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ADVANCE REPORT, MATTAGAMI LAKE MAP-AREA

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ADVANCE REPORT

MATTAGAMI LAKE MAP-ARIA

PROVINCE OF QUEBEC, CANADA

DEPARTMENT OF MINES AND FISHERIES

HONOURABLE ONESIME GAGNON, MINISTER. L.-A. RICHARD, DEPUTY-MINISTER.

BUREAU OF MINES

A.-O. DUFRESNE, DIRECTOR.

ADVANCE REPORT

MATTAGAMI LAKE MAP-AREA

1 - Western Section, by W.W. Longley

2 - Eastern Section, by P.E. Auger

- 1938 -

QUEBEC

1939

PR. No. 127

MATTAGAMI LAKE MAP-AREA

WESTERN SECTION

by W.W. Longley

LOCATION AND ACCESS

Mattagami lake is about one hundred and twenty-five miles north of Senneterre, Abitibi district. It is drained by the Nottaway river, which, leaving the lake near the centre of its northern shore, flows northward to James bay. The Bell river empties into the lake on its southwestern side.

The Mattagami Lake West map-area lies north and south of the western end of the lake, extending from about latitudes 49°45'N. to 50°00'N. and from longitudes 77°30'W. to 77°45'W. It can be reached easily by canoe either from Senneterre by way of the Bell river or from Rochebeaucourt bridge by way of the Laflamme and Bell rivers. The latter route is the shorter and easier. There is a good highway from the town of Barraute, on the Canadian National railway, to the bridge.

GENERAL GEOLOGY

A range of low hills about two and a half miles south of the lake extends from the eastern border of the area to the Bell river. Mount Laurier, the highest peak of the range, rises about 700 feet above its surroundings. There are a few low hills elsewhere in the area. Outcrops are abundant on the hills and on the shores and islands of the lake, but in the lower parts of the area bedrock is buried beneath a thick mantle of varved clays and other glacial deposits. No gravel deposits of important dimensions were observed in the area.

The section of the area north of Mattagami lake is occupied almost entirely by granite gneiss. That south of the lake is underlain largely by Keewatin greenstones with some gabbro, and an intrusive body of considerable size that is chiefly syenite and diorite. There are good exposures of conglomerate on two small islands in the lake.

Sedimentary Rocks (Temiscamian?)

The two islands on which the conglomerate is exposed are about two miles apart, near the middle of the lake, east of the Bell river and northwest of Dunlop bay. The conglomerate is a rather massive rock with sparsely scattered, well-rounded pebbles, chiefly granite, which are only slightly deformed. The beds have the same dip and strike as the greenstones along the southern side of the lake.

Along the northern shore of the lake, there are a few outcrops of finely banded rock that is probably sedimentary and closely related to the conglomerate.

Keewatin Greenstones

The greater part of the map-area south of the lake, and most of the islands in the lake, are occupied by greenstones, mainly pillow lavas and amygdaloidal flows interbedded with fragmental lavas. Mount Laurier is made up of such interbedded layers, with the individual beds ranging from 10 to 200 feet in thickness. There are good exposures of similar interbedded rock near the mouth of the Bell river.

Many exposures of tuffaceous rock occur in the area. A prominent belt of finely banded tuff extends along the southern side of the lake. In many places, the rock is highly sheared and altered, and locally it is considerably carbonatized and slightly mineralized with pyrite.

Gabbro

A large portion of the southern part of the map-area is occupied by gabbro. Typically, the rock is fine grained, highly altered, and contains much pyroxene. In some places, however, it is quite coarse grained and presents anorthositic facies. A stratiform banding is usually evident in the coarse grained rock.

On the northern shore of the lake, two large gabbro dykes were seen, and there may be others. The two observed are about two hundred and fifty feet wide and trend slightly north of east. The gabbro is massive and coarse grained.

There are many occurrences of fine grained gabbro in close association with the lavas. These are probably sills that were injected into the flows.

Acidic Intrusive Rocks

North of the lake, the map-area is occupied chiefly by gneisses. These are in part highly recrystallized schists, possibly representing sediments that have been intimately intruded in lit-par-lit fashion.

