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UPPER GATINEAU REGION, PART D

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PROVINCE OF QUEBEC, CANADA

BUREAU OF MINES

Honourable J. E. PERRAULT, Minister of Mines

J. L. BOULANGER, Deputy-Minister A. O. DUFRESNE, Director

ANNUAL REPORT

OF THE

QUEBEC BUREAU OF MINES

FOR THE CALENDAR YEAR

1933

JOHN A. DRESSER, Directing Geologist

PART D

QUEBEC

PRINTED BY R. PARADIS

PRINTER TO HIS MAJESTY THE KING

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UPPER GATINEAU REGION AND VICINITY

by J. A. Retty

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(All photographs by the Royal Canadian Air Force, Department of National Defence).

UPPER GATINEAU REGION AND VICINITY

by J. A. Retty

INTRODUCTION

General Statement and Acknowledgments

During the field season of 1933, the writer made a reconnaissance examination of the geology of the upper Gatineau district and vicinity. The work was undertaken to obtain geological data on the territory north of Maniwaki, and to determine whether or not the gold-bearing rocks of northwestern Quebec extend eastward into the upper Gatineau district. Examination of the area was also desired because of the occurrence of gold on the Wapus river in the upper Gatineau district. The field work was begun on June 9th and completed on August 26th.

The co-operation of officials of the Canadian International Paper Company greatly facilitated the work of the party. The writer wishes to express his thanks to Messrs. G. A. Delahey and W. J. Sutherland, superintendents of the Maniwaki and Clova divisions of the Company, and to their associates, for many acts of kindness. It is a pleasure, also, to acknowledge the assistance rendered by Messrs. J. E. Gendron, Crown Lands agent and game-warden, Maniwaki, R. Hilliker, Superintendent of the Gatineau Boom Company, and Jos. Cusson.

J. J. Harris assisted efficiently in mapping the geology. Wm. Odjick, Indian guide of Maniwaki, also deserves mention for safely piloting the party down the rapid waters of the Gatineau river.

The plans used as a base for the geological map were supplied by the Topographical Survey of Canada, the Surveys Branch of the Department of Lands and Forests, Quebec, and the Engineering Department of the Canadian International Paper Company.

The writer is especially indebted to Mr. A. M. Narraway, Associate Director and Chief Aerial Surveys Engineer of the Topographical Survey of Canada, for advance copies of aerial maps, which greatly facilitated the work of compilation.

Location and Area

Maniwaki is a village situated 90 miles north of Ottawa at the terminus of the Ottawa-Maniwaki branch of the Canadian Pacific railway. The area to be described in this report begins at a point 50 miles north of Maniwaki and continues north to the Quebec-Cochrane branch of the Canadian National railways. It is bounded on the east by the Gatineau river; on the west by the Capitachouane river and Cabonga reservoir; and on the south by the Gens-de-terre river and Mercier reservoir.

The district, thus defined, comprises an area of approximately 3,500 square miles.

Access and Communication

The southern part of the area may be reached from Maniwaki by a motor road to Lacroix dam on Mercier reservoir, the distance being 30 miles. Northwest of Lacroix dam, this motor road continues to Hunter lake, 35 miles away. From Hunter lake, there is a portage to Cabonga reservoir. This is the best route to follow going northwards. The safest mode of travel is by power boat, as Cabonga reservoir is large and in many parts of it floating and water-logged trees and submerged stumps are abundant.

The Gatineau, above Mercier reservoir, is navigable upstream only with great difficulty. Descent of this river, too, is very dangerous at all times and should be attempted only by expert canoemen.

The northern part of the area is easily entered from Clova, Monet, or Bourmont, stations on the Quebec-Cochrane branch of the Canadian National railways, approximately 200 miles west of Quebec city.

Clova, a hamlet of some twenty buildings, is the northern headquarters of the Canadian International Paper Company for this district and southward. An improved gravelled highway has been constructed from Clova to Elbow dépôt, a distance of 53 miles. The highway follows the Gatineau river to mileage 37 and thence extends southwest to Elbow dépôt, 16 miles away. From mileage 37, two other roads branch off; one leads south to Rapid creek, the other southeast along the Gatineau river to Coucou dépôt, 13 miles distant,

where the Coucou river joins the Gatineau. From Coucou dépôt, the road continues southwest to Sand Lake cache, 12 miles up Coucou river, and at a point four miles up the river a branch goes south and east to Pike Lake cache, about one and a half miles from the junction of Bazin and Gatineau rivers.

