

RASM 1930-B4(A)

GABOURY-BLONDEAU TOWNSHIPS MAP-AREA, TEMISCAMINGUE COUNTY, PART B

Documents complémentaires

Additional Files



Licence



Licence

Cette première page a été ajoutée
au document et ne fait pas partie du
rapport tel que soumis par les auteurs.

Énergie et Ressources
naturelles

Québec 

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
1930

JOHN A. DRESSER, Directing Geologist

PART B

	Page
Central-Cadillac Map-Area, Abitibi County, by L. V. Bell..	3
Cléricy-Joannès Map-Area, Abitibi and Témiscamingue Counties, by L. V. Bell.....	18
Venus Gold Mine, Barraute Township, Abitibi County, by L. V. Bell.....	39
Gaboury-Blondeau Townships Map-Area, Témiscamingue County, by J. A. Retty.....	53
Geological Exploration on the North Shore, Escoumains to Forestville (Mille Vaches sheet), by Carl Faessler...	89



QUEBEC
PRINTED BY R. PARADIS
PRINTER TO HIS MAJESTY THE KING
1931

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
1930

JOHN A. DRESSER, Directing Geologist

PART B

	Page
Central-Cadillac Map-Area, Abitibi County, by L. V. Bell . . .	3
Cléricy-Joannès Map-Area, Abitibi and Témiscamingue Counties, by L. V. Bell	18
Venus Gold Mine, Barraute Township, Abitibi County, by L. V. Bell	39
Gaboury-Blondeau Townships Map-Area, Témiscamingue County, by J. A. Retty	53
Geological Exploration on the North Shore, Escoumains to Forestville (Mille Vaches sheet), by Carl Faessler . . .	89



QUEBEC
PRINTED BY R. PARADIS
PRINTER TO HIS MAJESTY THE KING

1931

GABOURY-BLONDEAU TOWNSHIPS MAP-AREA

TÉMISCAMINGUE COUNTY

by J. A. Retty

CONTENTS

	Page
INTRODUCTION.....	55
Subject of report.....	55
Acknowledgments.....	55
Location and extent of area.....	55
Means of access.....	56
Previous work.....	56
Methods of work.....	57
DESCRIPTION OF THE AREA.....	57
Topography: Relief, Drainage.....	57
Water powers.....	59
Forests.....	59
Game.....	59
Agriculture.....	59
Glaciation.....	60
GENERAL GEOLOGY.....	60
Preliminary outline.....	60
Table of formations.....	61
DESCRIPTION OF FORMATIONS.....	62
Keewatin: Andesite, Rhyolite, Basalt, Breccia, Altered intrusives, Iron formation.....	62
Sediments associated with Keewatin volcanics.....	64
Age of sediments associated with Keewatin rocks.....	65
Structure of the Keewatin.....	66
Pre-Témiscamian (?) intrusives: Serpentinized rock, Gabbro and Metagabbro, Feldspar porphyry, Quartz porphyry, Lamprophyre.....	66

CONTENTS—*Continued*

Témiscamian (?): Description, Structure, Origin, Age.....	69
Algomian (?): Granite, Porphyritic granite, Pegmatite and Aplite.....	72
Age of the granite.....	73
Syenite and Diorite.....	74
Keweenawan: Diabase and Olivine Diabase.....	74
ECONOMIC GEOLOGY.....	75
Asbestos.....	75
Bellehumeur-Ferron claims.....	75
Crevier claim.....	77
Gold, Copper, and Iron.....	78
Pedlow claims.....	78
Bellehumeur-Turgeon claims.....	80
Landy claims.....	81
Carufel prospect.....	82
Turney claims.....	83
Lake Girard workings.....	84
Lake Gauvin workings.....	85
Lorrainville Mining Syndicate.....	86

ILLUSTRATIONS AND MAPS

Map No. 119.—Gaboury-Blondeau Townships.....(In pocket)	
Plate II A—Iron formation showing drag-folds, Lake McKenzie.....	64
B—Band of conglomerate between volcanic flows, east end lake McKenzie.....	64

GABOURY-BLONDEAU TOWNSHIPS MAP-AREA

TÉMISCAMINGUE COUNTY

by J. A. Retty

INTRODUCTION

SUBJECT OF REPORT

It has been known for some time that gold, copper, and asbestos occur in the townships of Gaboury and Blondeau, Témiscamingue county, Quebec. During the field season of 1930, the writer was assigned the task of making a preliminary survey of the geology of these townships and of examining the mineral deposits that occur therein. This report and the accompanying map-sheet represent the results of the work.

ACKNOWLEDGMENTS

The Department of Lands and Forests, Québec, furnished the township plans that were used in the compilation of the base map.

Messrs. R. Carufel, V. Bellehumeur Sr., E. Dupuis and N. Mé-nard gave much valuable information upon the topography of the area.

Messrs. F. Morisset and J. Morency, who were appointed to the party as technical assistants, did their work very satisfactorily.

The writer is deeply grateful to Professors A. F. Buddington and E. Sampson of the Department of Geology, Princeton University, for advice and assistance during the preparation of the report.

LOCATION AND EXTENT OF AREA

The area is situated in Témiscamingue county, 170 miles north-west of the city of Montreal and nine miles east of the Mattawa-Angliers branch of the Canadian Pacific railway. It is two miles south of lake des Quinze and 25 miles east of lake Témiscamingue. The

meridian of longitude $79^{\circ} 15'$ almost coincides with the north-south centre line of the township of Gaboury. The parallel of latitude $47^{\circ} 15'$ lies just outside the southern border of the sheet.

The map-sheet comprises an area of approximately 150 square miles.

ACCESS

Several routes to the area are available, depending upon the mode of transportation, the point of departure, and the destination desired.

The township of Gaboury may be entered most conveniently from Laverlochère, a village on the Mattawa-Angliers branch of the Canadian Pacific railway. The first stage of the journey is over a motor road to the village of Latulipe, 14 miles east. From Latulipe there is a choice of a land or a water route: an automobile road may be followed two miles south to the township, or the journey may be made by canoe up the Fraser river, the distance being four miles. As an alternative to the above, the village of Angliers, the terminus of the Mattawa-Angliers branch line, may be made the starting point, and from here lake des Quinze and the Fraser river, which flows into it, afford an excellent water route to the area, the distance being about 20 miles.

The township of Blondeau may also be reached by way of Latulipe. There is, however, an alternative route which is longer, but much easier as it requires less portageing. This route starts at Kipawa, a station on the Mattawa-Angliers branch. A regular boat service is maintained from Kipawa station up this and Turtle lakes to Hunter's Point, from which the township of Blondeau is reached through lakes Ostaboning and Lavoie.

PREVIOUS WORK

Previous to 1930, no geological mapping had been done within the area.

A. E. Barlow ① in his work in Nipissing district, Ontario, and Pontiac county, Quebec, mapped up to the western border of the area, where it joins the township of Laverlochère, and M. E. Wilson ②, in later work, also mapped up to the western border of that township.

① Geol. Surv. Can., Pub. No. 962, 1907.

② Geol. Surv. Can., Pub. No. 1064, 1910; also Memoir 103, 1918.

METHODS OF WORK

In mapping the geology, a general reconnaissance examination of watercourses was first made, in order to delineate the major rock types of the area. Details were subsequently added from information gained on traverses inland. These were spaced at intervals of approximately one mile in the township of Gaboury. In the township of Blondeau, some closely spaced traverses were made, but mapping was for the most part confined to tracing contacts between different types of rock.

Surveys of the topography were made with a Boyd telemeter.

DESCRIPTION OF THE AREA

TOPOGRAPHY

RELIEF:

The area lies within the great Laurentian plateau that occupies almost the whole of northeastern North America, being situated about 150 miles north of its southern margin. The irregular topography that characterizes the northern parts of the plateau also prevails here. In places, the local relief is as much as 300 feet, but for the most part the hills are from 20 to 40 feet high and the land surface rocky and hummocky.

The most prominent hills are situated on the west side of lakes Girard and Allard. Two of the hills stand out conspicuously against the skyline. One of these, with a northerly trend, rises to the southwest of lake Girard; the other is between the south end of Kelly lake and lake Allard, and has a south-southwest trend.