A coarse-grained biotite granite-gneiss is the most prominent of the intrusive rocks. It occupies a large part of the area north of the lake.

Around the southern end of Dunlop bay and extending to the eastern boundary of the area is a body, about one mile wide, of massive coarse-grained intrusive rock. The character of this rock varies from place to place. Near the western end of the mass it is a pink hornblende syenite, and it grades into a grey diorite or gabbro in some places along the southern boundary of the body.

Massive, medium-grained, pink granite outcrops on a point along the southern shore of the lake, about half a mile from the western end of the southwest bay, and a similar rock, but somewhat sheared, is exposed on a point about two miles west of the mouth of Dunlop bay.

Two small outcrops of fine-grained, pink, biotite granite were observed just northeast of Garon lake. These are probably at or near the western margin of a large body of granite that underlies the southern half of Olga lake.

Many small rhyolite, feldspar porphyry, syenite, and granite dykes occur in the area. The majority of these trend about east-west, parallel to the main structure.

STRUCTURE

The topography of the area is controlled chiefly by faulting, which is strongly evident in two directions about at right-angles - one east-west and the other north-south.

The stratified rocks are very tightly folded, strike approximately east-west, and have very steep dip. The foliation of both stratified rocks and gneisses is approximetely parallel to the bedding of the stratified rocks.

Many zones of slight shearing occur throughout the area. Their usual trend is within a few degrees of east-west. In general, they are more or less mineralized with sulphides, and in places they are carbonatized. Along some of the zones there has been considerable replacement of the rock by sulphides.

The most persistent zone of shearing observed is in a belt of tuffs along the southern shore of the lake. Here, the relative movement has been of the northern side of the shear-zone toward the east. The zone can be followed from the western end of the lake to Dunlop bay, and it is quite possible that it controls the configuration of the southern shore of the lake.

ECONOMIC GEOLOGY

There is much mineralization in the area. Disseminated pyrite, with some pyrrhotite, is present in almost all rock specimens. The zones of heavier mineralization may

be divided into two well defined groups: sheared fragmental lavas replaced by sulphides, in which the sulphides are often quite massive, with a marked absence of silicification; and sheared zones which contain quartz veins or which have been extensively silicified. The latter often contain much carbonate. Still a different type of mineralization was observed in a syenite dyke, which contains much disseminated chalcopyrite.

Twenty-seven samples, taken from several localities, were assayed, with the results shown in the table below.

RESULTS OF ASSAYS

Sample No. & Key to Location on Map	Gold (oz./ton)	Silver (oz./ton)	Sample No. & Key to Location on Map	Gold (oz./ton)	Silver (oz./ton)
1	none	none	15	0.016	none
2	trace	trace	16	0.002	trace
3	0.002	none	17	0.003	none
4	0.002	trace	18	0.344	0.876
5	none	none	19	trace	0.020
6	none	none	20	none	trace
7	trace	trace	21	trace	0.070
8	0.002	trace	22	0.006	0.025
9	trace	trace	23	none	none
10	trace	0.025	24	0.030	0.100
11	0.005	0.090	25	0.008	trace
12	0.007	0.097	26	0.010	trace
13	0.005	0.020	27	0.015	trace
14	0.008	trace			

Note: Copper assays on Nos. 6, 11, and 12 gave 0.12, 0.53, and 0.38 per cent Cu. Copper determinations were not made on the other samples.

Considerable prospecting was done in the area some years ago. Most of the work was confined to zones of sulphide replacement. These are in sheared fragmental lava belts. Some of these mineralized zones are many feet wide, and in places the sulphides are quite massive. The important sulphides present are pyrrhotite, pyrite, and arsenopyrite, and very small amounts of chalcopyrite. These deposits are spectacular in appearance but they carry very low gold values. It is quite possible that some may be found with copper in commercial quantity.

The most explored of the sulphide deposits is that on the Dunlop property, southeast of Dunlop bay, where considerable diamond drilling has been done. The intersections showed wide zones replaced by sulphides, but the values were not of commercial interest. Sample No. 21 was taken from a trench on this property, and consisted of selected pieces carrying chalcopyrite.