'Caches' or 'dépôts', which are used as stopping places or as headquarters for outlying logging operations, are maintained at regular intervals along the roads.

The Canadian International Paper Company has established a system of telephone lines along the main routes, connecting their several dépôts. There is also a network of telephone lines across country, linking the lookout towers—situated on high hills throughout the district—which are maintained for the rapid detection and location of forest fires.

The waters of the upper Ottawa river may be reached at Travers lake, on the Clova road between mileage 37 and Elbow dépôt.

The Capitachouane and Camachigama rivers are reached most easily from Bourmont, a station twenty miles west of Clova.

Surveys are now being made by the Department of Roads, Quebec, for the construction of a highway to connect the new Pascalis goldfield with both Maniwaki and Mont-Laurier. With the completion of this road, there will be a direct route across the southwest part of the area connecting both of these towns with Senneterre.

Previous Work

In 1916, Joseph Keele made a reconnaissance trip up the Gens-de-terre river, through what is now Cabonga reservoir, to Barrière lake ①.

During the same season, H. C. Cooke came down the Gatineau river from Parent, Que., to Ottawa, Ont. The results of his observations have not been published ②.

In 1917, M. E. Wilson examined the Maniwaki map-area, which lies south of the district described in this report ③.

With the exception of Keele's description of the southwest portion, nothing has been published to date on the present map-area.

① Geol. Surv. Can., Summ. Rep., 1916, pp. 219-227.
② *Ibid*, p. 228.
③ Geol. Surv. Can., Mem. 136, 1924, pp. 128-136.

Method of Work

The extent of the area and the shortness of the season did not permit of many detailed observations. The work was of a reconnaissance character only, except in the vicinity of certain mining claims and of rocks of the Grenville series, and at other points of exceptional geological interest. Critical examinations were confined, in the main, to the immediate vicinity of the roads, the streams, and the more accessible lakes.

Timber

From the economic viewpoint, the most important timber in the district is spruce, of which extensive forests, covering hundreds of square miles, are to be found throughout the area. Fire has, as usual, taken its toll, but in the central section, especially, the stands have thus far escaped remarkably well, due undoubtedly to the efficient system of fire protection that has been established within the area by the Canadian International Paper Company, which holds most of the limits. This Company is operating at present on a large scale along the Gatineau river.

Water-Powers

There are many water-power sites in the district, some large, others small. The following table lists the more important sites on the Gatineau system. The information presented has been obtained from a report on the water-powers of the Province of Quebec, co-operatively prepared by the Dominion Water-Power Service and the Quebec Streams Commission.

WATER-POWER SITES ON THE GATINEAU SYSTEM

LOCATION	Head (feet)	Drainage Area (square miles)	Est. Capacity in h. p. at 80% Efficiency	
			At ordinary minimum flow	At ordinary six months' flow
Gatineau (Ottawa drainage):				
Snake fall	35	2,665	3,223	5,946
Hardwood fall	72	2,705	6,729	12,397
Sturgeon fall	15	2,750	1,425	2,625
Tamarac (Trib. to Gatineau):				
10 miles below Coquar	8	62	18	31
20 miles below Coquar	12	136	56	103
35 miles below Coquar	20	286	198	363
36 miles below Coquar	21	286	208	382
Gens-de-Terre (Trib. to Gatineau):				
Below Cabonga lake	40	1,160	1,600	2,950
Foot of Travers lake	27	1,680	1,570	2,890
Big Poigan rapids	26	1,700	1,527	2,812
Upper Poigan rapids	18	1,750	1,088	2,005
Lower Poigan rapids	20	1,770	1,223	2,253
Malin rapid	40	1,805	2,495	4,596
Penché rapid	22	1,805	1,372	2,528
Hell's Gate rapid	21	2,040	1,480	2,726
Noyé rapid	18	2,050	1,344	2,348
Mine rapid	77	2,060	5,481	10,090
Bois Franc rapid	33	2,070	2,361	4,347
Narcisse chute	44	2,070	3,148	5,800
Savard rapid	9	2,100	798	1,470
Côte-Jaune rapid	58	2,550	5,110	9,557

In addition to the above, there are important water-power sites on the upper Ottawa river, and at other localities in the district, which have not been surveyed.