Flat tracts occur locally in the township of Gaboury. The northern part of the township, in the vicinity of the centre line, is a broad plain of clay and sand with occasional rock outcrops protruding through the soil. It extends south to about the south boundary of range III. McKenzie creek lies in a flat-bottomed valley from 400 feet to half a mile wide, and, to the west of McKenzie lake, a broad, flat area extends for a distance of two miles. There is another plain-like expanse in the immediate vicinity of lake Brisebois and westward from it. Flat areas, such as these, were not observed at any point within the township of Blondeau.

Swamps are rare and never assume the form of open muskegs, such as occur farther north.

Long, straight, steep-sided ('linear') valleys occur at two localities within the area. Long lake occupies one of them. It is one and a quarter miles long and only from 100 to 400 feet wide. The trend of the lake is N.15°E.

The southern arm of Timber lake and the depression that continues south from it is also a linear valley, trending N.5°E. It is not as regular as the valley in which Long lake lies.

Another valley extends from the east end of McKenzie lake to the south arm of Timber lake. It strikes approximately east-west, but its outline is irregular and it would not be classed as a linear valley.

Wilson ① advances several hypotheses to explain the origin of these linear valleys and concludes that the evidence favours block-faulting. He inclines to the belief that "they were formed during the period immediately preceding the Pleistocene". The work of the writer did not uncover any new evidence bearing on the age or the origin of these valleys.

DRAINAGE:

The area lies wholly within the basin of the Ottawa river. A local divide separates it into two watersheds: some of the waters flow north into lake des Quinze, and others south into lake Kipawa. The northwestern part of the area is drained by Gillies creek and the central portion by the Fraser river and its tributaries, Timber creek, McKenzie creek, and the Little Fraser river. These streams flow north into lake des Quinze. The construction of a dam on lake des Quinze has raised the level of the water in the lower part of the Fraser river and in two of its tributaries, McKenzie creek and Timber creek, and there are areas of drowned land along some sections of the streams affected.

The eastern part of the area is drained by the Cherry river, which flows south out of lake Allard into lake Ostaboning, ultimately reaching the Ottawa river through Kipawa lake and Kipawa river.

① Geol. Surv. Can., Memoir 103, 1918, pp. 37-40.

The course of the streams is entirely independent of rock structure. Some of the lakes, however, have their long axis parallel to the schistosity of the underlying rocks. Others are transverse to it, and their orientation may be related to fracturing at right angles to the schistosity.

WATER-POWERS

Several of the smaller rapids might serve as a source of power for local use, particularly the rapid at the outlet of lake Allard. There is, however, no fall of sufficient magnitude to warrant projection of any large hydro-electric development.

FORESTS

A variety of trees are met with in the area. They include white birch, yellow birch, maple, ash, poplar, white spruce, black spruce, white pine, red pine, jack pine, balsam, and tamarack.

About thirty years ago, all saw-logs were removed by lumbering firms. Following this, repeated forest fires destroyed most of the young timber. A few stands of black spruce remain in the low-lying districts. During the winter months, many of the local farmers contract with the International Paper Company to cut the spruce. This is an important source of income for them.

GAME

Fish are very plentiful in the lakes. Deer and moose, though seen occasionally, are not abundant. Trappers report that fur-bearing animals are scarce.

AGRICULTURE

The village of Latulipe is the centre of a farming district, the southern margin of which extends into the township of Gaboury. The belt of farming land in the township of Gaboury would be approximately outlined by range I and distances one-half mile east and one and one-half miles west of the north-south centre line. The soil is clay.

Several lots have been taken up within the township, some of which are partially cleared and cultivated. Hay, root, and grain crops are raised with success. Dairying is also carried on. There is a cheese factory at Latulipe.

Most of the produce is sold to lumber companies operating about lake des Quinze. Scows are sent up the Fraser river to Latulipe, where the merchandise is loaded and shipped to various points along lake des Quinze and the upper Ottawa river.

The farmers, with but few exceptions, cannot gain a livelihood entirely from the pursuit of agriculture and are obliged to seek employment elsewhere during the winter months.

GLACIATION

Throughout the area, there is much evidence of glacial action. Striae which occur at many points indicate the general trend of the ice movement to have been S.30°W.

In the more elevated sections, practically all the soil has been removed by the scouring action of the ice. In burned areas, bedrock is widely exposed, and in the areas of green bush only a thin mantle of soil remains.

Glacial deposits occur at many places in the map-area. Erratics are common, and moraines are occasionally seen. There are large sand covered tracts in several localities, as between Timber lake and Pine lake, between Timber creek and McKenzie creek, and in the southwest part of the area. The sand was probably laid down as outwash in front of the retreating glaciers. Clay covers the central part of the most northerly range of the township of Gaboury. It is probably a deposit formed in a temporary glacial lake during the recession of the ice.

GENERAL GEOLOGY

PRELIMINARY OUTLINE

The oldest rocks within the area are volcanics, in which narrow, lens-like patches of sediments occur. The volcanics are intruded by serpentized rock, gabbro, feldspar porphyry, quartz porphyry, and lamprophyre. The feldspar porphyry cuts the serpentized rock at one locality. Apart from this, the mutual age relations of the above-mentioned intrusives are unknown.

To the south of the volcanics, there is a broad belt consisting of schists and granite in very intimate association. The evidence at hand indicates that these schists are younger than the volcanics, and that they are of sedimentary origin. Besides the granite that is associated with the schists, there are present in the northern part of the area large granite masses of different types and probably of different ages. They are definitely younger than the gabbro which cuts the volcanics. Olivine diabase is intrusive into the granite in the northern part of the area. Ordinary diabase, which is definitely younger than the gabbro and probably contemporaneous with the olivine diabase, was found at one locality.

TABLE OF FORMATIONS

QUATERNARY	Recent	Sand, gravel
	Pleistocene	Boulders, sand, clay
	Keweenawan	Olivine diabase, diabase
	<i>Intrusive contact</i>	
	Algoman (?)	Granite, porphyritic granite, pegmatite, aplite, with small areas of syenite and diorite
	<i>Intrusive contact</i>	
PRE-CAMBRIAN	Témiscamian (?)	Quartz-biotite schist, quartz-hornblende schist, conglomerate
	<i>Unconformity (?)</i>	
	Pre-Témiscamian (?) Intrusives *	Lamprophyre, quartz porphyry, feldspar porphyry, gabbro, meta-gabbro, and serpentized rock
	<i>Intrusive contact</i>	
	Keewatin	Andesite, rhyolite, basalt, breccia, altered intrusives, iron formation

* Found within volcanics; relationship to schists and granite unknown.

DESCRIPTION OF FORMATIONS

KEEWATIN

A band of Keewatin volcanics begins at lake Clair in the township of Laverlochère and continues almost uninterruptedly to beyond the eastern margin of the area. Its width varies from about two miles in the western section to three miles in the vicinity of Timber lake, and gradually decreases towards Kelly lake. To the east of Allard lake, the band is interrupted by granite, but it is found again around Moran lake. It extends northward from there to lake Gauvin, and was traced east as far as Sand lake.

ANDESITE:

The band of Keewatin volcanics is made up predominantly of andesite, greenish to grey in colour and generally massive. The rock is occasionally porphyritic, with phenocrysts of feldspar, up to 5 mm. in diameter, distributed throughout an aphanitic groundmass. Pillow structure is of common occurrence, the pillows ranging in size from six inches to three feet along the major axis. Vesicular or amygdaloidal structure was seldom observed.

In thin section, the rock is seen to be composed of epidote, zoisite, saussurite, and chlorite and quartz, the original minerals being completely altered.

On the Pedlow claims at the northernmost portage on Timber creek, the andesite is traversed by stringers of carbonate, up to one-third of an inch in width, which follow shear planes in the rock.

RHYOLITE:

Outcrops of rhyolite are seldom seen within the area. Ordinary massive rhyolite was observed only at two localities: southwest of McKenzie lake, and on the south shore of Mud lake. It is a light-coloured rock composed mainly of quartz and sericite, with a little zoisite and rutile.

