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GEOLOGY OF NORTH SHORE, MANICOUAGAN TO GODBOUT, 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

	Page
Marsoui Map-Area, Gaspé Peninsula, by I. W. Jones.....	3
Summary Report on North-Central Gaspé, by I. W. Jones.....	41
Northwest part of Lac-Saint-Jean region, by Bertrand T. Denis.....	55
Western Témiscouata Region, by H. W. McGerrigle.....	93
Upper Gatineau Region, by J. A. Retty.....	129
Geology of North Shore, Manicouagan to Godbout, by Carl Faessler.....	149



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**GEOLOGICAL EXPLORATION ON
THE NORTH SHORE,
MANICOUAGAN TO GODBOUT**

by Carl Faessler

CONTENTS

	<i>Page</i>
INTRODUCTION.....	151
Previous work.....	151
Location and area.....	151
Population and settlement.....	152
Means of communication.....	154
Organization and acknowledgments.....	155
TOPOGRAPHY.....	155
Champlain terraces and Laurentian plateau.....	155
Rivers.....	156
Lakes.....	157
GEOLOGY.....	158
Table of formations.....	158
DESCRIPTION OF FORMATIONS.....	158
Pre-Cambrian.....	158
Grenville series.....	158
Granite series.....	160
Quaternary.....	161
ECONOMIC GEOLOGY.....	164

MAP AND ILLUSTRATIONS

Page

Map. No. 302.—Manicouagan to Godbout, North Shore... (in pocket)

Figure 1.—Principal fiords with their secondary fiords. 162

PLATES

(after page 165)

Plate I—A.—Fiord of Saint-Nicholas.

B.—Palæozoic breccia at Pointe Saint-Gilles.

Plate II—Glacial grooves at the entrance of Saint Pancras fiord.

**GEOLOGICAL EXPLORATION ON
THE NORTH SHORE,
MANICOUAGAN TO GODBOUT**

by Carl Faessler

INTRODUCTION

Our exploration on the North Shore of the St. Lawrence reached Manicouagan river in the season of 1932. In 1933 the work was resumed at this river and was continued eastward to the river Godbout. The Manicouagan joins the St. Lawrence some 217 miles below the city of Quebec and the Godbout enters it about 30 miles farther towards the east.

PREVIOUS WORK

Jas. Richardson^①, A. P. Low^②, and J. H. Valiquette^③, as mentioned in my report for 1932, ascended the Manicouagan river at different times far beyond the limits of this map-sheet, but only along its western boundary. Richardson also traversed the coast-line of the North Shore from Tadoussac to Seven Islands and referred to one locality within our area. H. de Puyjalon, too, presented some notes to the Legislative Assembly of the Province on the subject of a geological exploration along the North Shore of the river and gulf of the St. Lawrence, in March, 1882, but did not make any specific reference to the area here studied. Consequently, there is no previous geological report to be discussed in describing the interior of this district.

LOCATION AND AREA

The district to be described lies, as has been said, between the Manicouagan river on the west and the Godbout on the east. In breadth, it extends from the St. Lawrence river on the south to a line drawn at

^① Geol. Surv. Can., Report of Progress, 1866-69, pp. 305-311.

^② Geol. Surv. Can., Ann. Rept., Vol. VIII, Pt. L., 1895.

^③ Que. Bur. Mines, Ann. Rept., 1908.

the north boundaries of the townships of Franquelin and Bourdon. The length—east and west—is about 30 miles, the average breadth $12\frac{1}{2}$ miles, and the total area 380 square miles. It includes the townships of Lafèche, Franquelin, and Bourdon, and the southwest corner of Morency.

POPULATION AND SETTLEMENT

The district is not one that is conducive to settlement. Land suitable for tillage is rare and there is little land under cultivation. Alluvial terraces, such as furnish agricultural land farther southwest, are rarely found here.

At the mouth of the Manicouagan is the remnant of a settlement formerly known as Old Post. This was once a hamlet containing a saw-mill, a considerable number of houses, with a school and chapel for the needs of the people. But for some years past the place is abandoned except for one family that remains in summer only, for the maintenance of the telephone, telegraph, and Marconi services. In winter the operator of these services is removed to Baie Comeau.

Baie Comeau, six miles east of Old Post, is the site of a projected pulp and paper mill of the Ontario Paper Company, of Thorold, Ont. Here a substantial wharf has been built, the land cleared for a village, and several good roads made. It is proposed to transmit electric power to this site from Outarde Falls. Unfortunately, this promising development has been in abeyance for the past three years and only one family remains here throughout the year.

The projected village of Baie Comeau is situated on one of the three lateral fiords tributary to Des Anglais bay. Another, called Anse-du-moulin, was once the site of a saw-mill but has been abandoned for several years. The third lateral fiord is occupied by Baie-des-Anglais, where there is a salmon fishing club, open during the summer only.

Seven miles in a straight line east of the Manicouagan is the hamlet of Mistassini, situated on the east side of the Mistassini river at its entrance to the St. Lawrence. This is the only place within the district where farming is carried on as an occupation. Three families of colonists live here, and a mile and a half distant are the premises of a salmon fishing club, occupied by the guardian and his family throughout the year.

Two miles east of Mistassini is the village of Franquelin, sometimes called Baie des Cèdres, which is the most important settlement in the area mapped. It is on the west side of the Franquelin river, at its entrance to the St. Lawrence, and is situated on the property of the Ontario Paper Company. There is a good wharf, a small hydro-electric plant which furnishes light to the village and power needed by the Company, a store, and a hospital in charge of a doctor who is in residence throughout the year, besides a post office and telegraph office which are maintained by the Federal Government. A school and chapel are under the care of the curé of Godbout. The population numbers about 250 permanent residents, with an additional 500 bushmen in winter. All are employed by the Ontario Paper Company, which cuts and peels annually some 35,000 cords of pulpwood in this vicinity and ships it to Thorold, Ont.

Seven miles below Franquelin is the fiord of St. Nicholas, at the mouth of which are an old saw-mill and several houses, all now abandoned. These formerly made up the village of St. Nicholas.

The adjacent territory is an ancient seigniory, now owned by private parties, who sell wood at times to companies operating in the district. One family only now lives here throughout the year, that of the fire ranger of the district.

From St. Nicholas to Godbout there is no settlement. The village of Godbout is on the east side of the river and is thus beyond the limits of the present map-sheet. Godbout is the centre of operations of the St. Regis Lumber Company. This Company cuts pulpwood on its limits along the Godbout river and especially on the two westerly tributaries, Mononele and Étienne.

The two operating companies, Ontario Paper Company and St. Regis Lumber Company, employ practically all the labour of the district. Fishing is not followed as an occupation, although salmon are sufficiently plentiful to attract two sportsmen's clubs, one at Baie-des-Anglais and the other at Mistassini.

A few hunters by occupation come from Pointe Lebel or Godbout. Beaver are found around a good many of the lakes. Caribou are rather plentiful about the head of St. Nicholas river, and bears are found throughout the region.