GAME

The region abounds in the type of game that characterizes other parts of northern Quebec. Moose are very plentiful, but deer are scarce, as they do not frequent country so far north. The lakes and streams are well stocked with fish. The supply of fur-bearing animals has been greatly depleted owing to the activity of the trapper.

General Character of the Area

The area lies wholly within the great Laurentian plateau, and, broadly, presents the remarkable uniformity of relief that is characteristic of the plateau elsewhere. This feature is especially well seen from the lookout towers.

In detail, however, the land surface is rather rugged, with numerous small hills and ridges of variable height, composed of banded paragneiss and orthogneiss, rising above the general level, though the range of elevation does not exceed 300 feet. The higher hills have been chosen as the sites for lookout towers, whose positions are indicated on the accompanying map. In the region as a whole, the hills and ridges have no definite orientation. Locally, however, some parallelism appears. Thus, in the north part of the district, on the road from mileage 37 to Rapid creek, a number of parallel ridges have an approximately east-west trend, and there is a similar series of east-west ridges in the southwest part of the area, along the lower stretches of the Gens-de-terre river.

The slopes of the ridges are covered by a thin mantle of boulders, sand, and vegetable matter. The sand has been derived, in part, from the disintegration of the underlying gneiss; but some of it, and also the boulders, probably represent the ground moraine and outwash of the continental ice-sheet.

The land surface in the low-lying parts of the area is generally rough and hummocky, with a covering of soil similar to that on the ridges. Rock outcrops, though lacking in some sections of the area, are in general fairly abundant. Flat, plain-like areas are of quite common occurrence in the lowlands, but they are very limited in extent. Such areas were noted in the north and central parts of the district along the Clova highway, the Capitachouane and Camachigama rivers, and in the vicinity of Landron lake on the upper Ottawa river. In the south part of the district, similar plains, in which the sand is forty feet thick, occur along the Gatineau river from two to three miles above the point where it flows into Mercier reservoir. Sand deposits are also found among the islands of Mercier reservoir and on the east shore of Cabonga reservoir.

The rivers, though turbulent in places, are generally navigable. Falls and rapids are common along their courses. The Capitachouane

river is remarkable in that numerous meanders, oxbows, and cut-offs appear along its lower portion (see Plate I). One river terrace, probably formed by the down-cutting of the stream, was noted at Mishomis farm, on the Gatineau river.

The topography has been considerably modified by glaciation. The rock surface has been denuded, and boulders, sand, and clay have replaced the pre-existing soil. Moraines are of very general occurrence, and the streams have been considerably changed by the plucking, transportation, and deposition effected by the ice.

Excellent illustrations of the excavation of valleys in glacial deposits were noted along the Clova road in the vicinity of mileage 37 (see Plate II-A). Several small streams, rising in adjoining lakes, have cut down through the unconsolidated glacial deposits, forming valleys half a mile across and from sixty to seventy feet deep.

Glacial striae, striking N.20°E., may be seen on rock exposures at lakes Choiseul, Capitachouane, and McLennan. Their general absence throughout the area is probably due to the rapid weathering of the gneisses which form the prevailing country rock.

No sections of the district examined are adapted to farming. The unfavourable nature of the soil in the flat tracts, and the rugged character of the country elsewhere, render the area unfit for cultivation.

Drainage

The most important river within the area is the Gatineau. The main river is formed by the junction of Bazin and upper Gatineau rivers, which meet at a point about fifty miles northeast of Mercier reservoir.

The Bazin river rises in the vicinity of Parent, Que., and flows in a southwesterly direction to meet the Gatineau river. The latter is formed by the junction of the Clova and Tamarac rivers, which have their source near Clova and flow in a general southerly direction to the vicinity of mileage 22 on the Clova road, where they join.

Along its entire upper course, the Gatineau river is broken by many falls and rapids. The country on both sides is generally rugged and hilly.

The Gens-de-terre river is the most important tributary of the Gatineau. It rises in Cabonga reservoir and flows in a general southeast direction to Mercier reservoir. A short distance below Cabonga reservoir it is joined by the Bélinge river, which drains O'Sullivan lake and Stramond lake.