Porphyritic rhyolite was observed on both the south and east shores of Mud lake, and on the south shore of Sand lake just east of

the outlet. It is identical in composition with the ordinary rhyolite except that it contains phenocrysts of quartz up to 2 mm. in diameter, and occasional phenocrysts of feldspar. It resembles intrusive quartz porphyry.

BASALT:

Only one outcrop of basalt was seen in the area. This is on the trail which leads to the Carufel copper prospect east of Mud lake, and is about half a mile distant from the lake. The rock is dark in colour, fine-grained, and massive.

BRECCIA:

Volcanic breccias or agglomerates are rare. They appear to the northwest of McKenzie lake. The rock is composed of fragments, from one to two inches long, of andesite and rhyolite, embedded in an andesitic groundmass. A striking exposure on the east side of lake Allard, about half a mile south of the portage from Kelly lake to lake Allard, shows angular fragments of rhyolite, up to 18 inches long, in a greenish, chloritic matrix.

ALTERED INTRUSIVES:

Certain rocks having a coarser grain than is usual in the volcanics, and which may be intrusive, have been mapped with the volcanics. Definite contacts between these coarser-grained rocks and the surrounding rocks were not found, and they have been so altered that their original character is entirely obscured. Their similarity in composition, texture and structure to the central parts of large flows suggests that they may be extrusive.

Outcrops of these highly altered rocks are abundant on the portage from Mud lake to Shanty lake, on the shores of Shanty lake, and at the south end of Kelly lake.

Typical chloritized rocks that are commonly termed 'greenstone' have likewise been classified as Keewatin.

IRON FORMATION:

Banded iron formation crops out on the peninsula which projects eastward from the west end of McKenzie lake between the inlet and the outlet. It strikes S48°E. and dips 84°E. Several other zones

were noted between McKenzie lake and Timber lake, and there is also a band on the east side of Kelly lake about 300 feet south of the point where the lake first narrows close to the south end.

The outcrops range from 30 to 40 feet in width, and from 20 to 200 feet in length, the longest observed being situated on the east side of Kelly lake. The zones are rust-coated. In places, differential weathering of the bands has produced a furrowed surface on the exposure.

On McKenzie lake, the formation consists of bands of magnetite, up to half an inch in width, alternating with wide quartzose bands and occasional narrow bands of chlorite schist (see Plate II—A). Grains of pyrite are present here and there throughout the bands. Magnetite constitutes about 50 per cent of the rock by volume.

A polished section reveals that the rock has been considerably fractured, and small faults cut across the bands. The siliceous bands vary in colour from light grey to black. Under the microscope they are seen to be composed of a mosaic of recrystallized quartz with varying amounts of magnetite and a little pyrite. The light or dark colour of the rock depends on the magnetite content. The greenish bands consist of chlorite and hornblende, and contain magnetite and pyrite. The fractures which cross the quartzose bands are filled with chlorite, hornblende, and a little pyrite.

The iron formation on Kelly lake differs only in minor features from that on McKenzie lake. The bands are narrow and not so numerous as at McKenzie lake. In places, also, they are ribbon-like and wavy. The quartz is greenish. In thin section, the rock is seen to be intensely crushed and to contain chlorite and carbonate.

Wilson ① has described similar iron formation occurring in the adjoining area to the east.

SEDIMENTS ASSOCIATED WITH KEEWATIN VOLCANICS

Narrow lenses of conglomerate and biotite schist occur within the Keewatin volcanics along a zone close to their southern margin. The distribution of these sediments is very erratic and their occurrence is so limited that they cannot be shown on a small scale map.

The most prominent exposures are on McKenzie lake and in the immediate vicinity. Small sporadic patches are found both to the east and to the west of the lake within the volcanics.

① Geol. Surv. Can., Pub. No. 1064, 1910, p. 17.



Iron formation showing drag folds, on lake McKenzie.



Bank of conglomerate between volcanic flows, 200 feet north of east end of lake McKenzie.



A band of conglomerate (see Plate II—B) about six feet wide, striking east-west and dipping vertically, occurs at the east end of McKenzie lake, about 200 feet north of the shore. It is bordered on either side by volcanic flows. Eastward from this, again, conglomerate crops out to the north of a very prominent exposure of serpentinized rock. The northern part of the small island in McKenzie lake is bordered by conglomerate, in which the pebbles are smaller and fewer than in the ordinary type. The rock was observed again on Brisebois creek, about half a mile below the old dam. Many other small patches of sediments were noted away from the watercourses along the same general zone.

The pebbles of the conglomerate include granite, syenite, diorite, and chlorite schist. They form about 30 per cent of the rock and range in size from half an inch to 14 inches along the major diameter. The matrix is generally soft, consisting of a mixture of coarse biotite and chlorite, or, in some places, of fine chloritic material. Under the microscope the matrix is seen to be composed of biotite, chlorite, and hornblende, with occasional fragments of quartz and orthoclase and grains of epidote. Biotite schist is often associated with the conglomerate, and its lithological similarity to the matrix of the latter strongly suggests that this schist is the metamorphosed equivalent of greywacke.

AGE OF SEDIMENTS ASSOCIATED WITH KEEWATIN ROCKS

In their structural features these sediments are similar to those in the vicinity of Lake Clair described by Wilson ①, and they also resemble those termed by Harvie the 'Fabre series', in the township of Fabre, seven miles southwest of the township of Gaboury. Harvie ② considers the Lake Clair sediments equivalent to the Fabre series. As it is generally thought that the Fabre series is of Témiscamian age ③, it is logical to assign a similar age to the sediments associated with rocks of Keewatin age within the present map-area, in view of their lithological and structural resemblance to the Fabre series and to the Lake Clair conglomerate.

① Geol. Surv. Can., Pub. No. 1064, 1910, p. 18.

② Geology of a Portion of Fabre Township, Pontiac County", by Robert Harvie; Dept. of Colonization, Mines and Fisheries, Quebec, 1911, p. 16.

③ Geol. Surv. Can., Mem. 103, p. 53.

The occurrence to the south of the volcanics of sedimentary schists which have been correlated tentatively with the Témiscamian would suggest that the bands of conglomerate and biotite schist represent the initial phases of deposition of the sedimentary series, the explanation of the succession being that periods of vulcanism alternated with periods of sedimentation before the continuous deposition of sediments took place. This feature is quite characteristic of rocks of Témiscamian age, as volcanic flows are common within the Témiscamian series ①.

STRUCTURE OF THE KEEWATIN

From determinations based on the mutual relations of pillows in exposures situated about 1,000 feet south of the old dam north of McKenzie lake, it is thought probable that the tops of the Keewatin flows in the area face south. This, however, needs confirmation by further evidence before being accepted as proved.

The volcanics have a general easterly strike and an approximately vertical dip. Local deviations from this attitude are met with, which suggest the presence of minor folds. That some folding has taken place is shown by the presence of drag folds in the iron formation on McKenzie lake (see Plate II-A). The position and the configuration of the drag folds indicate that an anticline lies to the southwest, or a syncline to the northeast, which strikes approximately southeast. The stress which produced it came from the northeast.

PRE-TÉMISCAMIAN (?) INTRUSIVES

SERPENTINIZED ROCK:

This type of rock outcrops to the east of McKenzie lake, at several localities on this lake, and on the north shore of lake Edouard. It takes the form of small, irregular stocks, which are confined to a zone striking a little north of west from the east end of McKenzie lake. The rock is definitely intrusive into the Keewatin volcanics. A contact with the latter, though somewhat obscured because of drift, may be found by careful searching at the east end of McKenzie lake. There the country rock is sheared and is cut across by the intrusive.

(1) See Cooke, H. C., Opasatica Map-Area, Timiscaming County, Quebec; Geol. Surv. Can., Summ. Rept., 1922, Part D, pp. 46-49.

