

# RP 286(A)

PRELIMINARY REPORT ON JOHAN-BEETZ AREA (WEST HALF), DESHERBIERS AND JOHAN BEETZ TOWNSHIPS, SAGUENAY COUNTY

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PRELIMINARY REPORT

ON

JOHAN BEETZ AREA (WEST HALF)

DESHERBIERS AND JOHAN BEETZ TOWNSHIPS

SAGUENAY COUNTY

BY

GERALD E. COOPER



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I N T R O D U C T I O N

The western half of the Johan Beetz area was mapped by the writer during the summer of 1952. The area is bounded by longitudes  $62^{\circ}45'$  and  $63^{\circ}00'$ , and by latitudes  $50^{\circ}15'$  and  $50^{\circ}30'$ . The east boundary of the map-area is  $2\frac{1}{2}$  miles east of Johan Beetz, a small settlement on the Gulf of St. Lawrence, 440 miles below Quebec City. The eastern half of the area was mapped during the summer of 1951 (1).

Means of Access

Boats of Clarke Steamship Co. Ltd., sailing from Montreal and Quebec, make regular stops at Johan Beetz. From this village a fishing barge is the best means of travelling along the part of the north shore of the St. Lawrence that crosses the southern part of the area.

The interior of the area is readily accessible by canoe. A well established route follows Petite Piashti river and gives access to lakes Salé, Petit Piashti, and Grand Piashti. Between Johan Beetz and Salé lake the river is wide and shallow, its bottom being covered by numerous boulders and gravel bars. At the head of the east bay of Petit Piashti lake, a second route traverses lakes Goéland, Cabane-Brûlée, Croche, Cabane-Plate and Ledoux, giving access to the northeast corner of the map-area. A third route, also beginning from Petit Piashti lake, but from the head of a small bay on the west side of the lake, crosses to Turgeon lake, which belongs to the Corneille river drainage system. From the northwest corner of this lake, Corneille river may be followed to Ferland lake in the northwestern part of the area. Along each of three canoe routes there are, in addition to the lakes named, many smaller ones and there are well-cut portages wherever overland travel is necessary.

Tanguay lake, in the southwestern part of the area, is most easily reached from the sea by way of Corneille river, which discharges into the *St. Lawrence gulf* four miles west of Johan Beetz. Swift waters between high, granite walls do not permit use of canoes along that part of the river that joins Tanguay and Turgeon lakes.

(1) Cooper, Gerald E., Johan Beetz Area (Eastern Half), Saguenay County, Quebec, Dept. Mines, P.R. 263, 1951.

There are numerous lakes throughout the area suitable for landings by seaplanes.

### T O P O G R A P H Y

The topography of the area may be divided into three units - the coastline, a ridge and valley section in the area of sedimentary rocks and metagabbro, and an upland area mostly underlain by granite.

The shore is flat and indented by many bays. There are also many barren islands along the coast. Usually the bays and islands trend parallel to the structure of the underlying rocks. The shape of some of them is also controlled by joints, particularly in the area of granitic rocks.

Inland, with the exception of that part of the area underlain by granite, the country is more rugged. Long narrow ridges, having fairly steep slopes, alternate with narrow valleys, many of which are occupied by small lakes and streams. This ridge and valley topography is characteristic of that part of the region underlain by the sedimentary rocks and metagabbro. The ridges, which outline the general structural trends of the area, strike southeast in the northeastern part of the area and curve gently to a southwesterly direction in the southeastern part. The same feature is observed on a smaller scale east and south of Ferland lake. West of Salé lake, the ridges trend almost east-west. Inasmuch as the sedimentary rocks are more easily eroded than the metagabbro, they underlie the valleys, whereas the ridges are formed of gabbro or gabbro and quartzite. A few ridges are formed of pegmatite.

The central and west-central part of the area, which is predominantly underlain by granite, consists of an upland that slopes gently towards the gulf of St. Lawrence.

With the exception of a few hills, the overall altitude of the area is less than 400 feet above sea-level.

### G E N E R A L   G E O L O G Y

All the consolidated rocks of the area are of Precambrian age. About half of the map-area is underlain by sedimentary rocks and sills and dykes of altered gabbro. The remaining rocks are chiefly granites, but there are also some gneisses, migmatites and pegmatites.

Of the sedimentary rocks, quartzites of variable composition are most abundant. These rocks are best exposed east of Petite Piashti river, where they form bands of irregular thickness between sills and dykes of altered gabbro. They are also exposed north of the coast, and east and south of Ferland Lake.

Metagabbro, in places, crosses the bedding of the sedimentary rocks at a small angle, but more commonly it is as sills between beds of quartzite or quartzite and schist.