The Ottawa river rises above Travers lake, about five miles southwest of the Gatineau, and flows in a southwesterly direction through lakes Bouchette and Barrière to Grand Lac Victoria. Along its upper section the river is small, but it becomes a large stream in the vicinity of Bouchette lake. Few rapids occur along its course. About halfway between Travers lake and Barrière lake, the river splits in two channels. One continues in the general southwest direction of the main body of water; the other goes south to Landron lake, then west, and finally swings north to re-join the main stream.

The first tributary of the Ottawa, coming downstream, is the Festubert river. Flowing from the northeast, it enters the Ottawa just above the point where it splits, as described in the last paragraph. This stream is small and relatively unimportant.

The next tributary is the Camachigama river. It rises in the area northeast of the lake of the same name and flows into the Ottawa on its north side at Bouchette lake. Along its upper stretches, the Camachigama is turbulent, but the lower portion has many bays and much quiet water.

The Capitachouane river enters the Ottawa from the north, about six miles below Barrière lake. It has its source in the vicinity of Bourmont. It is very rough directly below Péronne lake; and along this section is navigable only with difficulty. Along the lower portion, where it meanders through miles of glacial deposits, the river is relatively tranquil.

There are many large lakes within the region, the most important of which are Chouart, Choiseul, Capitachouane, Capimitchigama, Stramond, O'Sullivan, Landron, Barrière, Bouchette, Camachigama, Petawaga and Poigan. A multitude of smaller lakes also dot the area, as may be seen by a glance at the accompanying map. Wilson estimates that 27 per cent of the area to the west of that here dealt with is covered by water ①. This would be a conservative estimate in the present map-area (see Plate II—B).

① Geol. Surv. Can., Mem. 103, 1918, p. 28.

Two reservoirs, formed by dams and cut-offs, constructed on Cabonga and Baskatong lakes, are known respectively as the Cabonga and Mercier reservoirs. These are under the control of the Quebec Streams Commission and are used to regulate the flow of water in the Gatineau river, where the hydro-electric plants of the Gatineau Power Company are situated.

GENERAL GEOLOGY

General Statement

All the solid rocks of the area are of pre-Cambrian age. In the section south of the upper Ottawa river, these include bands of rocks of the Grenville series: crystalline limestone, quartzite, metamorphic pyroxenite, garnetiferous gneiss, biotite-rich paragneisses, and amphibolite. These are intimately associated with orthogneisses of variable character and have been intruded by pegmatite and aplite.

So-called 'banded gneisses' are also prominent in certain parts of the area. These represent sedimentary rocks, presumably Grenville, which have been so intimately intruded by granite and subsequently or simultaneously metamorphosed that it is impossible to map them as distinct units.

Extensive areas within the map-sheet are occupied by orthogneiss. This is probably of the same age as the igneous intrusion which brought about the formation of the banded gneisses.

Apart from pegmatite and aplite, the only massive rocks seen in the area are garnetiferous quartz gabbro, observed in two localities, and peridotite, represented by a single dyke. Since they are not foliated, these rocks are probably later than the orthogneiss.

Glacial drift and, to a minor extent, river deposits are found above the bed-rock.

TABLE OF FORMATIONS

PLEISTOCENE	Boulders, sand, clay		
PRE-CAMBRIAN	Altered peridotite		Not foliated
	Garnetiferous quartz gabbro		
	Pegmatite, aplite		
	Orthogneisses	Granite gneiss, syenite gneiss, granodiorite gneiss, diorite gneiss	
	Banded gneisses		
	Grenville series	Crystalline limestone, quartzite, metamorphic pyroxenite, garnetiferous gneiss, biotite-rich paragneiss, amphibolite	

GRENVILLE SERIES

The mode of occurrence of the Grenville series is such that it cannot be represented as a distinct unit on the accompanying map. The several members of the series vary in character and are injected by pegmatite and orthogneiss. Field occurrences are small and often are intimately associated with banded and other gneisses.

CRYSTALLINE LIMESTONE:

Crystalline limestone is by far the most important member of the Grenville series. Outcroppings were observed on Notakim lake and along the lower portion of the Gatineau river, above the point where it enters Mercier reservoir. Smaller, isolated bands occur on Cabonga reservoir, Bélinge river, Capimitchigama lake, Poigan lake, and Wapus river. The occurrence at Capimitchigama lake is of special interest, as it is only forty miles south of the Quebec-Cochrane branch of the Canadian National railway.

