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PRELIMINARY REPORT, GEOLOGY OF COUSINEAU - ROLLAND AREA (SOUTHERN PART OF MONT-TREMBLANT PARK), MONTCALM, TERREBONNE AND JOLIETTE COUNTIES

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Énergie et Ressources naturelles
Québec

DEPARTMENT OF NATURAL RESOURCES

RENÉ LÉVESQUE, MINISTER

P.-E. AUGER, DEPUTY MINISTER

Geology of COUSINEAU-ROLLAND AREA

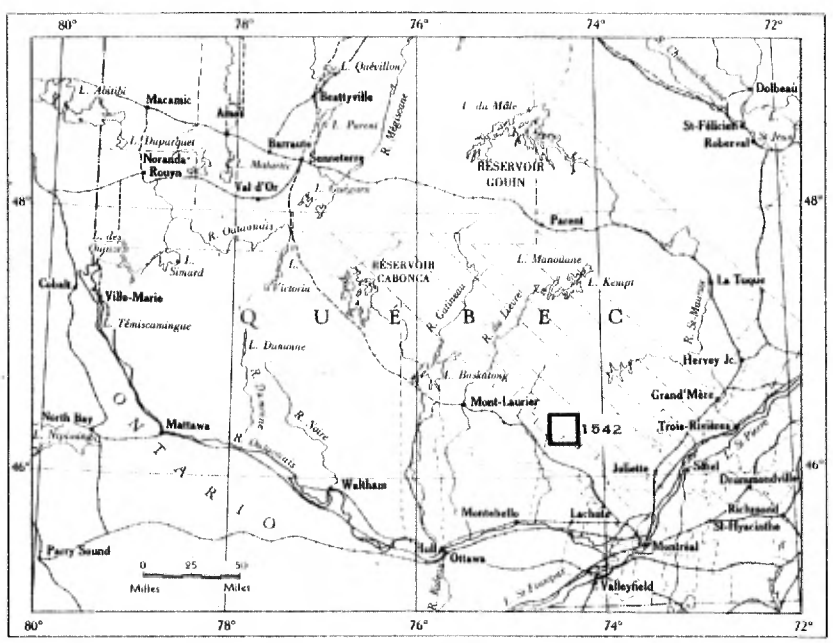
(Southern Part of Mont Tremblant Park)

MONTCALM, TERREBONNE, and JOLIETTE COUNTIES

PRELIMINARY REPORT

by

M. KATZ



QUEBEC

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QUEBEC DEPARTMENT OF NATURAL RESOURCES

RENÉ LÉVESQUE, MINISTER P.-E. AUGER, DEPUTY MINISTER

GEOLOGICAL EXPLORATION SERVICE

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COUSINEAU-ROLLAND AREA

(Southern Part of Mont Tremblant Park)

MONTCALM, TERREBONNE, and JOLIETTE COUNTIES

by

M. Katz

INTRODUCTION

Location

The Cousineau-Rolland* area was mapped during the summer of 1963. It is bounded by latitudes 46°15' and 46°30' and longitudes 74°15' and 74°35'. This area of about 270 square miles lies largely within the southern part of Mont Tremblant provincial park and includes parts of Cousineau, Rolland, Archambault, Lussier, Nantel and Jamet townships in Montcalm county, part of Grandison township in Terrebonne county, and a little of Forbes township in Joliette county.

Access

Although there are no settlements in the area, it is readily accessible from several important centres developed mainly as tourist resorts.

The eastern part of the area may be reached from Highway 18, Saint-Donat, and Archambault lake. A gravel road from Saint-Donat to the eastern part of Mont Tremblant park connects with various private logging roads and facilitates travel within the northeastern part of the area. From Supérieur lake a good gravel road services the park as far north as Diable (Devil) lake, just north of the northern boundary, and several other branch roads provide easy access to the western part of the area. The northwest corner may be reached by a private logging road which starts north of Macaza lake and goes to Savane and Armand lakes. The central part of the area can be reached by foot on a good network of old logging roads, winter roads, and trails. Float planes can land on most of the larger lakes. A private fishing camp on Saint-Louis lake is serviced regularly during the summer season by aircraft based at Saint-Jovite.

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* The map-area covers the west half of Saint-Donat-de-Montcalm (31 J/8) sheet and the eastern third of the east half of L'Annonciation (31 J/7) sheet of the National Topographic Series.

Resources and Industry

Timber is the main natural resource of the area, although intensive logging has diminished the forest reserves.

The tourist trade, important in the Archambault Lake area, is gaining considerably since the opening of Mont Tremblant park, which attracts many thousands of campers and tourists every summer. Fishing clubs are numerous and many of the lakes are easily reached by trails.

Some farms are found south of Provost lake and farming was attempted on the west side of Archambault lake at the mouth of Saint-Michel river.

