

# RP 502(A)

PRELIMINARY REPORT, GEOLOGY OF KIPAWA LAKE AREA, TEMISCAMINGUE COUNTY

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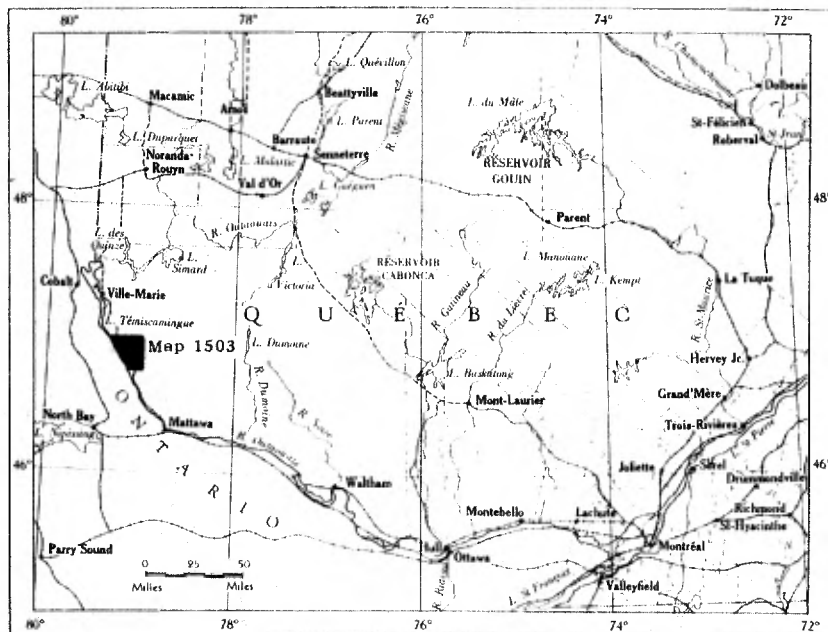
# Geology of KIPAWA LAKE AREA

TÉMISCAMINGUE COUNTY

PRELIMINARY REPORT

by

Jean-Louis Robert



QUEBEC DEPARTMENT OF NATURAL RESOURCES

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**GEOLOGY**  
OF  
**KIPAWA LAKE AREA**  
TÉMISCAMINGUE COUNTY

PRELIMINARY REPORT

BY

JEAN-LOUIS ROBERT



QUÉBEC  
1963

# PRELIMINARY REPORT

on

KIPAWA LAKE AREA\*

TÉMISCAMINGUE COUNTY\*\*

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## INTRODUCTION

The Kipawa Lake area, which was mapped during the summer of 1962, is bounded by latitudes 46°45' and 47°00', longitude 78°52'30" to the east and the Quebec-Ontario boundary (Témiscamingue lake) to the west. This area of 295 square miles includes Tabaret and Mercier townships, as well as parts of Shehyn, Atwater, Reclus and Gendreau townships, all in Témiscamingue county.

Provincial Highway 46, which connects the towns of Témiscamingue and Rouyn, crosses the western boundary of the area. The Mattawa-Angliers branch of the Canadian Pacific Railway trans-continental line enters the area at the southern boundary a few miles northeast of the town of Témiscamingue, goes around Tee lake and then swings back towards the western boundary to follow more or less the course of the highway between Dozois and the northern boundary. A branch of this line leads to Kipawa.

Kipawa, the only village in the area, is located in the south centre on the west shore of Kipawa lake, 8 miles northeast of Témiscamingue. Highway 46 ends at Témiscamingue, 2 ½ miles from the southwestern corner.

Kipawa lake is navigable throughout and provides easy access to the eastern three-quarters of the area. Access to the western part is by the highway and its secondary branch roads, the railroad and Témiscamingue lake.

Most of the area drains into Kipawa lake, which flows into Témiscamingue lake through its outlets, Gordon creek to the south and Kipawa river to the north. The Marsac Lake hydrographic basin empties directly into Témiscamingue lake.

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\* Covers parts of Ottetail Creek (31 L/14) and Grindstone Lake (31 L/15) maps of the National Topographic Series.

\*\* Translated from the French.

The area has a characteristic ridge and valley topography. The marked alignment of the ridges and valleys reflects the structural directions of the underlying rocks. Local relief is about 200 feet. In the southeastern corner of the area, hills underlain by beds of quartzite rise above the general level to a maximum altitude of 1,450 feet, and have a local relief of 600 feet.