The limestone usually occurs in well-defined bands, which may be as little as one inch to as much as thirty feet in width. It is a fine- to medium-grained rock, generally white, but at some localities buff or salmon in colour. The rock is composed principally of white, glistening crystals of calcite, throughout which are often scattered numerous, small plates of amber mica, so distributed that the rock

has a pronounced banded appearance. Banding in the limestone is sometimes due, also, to variations in texture. Other minerals commonly present in small amount are biotite, graphite, muscovite, and pyrite.

The limestone is intimately associated with other members of the Grenville series. It often holds detached fragments of banded gneiss, paragneiss, and orthogneiss, and, conversely, is also found in places as small, irregular inclusions within the gneisses.

QUARTZITE:

Narrow bands of quartzite are associated with the crystalline limestone. They were especially observed along the lower east side of Notakim lake. The bands examined at this point are as much as ten inches in width. Usually, they are much narrower than this. The typical rock is composed entirely of vitreous quartz, but occasional small crystals of garnet were noted in a specimen from Stoney lake.

METAMORPHIC PYROXENITE:

In some places, where the Grenville limestone has been intruded by pegmatite, there has been a development of pyroxenite as a result of contact metamorphism. Such occurrences were noted at the south end of Notakim lake and on an island in the Gatineau river at the first chute below Mishomis farm. The rock is medium-grained, granular, and white to pale green in colour. Under the microscope, it is seen to be composed of diopside with minor amounts of tremolite.

GARNETIFEROUS GNEISS:

Garnetiferous gneiss was found at many localities within the area. The largest exposures seen are on Barrière lake, along the upper Ottawa river, and on Cabonga reservoir, but small local bands occur haphazardly throughout the district. Whether or not all belong to the Grenville series is difficult to determine, and, for this reason, only those masses that occur in the vicinity of Grenville limestones are here included in the series.

The rock is variable in appearance and in mineral composition. The colour of the garnet ranges from blood-red, through pink, to amethyst. Apart from the garnet, some varieties of the rock are

made up of quartz and feldspar, while others are composed in great part of amphibole. There can be little doubt, therefore, that these garnetiferous gneisses have been derived from sedimentary rocks of very diverse composition.

Specimens from a number of different localities were examined in thin section under the microscope, and the following are selected as examples to illustrate the variation in mineral composition. A medium grained variety from the Gens-de-terre river at the outlet of Cabonga reservoir is composed predominantly of quartz and garnet, with minor amounts of biotite, hornblende, and albite. A specimen from the outlet of Moon lake is fine-grained, banded, and syenitic in composition. One from the Cusson prospect, on Wapus river, is also fine-grained, but consists predominantly of hornblende, with a small amount of quartz and albite. Another example of a basic variety is that at the south end of O'Sullivan lake, where the rock is composed of pyroxene, secondary hornblende, garnet, biotite, quartz, and plagioclase feldspar.

BIOTITE-RICH PARAGNEISS:

Many of the gneisses that are associated with the Grenville series are believed to be of sedimentary origin, although it is not possible definitely to establish their identity as such on mineralogical grounds. The outstanding group of this class are the biotite-rich gneisses, whose high content of iron and potash suggests that they have originated from sedimentary rocks.

AMPHIBOLITE:

Amphibolite is of rare occurrence. Small masses were observed along the southeast shore of Stramond lake and in the yard at Coucou dépôt. Smaller bands and stringers are present in other parts of the area.

The rock is green in colour, from medium to coarse-grained, and is not foliated. Under the microscope, it is seen to be composed almost entirely of green amphibole, with a little quartz and, in some specimens, a little biotite.

Banded Gneisses

There occurs throughout the area, irregularly in places, in others with monotonous continuity, a series of gneisses, whose most outstanding and constant characteristic is an even banding.

The simplest type of banding arises from the alternation of rocks of greatly differing composition, such as granite with basic garnetiferous gneiss. Banding also results from difference in texture, where fine grained and medium or coarse grained bands alternate; or it may be brought about by a variation in the proportions of certain minerals, such as biotite and hornblende, some bands being conspicuous because of a predominance of these minerals, while others stand out by way of contrast because of their absence.

