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Preliminary report on Manitou lake area, Saguenay electoral district

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PROVINCE OF QUEBEC, CANADA

DEPARTMENT OF MINES

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GEOLOGICAL SURVEYS BRANCH

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PRELIMINARY REPORT

ON

MANITOU LAKE AREA

SAGUENAY ELECTORAL DISTRICT

BY

J. T. JENKINS



QUEBEC
1957

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PRELIMINARY REPORT

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MANITOU LAKE AREA

SAGUENAY COUNTY

by

John T. Jenkins

INTRODUCTION

The Manitou Lake area was geologically mapped during the summer of 1956. It comprises 190 square miles, bounded by longitudes $65^{\circ}15'$ and $65^{\circ}30'$ and latitudes $50^{\circ}45'$ and $51^{\circ}00'$. The southern end of Manitou lake is 65 miles northeast of Sept-Îles, on the north shore of the Gulf of St. Lawrence.

The easiest access to the area is by hydroplane from the base at Rapide lake near Sept-Îles. Landings can be made on Manitou, Elinore, Lloyd, Wrong, Barbara, Epinette, Gaynor and Tortue lakes. The area may also be reached by a wide, well-kept portage that runs from the coast at the mouth of Manitou river to the south end of Des Endistes lake. This lake is joined to Manitou lake, 15 miles due north, by Manitou river, which is navigable by motor canoe over the entire connecting length.

Travel within the area is not easy. Manitou lake extends the entire length of the area near its eastern boundary, but high, steep hills encircle, and restrict travel from, the lake. The central and southern parts of the area can be reached by hydroplane or by arduous portage. Portages were cut or cleared between Manitou lake and Return and Duncan lakes; Return lake and two smaller lakes to the northwest, Guynay lake and Tortue river; Elinore and Coin lakes; and linking Duncan, Epinette, Wrong, Lloyd, Barbara, Gaynor and Tortue lakes. There are no navigable rivers or lakes suitable for hydroplane landings in the northern part of the area.

Topographically, the area is a highly dissected upland which rises above the level of Manitou lake (elevation 520 feet) in two stages. The hills about the lake rise abruptly to elevations of more than 2,000 feet, and the topography here is especially rugged. About one mile north of Gaynor, Barbara and Epinette lakes, a second stage of the upland rises to elevations of more than 3,000 feet. Local relief in this second stage is from 500 to 700 feet. The highest point, 3,440 feet, is near the western boundary about one mile from the northern limit of the area.

The greater part of the area drains into Manitou lake. The extreme western and the southwestern parts are drained by Tortue river. The gradient of this river within the area is steep, except for 2.5 miles below Elinore lake, for it drops more than 500 feet in 8 miles.

Evidence of glaciation is plentiful in the area. Several well developed U-shaped valleys, including the valley of Lloyd river, enter Manitou lake from the west. Deposits of glacial till and roughly stratified glacial material

up to 70 feet thick were noted in several localities. Glacially transported anorthosite boulders up to 8 feet across occur 3 miles or more south of the main anorthosite body. Morainic material is found throughout the area except on top of the hills of the higher upland. Glacial striae were seen only on the shores of Lake Manitou, where they parallel the trend of the valley.

GENERAL GEOLOGY

All the consolidated rocks of the area are Precambrian. They are, in order of abundance: anorthosite, injection gneiss, pink gneissic granite, syenitic rocks, injected orthogneiss, gabbroic rocks, pink biotite granite, diorite, amphibolite, paragneisses, and grey granite gneiss.

The extent of the anorthosite and syenite and the positions of the contacts between these rocks and between the syenite and injected orthogneiss in the northern part of the area have been inferred largely from aerial photographs; time did not permit a complete coverage of this portion of the area by traversing.

Relationships between some of the rock units in the area have been inferred from geological work done in nearby areas.

Table of Formations

Recent and Pleistocene		Clay, sand, gravel, erratic boulders
Precambrian	Intrusive rocks and mixed gneisses	Pegmatite, aplite and basic dykes Pink biotite granite Pink gneissic granite
		Injection gneiss and injected orthogneiss
		Syenitic rocks Diorite Anorthosite and gabbroic rocks Grey granite gneiss
	Metasedimentary and associated igneous rocks	Amphibolite Hornblende-biotite gneiss, quartzfeldspar gneiss, crystalline limestone, impure quartzite, hornblende-biotite schist

PRECAMBRIAN

Metasedimentary Rocks and Associated Igneous Rocks

Metasedimentary rocks (paragneisses) are the oldest rocks in the area. Although they are exposed at many places in the southern part of the area and east of Manitou lake, they do not form units large enough to map on the present scale. Almost all exposures of paragneisses contain some granitic material and, in places, a quarter of the rock in the injection gneiss zone is made up of granite.

Most exposures of paragneiss are distinctly layered, with layers varying from a fraction of an inch to several feet thick. Gneissic structure is marked in some varieties. Pink garnet is found in most.