The cover of glacial debris is thicker in the southern half than in the northern half. Drumlinoid till predominates in the low ground south of Marsac lake. The two main eskers, which were traced for several miles, occur south of Marsac lake and near the eastern boundary of the area; the latter extends southwestward into Jeambeau bay. A third and smaller esker extends from the south shore of Hunter lake in a southwesterly trend, slightly oblique to that of the preceding two.

Glacial striae, friction cracks and the trend of eskers show that the direction of movement of the Pleistocene glaciers was between south and S.20°W.

This survey of 1962 is adjacent to previous surveys in the areas to the north (Robert, 1961 and 1962), northeast (Sabbourin, 1960) and east (Lyall, 1959).

#### GENERAL GEOLOGY

All the rocks of the area are Precambrian in age. The oldest are porphyroblastic gneisses, mafic or feldspathic paragneisses and quartzites. Iron-bearing rocks and muscovite schists are intercalated with the quartzites. The paragneisses, particularly those less quartzose, become mixed gneisses through injection or dilution along the strike or in the nose of folds.

The granitic gneisses of the southern half of the area may be in part igneous or they may represent products of extreme transformation of paragneisses. The grey granite of the northeastern part belongs to the batholith that extends into the Fabre-Mazenod area to the north (Robert, 1962). The pink granite, which is the most recent intrusive rock, occurs only in the western part of the area where it crops out as small masses or lenses within the granitic gneisses and paragneisses. Two northwesterly trending diabase dykes are the most recent intrusions of the area.

All the rocks of the area, except the diabase dykes, were deformed at least once. Three principal structural directions were observed: 1) northeast structures of the northwest corner; 2) north-south structures characteristic of the central and northeastern sectors; and 3) northwest structures of the southern half.

TABLE OF FORMATIONS

Pleistocene and Recent	Till, sand and gravel
Precambrian	Diabase dykes
	Pink, massive to gneissic, biotite or hornblende granite; pegmatite
	Grey granite and granitic gneiss; pegmatite
	Granite and granitic gneiss spotted red
	Mixed gneisses
	Hornblende-plagioclase rock
	Iron-bearing: thin bedded quartzite; silicated, pyroxene-amphibole-garnet rocks
	Quartzite; quartz-muscovite schist; muscovite schist; feldspar-quartz-biotite-muscovite paragneiss Biotite paragneiss Hornblende-biotite gneiss Porphyroblastic gneiss and schist

Porphyroblastic Gneiss and Schist

These rocks occur in a small band in the northwest corner and in a few narrow lenses within the gneisses. They are easily identified by the presence of white or pink feldspar porphyroblasts. The porphyroblasts are well defined and slightly elongated to the direction of foliation in schistose varieties and rather blurred and irregular in the gneissic (uniform composition) rocks. The porphyroblastic gneiss and schists are made up essentially of feldspar, quartz and biotite. Their colour varies from pale to dark grey depending on the biotite content or is in various shades of pink, in keeping with the colour of the predominant feldspar. The porphyroblastic gneiss and schists probably are paragneisses impregnated with grey or pink granitic material.

### Hornblende-biotite Gneiss; Biotite Paragneiss

These rocks generally have a good layering, which may represent either differences in original composition or litle injections of quartzofeldspathic material between the layers. In either case, the layering suggests that the rocks were originally sedimentary. In some outcrops, the feldspathic bands or injections account for 70% of the volume, and the mafic bands still have the same appearance as that of the rocks in thicker lenses. The lenses of mafic gneiss follow the structural pattern in the area.

The hornblende-biotite gneisses usually have about 20% mafic minerals, but the proportions may vary between 10% and 40%. Plagioclase and quartz are the other main constituents. The rock is pale to dark grey, the colour varying with the tenor of ferromagnesian minerals. The biotite paragneiss is finer grained and in thinner, but more continuous, layers than the hornblende-biotite gneiss.

### Quartzite and Associated Rocks

The principal outcrops of quartzitic rocks form two small patches within the gneisses, south of Anglais bay of Kipawa lake. Elsewhere, they are found only in a few narrow and discontinuous bands. The quartzitic rocks include quartzite, muscovite-quartz schist, muscovite-biotite-quartz-feldspar paragneiss and some iron-bearing rocks. All these rocks are found associated in sequences that vary from place to place.