In hand specimen, the rock is massive and fine grained. Weathering has produced a whitish, powdery film on the surface of the exposures, and this affords an excellent means of recognition. An intricate system of joints crosses the outcrops in every direction. These weather out and leave shallow, intersecting fissures, from one-eighth to one-half an inch wide, in the rock. The fresh surface is black. In many places, visible specks of serpentine are disseminated through the rock, and, here and there, narrow veinlets of asbestos occur within it.

Under the microscope, the rock exhibits typical mesh structure. It is composed predominantly of serpentine, together with magnetite and a little carbonate. No vestige of the primary constituents of the rock was seen in any of the thin sections examined, but the original composition was probably that of a peridotite or dunite. The alteration may be ascribed to hydrothermal waters migrating from the granite batholith which occurs to the south. Evidence of the influence of this batholith on the serpentinized rock is found in the presence within the latter of feldspar porphyry dykes, which are probably differentiates of the same magma that gave rise to the granite.

GABBRO AND METAGABBRO

Gabbro occurs within the area both as dykes and irregular masses. The largest mass observed lies south of lake Girard, where it forms a high hill which is a marked topographic feature. The dykes, so far as noted, occur only in the Keewatin volcanics. Granite was observed cutting gabbro in the northeastern part of the area.

In hand specimen, the rock has the appearance of a typical gabbro, being massive, medium-grained and greenish, with recognizable crystals of the ferromagnesian minerals and plagioclase. Under the microscope, it is seen to be considerably altered, but, in one of the sections examined, the unaltered plagioclase was found to be bytownite, which indicates that the original rock was probably a gabbro. Ordinarily, the minerals present are all secondary and include hornblende (or amphibole), chlorite, saussurite, and quartz. Pyrrhotite and abundant ilmenite also occur in the rock, the latter bordered by a rim of secondary leucoxene.

In exposures seen along the stream flowing out of lake Girard, and at the west end of Moran lake, alteration of the rock has proceeded to such an extent that it would probably be best termed a

meta-gabbro. The alteration is largely to chlorite, but some serpentine has formed locally. This altered type is fine-grained, greenish, and generally massive. Weathering along joint planes has produced a system of shallow intersecting fissures on the surface of the rock, which impart a distinctive appearance to it. The transition from ordinary gabbro to meta-gabbro may be observed at several places along the stream flowing south out of lake Girard. Thin sections of the meta-gabbro resemble those of the comparatively unaltered rock, the difference being chiefly one of grain. The chloritized types have an abundance of chlorite, and the serpentinized types, of serpentine and magnétite.

FELDSPAR PORPHYRY:

Narrow dykes of feldspar porphyry occur at many points within the area. They are very abundant in the vicinity of McKenzie lake. Southwest of the lake, there is a stock of this type of rock, about a quarter of a mile across. This is probably the source of the dykes. The prevailing and almost invariable strike of the dykes is N.60°W.

The dykes vary somewhat in appearance, but are of fairly constant composition. All have a groundmass which is fine-grained to aphanitic, through which are distributed phenocrysts of feldspar from one-sixteenth to one-quarter of an inch in diameter. The colour varies from pinkish to dark grey, or greenish when altered.

Under the microscope, the phenocrysts are found to be orthoclase, albite, occasionally microcline, and rarely quartz. Some of the albite phenocrysts are zoned. The groundmass is a dense aggregate of quartz and feldspar, with minor amounts of chlorite, epidote, and zoisite, the last three being very abundant in the dykes that have been sheared and altered.

QUARTZ PORPHYRY:

Only one example of quartz porphyry that is definitely intrusive was found within the area. This is a dyke occurring on the Bellehumeur-Turgeon claims about three-quarters of a mile northeast of Timber lake. It strikes S.70°W. Quartz porphyry was found at other localities, but in these its intrusive character is somewhat in doubt, as definite contacts were not seen.

On the weathered surface, the rock is massive and whitish. It contrasts strikingly with the darker volcanics in which it occurs. Crystals of glassy quartz and of feldspar up to 3 mm. in diameter are distributed through a fine whitish groundmass. Under the microscope, the quartz is seen to have been crushed. The feldspar is albite, partially sericitized. Biotite, epidote, muscovite, hornblende, and pyrite are present in minor amount. The groundmass is a micro-felsitic aggregate of quartz and feldspar.

LAMPROPHYRE:

Two dykes of lamprophyre were observed within the area. One is in the western part of the township of Gaboury, north of lake Brisebois. It is four feet wide, and strikes approximately north-south. The rock is dark grey and contains biotite as well as hornblende. It is allied to vogesite in composition.

The second lamprophyre dyke occurs on the west shore of lake Allard, about half a mile south of the portage to Kelly lake. It is lighter in colour than the preceding, is 16 inches wide, and cuts volcanics. It is composed of chlorite, orthoclase, albite and quartz.

TÉMISCAMIAN (?)

DESCRIPTION:

Schists and granite, very intimately associated, occur to the south of the area of Keewatin volcanics. These rocks extend continuously across the area, forming a very regular belt from two to three miles wide. In the vicinity of their junction with the volcanics, schists predominate, but they gradually merge into granite towards the south and the east. The intermingling of the granite and the schists has been so complete that it has been found impossible to differentiate between the two on the accompanying map. The schists often grade into gneisses in the vicinity of the larger masses of granite.

These rocks are exceedingly variable in appearance, but can always be identified easily because of the bright, glistening cleavage surfaces of biotite or hornblende. They are banded and thinly laminated. The bands vary in width from one to two inches. Their colour is black, dark green, grey and brown, the last due to the weathering of iron-rich varieties. Even within a single exposure, the colour

varies. The black and green colours are due to a high content of biotite or hornblende, or both, and the grey to dominance of quartz and feldspar. The grain is always fine.

Under the microscope, these rocks were found to be composed mainly of quartz, hornblende, biotite, orthoclase and plagioclase, which occur in varying proportions in the several varieties. Less common constituents are microcline, microperthite, apatite, chlorite, epidote, zoisite, and muscovite. The hornblende occurs as prismatic crystals, arranged with their length parallel to the schistosity; the biotite is platy. Both lie in a mosaic of recrystallized quartz and feldspar. Some of the quartz shows crushing effects.

STRUCTURE:

The attitude of the schists is vertical or nearly so, but in places the dip varies as much as 20 degrees within forty feet. The strike is generally easterly. On the east side of lake Brisebois, these rocks are much contorted. The alternation of granite and schist bands may be best observed here. Vertical exposures along the edge of the lake afford excellent sections for study. The granite is seen to send off tongues from a subjacent mass into the overlying schist in a manner somewhat similar to *lit-par-lit* injection.

Along the south part of lake Allard, striking sections are exposed on both sides of the lake, where the alternation of schist and granite may again be well observed. The schists here dip to the south.

ORIGIN:

On the basis of field evidence and lithology, it is concluded that the schists are of sedimentary origin.

Towards the northern margin of the schists of lake Menard, there is an exposure of conglomerate which is thought to represent the basal member of the series. It contains pebbles of granite and quartz porphyry, embedded in a matrix of hornblende schist which is identical in composition with the surrounding schists. Originally this cementing material was probably greywacke, which, when subjected to metamorphism, was altered to the hornblende schist, whereas the pebbles, being more resistant mechanically and chemically, are still distinctly recognizable, although they are much crushed and elongated, and somewhat altered.

A band of conglomerate with chlorite matrix and containing relatively fewer pebbles was also found within the area of schists on the west shore of the large bay of lake Allard that extends south from the mouth of Sand creek.

In the comparatively unmetamorphosed part of the schists, close to their junction with the volcanics, the rock has a parallel banding which resembles sedimentary bedding.

The proof of the sedimentary origin of the schists, on the basis of lithology, is convincing. The alteration of sediments to hornblende and biotite schist is a common accompaniment of batholithic intrusion ①. Under the microscope, some of the schists are found to be almost identical in composition with quartzite.

AGE:

It is evident that the schists are older than the granite which is associated with them. The relative age of the schists and volcanics has not been proved with certainty, but the evidence at hand indicates that the schists are the younger.

It has already been mentioned that the writer inclines to the belief that the tops of the volcanic flows face south. Assuming the correctness of this view, the sediments of the map-area lying directly to the south of the volcanics were deposited on their surface, and are consequently younger than the volcanics.