Hornblende-biotite paragneiss is the most common type. It is black to dark greenish-grey, weathers dirty grey to rusty grey, and is fine- to medium-grained. This rock, although generally gneissic, is locally massive. The hornblende-biotite type grades to a hornblende variety on the one hand and a biotite variety on the other. These latter varieties are strongly gneissic, grey and medium- to fine-grained. All three varieties, in general, consist of 50 per cent mafic minerals (hornblende or biotite or both) with plagioclase (up to 40 per cent), quartz (up to 10 per cent) and garnet making up most of the remainder of the rock.

Quartzo-feldspathic gneiss is almost as common as the hornblende-biotite gneisses. It is fine-grained and weathers rusty reddish-brown. No fresh surface of this rock were seen. Roughly equal amounts of quartz and feldspar make up 90 per cent of the gneiss. Biotite and, locally, flakes of graphite, are minor constituents.

Crystalline limestone crops out in thin lenses on the northern side of the largest island in Manitou lake, on the west shore of the lake half a mile north of the island and on the east shore a mile north of the island. The limestone is white to dirty grey and medium- to coarse-grained. Calcite comprises more than 95 per cent of the rock, and there are minor amounts of wollastonite, garnet and sphene. The lens on the east shore of Manitou lake is up to 6 feet wide and 30 feet long.

A few very thin layers of grey-white impure quartzite are interbedded with the limestone. Biotite, the chief impurity, makes up less than 10 per cent of the rock.

A hornblendic rock (amphibolite?) is common in the southern part of the area and east of Manitou lake. It forms concordant layers in the paragneisses and the pink gneissic granite, or is associated with gabbroic rocks. The rock is dark medium- to coarse-grained, and massive. It is composed of 50 per cent hornblende, 40 per cent plagioclase, and minor amounts of chlorite and biotite. It is probable that some of this hornblendic rock is an altered sedimentary material and that some is altered basic igneous material.

Intrusive Rocks and Mixed Gneisses

Grey Granite Gneiss

This rock is strongly gneissic, with biotite-rich layers a fraction of an inch thick alternating with layers of equal thickness composed largely of quartz and feldspar. Hornblende and garnet are the minor constituents. Grain size is from fine to medium. The rock is banded black and dirty white on the fresh surface, and a uniform dirty grey-brown on the weathered surface. A small zone of this material, possibly representing a highly streaked out orthogneiss, occurs near the northwest corner of Manitou lake. Isolated exposures are scattered throughout the injection gneiss zone.

Anorthositic and Gabbroic Rocks

Anorthositic rocks occupy the entire north central and northwestern parts of the area. They vary from a pure anorthosite, with more than 90 per

cent plagioclase (sodic labradorite), to anorthositic gabbro, with 75 to 65 per cent plagioclase. Hornblende and pyroxene, comprise up to 30 per cent of the rock. Magnetite and ilmenite are minor. The colour varies from dark bluish grey of brownish grey, and the weathered surface is mottled grey-brown and black. The rock is generally medium in grain, but some is coarse. It is massive, except for somewhat gneissic phases near the boundaries of the body.

Gabbro borders the anorthosite mass on the south and southwest. This rock is fine- to coarse-grained, massive, black to dark grey on the fresh surface and mottled rusty-brown and black on the weathered surface. Pyroxene, hornblende and plagioclase are the main constituents. Biotite and garnet are accessories; olivine and magnetite are present locally. Some amphibolite has been mapped with these bodies. Four small bodies of gabbro in the southern and western parts of the area have been mapped, and other isolated exposures are scattered through the injection gneiss and injected orthogneiss zones.

Diorite

Three small bodies of diorite are shown on the map. One is southwest of Lloyd lake, a second occupies the southwest corner of the area west of Coin lake, and the smallest is at the northern border of the syenite mass $1\frac{1}{2}$ miles southeast of Guyray lake. In addition, dykes of the diorite cut the gabbro. The rock is fine- to medium-grained, massive, greenish-grey to dark on the fresh surface, and rusty black on the weathered surface. Andesine, potassic feldspar, hornblende, epidote and biotite are the major constituents.

Syenitic Rocks

A body of syenitic rocks occupies the southwest portion of the area, on either side of Tortue river. This rock is beige to rusty brown on the fresh surface, and light grey to dark brown on the weathered surface. It is fine to coarse in grain and locally porphyritic. Although generally massive, local facies are markedly gneissic. Microperthite is generally the chief component, but in places there are granitic facies with quartz making up 30 to 40 per cent of the rock. Garnet, hornblende and plagioclase together make up less than 10 per cent. Phenocrysts of albite up to one half inch long locally make up 20 per cent of the rock.

A second body of brown to beige syenite extends along the northeastern boundary of the anorthosite mass. Although generally massive, it is strongly gneissic within a half mile of the contact with the anorthosite. The rock is locally granulated, and is fine- to medium-grained. Microperthite is the chief constituent, and accessory minerals include quartz, plagioclase, hornblende and garnet.

A smaller body of medium-grained, brown, gneissic syenite is in contact with the anorthosite $1\frac{1}{2}$ miles south of Epinette lake, and dykes of syenite cut the diorite.