The massive quartzite is white or greenish and in beds ranging from 2 inches to 3 feet thick. The interbeds consist of either mica schist, kyanite-quartz gneiss or simply less pure quartzite. Cross-bedding was seen in some vertical sections. Besides quartz, the quartzite contains muscovite, specularite, magnetite and kyanite.

The quartzites grade into quartz-muscovite schists, in some beds by a gradual increase in the proportion of muscovite. On a large scale, there seems to be repetitions of sequences, each with a predominant member. In places, the schistes may contain feldspar, biotite and garnet.

Muscovite-biotite-quartz-feldspar paragneisses are intercalated with quartzites and mica schists of the small basin and the narrow band respectively north and southwest of Kipawa. Also, there is a gradation between quartzitic rocks and paragneisses. The latter are gneissic, locally porphyroblastic, greyish or pinkish and have a variable grain size. Locally they contain specularite and a high percentage of epidote. In contact with the silicated, pyroxene rocks the presence of iron oxides gives the paragneisses a buff colour.

### Iron-bearing Rocks

Three types of magnetic rocks were recognized: 1) iron-bearing quartzites with magnetite-rich layers alternating with thin beds of quartzite; 2) coarse-grained pyroxenites; and 3) silicated, pyroxene-amphibole-garnet rocks. These rocks crop out within the small basin northwest of Kipawa. A few beds of iron-bearing quartzites are associated with the quartzite on the west side of Beauvin narrows.

The quartzite is massive, fine grained and dark grey, and contains 5% - 10% magnetite. Beds of quartzite and magnetite averaging  $\frac{1}{4}$  to 1 inch thick, form a section up to 80 feet thick. The thin beds are continuous for hundreds of feet and indicate that all these rocks belong to a sedimentary sequence.

The coarse-grained pyroxenite is composed almost entirely of manganiferous hypersthene crystals up to  $2\frac{1}{2}$  inches long and grains of magnetite. In one outcrop gradation between the pyroxenite and the silicated pyroxene-amphibole-garnet rocks is apparent. Plagioclase is one of the main constituents of the silicated, pyroxene-amphibole-garnet rocks.

### Hornblende-plagioclase Rocks

Some lenticular layers of dark rock occur here and there within the granitic gneisses and are concordant with the adjacent gneissic structure. The rock is medium to coarse grained, dark green or black, and generally foliated. Hornblende and plagioclase are the essential minerals.

### Mixed Gneisses

Layering in the mixed gneisses of the area results from the introduction of 20% - 90% granitic or pegmatitic material along the foliation planes. The mixed gneisses more or less constitute zones of transition between the paragneisses and the granitic gneisses.

The two main varieties of these rocks are the well-layered mixed gneiss and the nebulous mixed gneiss. The former occupies most of the bands of these gneisses next to lenses of paragneisses. It consists of alternating layers of granitic material and paragneiss. The granitic layers are from a few inches to a few feet thick; the paragneiss is rarely more than 6 inches.

The nebulous mixed gneiss is composed almost entirely of granitic gneiss with faint traces of lenses of paragneiss. The traces are relics of original paragneisses more digested by the invading rock.

### Grey Granite and Granitic Gneiss; Pegmatite

Grey granite and granitic gneiss occupy slightly more than 50% of the area. They are foliated, grey and have a similar mineralogical composition and texture. The main mass of grey granite, in the northeast corner of the area, is probably the southern extension of the granite batholith of the area to the north (Robert, 1961). This intrusive rock is made up of oligoclase and quartz. Biotite, epidote and, locally, hornblende are the accessory minerals. In many places, this granite is in sills within the paragneisses and mixed gneisses.

The granitic gneiss underlies almost all the area lying between the lenses of paragneisses and the bands of mixed gneiss. The granitic gneiss has a greater quantity of ferromagnesian minerals than the granite and, as suggested by the name, a more pronounced foliation.

North and east of Truite lake, the granite and granitic gneisses are dotted red in places by a film of iron oxide on quartz grains.

Pegmatite is associated with the granitic injections in places.

### Pink, Massive to Gneissic Granite; Pegmatite

The pink granite is the most recent acidic rock of the area, and outcrops of it define several small masses and lenses near the western margin. Pegmatite accompanies the granite throughout.