MEANS OF COMMUNICATION

There are no waggon roads along the coast. A trail follows the government telegraph line, which traverses the entire district, but there are no bridges over the rivers that interrupt this trail. The Franquelin river can be crossed on a dam a quarter of a mile above the village, and the Godbout by a bridge of the St. Regis Lumber Company, some 12 miles from the St. Lawrence. In summer, communication between different posts along the shore is made wholly by water, and in winter by dog teams or sometimes by horse-drawn sleighs, following the telegraph line and on the ice of the rivers.

Several wood roads lead into the interior. One of the Ontario Paper Company's roads from Franquelin runs by way of the basin of the Mistassini and the Chasseur river to 'Cache Five', the principal dépôt of the Company, and thence by way of Chasseur creek to a point on Franquelin river, 15 miles from the village. This road is well maintained and is fit for use by horse-drawn vehicles. The same Company maintains another road from the village to 'Cache Three', and a trail thence along the Chasseur river to 'Cache Four', which is on the main, or first, road mentioned. There is also an inferior road from the fiord St. Nicholas to St. Nicholas lake.

The St. Regis Lumber Company maintains an automobile road from the village of Godbout along the east side of the river to Twelve-mile Cache, which is the principal distributing dépôt for the camps on the west side of the Godbout. This Company also maintains good roads along Mononcle and Étienne rivers. Besides the lumber roads, there are hunting trails which connect the principal lakes with one another and with the coast.

The Manicouagan is the only river that affords an inland canoe route throughout the season. Of the others, only the Godbout and the lower reaches of the Franquelin may be used even in the high water of spring-time, and then only for short intervals.

Communication with the south shore of the St. Lawrence is provided by the *Marco Polo* and *Gaspesia*, of the Clarke Steamship Company, of Quebec. These boats, which carry mail, call at Baie Comeau, Franquelin, and Godbout on the north side, and at Rimouski and Matane on the south shore. Of other boats in coasting trade, the *Sable I*, of the same Company, makes trips along the North Shore in

winter as well as summer from Quebec or Pointe-au-Pic to Natasquan and Newfoundland. In winter, mail is brought to the North Shore mainly by the service of Canadian Airways, Limited, whose 'planes make regular flights from Quebec to Seven Islands. From principal landing places, mail is distributed to minor posts by motor boat or dog-team. In the winter of 1934, an attempt is to be made to drop mail at Franquelin and other villages without landing the aeroplanes.

ORGANIZATION AND ACKNOWLEDGMENTS

The work of the present survey was begun on June 1st at the Manicouagan river and finished at Godbout in the last days of August. The party consisted of the writer, six assistants, and a cook. P. E. Auger served as chief assistant.

I would warmly thank the officials of the Ontario Paper Company for their valuable assistance in all that pertained to our work, and for their hospitality to our party. Mr. Maher, manager, Mr. Provancher, engineer, with Messrs. Gleeson, Redmond, and McKinnon of this Company, and Mr. Gagné, post-master and telegrapher, all rendered us many valuable services.

The geological map which accompanies this report is based on the aerial map furnished by the Service de la Photographie Aérienne de la Province de Québec.

TOPOGRAPHY

CHAMPLAIN TERRACES AND LAURENTIAN PLATEAU

The district between the Manicouagan and Godbout rivers presents a rather uniform topographic aspect, due to the fact that it is occupied almost entirely by the Laurentian plateau. Plains composed of deposits of Champlain and recent age, such as occupy large areas in the parts of this region hitherto studied, are here practically absent, and alluvial deposits occupy only ten square miles of the surface.

The district is essentially a plateau dissected by a system of drainage that is deeply entrenched. Ridges with steep slopes separate deep valleys. The ridges are always rounded towards their summits

by erosion, principally glacial. At the south, the plateau terminates in a steep escarpment, which forms the coast-line of the St. Lawrence. This coast is rocky and sharply indented. The steep edges of the plateau border the sea, and it is only about the mouths of some of the rivers that tongues of alluvial soil afford places for habitation. The Quaternary glaciers have exerted enormous force in this region. This is well shown by the large number of fiords, which give the coast its characteristic topography (see Plate I—A); by the numerous valleys in the interior, which are wide and deep and have flat floors, whether occupied by streams or not; and even more effectively by the immense number of lakes, which are due to derangement of drainage by deposits of glacial débris in earlier channels.

RIVERS

The principal rivers are the Manicouagan, which was described in the report of 1932, and the Godbout. Between these, in order of importance, are the Franquelin, Des Anglais, Mistassini, Amédée, and St. Nicholas, which, with some smaller streams, all flow into the St. Lawrence.

The Godbout is about 60 miles long and drains an area of 700 square miles. It is used by the St. Regis Lumber Company for 'driving' logs to the coast. A series of rapids a mile and a half from its mouth gives a difference in level of 127 feet, while a chute of 55 feet occurs a mile and a half above the rapids, or three miles from the St. Lawrence.

The Franquelin is a smaller river than the Godbout; it serves to float the wood of the Ontario Paper Company from the timber limits to the St. Lawrence. Six miles from its mouth, the Franquelin divides into two branches of about equal size. The sources of these branches are thirty miles from the St. Lawrence. Four miles from the mouth of the river there is a magnificent chute, 160 feet high; and a mile lower down, one of 25 feet. The latter is utilized by the Ontario Paper Company in a small hydro-electric plant for supplying light and power at Franquelin.

The Ile des Anglais and Mistassini rivers occupy picturesque valleys, which contain the largest lakes of the district. There are, as yet, no lumbering operations on these rivers. The St. Nicholas is a turbulent stream that descends in steps from a basin at a considerable altitude in which St. Nicholas lake lies. Its drainage basin is wholly within this map-area. There was formerly a lumber camp in this locality, which, however, proved difficult of operation owing to the nature of the river.

LAKES

Lakes are very numerous in the district. In the area of 380 square miles there are more than 700 lakes, which may be grouped approximately as follows in regard to their location:

13	in the basin of the	Manicouagan
42	“ “ “ “ “	Amédée
118	“ “ “ “ “	Des Anglais
123	“ “ “ “ “	Mistassini
167	“ “ “ “ “	Franquelin
75	“ “ “ “ “	St. Nicholas
102	“ “ “ “ “	Godbout

About 100 others are in the basins of smaller streams that empty directly into the St. Lawrence.

The largest of the lakes, Chesnaye lake, named Gros-Brochets or Malfait on other maps, is situated on Des Anglais river. It is about four miles long. Next in size is St. Nicholas, or Grand Lac St. Nicholas, which has a maximum length of three miles. Amongst others, Castelnau, Franquelin, Amédée, and Mistassini, which are each two to three miles in length, are, like the first named lakes, of unusual beauty, many of them bordered by high, steep or vertical cliffs.

GEOLOGY

The following table shows the geological formations occurring in the district:

TABLE OF FORMATIONS

QUATERNARY	Recent	River deposits
	Champlain	Bedded sands and clays of marine origin
	Glacial	Moraines and erratic blocks
<i>Long Interval of Erosion</i>		
PRE-CAMBRIAN	Granite Series	Granite gneiss, pegmatite, diorite, gabbro, anorthosite
	<i>Intrusive Contact</i>	
	Grenville Series	Paragneiss, quartzite, and crystalline limestone of sedimentary origin

DESCRIPTION OF FORMATIONS

PRE-CAMBRIAN

As compared with related areas that have been described in previous years, the present field presents two distinguishing features. Both relate to the character of the pre-Cambrian formations. One is the large area that is occupied by the Grenville series. The other is the presence of anorthosite as an important intrusion in the vicinity of St. Nicholas.