Structurally, the schists resemble the sediments of Témiscamian age occurring in areas farther north, and also the Fabre series to the southwest that has been correlated with the Témiscamian. All have been greatly disturbed, and now have an approximately vertical attitude. Lithologically, also, the schists are similar to metamorphosed greywackes of Témiscamian age.

The evidence for Témiscamian age is further strengthened by the presence of narrow sedimentary bands within the volcanics just north of the junction of the volcanics and schists. These have been described on an earlier page, where it has been shown that they are probably to be correlated with the Témiscamian sediments of other areas.

① See Geol. Surv. Can., Mem. 39, 1913, p. 73; also Mem. 103, 1918, pp. 96-97.

These combined lines of evidence, together with the fact that sediments older than the Keewatin are of rare occurrence, indicate that the schists are younger than the volcanics and are probably of Témiscamian age.

ALGOMAN (?)

GRANITE:

The most widespread rock within the area is granite. It occupies a strip three miles in width which extends almost continuously across the northern part of the map-area, and beyond. In the southern part, granite is intimately associated with the Témiscamian (?) sedimentary schists and forms about 50 per cent of the rock there exposed.

The most common type is a massive pink granite, which in hand specimen is seen to be composed of hornblende or biotite, or both, together with quartz and pink orthoclase. At one locality, on lake Allard, the feldspar is quite reddish and the percentage of ferromagnesian minerals low.

Under the microscope, the granite is seen to be composed of quartz, orthoclase, albite, occasionally microcline, hornblende, and biotite, with a little titanite, apatite, magnetite, and pyrite. The feldspars are generally sericitized, and the hornblende and biotite are very often altered to epidote and chlorite. In some of the thin sections examined, the quartz shows crushing effects.

A white granite occurs on Kelly lake. The colour is due to a higher content of quartz than is present in the typical pink granite. On weathered surfaces the quartz stands out in relief, and the rock has a hackly appearance. Although this type is probably a quartz-rich variety of the pink granite, it may represent a granite of different age.

In the northeastern part of the area, where the granite was observed cutting a mass of gabbro, the granite is finely sheared, and is greenish, due to the presence of sericite.

There is also some change in the character of the granite where it is near or in contact with the schist, but this change is never pronounced, consisting merely in an increase in the percentage of ferromagnesian minerals, and a decrease in the content of quartz.

PORPHYRITIC GRANITE:

Porphyritic granite occurs at several places within the area. A large dyke, striking N.35°E., is exposed on Timber lake, about three-quarters of a mile southeast of the outlet, where the lake broadens out. It is about 800 feet wide and a mile and a quarter long. Other occurrences are to be seen on Windy lake, to the southwest of the lake, and to the east as far as Sand creek. It is a fresh, massive, pinkish rock containing phenocrysts of orthoclase, up to one inch in diameter, in a granitic matrix composed of quartz, orthoclase, albite and hornblende.

Sheared porphyritic granite occurs at a point where Timber creek narrows half a mile north of range line III-IV. The strike of the shearing is east-west, and the dip is 70°N. The sheared type is darker than the normal porphyritic rock and the phenocrysts it contains are smaller.

PEGMATITE AND APLITE:

Pegmatite occurs both as dykes and irregular masses within the area occupied by granite. Quartz, biotite, muscovite, hornblende, garnet, albite, and orthoclase are the only minerals observed in the pegmatite.

Dykes of pink aplite are of common occurrence within the granite, and they are occasionally seen cutting the volcanics. They are composed of quartz, orthoclase, muscovite, and albite.

Muscovite granite occurs as dykes intruding the sedimentary schist on the east shore of lake Brisebois, close to the outlet. They are probably related genetically to the pegmatite and aplite dykes. The rock is composed of quartz, muscovite, albite, orthoclase, and microperthite.

AGE OF THE GRANITE:

Granting a Témiscamian age for the sedimentary schists, the granite which cuts them must be Algoman or younger. It is not possible to establish its age more definitely than this because of the absence of rocks of the Cobalt series within the map-area.

REPLACEMENT OF ANDESITE BY GRANITE:

An interesting example of the granitization of andesite is to be seen at one point within the area. On the northwest point of a hook-shaped bay that lies to the south of the outlet of Kelly lake, granite is exposed. About 40 feet south of this point is a small area of volcanics. The rock is andesite in which pillows up to 18 inches in diameter are present. Parts of the outcrop have been granitized, but the outlines of the original pillows are preserved. A complete range may be traced from pillows of unaltered andesite, through others partially granitized, and finally to those that are completely granitized. Within any single pillow granitization is uniform; the variation in the amount of replacement is seen by comparing different pillows.

SYENITE AND DIORITE:

Small exposures of syenite are to be seen at several places within the area. They occur more especially along the northwestern contact of the granite with the volcanics, in the township of Gaboury.

Diorite is much more abundant within the area than syenite. A large mass of altered diorite crops out at the mouth of Mud creek; another mass of similar rock is exposed on the southeast shore of Heart lake; and there is a stock of augite biotite diorite, at least half a mile across, to the northeast of Mud lake, just beyond the margin of the volcanics, the rock in this occurrence being remarkably fresh.

The syenite and diorite do not occupy sufficiently large areas to be represented as separate units on a map of the scale of that accompanying this report, and for this reason they have been grouped with the granite.

KEWEEAWAN

DIABASE AND OLIVINE DIABASE:

Diabase dykes occur in the vicinity of Mud lake and in the adjoining area to the northeast. Their general direction is northeasterly but some of them strike N.10°W. They contain olivine. One fine-grained dyke of olivine-free diabase was seen at the northeast end of Moran lake. It strikes N.45°E. This dyke may be contemporaneous with the olivine-bearing variety.

From the similarity of these dykes to others of the adjacent region, they are thought to be of Keweenawan age.

ECONOMIC GEOLOGY

Those parts of the map-area that are occupied by Keewatin volcanics offer possibilities for the occurrence of mineral deposits. Lenses and narrow veins of quartz were observed within the volcanics at many points, as well as intrusive quartz and feldspar porphyries, similar to those that are associated with ore deposits in other localities. A thorough search, especially in the neighbourhood of these veins and intrusions, might well reward the prospector.

The belt of sedimentary schists is perhaps not so favourable for prospecting, because of the granitization to which the schists have been subjected, and because of their intimate association with the granite.

The pegmatite dykes that occur within the granite are a possible source of rare or gem minerals, but such minerals were nowhere observed in them by the writer.

ASBESTOS

There has been a certain amount of work done on asbestos prospects in the vicinity of McKenzie lake. The asbestos is chrysotile or serpentine asbestos and it occurs both as 'cross-fibre' and 'slip-fibre'. The cross-fibre is in short, discontinuous veins. It has a fine, clear, lustrous appearance, and is green in colour. It is somewhat harsh, though easily separable. The longest cross-fibre observed was three-fifths of an inch, and this was seen in only one short vein. The slip-fibre is dull white to green in colour. It occurs along joint planes in the form of short narrow, lenticular veins. When rolled between the fingers, it crumbles and is easily broken.

BELLEHUMEUR-FERRON CLAIMS:

V. Belhumeur, Jr., and W. Ferron are the holders of claims R-6680, R-6681, R-6682, R-6683, and R-4883, which are situated on the north and on the east side of McKenzie lake. The country rock at this locality consists of Keewatin volcanics, in which narrow sedimentary bands, presumably of Témiscamian age, occur. The volcanics are intruded by a number of small stocks of serpentized rock, and it is in these that the asbestos occurs.

The most important occurrence is about half a mile east of the southeast end of McKenzie lake, on claim R-4883. There is a good trail from the edge of the lake to the prospect. The topography here is more rugged than usual. The region has been burned over, and the bedrock is well exposed. The outcrop is situated on the side of a hill which rises to the north to an elevation of 75 feet above the level of the surrounding country. To the south the rock disappears beneath a swamp.