Some of the bands are definitely of metamorphosed sedimentary material. They consist of garnetiferous gneiss, quartzitic gneiss, amphibolitic gneiss, or biotite-rich quartz-feldspar gneiss. These rocks are regarded as possessing a structure inherited from the sedimentaries from which they have been derived. They may succeed one another within a single outcrop, or they may alternate with bands which are definitely igneous, such as granite gneiss or syenite gneiss, this alternation being brought about by *lit-par-lit* injection.

Many of the banded gneisses, on the other hand, are composed entirely of material which is definitely igneous. These may be easily identified as orthogneisses because of their well defined composition.

There are, however, many 'hybrids' within the areas of banded gneisses which, from a study of their field relationships or from their composition, cannot be classed either as igneous or sedimentary. The origin of these types must remain partly in doubt. They have probably resulted from the impregnation of sedimentary strata with igneous material.

Orthogneisses

Metamorphosed intrusive rocks are present throughout the map-area. They include gneissoid varieties of granite, syenite, granodiorite, and diorite. The occurrences vary in size from small masses to bodies of batholithic dimensions.

Granite and syenite gneisses are the most important members of this class. They are light grey to pink in colour and possess the usual granitic texture. The granite gneiss consists essentially of quartz, orthoclase, and albite, with biotite or hornblende, or both. The biotite variety is the more common. Zircon, apatite, and magnetite are present as accessory minerals. In some of the thin sections examined, the minerals are fresh, but in others they are considerably altered and the quartz shows strain effects. The syenite gneiss is similar, except for the absence of quartz and the fact that the rock contains very little biotite.

The granite and syenite gneiss, though present in many parts of the area, have their greatest development on lakes Choiseul and McLennan and along a chain of lakes west of the Gatineau river, in the vicinity of Mishomis farm.

Granodiorite gneiss is rare. It resembles the granite gneiss, but contains less quartz and orthoclase, more plagioclase, and biotite is replaced entirely by hornblende.

Diorite gneiss was observed only at one point, near the outlet of the Capitachouane river. It is the usual type of mottled, medium grained rock composed predominantly of green amphibole and plagioclase.

Pegmatite and Aplite

Pegmatite occurs throughout the area in the form of dykes and irregular masses, and as injections along the planes of foliation in the gneisses. It is white to pink in colour, coarse-grained, and granitic in composition.

The pink variety is the most common. It is found in dykes from three to thirty feet wide, which are usually not foliated. Chloritization of the feldspar as a result of contact-metamorphic action was observed at two points where pegmatite dykes cut the gneisses: to the west of Corbeau lake, and on the western arm of O'Sullivan lake. Chloritization is the only type of alteration observed in thin sections of the pegmatite.

Large, irregular masses of white pegmatite occur within the crystalline limestone. Their intrusion has produced the masses of diopside already described under the heading 'metamorphic pyroxenite'.

Pegmatitic injections are also common in the gneisses. They vary in width from two to three inches and are usually present along the planes of foliation as small lenses, or as continuous veinlets which cut across the bands and form an intricate network in the country rock.

The following minerals were observed in thin sections of the pegmatites: orthoclase, quartz, albite, biotite, muscovite, garnet, tourmaline, magnetite, titanite, pyrite, pyrrhotite, chalcopyrite, calcite, and microcline.

Aplite is not of frequent occurrence. It is a pink, fine-textured rock in which quartz and orthoclase may be distinguished with a lens.

Garnetiferous Quartz Gabbro

An unusual type of rock was observed on the south shore of Indian lake, and at three different points on Akos lake. The very definite alignment of the exposures on Akos lake suggests that the occurrence is a dyke, but actual contacts were not seen. The trend of these exposures is N.20°E.

The rock is greenish, medium grained, and massive. Well-developed crystals of feldspar, pyroxene, and garnet may be observed in the hand specimen. The texture is ophitic in places. The microscope discloses an unusual composition. Lath-shaped crystals of oligoclase are present, with augite and garnet as the predominant interstitial material. Quartz, micropegmatite, and a small amount of olivine are minor constituents. Some of the feldspar is peculiar in that it contains uniformly scattered rectangular plates of chlorite, so that there is a resemblance to the schiller structure often seen in hypersthene. It differs from the schiller structure in that the orientation of the plates is not uniform.

This rock has probably been formed by gabbro assimilating sedimentary material during its intrusion.