GRENVILLE SERIES:

In the area examined this year, the Grenville series occupies about 115 square miles. After practically disappearing from the North Shore for a distance of 70 miles or more, Grenville formations, as was

noted last year, reappear on the west side of the Manicouagan river. They continue on the east side of this river, the starting point of the season's work for 1933, and thence they continue as far as the Mistassini river, where they disappear as abruptly as they began.

The area of Grenville is bounded on the west by the valley of the Blanche river and Grand Lac Salé ①, and on the east by the valley of the Mistassini. These valleys on either side of the Grenville area have certain peculiar features in common. They are deep and for long distances have steep walls that are even vertical at many places. They give the impression of fault zones, which have been eroded by the ice so as to form very distinct trenches. It therefore seems quite probable that the Grenville is a depressed block between two systems of faults, which has escaped erosion by reason of its depression.

On the south, the limit of the Grenville is much less definitely shown. It there gives way more or less gradually to granitic gneiss. The Grenville does not reach the St. Lawrence at any place yet observed. Towards the north, it extends beyond the limit of the present map to an unknown distance, and the nature of its contact is not known.

The Grenville strata vary in strike from N.12°E. to N.36°W. They dip towards the east at angles ranging from 12 to 33 degrees from the horizontal.

Paragneiss.—This is the most abundant phase of the Grenville. The rocks are foliated and banded gneisses which in many places have the fine texture of schists. They are composed essentially of biotite, quartz, and orthoclase feldspar. Some plagioclase is always present. In many places the paragneiss is rich in garnet and, under the microscope, apatite is always found. The rock is very commonly calcareous. As it becomes more acidic in composition, the paragneiss passes by transition into quartzite.

Quartzite.—Many bands of quartzite in this district contain garnet. These bands are light rose in colour and rather granular in texture. Near the surface the rock tends to become friable and easily breaks into grains of quartz and garnet. However, the characteristic

① Same as *Aux Brachets* lake on Faessler's map No. 232, Que. Bur. Mines, Ann. Rept., 1932, Part D.

quartzite of the district is white in colour and is composed essentially of quartz alone. It forms several large hills that are conspicuous from a distance owing to their glistening white appearance. Such quartzites occupy a good part of the basin of Des Anglais river.

Crystalline Limestone.—No crystalline limestone was found in this area east of the Manicouagan river, but in searching for an occurrence of limestone reported by Richardson ①, an exposure of Grenville limestone was found on the second portage of the Manicouagan, on the west side of the river, and outside of the map-area. This may be Richardson's locality. About midway up the chute there is a little island of rock forming a sort of pillar twenty feet high and having a surface of about 1,000 square feet. This pillar is composed of bands, all more or less calcareous, but only one band five feet thick may be properly termed crystalline limestone. Here and there it is replaced by metamorphic pyroxenite. The limestone was not seen in the valley banks, which, however, are not well exposed for examination.

GRANITE SERIES:

The rocks of this series occupy the larger part of the area mapped. They include granite-gneiss and diorite with pegmatite, and anorthosite. Pegmatite is rare and occurs only as narrow dykes or other small bodies. True granite is found seldom, if at all, as the rocks of this composition are all more or less gneissic. Approaching the anorthosite intrusion described below, the granite gneisses become highly foliated and in some places, near their contact with the anorthosite, they have a marked 'augen' structure. This may be well seen at St. Nicholas fiord, where the cliffs on the east side are anorthosite and on the west are foliated gneiss; also at Falaises lake, and on the Étienne river. Augen-gneiss is found in the vicinity of the anorthosite at the head of Longchamp lake, at Forbes lake, and elsewhere.

Anorthosite.—Anorthosite occupies some thirty-five square miles in the southeast corner of the map-area, bordering the river Godbout and probably continuing far beyond the area mapped; in fact, the anorthosite occurring here is apparently part of the great mass that

① Jas. Richardson, in the report already cited, says (p. 306): "About twelve miles up the river last named (Manicouagan), there occurs in the gneiss a bed, twelve feet thick, of coarsely crystalline limestone, grey, yellowish, and occasionally pinkish in colour, and holding grains of green pyroxene."

is known about lake Saint-Jean and which, as indicated on a generalized geological map of Canada issued by the Geological Survey, reaches the St. Lawrence at Homards bay, forty-miles below St. Nicholas.

In its character and its relationship to the rocks which surround it, the anorthosite of this area corresponds closely with that of other known bodies of this rock in eastern Canada ①. It is plainly intrusive into the older granite gneisses of the region, and at the same time it seems to have a close genetic relation with certain of the granite intrusions. These may, however, be of later age than some of the gneisses.

There are two phases of the anorthosite. One is dark coloured and consists essentially of basic plagioclase with more or less pyroxene, commonly augite. By increase of pyroxene this phase passes into gabbro in places, especially near the outer margin of the mass. This dark coloured variety forms the major part of the anorthosite occurring within the map-sheet.

The other phase is practically white in colour and very fine grained. It is composed almost entirely of plagioclase feldspar, of less basic composition than that in the darker type, and tends to form narrow bands within the latter rock ②.

QUATERNARY

GLACIAL:

The glaciers of the Pleistocene period left abundant evidence of their work in this region. A number of well defined fiords are to be seen, and there are others that are largely filled with alluvial material that goes to conceal their form. The principal fiords all have about

① Adams, F. D., *Ueber das Norian oder Oberlaurentian von Canada*; N. Jb. f. Min., Beil. Bd. VIII, 1893, pp. 419-498. Also Geol. Surv. Can., Ann. Rept., Vol. VIII, Pt. J, 1895.

Mawdsley, J. B., Geol. Surv. Can., Memoir 152, 1927, pp. 14-15.

Bowen, N. L., Jour. Geol., Vol. XV, 1917, pp. 209-248.

② Rocks that may be of Palæozoic age are exposed in a very small area in the vicinity of Pointe Saint-Gilles. At this place there are fissures in the granite gneiss which are filled by sandy limestone, or, in some cases, by angular fragments of gneiss in a calcareous cement. Such fissures containing breccia extend for two miles along the shore, as far as La Chasse river. All are covered at high tide. The largest bands are as much as three feet in width (see Plate I-B).

