'$ and $51^{\circ}45'$ and longitudes $75^{\circ}45'$ and $76^{\circ}15'$. Montagnes lake, which gives its name to the area, is 145 miles N. 30° W. from the mining town of Chibougamau.

Float planes based at Caché lake, near Chibougamau, are the only practical means of reaching the area. Planes can land on lakes whose locations give easy access to all parts of the area

In the extreme north of the area, the topography is very rugged and sizeable hills of granite are found. In the southeast corner and in the vicinity of Némiscau river, in the western part, only peat bogs and swamps are seen.

The vicinity of Montagnes lake is more easily accessible; southeast of the lake, the topography is characterized by a series of hills and shallow valleys covered with stands of evergreens, whereas, on the northwest side, the rather regular cover is composed of glacial deposits on which vegetation has been almost completely destroyed by forest fires. However, the dead trees are still standing and exploration is easy.

Traverses were made at half-mile intervals over most of the area, but certain critical formations along the eastern shore of Montagnes lake and south of Indien lake were traversed at 1,000-foot intervals.

Most of the area is drained by Némiscau river, which crosses it in a northeasterly direction. West of the area, this river flows into the Rupert, which in turn flows toward James bay.

GENERAL GEOLOGY

All consolidated rocks of the area are of Precambrian age.

In view of the southwesterly dip of the folds throughout the area, it may be assumed that the granitic gneisses in the northeastern part are overlain by the paragneisses and schists.

* Translated from the French.

A few lenses of metavolcanic rocks occur in the upper part of the schists, whereas all levels of metasedimentary rocks contain sills and lenses of rocks metamorphosed to amphibolite and serpentinite.

Close to the northern limit of the area, grey hornblende granite underlies approximately 11 square miles. This grey granite is cut by a fine-grained, white or pink granite that underlies most of the area north of Némiscau river. All the rocks mentioned above are cut by pegmatites, which, in turn, are cut by diabases.

Table of Formations

Pleistocene and Recent	Moraines, eskers, alluvial deposits, string bogs
Precambrian	Diabase Pegmatite White and pink granite Grey hornblende granite Serpentinites Amphibolites Metavolcanic rocks Biotite schists; biotite-garnet schists; biotite sillimanite, cordierite, and garnet schists Quartz-rich paragneisses, quartz-sericite schists, quartzites Granitic gneisses

Granitic Gneiss

In the eastern half of the area, scattered outcrops shows that granitic gneiss underlies an area of about 25 square miles north of the metasedimentary belt and 10 square miles south of it. The composition and texture of this gneiss are greatly varied. In places, the rock is fine grained and rich in plagioclase with minor quartz and some biotite. Elsewhere, quartz augen rest in a fine-grained groundmass of plagioclase and biotite flakes; in such cases the schistosity is well developed.

These gneisses may constitute the basement of the metasedimentary sequence or they may have been formed by injection of granitic material in the lower part of the sequence. It should be noted that the schistosity in these rocks seems concordant with that in the paragneisses.

Paragneisses

Paragneisses extend over a distance of about 8 miles south of Montagnes lake. The band gradually increases in width from 1,000 feet toward its west end to 4,500 feet east of Montagnes lake, and has a general strike of N.60°E., and a nearly vertical dip.

Outcrops in the western part of the paragneiss band show a foliation formed by orientation of biotite and muscovite flakes in a quartz-rich rock containing feldspar and garnet crystals. Towards the east, biotite disappears and the composition of the rock is approximately that of an impure quartzite; it there contains much quartz and minor feldspar, sericite and garnet. In many places, sillimanite forms nodules on the surface of outcrops or short fibres along schistosity planes.

Biotite Schists

This metasedimentary rock underlies a band about 4 miles wide extending diagonally from the northeast end of the map-area to its southwest limit, — an area of about 100 square miles.

The biotite schist is in general composed of quartz, feldspar, much biotite and, in a few places, garnet. Much of this fine-grained, light to dark brown rock shows sillimanite and cordierite nodules on its outcrop surface. The cordierite is seen as dark blue lenses on fresh surfaces.