The serpentized rock crops out almost continuously over an area 350 feet by 200 feet, with its greater length in a northwesterly direction. Close to the northern margin of the outcrop, the rock is cut by a 4-foot dyke of feldspar porphyry, striking N.60°E. The dyke has been somewhat altered, but the phenocrysts of feldspar are still recognizable. Surrounding the outcrops of serpentized rock on all sides, at a short distance beyond its margin, are Keewatin volcanics.

The outcrop has a 30-degree slope, and at many points along its surface, blasting has been done in the search for asbestos. The rock is strongly jointed, and narrow veinlets of asbestos from one to two millimeters wide, as well as small, irregular patches of massive serpentine and picrolite, are present here and there over the entire surface of the outcrop, but more especially along the joint planes. On the upper parts of the exposure, six small pits have been sunk on wider veins of asbestos.

Pit No. 1 is situated on the east side of the trail at the northern margin of the outcrop. It is 10 feet by 6 feet with its length east and west. The surface rock has been removed by blasting to a depth of six inches. The feldspar porphyry dyke referred to above is exposed here over a length of three feet, and the serpentized rock is sheared parallel to it. Much pyrite is present in the porphyry. On the north side of the porphyry dyke, a width of one foot of slip fibre occurs over a length of one foot.

Pit No. 2 is 60 feet southwest of pit No. 1. Its dimensions are eight feet by six feet. The feldspar porphyry dyke is also exposed here. It contains an inclusion of sheared, greenish, talcose rock, with which slip-fibre is intimately associated.

Pit No. 3 is 100 feet south-southeast of pit No. 1. It is roughly eight feet long and six feet wide. Joint planes in the rock have a thin coating of picrolite, which is sometimes intermingled with magnetite

and calcite. Veinlets and coatings of massive serpentine are common. On the south side of the pit there is a veinlet of cross-fibre, one-third of an inch wide, exposed for a length of three inches.

Pit No. 4, five feet southeast of pit No. 3, is about the same size as the latter and shows similar conditions. A number of intersecting veinlets of cross-fibre, from one-eighth to three-fifths of an inch wide, are exposed here.

Pit No. 5 and *pit No. 6* are also of about the same size as pit No. 3. Only a few small patches of slip fibre were observed in pit No. 5, which is situated 60 feet southeast of pit No. 4. Pit No. 6 is 50 feet east of pit No. 5. Pierolite associated with calcite and magnetite are present here in small amount.

On claim R-6683, about 300 feet northeast of the bay that lies north of the small island in McKenzie lake, there is another outcrop of serpentinized rock, measuring about 18 feet by 6 feet. Geological conditions here are similar to those on claim R-4883. A small tongue-shaped mass of feldspar porphyry appears on the east side of the prospect pit, and directly west of this, a width of six inches of massive serpentine of irregular outline is exposed over a length of about two feet. Small shreds of slip-fibre are present on the surface of the joint planes in the serpentinized rock in the northwest corner of the pit. Magnetite is associated with the fibre.

CREVIER CLAIM:

Jos. Crevier, of Lorrainville, Que., holds a claim at the east end of McKenzie lake, under mining license No. 1940. This ground had previously been staked in 1916 by Nap. Bouchard. It was re-staked in 1923 by the present holder. The country rock at this point is Keewatin volcanics intruded by serpentinized rock. The asbestos occurs in the latter rock, which is strongly jointed.

Exploration has been carried on at two points. The first is situated 500 feet east of the east end of McKenzie lake and 150 feet north of a creek which flows into the lake. The spot is marked by a very prominent outcrop of serpentinized rock, which is about 50 feet from east to west, 40 feet from north to south, and 30 feet high. On the south margin it is cut by a dyke of pink feldspar porphyry, striking east, which contains numerous grains of pyrite. A small amount of blasting has been done on the south and west sides of the outcrop.

The rock is strongly jointed, and along the joints occur small quantities of slip fibre, picrolite, and massive serpentine. Occasional 3-millimeter veinlets of cross-fibre and small patches up to half an inch in width are present. Small, irregular bands of magnetite and calcite are associated with the slip fibre.

The second pit is situated 300 feet southeast of that just described. It is located in the serpentized rock at the foot of a hill on the north edge of a swamp. The pit is 4.5 feet by 8 feet at the surface, and four feet deep, but it was filled with water when visited by the writer.

Narrow, lenticular veins of slip-fibre, from four to six inches long, associated with massive serpentine, are exposed intermittently on the faces of the joints, for a vertical height of four feet above the surface of the water in the northwest corner of the pit, where its face slopes upward along the side of the hill. They may continue downward, beneath the water. One veinlet of cross-fibre, half an inch wide and four inches long, was observed on the north side of the pit.

So far as is known, no development work took place on this claim during the summer of 1930.

GOLD, COPPER, AND IRON

PEDLOW CLAIMS:

J. E. Pedlow holds a group of claims adjacent to Timber creek in range IV, township of Gaboury. They are known locally as the 'Syndicate property'. These claims occupy the northern half of lots 28, 29, 30 and 31, and are numbered R.6114, R.6115, R.6116, and R.6117. Timber creek flows northward through claim R.6116. The second rapid upstream from the mouth of the creek is on this claim. The portage around the rapid is on the west side of the creek.

The region is moderately hilly, with elevations from 20 to 30 feet above the level of Timber creek. Fire has destroyed all the timber of early growth, but small trees of second growth are abundant.

The prospect is situated within Keewatin volcanics about half a mile south of their contact with a granite batholith. The prevailing rock is andesite, in which there are two intense shear zones. One, at 175 feet south of the lower end of the portage, is at least 900 feet long and is in large part on the west side of the creek. Its strike is approx-

imately east-west, and it dips from 60° to 80° south. The second shear zone is 540 feet south of the first, on the west side of the creek, opposite the upper end of the portage. It also strikes approximately east-west, and dips from 70° to 75° south. It is at least 500 feet long.

Ferruginous dolomite has been introduced into the country rock along both shear zones. It is brownish in colour, due to weathering, and in places attains a width of half an inch. Dykes and lenses of pink feldspar porphyry are to be seen cutting the volcanics at many points on the property.

Some exploration work has been carried out on claims R.6115 and R.6117, but most of the workings are on claim R.6116. They are confined entirely to the two shear zones. A building has been erected close to the north end of the portage, on claim R.6116. The minerals found on the prospect are: quartz, ferruginous dolomite, pyrite, and a little sericite.

The North Zone.—About 240 feet north of the east end of the north zone, the volcanics are sheared at N.75°W., and have a vertical dip. Fine pyrite is uniformly disseminated throughout the rock over an area 30 feet square.

To the east of Timber creek, along this zone, only a few small veinlets and lenses of quartz are present in the rock. Between the creek and the portage, some coarse pyrite, a little quartz, and carbonate are found. The outstanding feature in this part of the zone is the occurrence of an irregular mass of quartz varying in width from 3.5 inches to 5 feet, which is exposed over a length of eight feet in the trench lying directly east of the portage.

In the first trench west of the portage, a 2-foot and a 5-inch width of quartz are exposed. A little sericite is associated with the quartz. Within the area immediately west of the trench, several small quartz lenses were noted. A pit on the face of a hill, 200 feet west of the trench, exposes irregular patches of quartz, two feet across, one of which attains a width of eight inches.

At the western end of the zone, a lens of quartz, with a maximum width of 16 inches, but at its lower end tapering to nine inches, is exposed in another pit. A dyke of feldspar porphyry containing pyrite also occurs here.

The South Zone.—At the eastern end of the south zone, pyrite is present in a lens of feldspar porphyry. Between there and the western end of the zone, a few small lenses and irregular patches of quartz were the only noteworthy features observed. At the western end of the zone, the volcanics are strongly sheared and carbonated. Two lenses of milky quartz occur here. One is 15 inches wide, and eight feet long; the other 10 inches wide, and six feet long. They have a general easterly trend.

No development work was carried out on this property during the summer of 1930. Assay results were not available.

BELLEHUMEUR-TURGEON CLAIMS:

The claims of V. Bellhumeur, Sr., and E. Turgeon are located about half a mile east of Timber lake and in the adjoining area to the north. They are numbered R.6643, Q.3355, Q.3356.