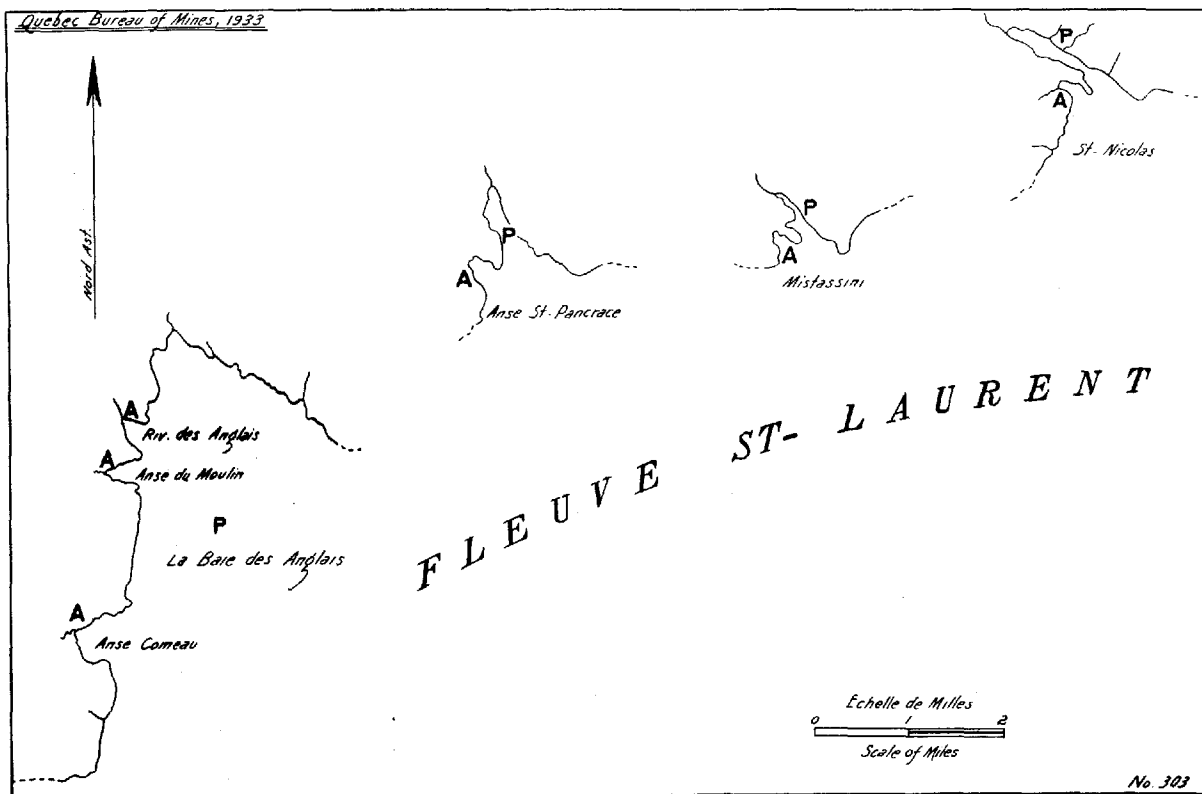


Figure 1.—Principal fiords, with their secondary fiords, between Manicouagan and Godbout (See map No. 302).

the same trend, between S.30°E. and S.50°E. Minor or secondary fiords enter them on their west side (see Figure 1). The principal fiords are at Baie des Anglais, St. Pancras, Mistassini, and St. Nicholas.

La Baie des Anglais is a large, open fiord that is deeply incised. Three subsidiary fiords enter it from the west, forming Des Anglais river, Mill cove, and Comeau bay. All of these are more or less filled by glacial deposits.

St. Pancras fiord (see Plate II) is deep, and at its outlet forms one of the best natural harbours of the region. A secondary fiord enters on the southwest side and there are several hanging valleys from which creeks fall in high chutes.

Mistassini fiord has one minor fiord on its west side. Both it and the main fiord are largely drift-filled.

Saint-Nicholas fiord also has one lateral fiord on the west and both are largely filled. There is, however, a channel that allows vessels to enter the principal fiord in safety.

The glacier has left many other traces of its passage. In all the region there is a striking parallelism of the valleys, which, like the fiords, usually trend S.30°E. to S.50°E. The valleys, especially those which contain lakes, are frequently bordered by steep cliffs, polished and in many places striated, which maintain a constant direction. Some wide and deep valleys with vertical walls have no streams. The floors of these valleys are occupied by well marked morainic material.

The last glacier, or at least that which has left the principal effects in this region, moved from northwest to southeast.

CHAMPLAIN:

The Champlain sea occupied only a very small area between the Manicouagan and the Godbout. On the east side of the Manicouagan, a small plain is formed by the Champlain deposits, within which are many exposures of the bed-rocks of the plateau. According to A. P. Low ①, this plain extends up the Manicouagan for a distance of

① *Loc. cit.*

fifty miles. An arm of the sea formerly occupied the present valley of the Amédée and so connected it with the Manicouagan. The sea also extended up the Des Anglais and Godbout rivers for an unknown distance, but probably did not reach the limits of the present map-sheet in the valleys of the Mistassini and Franquelin. The highest level at which marine shells, *mya truncata*, were found is about 300 feet above present sea-level. The locality is a short distance below the outlet of Castelnau lake, on La Chasse river.

ECONOMIC GEOLOGY

The region seems to promise little from a mining point of view. There is, however, an abundance of quartzite of excellent quality. Lakes Chesnaye, Trois-Pointes, Croche, and others are surrounded by hills of white quartzite which is of high purity. A sample taken near lake Chesnaye gave, on analysis, silica 99.71 per cent and ferric iron only 0.18 per cent. This quartzite would be suitable for making certain kinds of glass and in the ceramic industry, as well as in the metallurgical industry, for sand-blasting of cast iron, and for similar purposes. The most extensive quartzite area is about lake Chesnaye, some $4\frac{1}{2}$ miles from the shore, in the valley of Des Anglais river.

As a material for construction, a handsome augen gneiss should be mentioned. It is uniformly spotted, which gives a fine ornamental effect on a polished surface. It occurs in almost unlimited quantity, on the west side of the Mistassini outlet and on the shore of the St. Lawrence itself. It could well be employed in various kinds of ornamental construction.

Pegmatite occurs very sparingly in narrow veins and irregular masses along the St. Lawrence, at Pointe Saint-Gilles and near Franquelin. No minerals of economic value were observed in these occurrences.

Garnet-sand is found at many places along the coast, as at Pointe Saint-Gilles and elsewhere. Unfortunately, the proportion of garnet is small, probably less than one per cent of the sand.

Pyrite and graphite in small amount, and occasional grains of apatite, occur in a vein in the bed of Thompson creek, just below the

bridge on the road between Franquelin and 'Cache Three'. The vein, which is about a foot wide, has a composite filling consisting of crystals of calcite and pebbles of limestone contained in a calcareous matrix.

A commercial deposit of limestone in this district would be a great boon to the projected pulp industry. Unfortunately, no deposits of workable size have yet been found.





A.—Fiord of Saint-Nicholas.



B.—Palæozoic (?) breccia at Pointe Saint-Gilles.



Glacial grooves at the entrance of the fiord of Saint-Paneras.