Metavolcanic Rocks

Metavolcanic rocks are rare in the area. One outcrop was noted close to the west limit of the area, about 5 miles north of Némiscau river. Pillows in this outcrop indicate that the top of the formation faces south.

South of Indien lake, a few outcrops of a yellow-weathering rock contain pillow structures. These outcrops show a well-marked foliation and boudins in apparently more mafic beds. Pillow structures are about one foot long and are elongated in a direction perpendicular to the strike of the schistosity. In general, these structures are not well enough preserved to be of use in the determination of flow tops.

Amphibolites

Amphibolites occur throughout the area but are best shown along the southeast shore and at the northeast end of Montagnes lake. They are generally fine or medium grained and their schistosity is parallel to their contacts with other rocks and to the schistosity of surrounding metasedimentary rocks.

Most of these rocks are black. A few, richer in plagioclase, are bluish grey; others are dark green. In general, a preferential linear orientation of amphibole crystals is evident in the schistosity planes. In places, massive amphibolite may be seen in very sharp contact with schistose amphibolite.

These amphibolites appear to be as varied in composition as in texture; they generally contain, in addition to amphibole, variable quantities of plagioclase and quartz. In some cases, amphibole constitutes almost all of the rock. A few amphibolites contain biotite and epidote whereas others, in addition to black or green amphibole, show a second, light brown, fibrous amphibole, probably cummingtonite.

A mottled amphibolite was observed northeast of Montagnes lake, where it outcrops over a distance of about half a mile in an east-west direction. It has a hornblende-rich groundmass containing spots of plagioclase and epidote.

Amphibolites that occur in the vicinity of serpentinites show some rather special features. At the few places where they can be seen, their contact with serpentinite is sharp. Amphibolite occurs on both sides of the serpentinite at Valiquette lake, as well as at Caumont lake, about 2 miles west of the map-area. This amphibolite generally shows a good schistosity parallel to the schistosity of the surrounding metasedimentary rocks. It commonly contains a high percentage of fibrous amphibole and very little felsic minerals. In places, two amphiboles can be seen. Certain patches in the vicinity of serpentinite show the rather massive texture of a diorite and are then coarser grained and non-schistose and contain more plagioclase. In a few places, hornblende crystals are up to 2 inches long. The fibrous-textured amphibolite shows numerous traces of sulphides and contains many black tourmaline crystals.

Serpentinites

Serpentinites form a few isolated lenses in the metasedimentary rocks. The most important lens is at the southwest end of Montagnes lake on the north limb of a broad syncline that strikes northeast. This rock, with adjacent amphibolite, forms a hill about $\frac{1}{2}$ mile long and 300-400 feet wide.

In general, these serpentinites are rich in disseminated magnetite or carry erosion resisting veinlets up to $\frac{1}{4}$ inch thick that stand out on outcrop surfaces.

The serpentinite can be divided into three types: massive, and black or dark green on fresh surfaces; tremolite-rich; and chlorite-rich. However, these three types are intermingled.

Grey Hornblende Granite

A hornblende-rich granite, in places containing biotite, outcrops at the northern limit and in the southeast corner of the area. This granite is grey on both fresh and weathered surfaces and coarse or medium grained. It consists of black hornblende and a high percentage of white microcline and quartz. In many places, quartz augen and pink microcline phenocrysts occur in a medium-grained groundmass.

White or Pink Granite

This granite is the most abundant rock of the area and it forms, to the north, numerous steep hills. It cuts the hornblende granite as well as metasedimentary rocks. Almost everywhere it is a fine- or medium-grained rock, and its passage from white to pink is very gradual. North of Némiscau river, it is generally massive. South of the metasedimentary belt it is predominantly pink and contains coarse-grained facies.

Pegmatite

Pegmatites are seen throughout the area where they form masses, up to 2 square miles in extent, dykes cutting all other rocks with the exception of diabase, and sills parallel to the schistosity of the metasedimentary rocks.