Pink potassic feldspar, white plagioclase and quartz are the essential minerals. Biotite and, in places, hornblende are the accessories. The hornblende-bearing variety is coarser grained and better foliated than the biotite granite.

### Diabase Dykes

Some northwesterly trending diabase crop out in the western part of the area. The rock is black, dense, and fine to coarse grained. The coarser variety has an ophitic texture.

## STRUCTURE

The parallelism between the primary structures (bedding, cross-bedding) of metasedimentary rocks and the foliation of gneisses suggests that the latter corresponds to original bedding.

Under tectonic forces, the rocks of the area were deformed along northeast, north, and northwest directions. South of the mass of grey granite, the bands of gneisses are folded into a more or less regular series of synclines and anticlines.

In the southern part, axes of folds trend northwesterly, whereas, in the northwest, northeasterly folds predominate.

Analysis of the structural patterns suggests that there have been at least two periods of deformation. Northwesterly-trending folds appear to be superimposed over north-trending structures; or, the former could be the northwest extension of the latter. Moreover, north-south folds are much more open than the northwesterly-trending structures.

The south-trending Marsac Lake syncline seems to merge to the southeast, near the northern edge of the mass of red-dotted granite, with a northwest-trending syncline. Northeasterly folds occur only in the northwest corner of the area. They are tight and, as they approach the Marsac Lake syncline, their axes converge with, or are parallel to, the western limb of the syncline.

West of Marsac lake, the oval (dome and basin) structures are on the extension of northwesterly-trending axes and were formed by the superposition of northwest and northeast structures or through structural weaknesses.

Plunges of folds are generally south and southeast, but, in places, become north to northwest. Along the synclinal axis north of Kipawa, the plunges conform to the basin structure of quartzitic and iron-bearing rocks.

Joints are abundant and particularly well developed in the granite and granitic gneiss. The three main sets strike northwest, northeast and north.

The narrows in Témiscamingue lake seem to mark the emplacement of a major fault. Near the east shore of the lake a few minor faults follow parallel linear valleys that are oblique to its long axis. These faults are probably related to the Témiscamingue Lake fault.

#### ECONOMIC GEOLOGY

In 1958, Shakespeare Uranium Mines, Limited, did some geophysical and geological work on a group of claims in the southeastern part of the iron-bearing basin northwest of Kipawa. Magnetite concentrates from finely ground samples yielded 25% - 35% nearly pure magnetite. Tenors in titanium and silica of the concentrates were low.

These rocks outcrop in an elongated ellipse, the greater axis of which coincides with that of the northwesterly trending syncline. This elliptical structure is 7,000 feet long and 1,400 feet wide and extends under Kipawa lake. The outer part of the iron-bearing rocks overlies conformably the quartzitic rocks, whereas the centre is occupied by granitic gneisses.

Three main types of iron-bearing rocks were recognized: 1) quartzite, 2) pyroxenite, and 3) plagioclase-pyroxene-amphibole-garnet rock. A nearly continuous zone of pyroxenite outlines the ellipsoidal structure. The outer part of the zone and, in some places, the centre are altered to a plagioclase-pyroxene-amphibole-garnet rock. Both rock types contain variable quantities of magnetite, but the highest concentrations of magnetite occur in quartzite bands. In these, magnetite-rich beds, from a fraction of an inch to one inch thick, alternate with quartzite beds that generally are a little thicker. The quartzites are intercalated with pyroxenite and follow the outline of the basin, except in the southeastern part where no outcrop was seen. The outer band, with an average thickness of 30 to 40 feet, is 2,400 feet long. The second band has an average thickness of 20 to 25 feet and is about 1,400 feet long. The beds in the northern limb have a regular dip of 50° - 60° southwest, whereas the dips of the southwest limb are very irregular. The iron-bearing rocks (except quartzites) of the southwestern limb are plicated.

The thin inclusion of quartzite that crops out on the west shore of Beauvin narrows also contains thin magnetite-rich beds.

Specularite or magnetite are accessory minerals of quartzites. Some pegmatite veinlets in the quartzofeldspathic paragneisses contain crystals of specularite and ilmenite.

The gneisses and schists at the southern edge of the iron-bearing rocks are rusty, and small cubes of pyrite are disseminated here and there in the gneisses of the area.

Traces of chalcopyrite and pyrite were seen in some pyroxenitic iron-bearing rocks.

Southeast of Kipawa, the massive quartzites contain kyanite.

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