Topography and Drainage

The Cousineau-Rolland area is in the Laurentian uplands. Deeply incised valleys occupied by streams appear to have been modified by glaciers and produce the rugged topography that characterizes the area. The largest valleys include those that contain Lajoie, Provost, Pembina and Archambault lakes on the east and Diable river on the west. The greatest local relief, about 2,000 feet, is from the bottom of Diable River valley to the top of Mont Tremblant.

The topography and the patterns of the lakes and streams reflect the structures of the underlying rocks. Areas of gneisses are commonly characterized by aligned ridges and hills. Where more massive igneous rocks occur, the land features are irregular and may be quite rugged in places. In the central part of the area many streams and lakes follow lineaments and faults or joints.

Most of the western part of the area drains southward to the Ottawa through Diable river, which is the main tributary of the Rouge. Provost, Lajoie, Pembina, and Archambault lakes drain southeastward by way of Ouareau river to the St. Lawrence.

GENERAL GEOLOGY

The area is part of the Grenville sub-province of the Canadian Shield and the rocks are Precambrian in age. The oldest rocks are the Grenville paragneisses, which include hornblende and/or pyroxene gneisses, garnet sillimanite-graphite gneisses, quartzites and calcareous rocks. They occur as north-northwesterly trending bands and lenses, locally folded and contorted, within the intrusive granitic gneiss, anorthositic gabbro, quartz monzonites and granites. The paragneisses are more abundant in the western part of the area than in the central and eastern parts.

A large body of pink, granulated, granitic gneiss occupies the extreme southwest corner and is part of Mont Tremblant itself. Similar rocks are found throughout most of the area. A small body of anorthosite in the south centre intrudes the granitic gneisses and is separated from the quartz monzonitic augen gneiss by a thin sheet of pink granitic gneiss. Massive quartz monzonite and diorite are found extensively in the south and are converted into augen gneisses east of Diable river.

A similar but more gabbroic rock is found on the west side of Archambault lake. Large stocks of coarse-grained granites are found in the western and northeastern parts of the area. In places, the granites grade into quartz monzonites.

The contacts between the different rock types may be sharp, but gradations and reaction rocks are common.

TABLE OF FORMATIONS

Pleistocene and Recent			Sand, gravel, boulders
PRECAMBRIAN		Later Intrusives	Diabase dykes
	Morin Intrusives	Pine Hill	Aplites and granitic dykes Pink and brown porphyritic granites, syenites and augen gneiss Granite pegmatite and migmatite
	Morin Intrusives	Buckingham	Quartz monzonitic and dioritic augen gneisses Gabbro and gabbroic augen gneisses Anorthosite and anorthositic gabbro
		Granitic gneisses and Granulites	Pink to buff granitic gneiss; leaf gneiss; Trembling Mountain gneiss Green and grey granitic gneiss; intermediate gneiss and granulites
		Grenville paragneisses	Calcareous rocks and skarn Quartzite Garnet-sillimanite-graphite gneisses Biotite gneiss, hornblende and/or pyroxene gneisses

GRENVILLE PARAGNEISSES

Biotite, Hornblende and Pyroxene Gneisses

These dark, fine-grained and usually well-foliated gneisses are found throughout most of the area. They are commonly interbanded with granitic gneisses as small elongated bodies less than a few feet wide, although bands and pods up to 1,000 feet wide are found. The various gneisses are commonly so closely associated with one another that they are difficult to differentiate.

The biotite gneiss is less common than the other members of this group. It is usually found as small local bands or bodies within the pink granitic gneiss and occurs as a biotite-rich rock just south of Shaw lake in the southwest corner. The biotite is typically red-brown. Other common constituents are potash feldspar, plagioclase, quartz and minor amounts of garnet and hornblende.

Hornblende gneisses and amphibolites are widely distributed in both the pink and the green granitic gneisses, as well as being associated with other Grenville rocks. The hornblende is strongly pleochroic in dark greens and browns. Pyroxene and plagioclase feldspar are the other essential minerals present. In many places they grade into pyroxene gneisses, which contain essentially the same minerals but in different proportions. Garnet is a common accessory. A sinuous folded band of the pyroxenic rock occurs in the southwestern corner of the area.

Garnet-sillimanite-graphite Gneisses

Commonly these gneisses are rusty on the weathered surface but the fresh rock is white to greyish blue. They occur as large lenticular and folded bodies associated with the biotite, hornblende, and/or pyroxene gneisses and are also found as conformable pods and bands in granitic gneisses throughout the area.

Garnet porphyroblasts may be as large as 1 inch in diameter but are commonly smaller, and have a peculiar light pink colour. Sillimanite is in long needles and laths associated with the garnets or disseminated in the matrix. Other common constituent minerals are feldspar, quartz and graphite. In a few exposures the abundance of graphite warrants the term graphitic gneiss.