ALPHABETICAL INDEX

	PAGE		PAGE
A			
A Jim river—		Antoine tp.	62, 63
<i>See</i> Oulasiemska river.		Apatite, on Thompson creek...	164
A l'Ours river, L.-St.-Jean region	59	Aplite—	
Acadian folding, W'rn Témiscouata	101	L.-Saint-Jean region.	78, 79
Acadian region.	97	Upper Gatineau region.	144
Adams, F. D.	76, 78	Appalachian region.	97
'Africa' sand plains.	91	Arbour brook, Marsoui area.	16
Agglomerate, Témiscouata gr'p.	117, 119	Archambault, M.—	
Agricultural possibilities—		Quartz analyses by.	87
Marsoui map-area.	11	Asbestos, N. Central Gaspé.	54
Akos lake—		Ashuapmouchouan river. * 57, 59, 62-4	
Quartz-gabbro at.	145	Roberval granite along.	78
Albanet tp.—		Terraces along.	82
Laurentian rocks in.	75	Ashuapmouchouan tp.	58, 62
Quaternary deposits in.	81	Magnetite in.	85
Alecock, F. J.	14, 17, 42, 47, 54, 101	Quaternary deposits in.	81
Alex river.	63	Trenton ls. in.	79
Saguenay intrusives on.	77	Assays, gold, etc., ores, Marsoui area.	34-39
Alluvial clays, L.-St.-Jean region.	72, 80, 91	Auclair, Yvon, claim, Marsoui. .	39
Amazonite, Proulx tp.	89	Augen gneiss, North Shore. .	160, 164
Amédée lake.	157	Auger, P. E.	155
Amédée river.	156	Azurite, N. central Gaspé.	53
Amphibolite—		B	
North-Central Gaspé.	47, 51	Baddeley, Maj.-Gen. F. H.	59
Upper Gatineau region.	142	Baie Comeau.	152, 154
Analyses—		Baie-des-Anglais.	152, 153, 163
Dolom. limest., Portage brook	25	Baie-des-Cèdres.	153
Grenville limest., n'r Dolbeau.	83, 84	Bailey, L. W. 103, 112, 115, 119, 120	
Limestone, n'r Saint-Eusèbe. .	125	Baker brook.	100
Quartz, Lac-Bouchette.	87	Bannerman, H. M.	95
Quartzite, Les Pèlerins id.	126	Barlow, A. E.	82
Anglais, Baie-des.	152, 153, 163	Barrière lake.	133, 138
Anglais, des, river.	156, 157, 163	Garnetiferous gneiss at.	141
Quartzite on.	160, 164	Barter's camp—	
Anorthosite—		Lead-zinc deposits at.	52
L.-Saint-Jean region.	67, 68, 89	Basalt, Marsoui area.	28
Near Godbout river.	160	Bazin river.	133, 137
Anorthosite series.	76, 160	Beaches, marine, Marsoui area. .	15
Economic possib's of.	89	Beau lake, W. Témiscouata area. .	99
First named, by Adams.	59	Beaudet tp.	58, 63
Anse-du-moulin.	152	Laurentian rocks in.	74
		Beekmantown form'n—	
		N. Central Gaspé.	46
		W'rn Témiscouata area. .	107, 112

* Termed *Chamouchouane* on the map of 1933.

PAGE	PAGE		
Bélinge river.....	138	Capitachouane river..	132, 136, 138
Grenville ls. on.....	140	Diorite on.....	144
Bell, Robert.....	13	Sand plains along.....	136
Belle-Rivière.....	57	Caron tp.....	62
Berry mountains.....	49	Cascades brook—	
Bérubé, H. S.....	10	Change in course of.....	17
Biotite gneiss, Upper Gatineau.	142	Granitic rocks near.....	29
Black granite, n'r Saint-Gédéon.	89	Castelnau lake.....	157
Black Point—		Marine shells at.....	164
Cabano conglom. at.....	116	Chalcopyrite—	
Blanchard, Raoul.....	60, 69, 71	Dalmas tp.....	90
Bleue River valley—		Marsoui area.....	34, 39
Trachyte in.....	121	N. Central Gaspé.....	51, 53
Boisbuisson tp.....	6	Upper Gatineau region.....	147
Mineral deposits in....	33, 38, 39	Chalmers, R.....	13, 18, 60, 82
Bornite, Upper Gatineau region.	147	Chamouchouane.—	
Bouchette lake.....	138	see Ashuapmouchouan.	
Boulder clay, L.-Saint-Jean re-		Champlain deposits—	
gion.....	81	L.-Saint-Jean region.....	72, 80
Brian, Chas.—		North Shore.....	155, 163
Limestone analysis by.....	83	Champlain terraces, N. Shore..	155
Brochets, lake aux.....	159	Charlevoix tp.....	62
Burnt Point—		Chasseur river.....	154
Cabano conglom. at.....	116	Chazy, Marsoui area—	
		Fossils in.....	26
C		Chert beds, M. or L. Ordov.—	
Cabano—		Marsoui area.....	25
Agglomerate near.....	119	Chesnaye lake.....	157
Cabano conglomerate.....	115	Quartzite at.....	164
Cabano river.....	99, 100, 103	Choiseul lake.....	138
Témiscouata beds on....	116, 117	Glacial striæ at.....	137
Cabano River limestone.....	116	Orthogneiss at.....	144
Analysis.....	125	Chouart lake.....	138
Cabano River valley—		Christie tp.....	6
Limestone in.....	125	Mineral deposits in.....	33, 38
Cabonga reservoir....	132, 138, 139	Chromite, N. Central Gaspé... 54	
Dome structure at.....	146	Chrysocolla, N. Central Gaspé. 53	
Garnetiferous gneiss on.....	141	Chrysotile, N. Central Gaspé.. 54	
Grenville ls. on.....	140	Chute à l'Ours—	
Sand deposits on.....	136	Roberval granite at.....	78
Cacouna, Sillery at.....	112	Trenton ls. at.....	79
Camachigama lake.....	138	Chute au Marbre—	
Camachigama river.....	133, 138	Grenville rocks at.....	73
Sand plains along.....	136	Clarke Steamship Co.....	154
Cambrian form'n, W'n Témis-		Clarke, J. M.....	43
couata.....	103	Claude lake, Marsoui area. 7, 9, 17	
Canadian Airways, Limited.... 155		Quartz veins at.....	39
Canadian Int. Paper Co. 131, 133, 134		Claude river, Marsoui area.. 9, 15	
Capimitchigama lake.....	138	Diabase dykes along.....	30, 33
Grenville ls. on.....	140	Lower (?) Ordov. rocks on.. 22	
Capitachouane lake.....	138	Clay deposits, L.-Saint-Jean re-	
Glacial striæ at.....	137	gion.....	72, 81, 91
		Clova.....	132
		Clova river.....	137
		Cobourg ls., L.-Saint-Jean re-	
		gion.....	68
		Coleman, A. P.....	14, 15, 18, 44
		Comeau, Baie.....	152, 154