The largest body of granite is exposed around Turgeon lake in the central and west-central parts of the map-area. A second body outcrops around

Ferland lake. Smaller masses of granite crop out east and west of Johan Beetz and west of the mouth of Corneille river. That part of the coast from a point one-half mile west of Johan Beetz to Corneille river is underlain by gneissic granite. A band of this rock extends from Corneille river to Victor bay.

Puyjalon island, a small area of the coast east of the island, and an area on the east side of the mouth of Corneille river are underlain by gneissic rocks of mixed origin.

Pegmatites are common throughout the entire area, but are not abundant near the coast. Several large pegmatite dykes cut the sedimentary rocks and altered gabbro in the southern part of the area.

Table of Formations

Cenozoic	Clay, sand, gravel, erratic boulders	
Great Unconformity		
Precambrian	Intrusive Rocks	Pegmatites
		Biotite granite
		Gneissic granite
		Metagabbro
		Composite gneisses and migmatites
	Metasedimentary Rocks	Grey quartzite, with some hematite-and rutile-bearing quartzite and calcareous quartzite; micaceous quartzite; quartz- biotite gneiss; quartz-biotite schist, mica schist

Precambrian

Metasedimentary Rocks

What appears to be the oldest rocks in the area are metamorphosed sediments. Individual beds vary from a fraction of an inch to three feet thick. An impure grey quartzite is the most abundant of these rocks. Beds of micaceous quartzite, calcareous quartzite, and hematite- and rutile-bearing quartzite are interbedded with it in the northern half of the area. In the southern part of the map-area, micaceous quartzite, quartz-biotite schist, quartz-biotite gneiss and mica schist occur in almost equal amounts with grey quartzite.

Exposures of mica schist occur one mile east of Johan Beetz and on the shores of Victor bay. The rock is medium-grained, well sheared and consists predominantly of biotite with a minor amount of quartz. East of Johan Beetz pink garnets up to half an inch in diameter are distributed throughout the rock.

Quartz-biotite gneiss and schist are exposed here and there throughout the southern part of the map-area and near Ferland lake. They are usually associated with micaceous quartzite. Both types are fine-grained. In the gneiss, bands composed almost entirely of biotite alternate with bands rich in quartz. The rock is finely laminated; individual bands average less than four millimeters thick. The schist is siliceous in character, fine-grained and black coloured. These characteristics serve to differentiate it from the mica schist which is more coarse-grained and contains very little quartz.

Micaceous quartzite is a term used for a rock containing almost equal amounts of quartz and mica. Although it does not form any large units within the sedimentary rocks, it is easy to identify, particularly where it is associated with the lighter-coloured quartzite. The rock is very fine-grained and has a dark grey colour. All gradations between this quartzite and schist were observed. In some places alternate bands of schist, quartzite, and gneiss were observed, the width of individual bands varying from one to six feet.

Grey quartzite is the principal sedimentary rock of the map-area. Its composition is variable. In most places it is tough, fine-grained, and light grey in colour. Quartz is the major constituent; feldspar, amphibole, mica, magnetite, and epidote also occur. East of Petit Piashti lake and on the west side of Quetachou bay the rock contains black bands that have a high percentage of hematite and rutile. The black bands, which average  $1/32$  of an inch in thickness, alternate with bands of grey quartzite that are  $1/4$  to 6 inches wide, and are to be found in zones one-half to three feet thick. In several places, two or three such zones occur in about 20 feet of grey quartzite. The zones are lenticular; none of those seen exceed 30 feet in length.

At a few localities east of Petit Piashti lake, and on the west side of Quetachou bay, the quartzite contains small irregular blebs of carbonate. The matrix of this rock, especially in the case of the quartzite from Quetachou bay, effervesces with hydrochloric acid. Owing to solution of the carbonate, the weathered surface is pitted.

#### Composite Gneisses and Migmatites

Exposures of gneissic rocks of mixed origin may be seen on Puyjalon island, on the shore east of the island, and on the east side of the mouth of Corneille river. The rock shows a well defined banding caused by quartz and feldspar-rich layers separated by thin layers rich in biotite. In some places the rock contains lenticles resembling augen. These augen are formed of quartz and feldspar or of single feldspar crystals.

Near Ferland lake, sedimentary mica schist and quartz mica schist have been highly contaminated by granitic material. This has resulted in the development of a large amount of coarse feldspar crystals in these rocks. The feldspar is grey in colour and may form up to 75 per cent of the rock volume.

#### Intrusive Rocks

Metagabbro: Sills and dykes of altered gabbro are the oldest intrusive rocks known in the area. The best exposures of the rock are found in

the north and eastern part of the map-area. The most abundant variety of altered gabbro is a heavy, black, massive, medium-grained rock composed of abundant amphibole, feldspar, and some magnetite. Some biotite, pyrite, and, in a few places, chalcopyrite were observed. Near the granite bodies the gabbro often contains quartz. The larger gabbro bodies are coarse-grained, and sub-ophitic texture can be seen on the weathered surface where the feldspar has turned white. In the southern part of the area, the gabbro has been sheared and is composed of needle-shaped amphibole, biotite, and feldspar. This rock is tough, heavy, and black. Where the shearing has been intense, the rock has been transformed into a quartz-amphibole-biotite gneiss.