Quartzite

Masses of grey, dense quartzite are scarce in the area. They stand out as small steep knolls and ridges, and may be included in the granites or, more commonly, are interbanded with granitic gneisses and quartz monzonites as small conformable lenses.

Quartzite included in granite is feldspathized, especially in the contact zone. Feldspar starts to grow along foliation and bedding planes and the rock may grade into a granitic augen gneiss as, for example, northeast of Monroe lake.

Most of the quartzites are impure but in places are composed of 80-90% quartz. Feldspar and garnet are commonly present as accessories.

Calcareous Rock and Skarn

Only two outcrops of calcareous rocks were found in the area. One of these, exposed on a wagon road south of Rolland (Escalier) lake, may be classed as a true limestone. The rock is white, friable, and fine grained. The calcite is twinned, there is an appreciable amount of pyroxene, and disseminated graphite is conspicuous. The other outcrop, just north of Shaw lake, is of skarn rock composed of clinopyroxene with some carbonate in the matrix.

A large erratic of coarsely crystalline limestone was found about $1\frac{1}{2}$ miles east of Shaw lake. The calcite crystals are twinned and about $\frac{1}{2}$ inch across.

GRANITIC GNEISSES AND GRANULITES

Greenish Grey Granitic Gneiss, Intermediate Gneiss, Granulites

Thinly foliated gneiss and granulite are common in the central part of the area, and are very well exposed just west of Lajoie lake at Chutes-Aux-Rats. They usually weather to a thin, greyish, chalky surface, beneath which is a rusty zone a few inches thick. The fresh rock is greenish grey. Quartz lenses and pyroxene and hornblende bands up to a foot thick and 3 feet long are conformable to the foliation.

These rocks are associated with the later intrusives and may be interbanded with the pink granitic gneisses and paragneisses. They are cut in many places by numerous small pegmatite dykes.

The granitic varieties contain about 50% potash feldspar (in places perthitic), 20% quartz (much of it in irregular lenticles parallel to the foliation), 20% plagioclase feldspar, and 10% pyroxene and hornblende. The granulites and intermediate gneisses contain more plagioclase, pyroxene (commonly hypersthene), and garnet.

Pink to Buff Granitic Gneiss and Leaf Gneiss (includes Trembling Mountain Gneiss)

In the southwestern corner of the area, the northeast part of a large elliptical mass of buff to pink or almost brick red, thinly foliated gneiss underlies Mont Tremblant. This mass appears to intrude paragneisses. A similar rock also occurs as irregular sill-like bodies intruding the green granitic gneisses and in a body which lies in the axial zone or core of a large fold near Honoré lake. Small quartz pods and amphibolitic bands commonly parallel the foliation.

The rock is highly deformed and is composed almost entirely of granulated potash feldspar (microperthite) and quartz, typically elongated into leaves and ribbons parallel to the foliation. Dark minerals, where present, are usually biotite and hornblende and never exceed 5% of the rock.

MORIN INTRUSIVE ROCKS

Buckingham Rocks of the Morin Series

Anorthosite and Anorthositic Gabbro

A small body of this rock in the southcentral part of the area is dirty grey, coarse grained and massive. The plagioclase feldspar, locally iridescent, is probably labradorite. The rock contains abundant hornblende and pyroxene and, especially at contacts with other rock types, garnet.

Gabbro and Gabbroic Augen Gneisses

Medium- to fine-grained, rusty, dark green to brown gabbro and augen gneiss occur in a wedge-like mass west of Archambault lake at the eastern boundary. The rocks in the northern part of this mass are associated with granitic gneisses, and in the south they seem to grade into quartz monzonites. In the highly deformed rocks that have been converted into augen gneiss, the augen consist either of a single porphyroclast or a granular aggregate of feldspar. They are in some cases enveloped by aligned laths of biotite, hornblende or pyroxene. Garnet may be locally present in quantities up to 20%.

Quartz Monzonite and Diorite

The quartz monzonite and diorite rocks are usually green, medium to coarse grained, massive to vaguely foliated, and in part porphyritic. The weathered surface is grey and commonly pitted and a rusty zone extends several inches below the surface. These rocks are found in the southern part of the area and are a northern continuation of related rocks that surround the Morin anorthosite. They grade laterally into a gabbro on the east and into an augen gneiss on the west.

Feldspars (microperthite and plagioclase), some of which show flow arrangements, make up 70% of the rock. Quartz makes up 20%. Pyroxene and hornblende make up the rest of the rock, in general, although garnetiferous phases are common.

Quartz Monzonitic and Dioritic Augen Gneiss

Note: Although this unit has some similarities with the rocks just described, it is treated separately until more data are available.

Coarse- to medium-grained, grey, rust-stained augen gneiss occurs as an elongated, thick, sheet-like body in the western part of the area. The rock is strongly foliated and its steep dip is responsible for spectacular cliffs, such as those parallel to the Mont Tremblant Park road.