PAGE	PAGE		
Comeau bay.....	163	Diabase—	
Conglomerate—		Marsoui area.....	30, 33
Cabano.....	116	N. Central Gaspé.....	49, 52
Mt. Wissick series.....	121	Proulx tp.....	78
N. Central Gaspé.....	47	Diorite—	
Pohenegamook.....	114	Marsoui area.....	29
Sillery.....	107, 109, 110	North Shore.....	160
Cooke, H. C.....	133	Upper Gatineau region.....	143
Copper deposits, N. Central Gaspé.....	53	Dolbeau—	
Copper mountain—		Limestone quarry near.....	83
Copper deposits on.....	53	Dolbeau tp.....	58, 62, 63
Corbeau lake—		Quaternary deposits in.....	81
Pegmatite on.....	144	Saguenay intrusives in.....	76
Coucou dépôt.....	132	Dolomitic ls., M. or L. Ordov.,	
Amphibolite at.....	142, 147	Marsoui.....	25
Croche lake—		Fossils in.....	26
Quartzite at.....	164	Drag-folding—	
Croteau, D. M.....	39	In L'Islet rocks.....	106
Crystalline limestone—		Lac-Saint-Jean region.....	75
<i>See under Grenville.</i>		Drainage—	
Cusson, Jos.....	131	Marsoui area.....	15
Cusson claims.....	147	North Shore.....	156
Garnetiferous gneiss at.....	142	Upper Gatineau region.....	137
		W. Témiscouata area.....	99, 100
		Dresser, J. A... 57 <i>et seq.</i> , 98 <i>et seq.</i>	
D		Duchesnay tp.....	6
Dallaire, J. René.....	60	Mineral deposits in.....	38, 39
Dalmas tp.....	58, 62, 63, 64	Duchesne creek, Marsoui area—	
Feldspar in.....	89	L. (?) Ordov. slates near....	23
Gold prospect in.....	89	Quartz veins along.....	38
Quaternary deposits in.....	81	Dufferin tp.....	58, 62
Saguenay intrusives in....	76, 77	Molybdenite in.....	84
Danin lake—		Quaternary deposits in.....	81
Dome structure at.....	146	Du Loup river, W. Témiscouata	
Deepkill form'n, Marsoui area—		area.....	100
Fossils in.....	26	Dumais tp.....	58, 62
Delahey, G. A.....	131	Fault scarp at.....	69
Demeules tp.—		Quaternary deposits in.....	81
Quaternary deposits in.....	81		
Denis, Bertrand T.—		E	
Rep't, N. W. portion L.-Saint-		Economic geology—	
Jean region.....	55-91	Lac-Saint-Jean region.....	83
Denis, T. C.....	42	Marsoui area.....	32
Dequen tp.—		N. Central Gaspé.....	50
Quartz veins in.....	85	North Shore.....	164
Devonian—		Upper Gatineau region.....	147
N. Central Gaspé.....	48, 53	W. Témiscouata area.....	123
W. Témiscouata area.....	101	Elbow dépôt.....	132
Devonian (?)—		Ells, R. W.... 13, 27, 43, 103,	112
W. Témiscouata area.....	120	Estcourt—	
Devonian, Lower—		L'Islet rocks at.....	105
N. Central Gaspé.....	50	Estcourt tp.—	
Devonian, Middle (?)—		Trachyte in.....	121
Marsoui area.....	28	Étienne river.....	153, 154
		Augen gneiss on.....	160

F	PAGE	PAGE
Faessler, Carl—		
Rep't, North Shore, Manicou-		
agan to Godbout.....	149-165	
Falaises lake—		
Augen gneiss on.....	160	
Farnham slates.....	115	
Fault-scarps—		
Lac-Saint-Jean region.....	62, 69	
W. Témiscouata area.....	98	
Faulting—		
Lac-Saint-Jean region.....	69	
Marsoui area.....	31, 36	
N. Central Gaspé.....	48	
Pohenegamook.....	114	
Sillery.....	112	
W. Témiscouata area.....	102	
Federal Zinc and Lead Co. . .	50, 51	
Feldspar, L.-Saint-Jean region..	89	
Felsite, Marsoui area.....	29	
Festubert river.....	138	
Fjords, along North Shore..	156, 161	
Folding—		
Lac-Saint-Jean region.....	75	
Marsoui area.....	30, 39	
N. Central Gaspé.....	46, 48, 50	
Pohenegamook.....	114	
Sillery.....	112	
Témiscouata group.....	119	
Upper Gatineau region..	146, 148	
W. Témiscouata area.....	101, 102, 106	
Forbes lake—		
Gneiss and anorthosite on... .	160	
Fossils, Ordov., Marsoui area. . .	21	
.....	25, 26	
Franquelin.....	153, 154	
Pegmatite near.....	164	
Franquelin lake.....	157	
Franquelin river.....	154, 156	
Hydro-electric plant on.....	156	
G		
Gabbro, L.-Saint-Jean region. . .	68, 76	
Gabbro, quartz-, garnetiferous—		
Upper Gatineau region.....	145	
Gagné, Mr.....	155	
Galena—		
Lac-Saint-Jean region.....	84, 90	
Marsoui area.....	34, 37, 38, 39	
N. Central Gaspé.....	51, 52	
Galena brook—		
Lead-zinc deposits on.....	52	
Game, Upper Gatineau region..	135	
Garnet, L.-Saint-Jean region—		
Possibility of econ. deposits..	84	
Garnet sand, on North Shore..	164	
Garnetiferous-gneiss—		
North Shore.....	159	
Upper Gatineau region..	141, 148	
Garnetiferous-quartz-gabbro—		
Upper Gatineau region.....	145	
Garnier tp.....	62	
Gaspé—		
Marsoui map-area.....	3-39	
Need for roads in.....	8	
North-Central.....	41-54	
Topography.....	10	
Gaspé limestones.....	102	
Gaspé Mines.....	50	
Gaspé Sandstone series.....	48, 49	
Gatineau Power Co.....	139	
Gatineau region, upper.....	129-148	
Drainage.....	137	
Economic geology.....	147	
Geology.....	139	
Physiography.....	136	
Structure.....	146	
Water-powers in.....	135	
Gatineau river.....	132, 137	
Grenville ls. along.....	140	
Sand plains along.....	136	
Terraces along.....	137	
Water-power sites on.....	135	
Gauthier, Jos.....	88	
Gendron, J. E.....	131	
Gens-de-terre river. . .	132, 136, 138	
Garnetiferous gneiss on.....	142	
Water-power sites on.....	135	
Geology—		
Lac-Saint-Jean region.....	67	
Marsoui area.....	19	
North Shore.....	158	
Upper Gatineau region.....	139	
W. Témiscouata area.....	101	
Geology, economic—		
See Economic geology.		
Girard tp.....	58, 62, 63, 64	
Laurentian rocks in.....	74	
Quaternary deposits in.....	81	
Roberval granite in.....	78	
Glaciation—		
Lac-Saint-Jean region.....	72, 82	
Marsoui area.....	17	
North Shore.....	156, 161	
Upper Gatineau region.....	137	
Gleeson, Mr.....	155	
Glendyne—		
Témiscouata slates near.....	118	
Gneiss—		
Lac-Saint-Jean region..	67, 73, 74	
North Shore.....	159	
Upper Gatineau region..	141-4, 148	