The prospect is situated within a flat area about three-quarters of a mile northeast of the northern narrows on Timber lake. Directly to the north of the prospect is a small creek flowing southwest. The country rock consists of volcanics which are intruded, about 1,000 feet to the southwest of the prospect, by a large dyke of quartz porphyry. The contact of the porphyry with the volcanics may be seen at several places along the trail that leads from Timber lake to the prospect.

The mineralization occurs in an outcrop measuring about 40 feet from east to west and 20 feet from north to south, in which the rock for the most part is andesite, with strike S.80°W., and dip 75°S. Two sets of joints are well developed: one strikes N.17°E. and dips 45°E.; the other strikes N.36°W. and dips 35°S.W. Pillow structure is developed in the rock on the south margin of the exposure, the pillows ranging in size from 14 inches to 36 inches along the major diameter. On the north side of the outcrop, a seven-foot dyke of quartz porphyry, striking S.70°W., cuts the andesite, and the latter is slightly sheared for a width of one foot in the vicinity of the dyke.

The rock is generally rust-coated. Mineralization has occurred along joint planes, and consists of pyrite and pyrrhotite, with minor amounts of quartz and occasional specks of chalcopyrite, which, together, would form probably 20 per cent of the zone. On the south

side of the outcrop there are two lenses of quartz, which are elongated parallel to the strike of the rock: one is 3.5 feet long and seven inches wide; the other 1.5 feet long and six inches wide.

A V-shaped pit has been sunk on the slope of the outcrop at the western margin of the mineralized zone. Pyrite, pyrrhotite, and quartz may be seen in bunches and stringers along the face of the slope. Occasional specks of chalcopyrite are also present. These minerals are not so abundant in other parts of the zone.

About 30 feet east of the pit, a 15-foot trench has been dug across the strike of the zone. No mineralization was observed at this point.

Across the creek, at a point 365 feet distant on a bearing of S.70°W., another trench, 28 feet long, has been dug transverse to the strike. A seven-foot dyke of quartz porphyry, which is probably the continuation of that already referred to, occurs here. It strikes S.70°W. The country rock is andesite, and it contains a small amount of pyrite.

The owners report assay values of 40 cents per ton in gold and 1.5 per cent copper in a grab sample taken from the pit.

LANDY CLAIMS:

Claims R.6776, R.6777, R.6778, R.6779, and R.6780, which are situated in the area adjacent to the south end of Timber lake, are held by Messrs. Landy.

The mineral showings are on claim R.6776, on the eastern edge of a V-shaped depression which runs from the south end of the lake in a direction about S.15°W. A hill about 150 feet high rises on the east, and on the west the hills are about 50 feet high. A small stream flows northwards into the lake on the west side of the depression.

The rocks exposed on these claims are quite variable, both in appearance and in composition. They are biotite, quartz-biotite, and actinolite-chlorite schists, presumably of sedimentary origin, intimately associated with granite in a manner that suggests *lit-par-lit* injection. The high hill to the east of the depression is composed predominantly of pink biotite-hornblende granite, which is slightly gneissoid in places as the result of shearing.

Where mineralized, the rock is a green actinolite-chlorite schist, which is thought to be a metamorphosed sediment because of the presence of ovoid pink patches which may have been pebbles originally. These are to be seen on the steep face of the exposure. Their position on the precipitous face of the outcrop precluded the possibility of close examination.

The mineral showings occur in an intensely sheared zone, about 30 feet wide and at least 500 feet long, which strikes S.30°W. and dips 65°E. Quartz lenses and stringers are present along the north end of the zone. The lenses vary in length from 2.5 feet to 7 feet, with maximum observed width of two feet. Pyrite and chalcopyrite are associated with the quartz in minor amount; together, they form probably 10 per cent of the zone.

About 100 feet south of the lake, a pit has been sunk in the sloping surface of the shear zone. Its dimensions are 4.5 feet by 6 feet, with a face of 6 feet. Stringers and small lenses of quartz carrying some pyrite and chalcopyrite occur on the vertical faces of the pit.

The Annual Report of the Bureau for the year 1919 contains the following statement with regard to assay values in this zone: "Several samples were taken across veins and silicified zones, and analysed, but none showed more than a trace of gold" ①.

CARUFEL PROSPECT:

In 1928, a group of claims to the east of Mud lake were staked for copper by C. and R. Carufel. Development work was carried out on the property for a time, but subsequently the claims were allowed to lapse.

The prospect is situated about 60 chains southeast of Mud lake, and 30 chains northwest of Kelly lake. It may be reached by a trail which leads from the east side of Mud lake. The country here is rather hilly, local elevations being from 100 to 150 feet.

The country rock is Keewatin volcanics which, to the northeast, are intruded by a small stock of augite-biotite diorite, and to the north by a granite batholith. The bed-rock is exposed on the top of a high hill over an area about 100 feet by 75 feet. This rock is mainly andesite, with strike N.80°E. In many places it displays pillow

① Report on Mining Operations in the Province of Quebec for the year 1919, p. 48.

structure. On the north side of the exposure, the andesite is cut by an 80-foot dyke of gabbro, which has the same strike as the volcanics.

A trench, 75 feet long, striking N.15°W., has been dug on the eastern edge of the outcrop to explore the zone. Bed-rock is exposed for a length of 54 feet from the southern end of the trench. Along the first 20 feet in the south end of the trench, a pit, 12 feet wide, and varying in depth from five feet on the south end to zero on the north, has been blasted out on the sloping surface of the outcrop. With the exception of a three-foot horse of andesite in the centre, the first ten feet of the pit has exposed massive pyrrhotite, with minor amounts of quartz and chalcopyrite. For the next ten feet, the rock is merely rust-stained. Then follow 15 feet of andesite, with some pillows, whose borders have been replaced in part by narrow stringers of quartz and by pyrite. Within the next five feet, there appears an irregular, lens-like, patch of quartz, from nine inches to one foot in width. This is separated by one foot of andesite from three feet of rust-coated rock which lies beyond. The rock in the northern part of the trench shows no trace of mineralization. Twenty-feet from the north end, the gabbro dyke previously mentioned appears, showing chilling effects for a short distance from its contact with the andesite.

Twelve feet west of the south end of the trench, an irregular mass of quartz, 18 inches across, occurs. Thirteen feet farther west, rusty quartz varying from two to eight inches in width appears and is exposed for a length of 15 feet.

About 300 feet west of the main pit, along the foot of the hill, a small exposure of massive, pillow andesite has been trenched over a width of 10 feet and a length of 20 feet. A mineralized band, 18 inches wide, consisting of quartz and pyrite with narrow bands of chlorite schist, has been exposed. Shearing at N.80°E. occurs on both sides of the band.

TURNNEY CLAIMS:

The claims held by R. Turney are numbered R.5440, R.5441, R.5442, R.5443, and R.5444 and are situated on the east shore of Kelly lake, in the vicinity of the narrows about one mile from the south end of the lake.

Banded iron formation crops out about 500 feet south of the narrows, almost along the east-west line between claims R.5442 and R.5443. It lies within Keewatin volcanics. The band varies in width from 30 feet to 40 feet, and it is exposed over a length of 200 feet on the side of a very prominent hill overlooking the lake. The strike is east-west, and the dip 80°S.

Two small pits have been sunk in this zone along the slope of the hill. One is situated about 30 feet, and the other 70 feet, east of the water's edge. Several trenches have been dug at other points along the zone, to a distance of 200 feet from the lake. Not only the surface, but also the interior of the rock, is rust-coated. The banding is highly contorted, with greenish, crushed quartzite alternating with ribbon-like bands of magnetite. Pyrite and pyrrhotite are abundant along the zone.

LAKE GIRARD WORKINGS:

In 1924, Messrs. C. and R. Carufel staked a number of claims in the township of Blondeau, south of lake Girard. The workings on these claims are situated 350 feet south of the southwest end of a small lake immediately adjacent to lake Girard on the southwest.

The country here is hilly. It has been burned over, but the area to the northeast of lake Girard is still green.