Altered Peridotite

One dyke of a massive, greenish, fine-grained rock, striking N.60°W., was observed cutting banded gneisses at the outlet of Péronne lake. The dyke has a width of twenty feet and it exhibits no trace of foliation.

Little information as to the nature of the rock is given by the hand specimen, but in thin section it is seen to be composed of pyroxene and secondary hornblende, with some unaltered olivine.

STRUCTURE

The recrystallized, foliated character of the rocks, and the absence of horizon markers, render it almost impossible to work out any general structure. Moreover, the size of the area and the nature of the work carried on by the writer did not allow of detailed studies. As a result of numerous observations, the strike of the rocks is found to be irregular, with sharp or broad curves and locally minute plications. In a broad way, the trend is northeasterly. The angle of dip also varies from place to place, ranging from horizontal to vertical, though generally between 30° and 70°.

Foliation is well developed in the orthogneisses, and in some localities they have cataclastic structure. Banding is a marked feature of the paragneisses and undoubtedly results from the original sedimentary bedding. Because of the intensive development of secondary structures within the paragneisses, it is not always possible to determine the original bedding. Wherever observed, however, the bedding planes are parallel to the gneissose structure. Banding is also a feature of the rocks described above as 'banded gneisses,' in which the banding is due either to inherited sedimentary bedding or to secondary features brought about by igneous injections.

Schistose structure is entirely absent from amphibolite, garnetiferous quartz gabbro, altered peridotite, and aplite, and from most of the pegmatite.

Folding may be observed locally, as at a point west of Corbeau lake, where there is a small syncline. Dome structure, on a small scale, was noted on the northeast shore of Cabonga reservoir, and on Danin lake.

The distribution of the various rock types is haphazard, and no general relationships can be worked out from their field occurrence, except that Grenville limestone was not seen north of the Ottawa river. The outcroppings of other rocks are erratic, and no dependable conclusions can be arrived at regarding the distribution of the original sediments or the zones of subsequent igneous intrusion.

ECONOMIC GEOLOGY

The area examined does not appear to be as favourable to the occurrence of mineral deposits as was anticipated. The pegmatite dykes are a possible source of radioactive minerals, and of feldspar and mica. Pyrite was found in pegmatite at O'Sullivan lake; and pyrite, chalcopyrite, and bornite, in small amount, were observed in amphibolite in the yard at Coucou dépôt.

Cusson Claims

Jos. Cusson and Eugène Cusson hold a group of claims on Wapus river, about 70 miles northwest of Maniwaki. These may be reached by going 47 miles by automobile to Lepine farm and thence by waggon 30 miles to Johnny creek. The journey is then made by canoe, three-quarters of a mile down Johnny creek to Wapus river, and up the latter eleven and a half miles to the point where the claims are situated.

An alternate route is by way of Lacroix dam, which may be reached by automobile from Maniwaki, thirty miles to the south. At the dam, a boat may be secured for transportation to Petawagama portage, 18 miles distant. Then, after a portage one and one-eighth miles long, to Petawagama lake, a canoe with an outboard motor may be used to reach the north end of the lake, 16 miles distant, whence a trail 12 miles long leads to Cusson's hunting camp, which is situated on Wapus river, two and a half miles northeast of the claims.

The claim numbers are: Q.13451 to Q.13454, Q.13489 to Q.13492, and Q.13496. Two of the claims on the northwest side of the group are traversed by the Wapus river. The remaining claims lie south of the river. The boundary line between the counties of Montcalm and Hull cuts across two of the claims on the northeast side of the property.

The rock along the Wapus river is banded paragneiss of variable composition, with associated narrow bands of crystalline Grenville limestone. The strike is N.70°E. and the dip 30°N. The surrounding country is hummocky, sandy, and heavily wooded.