PAGE	PAGE
Godbout.....153, 154	Hybrid gneiss, Upper Gatineau.. 143
Godbout, Manicouagan to—	Hydro-electric plant, Franque-
Geological explor'n.....149-165	lin r..... 156
Godbout river.....154, 156	Hypersthene, L.-St.-Jean region—
Anorthosite on..... 160	In anorthosite..... 76
Gold—	In Roberval gran. and syen.. 79
Cusson claims (reported on).. 148	
Marsoui area.....32, 34, 36	I
N. Central Gaspé.....52, 54	Indian lake—
Notre-Dame-du-Lac (reported	Quartz-gabbro at..... 145
n'r).....123, 126	Iron ore, N. Cent. Gaspé..... 54
Gold prospect, Dalmas tp..... 89	
Goudge, M. F..... 83	J
Grand Lac Victoria..... 138	Jacques Cartier, mount
Grande Péribonea river..... 59	Elevation of..... 15
Granite, black—	James lake..... 63
Near Saint Gédéon..... 89	Jones, I. W.—
Granite, Laurentian—	Rep't, Marsoui map-area...3-39
Lac-Saint-Jean region...67, 74	Rep't, N. Central Gaspé...41-54
North Shore.....160	
Upper Gatineau region...143, 148	K
Granite, M. Devonian—	Kamouraska county—
Marsoui area..... 29	Report on.....93-127
Granite, Roberval—	Kamouraska formation...103, 113
Lac-Saint-Jean region...68, 78, 90	Keele, Joseph.....91, 133
Granite, Saguenay—	Keith, Arthur..... 101
Lac-Saint-Jean region...68, 77, 89	Keratophyre, n'r Sully..... 122
Granitic intrusives—	Kindle, E. M.....9, 49, 121, 122
N. Central Gaspé.....48, 51	
Granodiorite, M. Dev.—	L
Marsoui area..... 29	Lac-Bouchette—
Graphite—	Quartz veins at..... 85
Lac-Saint-Jean region..... 73	Lac-Saint-Jean depression..... 61
On Thompson creek..... 164	Area of..... 62
Graptolites, Marsoui area..... 25	Boundaries of..... 62
Gravel, L.-St.-Jean region...81, 91	Lac-Saint-Jean region, N.W.
Gregory, H. E..... 119	portion of—
Grenville series—	Rep't, Bertrand T. Denis...55-91
Lac-Saint-Jean region...67, 73, 83	Economic geology..... 83
North Shore..... 158	Faulting.....62, 69
Upper Gatineau region...140, 147	Geology..... 65
Gros-Brochets lake..... 157	Physiography..... 61
	Laflamme, Mgr. J. C. K..... 59
H	Lake Saint-Jean—
Ha! Ha! bay—	Area of.....57, 64
Fault-scarp at.....69, 71	Depth of..... 64
Hardwood fall—	Elevation of..... 61
Water-power at..... 135	Lake St. John Pulp & Paper Co. 83
Harris, J. J..... 131	Lakes, on North Shore..... 157
Helderberg rocks—	Landron lake..... 138
W. Témiscouata area...103, 121	Sand plains near.....136
Hilliker, R..... 131	Lapotardière tp..... 6
Holland tp., Gaspé—	
Copper deposits in..... 53	

PAGE	M	PAGE
Laurentian plateau—		
Lac-Saint-Jean region. 61, 65, 71		
North Shore..... 155		
Upper Gatineau region..... 136		
Laurentian rocks, L.-St-Jean re-		
gion..... 67, 74		
Economic possibilities of..... 84		
Lavigne, L..... 10		
Lead deposits—		
Marsoui area..... 32		
N. Central Gaspé..... 50		
Lemieux tp.—		
Lead-zinc deposits in..... 50		
Les Étroits—		
Slate quarries near..... 118, 123		
Les Pélerins islands—		
Anal. of quartzite..... 126		
Levis formations—		
Marsoui area..... 26		
N. Central Gaspé..... 46		
W. Témiscouata area... 101, 115		
Lime making, Pelletier tp..... 83		
Limestone, Devonian—		
N. Central Gaspé..... 48		
Limestone, Grenville—		
Lac-Saint-Jean region. 67, 73, 83		
North Shore..... 160		
Upper Gatineau region.. 140, 147		
Limestone, Mt. Wissiek... 121, 125		
Limestone, Ordovician—		
Marsoui area..... 21, 25		
Limestone, Sillery—		
W. Témiscouata area..... 107		
Limestone, Silurian—		
N. Central Gaspé..... 48		
Limestone, Trenton—		
Lac-Saint-Jean region..... 68, 69,		
..... 79, 90		
L'Isle tp..... 62		
L'Islet formation..... 103, 105		
Logan, Sir William..... 13, 43, 102,		
..... 110, 115, 119, 120		
Logan's line..... 102		
Long lake, W. Témiscouata area. 99		
Cabano conglom. on..... 116		
Cabano River ls. near..... 116		
Slate quarries on..... 123		
Témiscouata beds on..... 117		
Longchamp lake—		
Gneiss and anorthosite on... 160		
Loup (Du) river, W. Témiscou-		
ata area..... 100		
L'Ours river (A), L.St.-Jean re-		
gion..... 59		
Low, A. P..... 43, 59, 73, 151, 163		
Lower (?) Ordovician—		
Marsoui area..... 20		
Lyall & Beidelman..... 50, 51		
Mackenzie, Graham S..... 60		
Madawaska river..... 99, 100		
Madeleine river—		
Lead-zinc deposits on..... 52		
Madeleine-Nord river..... 8		
Magnetite—		
Ashuapmouchouan tp..... 85		
N. Central Gaspé..... 54		
Maher, Mr..... 155		
Mailhot, A..... 42		
Malachite—		
N. Central Gaspé..... 53		
Pelletier tp..... 84		
Malfait lake..... 157		
Manicouagan to Godbout—		
Geol. explor'n, by Carl Faess-		
ler..... 149-165		
Economic geology..... 164		
Geology..... 158		
Rivers and lakes..... 156		
Topography..... 155		
Transportation..... 154		
Manicouagan river..... 154, 156		
Grenville rocks on..... 159, 160		
Maniwaki..... 132		
Marine beaches, Marsoui area.. 15		
Marsoui..... 10		
Lower (?) Ordov. rocks near. 22		
Marsoui map-area—		
Report, I. W. Jones..... 3-39		
Agricultural possibilities..... 11		
Economic geology..... 32		
Geology..... 19		
Inhabitants..... 10		
Physiog'y and glaciati'n..... 14		
Structure..... 30		
Timber..... 12		
Topography..... 10		
Transportation..... 6		
Water-powers..... 12		
Marsoui river..... 8, 9, 16		
Farm land near..... 11		
Fossils in Ordov. sed. on.... 26		
Lead-zinc deposits on..... 51		
Ordov. sed. along..... 24		
Origin of name..... 16		
Stream-capture by..... 17		
Trail along..... 8		
Marsoui-Est river..... 8		
Marsouins..... 10		
Marsouins Mines, Ltd..... 32, 51		
Martre river..... 16		
Farm land near..... 11		
Ordov. sed. along..... 25		
Trail along..... 25		