The rock is composed of 70% feldspar (microperthite and plagioclase in about equal proportions) occurring in all stages from large porphyroblastic augen to a fine-grained, aggregated mosaic of feldspar surrounded by dark minerals. Quartz makes up 10% of the rock and hornblende, pyroxene, and magnetite combined may be as high as 20%. Some phases are extremely rich in magnetite and ilmenite, and zones rich in hornblende and garnet are common at contacts.

In the north, the augen gneiss seems to grade laterally westward into a granitic augen gneiss. It is commonly cut by small pegmatites and large sill-like granitic bodies with maximum widths up to a thousand feet. This latter feature is well displayed in the southern part of the mass.

Pine Hill Intrusive Rocks of the Morin Series

Pink to Brown Porphyritic Granites, Syenites and Augen Gneisses

Coarse-grained, pink to brownish green, granitic or syenitic rocks occur as large bodies and stocks in the western and northern parts of the area. They are associated in many places with the quartz monzonitic and dioritic augen gneisses.

Large phenocrysts of perthite, in places converted to augen, are found in a finer-grained groundmass of feldspar, quartz and hornblende. Garnetiferous varieties are also common. Locally these rocks may be more basic in composition, as is the case in the hypersthene-rich rock on an island in Rossi lake in the northwest corner of the area; this could be classified as a norite, and contains up to 30% magnetite in places.

Granite Pegmatite and Migmatite

These rocks are intrusive into the quartz monzonitic augen gneiss, which they closely resemble. They are coarse grained, pink to brown, and composed essentially of potash feldspar (microperthite) laths in a matrix of finer-grained quartz and feldspar. Hornblende is common and is usually found at the contact between the pegmatite and the country rock.

An injection rock of similar composition and containing large blocks of amphibolite and pink granitic gneiss was found on the Mont Tremblant Park road south of Shaw lake.

Aplites and Granitic Dykes

Pink, fine- to medium-grained dykes of aplite or granite cut the granite, syenite, and quartz monzonite. The dyke rocks are best exposed and thickest on the northwest shore of Rossi lake. Potash feldspar, plagioclase, and quartz are the main minerals.

LATER INTRUSIVE ROCKS

Diabase

Only two diabase dykes were seen in the area. One, only a few feet thick, is fine grained and cuts gabbro. The other, which is thicker, is porphyritic, cuts granitic gneisses, and is composed of laths of zoned plagioclase in a very fine-grained matrix.

PLEISTOCENE AND RECENT

Glacial deposits are widespread in the area as drift, boulders, and erratics. The valleys are partly filled by sand and gravel mainly of fluvio-glacial origin.

The direction of the ice movement was essentially south, as indicated by glacial striae and roches moutonnées.

STRUCTURAL GEOLOGY

Foliation

Most of the gneisses are well foliated. In the eastern part of the area the foliation trends northwest. Towards the centre it swings to the north and maintains this strike westward through the area. In the paragneisses and green granitic gneisses dips are inconsistent, as would be expected in folded terranes. The pink granitic gneisses and some igneous intrusions display more consistent attitudes, indicating large, thick, sill-like bodies.

Lineation and Folds

Lineation is generally parallel to the foliation, indicating tight, isoclinal folds. In areas with folds of large amplitude the lineation is essentially parallel to the fold axes. One of the largest folds is near Honoré lake in the east-central part of the area.

Faults, Joints, Lineaments

These features are prominent on practically every scale, from small, ruptured, amphibolitic bands in the granitic gneisses to major fault or joint systems that extend for many miles, as in the valley of Saint-~~Martin~~ Louis river.

A peculiar set of radiating joints surrounds Beattie lake in the west-central part of the area. North of Saint-Louis lake there are two sets of lineaments: one essentially parallel to the regional foliation and the other almost perpendicular to it.

ECONOMIC GEOLOGY

Silica. - Prospecting has been done for silica deposits by Dominion Silica Company north of Pembina lake and west of Archambault lake (oral communication, Mr. George Blix, foreman of operations, Dominion Silica Mine, Saint-Donat). Massive, impure, garnetiferous quartzites were observed in a few localities during the present survey.

Iron. - Magnetite occurs on a small island on the northwest side of Rossi Lake and magnetite-rich monzonites and gabbros were found south of Rolland (Escalier) lake and just west of the southern part of Archambault lake.

Graphite is quite abundant in some of the rusty weathering gneisses east and north of Rolland (Escalier) lake.

Construction Material. - Some of the granitic gneisses are being exploited for local building purposes. These rocks are usually picked up as boulders in the field, and then split and sold as building and ornamental stones. Granite and syenite could be similarly used.

Sand and gravel are used extensively for local road maintenance and construction.

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