The most wide-spread variety is the white microcline pegmatite containing in places muscovite, tourmaline, and garnet. A pink microcline pegmatite also occurs. At the north end of Montagnes lake, muscovite-garnet pegmatite contains spodumene crystals.

Diabase

The youngest consolidated rock of the area is diabase, which outcrops mainly in the eastern part of the area. A row of outcrops shows that the strike of the most important dyke would be about N.35°W. It can be traced for about 10 miles, and its width ranges from 200 to 300 feet. Where it cuts spotted amphibolite, no displacement of amphibolite is seen on either side of the dyke. Other, less important dykes with the same strike occur. East of Long lake, a small dyke strikes N.60°E.

PLEISTOCENE AND RECENT

The greater part of the area is covered by glacial deposits that form sand and gravel hills. A few eskers were noted.

Numerous boulders were observed throughout the area and a few of them allow interesting determinations. A boulder of spotted amphibolite with a volume of about 60 cubic feet was noted about 2½ miles S.45°W. from the only outcrop of spotted amphibolite observed in the area. This S.45°W. direction corresponds exactly to the direction indicated by all glacial striae noted in the area.

Boulders composed of spodumene pegmatite were seen on the serpentinite outcrop south of Montagnes lake and a few spodumene pegmatite outcrops were later mapped north of Montagnes lake, 5½ miles and N.45°E. of the boulders.

STRUCTURE

In general, the schistosity observed in metasedimentary rocks is parallel to the visible contacts between biotite schists and quartzites; therefore, the suggestion of a parallelism between schistosity and original bedding appears to be justified. On this

basis, the strike and dip of schistosity in the metasedimentary rocks in the northeast quarter of the area indicate a syncline between two anticlines. Many dips along Montagnes lake are close to the vertical, whereas, elsewhere, they average between 60° and 80° . Good lineations, more easily observed because of dragfolds and of the orientation of hornblende crystals, indicate that the folds have a southwesterly plunge of, in general, 30° to 60° .

South of Montagnes lake, the syncline is clearly outlined but, eastward, its axis can only be postulated because of an insufficient number of outcrops. For the same reason, the outlines of the north and south anticlines are likewise only assumed. This prudence is justified because, where outcrops are abundant, the structure seems more tightly folded than is suggested by the fold axes shown on the map. For instance, east of Noirs lakes, a small syncline is seen on the south limb of the main syncline and, upon a detailed study of the structure south of Indien lake, one can distinguish three synclines and three anticlines over a width of slightly more than one mile.

The few remnants of volcanic rocks south of Indien lake show pillow structures, but these are too stretched and irregular in shape to allow tectonic interpretations.

ECONOMIC GEOLOGY

Sulphides

At Valiquette lake, Noranda Mines Limited trenched an outcrop of ultrabasic rocks to study chalcopyrite mineralizations. Here, chrysotile fibres were seen to be replaced by chalcopyrite. Following this discovery, four holes were drilled, without, however, revealing economic concentrations. A grab sample gave 0.20% copper and 1.67% nickel.

Chalcopyrite, tourmaline and numerous small concentrations of pyrite were seen in amphibolites south of the serpentine outcrop of Montagnes lake. South of Indien lake, a rusted zone up to 500 feet wide extends for slightly more than 2 miles. In spite of deep weathering it can be seen that oxidation affects outcrops of quartzite and of cordierite and sillimanite schists. The only sulphide observed on surface was pyrite, but this zone probably warrants a more complete exploration.

Iron

In the southeastern part of the area, a few lenses of magnetite-rich rocks are seen in biotite schists; these lenses, however, contain a large proportion of quartz.

Chromite

Chromite occurs in very irregular bands in the serpentine south of Montagnes lake. Also, in many localities along Montagnes lake, chrome mica (fuchsite) was observed in quartz-rich paragneisses.

Spodumene

At the north end of Montagnes lake, light green spodumene crystals up to 2 inches long are present in a white muscovite-garnet pegmatite. The pegmatite is 1,000 feet wide and $\frac{1}{2}$ mile long.