PAGE	PAGE
McGerrigle, H. W.—	
Rep't, W. Témiscouata... 93-127	
McInnes, W. 103, 112, 115, 119, 120	
McKinnon, Mr. 155	
McLennan lake—	
Glacial striæ at. 137	
Orthogneiss at. 144	
Memphremagog slates..... 115	
Mercier reservoir... 132, 138, 139	
Sand deposits on. 136	
Meruimticook lake. 99	
Mesy tp. 62	
Métabetchouan tp. 62	
Middle (?) Devonian—	
Marsoui area. 28	
Middle Ordovician—	
Marsoui area. 24	
Mill cove. 163	
Miller, A. E. 10	
Claims of, on York river. 53	
Milot tp. 58, 62, 63	
Quaternary deposits in. 81	
Saguenay intrusives in. 76, 77	
Mishomis farm—	
Orthogneiss at. 144	
Terrace at. 137	
Mistassibi river. 63	
Trenton boulders on. 80	
Mistassini. 152, 153	
Mistassini fiord. 163	
Mistassini lake. 157	
Mistassini river	
... 57, 59, 63, 64, 156, 157	
Augen gneiss on. 164	
Grenville rocks along. 73, 159	
Laurentian rocks along. 74	
Molybdenite—	
Lac-Saint-Jean region. 84	
N. Central Gaspé. 53	
Monocle river. 153, 154	
Mont-Louis. 7	
Mont-Louis seigniory—	
Prospect in. 39, 52	
Mont-Saint-Pierre. 10	
Lower (?) Ordov. rocks n'r. 22	
Moon lake—	
Garnetiferous gneiss on. 142	
Moraines, Upper Gatineau	
region. 137	
Morency, Jean. 60	
Mt. Wissick group... 103, 120, 125	
N	
Narraway, A. M. 131	
Niagaran, W. Témiscouata area	
..... 103, 115, 116	
Norite, L.-Saint-Jean region.. 68,76	
Normandeau, P. 10	
Normandin church—	
Roberval granite used for... 90	
Normandin tp. 58, 62	
Laurentian rocks in. 74	
Quaternary deposits in. 81	
Roberval granite in. 78	
Tin ore reported in. 90	
Normanskill, U. & L.—	
Marsoui area. 26	
N. Central Gaspé. 46	
North-Central Gaspé—	
Report, I. W. Jones. 41-54	
Northwest mtn. Gaspé—	
Elevation of. 14	
Notakim lake—	
Grenville rocks on. 140,141	
Notre-Dame hills. 97, 98	
Notre-Dame-du-Lac—	
Agglomerate near. 119	
O	
Odjick, Wm. 131	
Okulitch, V. J. 95	
Old Post, settlement at. 152	
Ontario Paper Co.	
..... 152, 153, 154, 155, 156	
Ordovician, L.-St-Jean region	
..... 68, 69, 79, 90	
Ordovician, Marsoui area. 20, 24	
Folding in. 30	
Mineral deposits in. 33 <i>et seq.</i>	
Ordovician, N. Central Gaspé... 46	
Iron-ore deposits in. 54	
Lead-zinc deposits in. 51	
Ordovician, W. Témiscouata	
area. 101, 105, 107, 113, 115	
Orthogneiss, Upper Gatineau.. 143	
O'Sullivan lake. 138	
Garnetiferous gneiss at. 142	
Pegmatite at. 144	
Pyrite at. 147	
Ouellet, A., claim, Marsoui... 39	
Ouiasiemka or Ouasiemsea	
river. 59, 63	
Laurentian rocks along. 74	
Ouïatchouan river. 57	
P	
Paragneiss—	
North Shore. 159	
Upper Gatineau region. 141,147	
Parent tp. 58, 62	
Quaternary deposits in. 81	
Parks, W. A. 101	

	PAGE		PAGE
Pegmatite—		Pointe-Saint-Gilles—	
Lac-Saint-Jean region	78, 79, 83	Garnet sand at	164
Feldspar in	89	Pegmatite at	164
Molybdenite in	84	Population—	
Marsoui area	29	Marsoui area	10
North Shore	160, 164	North Shore	152
Upper Gatineau region	144, 148	Portage brook, Marsoui—	
Pekan brook—		Dolomitic ls. at	25
Magnetite on	54	Potsdam formation	102, 104
Pelletier tp.	58, 62, 63, 64	Price Bros. & Co., Ltd.—	
Grenville rocks in	73, 83	Limestones analysed by	84
Laurentian rocks in	75	Proulx tp.	58, 62, 63
Molybdenite in	84	Amazonite in	89
Quaternary deposits in	81	Grenville rocks in	73
Trenton & Utica b'ldrs in	80	Laurentian rocks in	75
Peneplanation, L.-St.-Jean area	68, 71	Saguenay intrusives in	76, 77, 78
Péribonca river	57, 63, 64	Provancher, Mr.	155
Fault-scarp in	69	Puyjalon, H. de	151
Peridotite—		Pyrite—	
N. Central Gaspé	47, 51	Marsoui area	25, 34, 36 <i>et seq.</i>
Sainte-Rose-du-Déglé	123	N. Central Gaspé	52, 53
Upper Gatineau region	145	Thompson creek	164
Péronne lake	138	Upper Gatineau region	147, 148
Peridotite at	145	Pyroxenite, Upper Gatineau	141
Perron boulevard	6	Pyrrhotite, on Cusson claims	148
Petawaga lake	138		
Petit Cap—		Q	
Lower (?) Ordov. rocks at	22	Quartz—	
Petit Lac Sainte-Anne—		Canadian prod'n and imports	88
Granitic rocks near	29	Market price	89
Petite Péribonca river	59, 63	Quartz-gabbro, garnetiferous—	
Saguenay intrusives along	77	Upper Gatineau region	145
Phosphatic nodules in Sillery beds	110	Quartz veins, Dequen tp.	85
Physiography—		Analyses	87
Lac-Saint-Jean region	61, 71	Quartzite—	
Marsoui area	10, 14	Devonian, N. Cent. Gaspé	48
North Shore	155	Grenville, North Shore	159, 164
Upper Gatineau	136	" Upper Gatineau	141
W. Témiscouata	97	Kamouraska	113
Picrolite, N. Cent. Gaspé	54	" Anal. and tests	126
Pierre river	15	L'Islet, W. Témiscouata	106
Elevation of	14	L. (?) Ordov., Marsoui	20
Pierre-Est river—		Ordovician, N. Cent. Gaspé	47
Claim on	39	Pohenegamook	114
Pike Lake cache	133	Sillery	107
Pilgrim islands—		Silurian, N. Cent. Gaspé	48
<i>See</i> Les Pélerins.		Quaternary deposits—	
Pioneer Mining Corp'n	50	Lac-Saint-Jean region	72, 80, 91
Pohenegamook formation	103, 113	North Shore	161
Pohénégamook lake	99	Quatre-Lacs brook, Marsoui—	
L'Islet rocks on	105	Diabase dykes on	30, 33
Sillery at	107	Quartz veins on	39
Poigan lake	138	Quatre-Lacs valley	18
Grenville limestone at	140	Quebec group	102, 103
Pointe-de-Chasse—		Quesnel tp.	58
Lower (?) Ordov. rocks at	22		

V	PAGE		PAGE
Vaillancourt, Georges.....	95	Water-power—	
Valiquette, J. H.....	151	Franquelin river.....	156
Vases river—		Gatineau region.....	134
Clay deposits on.....	91	Marsoui area.....	12
Verte river.....	100	Western Témiscouata.....	93-127
Volcanic agglomerate, Temis-		<i>See</i> under Témiscouata.	
couata.....	117, 119	Wilson, Alice E.....	9, 21
Volcanics—		Wilson, M. E.....	133, 138
Devonian, N. Cent. Gaspé... 48			
Ordovician, Marsoui..... 28		Y	
" N. Cent. Gaspé. 46, 52		York South river—	
W		Copper deposits on..... 53	
Wapus river—		Lead-zinc float on..... 52	
Claims on..... 147		Young, G. A. . 60, 78, 97, 104, 111	
Garnetiferous gneiss on..... 142			
Grenville ls. on..... 140		Z	
Wassiemka river—		Zinc deposits—	
<i>See</i> under Ouiasiemka r.		Marsoui area..... 32	
		N. Central Gaspé..... 50	