Injection Gneiss and Injected Orthogneiss

The southeastern, central and extreme eastern portions of the area are underlain by pink gneissic granite and by injection gneiss. The two rocks are too intimately associated to be mapped as separate units. The host rocks

of the injection gneiss are amphibolite, paragneiss, and, to a very minor extent, gabbro and grey granite gneiss. The introduced granitic material accounts for 25 to 75 per cent of the total volume of injection gneiss. The granitic component is predominantly pink gneissic granite, but some massive biotite granite and pegmatite is also present. Layers vary from a half inch to several feet thick.

Injected orthogneiss underlies the northeastern portion of the area on either side of Manitou lake. This rock, like the injection gneiss, is a mixed gneiss. It is distinguishable from the injection gneiss, however, in that the host components are sheared diorite, amphibolite and, locally, grey granite gneiss. Here, also, the introduced granitic component makes up 25 to 75 per cent of the gneiss.

A band of injected orthogneiss extends northwestward for 2 miles from the southern border of the area on either side of La Truite river. Pink gneissic granite, which locally has 5 per cent magnetite, injects gabbro and amphibolite.

Pink Gneissic Granite

Pink gneissic granite is widespread in the area. It is found as discrete exposures in the mixed gneiss zones, and is by far the most common granitic component of these mixed rocks. However, only in one locality, to the west and southwest of Elinore lake, is this rock sufficiently continuous to permit mapping it as a separate unit. Gneissic structure, the dominant feature of the rock, is locally emphasized by the presence of elongated blebs of quartz. The gneissic granite is fine- to medium-grained, pink on the fresh surface, and pink to beige on a deeply weathered surface. It is chiefly composed of quartz and alkali feldspars in widely variable proportions. Muscovite, biotite and hornblende are minor constituents. Disseminated grains of magnetite may make up as much as 5 per cent of the rock.

Pink Biotite Granite

Isolated exposures of pink biotite granite are present throughout the area, but only two bodies are sufficiently large to be mapped separately. The larger of these bodies lies east and southeast of Elinore lake along the northern boundary of the main body of syenite, and the smaller is in the centre of this syenite body. The rock is pink to beige and fine- to coarse-grained. One facies of the pink biotite granite is very coarse-grained, another is medium-grained, a third is slightly gneissic, and a fourth facies shows spheroids of granulated potassic feldspar. The biotite granite is composed chiefly of feldspars, quartz, and biotite, with a little hornblende in places. This rock seems to grade into the adjacent syenite.

Pegmatite, Aplite and Basic Dykes

Pegmatite and aplite dykes cut all the rocks described above and are in turn cut by dark, very fine-grained dykes. The dark dykes are porphyritic in places, having small phenocrysts of biotite. Pyrite is present locally in small amounts.

STRUCTURAL GEOLOGY

The overall structure of the area is complex. The only well defined contacts among the rock types shown on the map are those between anorthosite and adjacent rocks, and between the southwestern body of syenite and the gneisses of the injection zone. Gneissic structures parallel the contacts in both cases. Dips of the gneissic structure in anorthosite near the southern contact are up to 50° S. and at the eastern contact up to 65° SW. Dips within the syenite body are variable.

Several steep faults striking east of north occur along the east shore of Manitou lake, and one parallel fault was seen on the west side of the lake. These faults are possibly subsidiary to an inferred major fault along the valley of Manitou lake.

ECONOMIC GEOLOGY

Magnetite

In 1952 and 1953, development work was done on a group of 10 claims (locality 1, on map) held by Hollinger (Quebec) Exploration, Limited, and situated southwest of Marmont lake. More than 74,000 feet of lines were cut to facilitate the geological examination. Three main zones of magnetite-rich rock were found. They are 1,600, 1,200, and 1,000 feet long, and 20 feet wide on the average. In places, the zones are as much as 100 feet wide. Vertical extent of these bodies is not known. Two of the zones are close to, and west of, the cut base line; the third and largest zone is parallel to, and 300 to 400 feet east of, the base line. Within these zones, which have been systematically sampled, the iron tenor is about 52 per cent, and SiO₂ and TiO₂ are less than 20 and 2.2 per cent respectively.

The magnetite-rich zones are conformable lenses in the injection gneiss. They strike N. 25° W. and dip 40° to 60° W. Numerous lenses of amphibolite occur in the mineralized zone, and the magnetite-rich zones bear an obvious spatial relationship to them.

Sulphides

Sulphide minerals were found near a fault zone 400 feet from the east shore of Manitou lake and 2.5 miles from the southern limit of the area (locality 2, on map). Stringers up to ¼ inch thick of pyrite with a few grains of chalcopyrite cut sheared amphibolite. Four grab samples assayed 0.02, 0.05, 0.05 and 0.00 per cent copper. One sample also gave 0.02 per cent nickel and 0.03 per cent lead. Large boulders of amphibolite that seem to have been derived from cliffs to the east are more heavily mineralized.

Pyrite stringers occur at the intersection of two sets of joint planes in sheared amphibolite at a locality 3.9 miles from the northern boundary of the area. Grains of chalcopyrite were noted in the stringers.