The country rock is medium-grained hornblende granite which in places exhibits shearing in a general easterly direction. It forms part of a large granite batholith which occupies the region.

The mineralized zone lies within the granite, about 150 feet north of a large mass of gabbro which crops out as a hill having an elevation of 200 feet above the level of the surrounding country. The granite is definitely of later age than the gabbro, which it cuts on lake Girard. Evidence of its action on the gabbroic mass is to be seen in the extensive alteration of the gabbro to chlorite and serpentine at many points along the stream flowing south out of lake Girard. The granite, likewise, appears to be affected in the vicinity of the gabbro, but the alteration is comparatively slight and is confined entirely to the border of the mass. It may be due to assimilation, on a very small scale, of the country rock by the invading granitic magma.

The mineralization consists of quartz and sulphides lying in a zone 100 feet long and from 4 to 5 feet wide, which strikes S.55°W.

and dips 71°S.E. Blasting has been done at places along the entire length of the zone, and a pit, four feet square, has been sunk at a point 45 feet west of the east end.

The chief mineral that occurs along the zone is quartz, which is intermediate in character between glassy and milky. It is slightly fractured in places and encloses short, narrow seams of sericite. Specks of pyrite, and less frequently of chalcopyrite, may be seen in the quartz in hand specimen, and examination under the microscope reveals fine pyrite with some chalcopyrite, disseminated rather uniformly throughout the quartz.

The sequence along the strike of the vein in an approximately east to west traverse is as follows:

The first 25 feet is massive granite. It is rust-coated at many points and contains several small stringers of quartz. This is followed by a 10-foot length of granite in which, on the south side of the zone, there is a two-inch veinlet of quartz. The veinlet is bordered on the north by nine inches of material in which stringers of quartz predominate. Towards the western end of this 10-foot section, the veinlet widens until it attains a width of 15 inches, which it maintains for about 25 feet. Throughout this length, there is an eight-inch zone of sheared, rusted rock on the north side of the veinlet. Ten feet from the eastern end of this part of the vein, a pit, 4 feet by 4 feet, has been sunk. Within 10 feet west of the western margin of the pit, the vein gradually narrows down to one inch and pinches out.

A small amount of shearing was the only important feature noted along the succeeding 25 feet. Beyond this there is a 9-inch lens of quartz, three feet in length, and then, for the remaining 15 feet of the zone, to its western end, the rock is slightly rust-coated, probably due to the oxidation of pyrite.

During the summer of 1924, this group of claims was optioned to Charles and Gilbert Labine, representing McIntyre Gold Mines. Development operations were carried out on the property for a time, but the option was dropped and the claims were allowed to lapse.

High assay values in gold are reported from the property.

LAKE GAUVIN WORKINGS:

Some exploration has been done on the south shore of the creek flowing out of lake Gauvin. The workings are situated about 300 feet southwest of the bend which the creek makes to the north in its

course from the south arm of the lake. The country rock is Keewatin volcanics which have been sheared in a direction S.50°W. They dip at 38°E. A granite batholith makes its appearance three-quarters of a mile to the northeast of the prospect.

The workings consist of two trenches, which cut across the strike of the rock. The more northerly one is 30 feet long, and it has exposed an eight-inch vein of milky quartz. In the other trench, 40 feet to the southwest, a five-foot width of milky quartz is exposed. It contains some pyrite.

LORRAINVILLE MINING SYNDICATE:

The property of the Lorrainville Mining Syndicate is situated to the northeast and to the east of lake Clair in ranges XII and XIII, township of Laverlochère ①.

To the north and west, the region is flat and heavily covered with drift, but to the east it is hilly and rock outcrops are of common occurrence. The country rock is hornblende granite, which exhibits gneissoid and porphyritic facies in places. The southern margin of the claims to the east of lake Clair may include a small part of the easterly-trending belt of volcanics, but on the claims, granite is the predominant rock, and it is within it that the mineral occurrences are found.

Work has been done on three veins, which have been named the *Germain*, *Marotte* and *Gelinas* veins, these being the names of the original owners. Values in gold are reported from all three veins.

Germain vein.—This vein is on claim T.7196, close to its northeast boundary. The claim occupies the southern half of lot 21, range XII, and is reached by a good trail from lake Clair, half a mile distant.

The country here is heavily drift-covered, and the outcrop in which the vein occurs is the only exposure within a radius of 700 feet. It is hornblende granite gneiss.

① The writer is indebted to the Geological Survey of Canada for the use of the notes of J. Satterly, who examined this property in 1928. He also acknowledges with thanks the kindness of Messrs. P. and H. Laverdière, members of the Lorrainville Mining Syndicate, who conducted him about the property.

A 44-foot trench, running N.15°E., discloses a quartz vein, 27.5 feet wide, exposed along a length of 12 feet. Its strike is approximately east-west. The vein is cut by stringers of orthoclase and epidote, up to one-third of an inch wide, and also by a 6-inch orthoclase-feldspar dyke, which has been faulted.

The quartz is white to glassy and here and there it encloses small patches of chlorite. It has been fractured, and small amounts of pyrite, chalcopyrite, magnetite, epidote, and a little molybdenite, have been deposited along the cracks. Altogether, these minerals would probably form less than one per cent of the total volume of the vein.

An outcrop of quartz, about two-thirds of a mile west of the trench, is considered by the owners to be the continuation of this vein, but at the present stage of development, this conclusion is highly speculative.

Marotte vein.—The widest part of the Marotte vein lies 900 feet southeast of the trench on the Germain vein, and about 300 feet south of the north boundary of claim T.7181. This claim occupies the south half of lot 22, range XII. Outcrops are more numerous here. The country rock is porphyritic granite and hornblende granite gneiss.

The eastern section of the vein is exposed over a width of 92.5 feet in a trench which has been dug on a bearing of N.30°E. The vein is probably wider than this, as its contacts with the enclosing rocks have not been uncovered. Thirty feet from the northeast end of the trench, a 15-inch width of pyritized granite occurs. Three feet from the south end, a 15-inch inclusion of andesite was seen in the granite.

The quartz in this vein varies in character from glassy to milky. It encloses short, narrow seams of chlorite. Very little fracturing has taken place here. Pyrite, sericite, and magnetite are present in the quartz in small amount. Chalcopyrite is reported, but it was not observed by the writer.

Three trenches have been dug to the west of the above. They expose narrower parts of the vein at intervals along a total distance of 300 feet.

Gelinas vein.—The Gelinas vein is situated about half a mile east of the north end of lake Clair, and 360 feet southwest of lot post 23-24,

range line XII-XIII. It is about five-eighths of a mile southeast of the Marotte vein. The claim in which this vein lies occupies the north half of lot 23, and is numbered T.7184.

Rock is well exposed at the site of the vein. A 60-foot trench has been dug on a bearing of N.20°W., across the strike, to explore the zone. The vein strikes N.75°E., and dips at 75°N. On the south it is in contact with granite, whose original ferromagnesian constituents are altered to chlorite or epidote. On the north contact, the rock is coarse, slightly sheared, biotite granite.

The sequence from north to south across the mineralized zone is as follows: The first 12 feet is glassy quartz containing disseminated pyrite, and including a 6-inch band rich in coarse pyrite at a point 8 feet from the northern end of the trench. The 12-foot width of quartz is followed by a band of hornblende-feldspar schist, at least nine feet wide, but whose exact width could not be determined because of the presence of water along the next 15 feet of the trench. In the last 20 feet of the trench, beyond the water-covered section, the vein consists of quartz. Within this quartz, on the south margin of the vein, a pit nine feet wide has been sunk. Pyrite and chalcopyrite, together with a little sphalerite, molybdenite, and sericite, occur in irregular fractures in the quartz. The combined sulphides may form as much as three per cent of this part of the vein.

Two hundred feet west of the above, in lot 22 (claim No. T.7195), other occurrences of quartz were seen, which are probably the continuation of the Gelinis vein. To the east, on lots 24 and 25, beyond the boundary of the group of claims held by the Syndicate, quartz, which may also represent the same vein, was observed at several places.