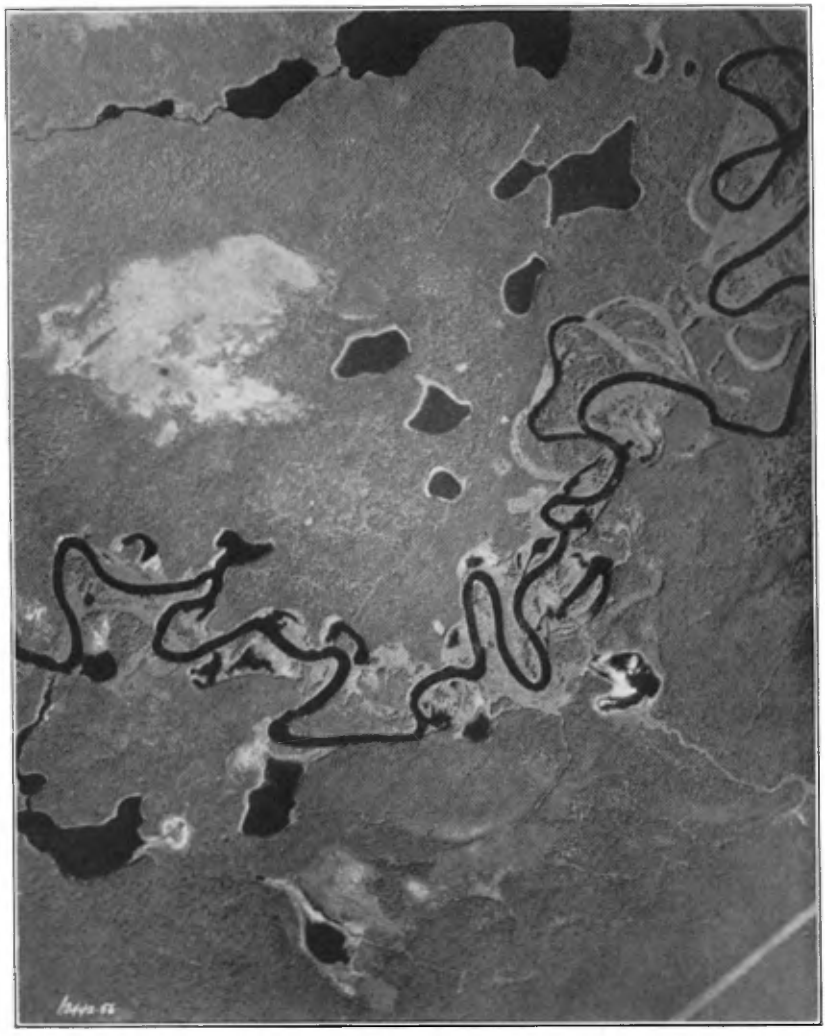
The Cusson workings are located 100 feet south of the river, on claim Q.13496. A trench 125 feet long, running S.5°W., has been blasted out to explore the zone. It has an average width of four feet and a depth varying from three to six feet.

The country rock is similar to that along the river. It is predominantly quartz-biotite-feldspar gneiss, with some garnetiferous gneiss and narrow lenses of crystalline limestone. These rocks have been invaded locally by fine-grained pink granite and later pegmatite, the outline of which is generally irregular. The strike of the rock varies from N.35°E. at the north end of the trench to N.60°E. at the south end. The dip varies from 30° to 60°N.W. Minor folds occur within the gneiss.

At the south end of the trench, the gneisses are cut by a 45-foot dyke of granite-pegmatite, striking N.70°W. This is probably the source of the pegmatitic injections in the country rock, in which occur the small local concentrations of quartz, pyrite, and pyrrhotite that have attracted attention.

The pegmatite occurs all along the trench in dykes, lenses, and irregular stringers, which vary in width from a quarter of an inch to three feet. A three-foot dyke and a two-foot mass are exposed in the trench at its south end. These are followed by several six-inch dykes which parallel the foliation in the gneiss. Another one-foot mass occurs 15 feet from the north end. Stringers of pegmatite are abundant throughout the length of the trench.

Pyrite and pyrrhotite, in small amount, occur in isolated irregular masses and also in veinlets in the gneiss in the central portion of the trench, and, at the north end, pyrite is common, disseminated in garnetiferous gneiss. Small concentrations of pyrite and pyrrhotite were also noted in pegmatite. Native silver has been reported here, but none was seen by the writer. We were also informed that assays of material from these claims show values in gold and silver.



(Photo Royal Canadian Air Force)

Meanders, ox-bows and cut-offs along Capitachouane river.

(*Photo Royal Canadian Air Force*)

A.—Excavation of valleys in glacial deposits along Clova road, south of mileage 37.

(*Photo Royal Canadian Air Force*)

B.—Large number of small lakes in area west of mileage 37.