Gneissic granite: This rock is exposed along the coast and for about one mile inland for a distance of three miles east of Corneille river. The same mass, forming a band 1/4 to 1/2 mile wide, extends westward from Corneille river to Victor bay.

The lithology of the gneissic granite is fairly uniform. In general, the rock is medium- to coarse-grained, pink or light grey, and consists of biotite, quartz and feldspar. The rock shows a pronounced gneissic structure, caused by discontinuous lens-shaped bands of quartz and feldspar separated by thin films rich in biotite. Inclusions of sedimentary rocks and gabbro occur within the gneissic granite.

Biotite Granite: The most northerly mass of granite outcrops in the region of Ferland lake and extends beyond the limits of the map-area. This rock is coarse-grained, pink or light grey and composed of abundant feldspar, quartz and biotite. A distinctive feature of the rock is the size of the feldspar grains which are always larger than the grains of biotite and quartz. Both microcline and orthoclase are present. There is seldom any structure in the rock other than jointing, which is very prominent.

The Ferland lake granite is separated from the Turgeon lake granite by a band of sedimentary rocks and gabbro. However, several dykes of granite resembling the Turgeon lake granite were seen cutting the coarse granite of Ferland lake.

Three, more or less distinct units of medium-grained pink biotite granite occur within the map-area. Of these, the Turgeon lake granite in the central and western parts of the map-area is of batholithic dimensions; the other two, the Johan Beetz granite and the granite west of Corneille river, are smaller.

The Turgeon lake granite is usually massive and light pink in colour. Pink feldspar, quartz and biotite are easily distinguished in hand specimen. In a few localities the rock is porphyritic, the phenocrysts being composed of crystals of pink feldspar. West of Corneille river, between Tanguay and Turgeon lakes, a tendency towards gneissosity is indicated by alignment of some of the minerals in the granite.

The Johan Beetz granite is very massive, dark pink coloured, and consists of quartz, biotite, and pink feldspar. It resembles the Turgeon lake granite in all respects except colour, being slightly darker.

The granite west of the mouth of Corneille river is fine- to medium-grained, light grey or pink coloured. The rock is gneissic in many places. Some of this structure is due to contamination by biotite schists.

Dykes of granite are common throughout the area. They range in width from a few inches to several feet. The smaller dykes are fine-grained, almost aplitic, but the majority are medium-grained. They cut both the sedimentary rocks and gabbro, as well as the gneissic granite and the granite of Ferland lake.

Pegmatites: Dykes and sills of pegmatite are abundant throughout the map-area. Since they cut all the rock types described above, the pegmatites are considered to be the youngest intrusive rocks in the area. In that part of the map-area underlain by gneissic granite, pegmatites of two ages were observed.

There are numerous irregular-shaped pegmatite masses in the Turgeon lake granite, none of which are large enough to be shown as separate units on the accompanying map. Larger pegmatite masses occur east of Petite Piashti river, and on both sides of Quetachou bay where they occur as sill-like bodies parallel to the structure of the sedimentary rocks and gabbro. Microcline and orthoclase are the most abundant minerals. Quartz occurs as an intergrowth with, as well as interstitial to, the feldspar crystals. Biotite, muscovite, garnet, magnetite and tourmaline also occur.

#### C E N O Z O I C

The Pleistocene glaciers, which crossed the area in a southerly direction, eroded the valleys and ridges, but left few deposits. The summits of the highest hills are usually bare with the exception of erratic boulders, while the valleys are covered with a thin veneer of sand and gravel.

Recent deposits consist of glacial sands and gravels reworked by present streams. Such deposits, although small, are numerous along the shores of the larger lakes and streams. The slopes of some of the higher gabbro ridges are flanked by blocks of gabbro.

#### S T R U C T U R E

The map-area is underlain by folded sedimentary rocks which outcrop as bands of irregular thickness between sills and dykes of altered gabbro. These rocks have been intruded by several bodies of granite.

East of Grand Piashti and Petit Piashti lakes the structural trend of the sedimentary beds and gabbroic sills is southeast and, east of the southern end of Petit Piashti lake, it is south. Proceeding south and west, it is seen that the trend of the structure swings southwesterly northeast of Salé lake and then westerly as far as the western boundary of the map-area. In the area lying between Grand Piashti and Ferland lakes the structural trend is also variable. In the northern part of that particular section of the map-area and close to Grand Piashti lake the trend is generally southerly but, farther south, towards the granite stock that is found around Turgeon lake, it becomes southeast. In the vicinity of Ferland lake, however, the trend is southwesterly and, indeed, the structural lines seem to encircle the lake.

Dips of the rock formations are variable in direction and amount throughout the area. East of a line that would go southeasterly from Grand Piashti lake, through Goéland lake, as far as a point about two miles east of the south end of Petit Piashti lake from whence it would swing in a southwesterly direction to reach Salé lake, westward dips predominate except immediately east of Salé lake where dips towards the east are more abundant. On the west side and within about two miles of that line, eastward dips predominate. If the line were to be extended westward from Salé lake as far as the western boundary of the map-area, near the head of Victor bay, it is seen that, on the south and north sides of that westerly trending line, dips are respectively toward the north and toward the south.

In the vicinity of Ferland lake the dips are toward the lake.

One of the noteworthy structural features of the area is the manner in which, around the granite intrusives, the strikes of the sedimentary beds and gabbro sills parallel the boundaries of the intrusive body. This feature is well displayed around the granite masses of Ferland lake and Turgeon lake.

Northeast of Salé lake and also south of Tanguay lake the sedimentary rocks and, more particularly, the metagabbro have been sheared. Where the shearing has been intense, the gabbro has been transformed and quartz introduced to form a quartz amphibole biotite schist. The schistosity is parallel or nearly so to the bedding of adjacent quartzites.

The general strike of the gneissic structure in the granite east of the mouth of Corneille river is southwest, except near the eastern border of the mass where it tends to strike southerly parallel to the contact between the granite and the intruded sedimentary rocks.

Joints are prominent in all the intrusive rocks. In the metagabbro, and in the granite around Turgeon lake, one set of joints strikes northwest and another northeast.

## ECONOMIC GEOLOGY

### Pyrite and Chalcopyrite

Pyrite, as small irregular grains or well formed cubes, was observed in a few places as disseminations in the fine-grained facies of metagabbro, but the quantity in each case was small.

A few small quartz veins and shear zones in the sedimentary rocks exposed in Victor bay are sparsely mineralized with pyrite and, in a few places, with chalcopyrite.

### Iron

Noticeable quantities of magnetite in small dykes of pegmatite were found near the mouth of Corneille river and west of Turgeon lake.

Hematite is an abundant constituent of the thin black bands which, with average thicknesses of  $1/32$  of an inch, occur in the quartzites at various localities. There is also a small amount of magnetite in these bands.

#### Titanium

As previously described, black bands in impure grey quartzite have been observed at several places in the map-area. The best known exposures are east of Petit Piashti lake and west of Quetachou bay. Rutile and hematite are abundant in these black bands, and there is some magnetite. The black bands average  $1/32$  of an inch thick and they alternate with layers of grey quartzite that are from one-quarter to six inches thick. They occur in zones that vary in thickness from six inches to three feet; two or three such zones may occur in about 20 feet of grey quartzite. Most of these zones are lens-shaped and none of those seen extend, along their strike, for more than 30 feet.

#### Molybdenite

Small irregularly scattered flakes of molybdenite were observed in a narrow dyke of pegmatite cutting gabbro on the east side of the east point at Quetachou bay. The gabbro is a large inclusion in the pegmatite which underlies most of the point. It is cut by a narrow irregular dyke of fine-grained pegmatite composed of white plagioclase and a small amount of quartz and biotite. The strike of the dyke is N.  $55^{\circ}$ E. and parallels the long direction of the gabbro inclusion. Scattered grains of molybdenite occur in the dyke, usually near its contact with the gabbro. No mineralization was observed in the gabbro.

#### Feldspar

The pegmatite dykes striking in a northeasterly direction on each side of Quetachou bay consist mainly of microcline and orthoclase feldspar with some quartz, biotite and muscovite. Although the average grain size of the pegmatite is between  $\frac{1}{4}$  and  $\frac{1}{2}$  of an inch, there are many zones in which feldspar crystals measuring three feet by two feet were observed. These zones of coarse-grained feldspar are dispersed along a belt on the northwest side of the east point of Quetachou bay. The belt trends about N.  $60^{\circ}$ E. and is approximately 300 feet wide over a length of at least  $\frac{1}{2}$  mile. Quarrying operations were carried out on the most favourable exposures at various times between 1914 and 1927. These operations were unsuccessful due to the presence of quartz, which occurs both as an intergrowth with and interstitial to the feldspar crystals.

#### Mica

Pegmatites of the area contain both muscovite and biotite mica. Although these minerals are abundant in places, nowhere was it possible to obtain a sheet more than four inches wide. Furthermore, in no place was the mica observed in sufficient quantity to be mined at present, even as low-grade mica.

#### Beryl

Several small crystals of beryl were observed in pegmatite dykes that cut granite on the west side of Ferland lake. These crystals are small, the largest measuring one inch in length and one-quarter inch in diameter. They are in a muscovite-rich band in the pegmatite.