Large zones of similar nature were observed on the eastern shore of a bay about a mile and a half west of Dunlop bay (Nos. 6, 7, and 8), and also about half a mile east of Gouin lake (Nos. 19 and 20). Many small zones were seen, practically all of which were in the fragmental lava.

Along the southern shore of the lake there is a persistent belt - or more than one belt - of tuff that has been strongly sheared. In many places it is extensively carbonatized, somewhat silicified, and slightly mineralized with sulphides (Nos. 17, and 23 to 27 inclusive). The values are low but rather persistent. The highest assay (No. 24, about $1.00 per ton) was obtained from a sample of massive pyrite, which occurs as pockets through the zone.

The highest gold assay obtained anywhere in the map-area was from massive chalcopyrite (No. 18 about $12.00 in gold per ton) which occurs as pockets in quartz stringers crossing a small island about one mile northwest of the mouth of the Bell river. On this island, three stringers, each about an inch wide and in a zone about three feet wide, cross the island in a north-south direction. They are tension fractures and may be related to the strong east-west shearing. There are many other similar quartz stringers in the vicinity, but no chalcopyrite was observed in them. The rock on a small point

about half a mile south of the island is much rust-stained and crossed by many small quartz stringers similar to those on the island. No samples were taken from this occurrence but it probably merits further examination.

Approximately two miles west of the mouth of Dunlop bay a broad point juts out into the lake. It is composed of Keewatin rocks which, toward the outer margin of the point, are in contact with a sheared fine-grained granite. To the south of the contact there is a strongly sheared grey rhyolite dyke which trends east-west. This dyke is considerably silicified and rather heavily mineralized with pyrite. A sample (No.10) from the best exposure of this zone yielded only a trace of gold, and one (No.5) from the east end of the dyke gave a negative result on assay.

On the small island just east of the mouth of Dunlop bay, a quartz vein about four inches wide is exposed for a length of six feet. This vein strikes east-west, dips almost vertically, and has sharp walls. It is mineralized with pyrite, chalcopyrite, and galena. An assay of a selected sample (No. 12) from the vein gave only 24 cents in gold per ton.

One of the most interesting occurrences of mineralization observed during the summer is west of Dunlop bay and about three-quarters of a mile northeast of Gouin lake. Here, a dyke of massive, medium-grained, greyish-pink syenite containing disseminated chalcopyrite is exposed for a length of about fifty feet and in places for a width of ten feet. A certain amount of prospecting has been done here. An assay of a sample from the dyke yielded 17 cents in gold per ton and 0.53 per cent copper.

Several other zones of interest were noted, from which samples were taken. Samples Nos. 15 and 16 are from a carbonatized shear-zone on the Bell river, about half a mile above Inlet rapids; No. 14 is from a small quartz vein cutting gneiss on the western shore of the north arm of the lake; and No. 22 is from a sheared, altered, and iron-stained syenite dyke, exposed on the eastern shore of the Bell river at Seven Channel rapids.

Although, up to the present, no mineral deposits of commercial value have been discovered within the map-area, the whole section along the southern shore of the lake holds definite promise as prospecting ground. Both gold and copper mineralization may be looked for. Attention should be directed in particular to the sheared tuff zones, especially in places where there are intersecting tension veins; the vicinity of the syenite dyke which carries disseminated chalcopyrite; the contact zone of the intrusive body that extends eastward from Dunlop bay, and especially to shears in the fragmental lava belts; and the galena-and chalcopyrite-bearing quartz vein on the island at the mouth of Dunlop bay.

77°30'

Service des Mines, Québec.--1939.-No.466

L. MATTAGAMI

Anvil Bay

Dunlop Bay

L. OLGA

INLET RAPID

R.

Mt. Laurier

L. Garon

SEVEN CHANNEL RAPID

BELL

49°45'

49°45'

GRANITE, SYENITE, DIORITE, GNEISS

SEDIMENTARY ROCKS
ROCHES SÉDIMENTAIRES

VOLCANIC FLOWS AND TUFFS
COULÉES VOLCANIQUES ET TUFS

GABBRO

0 2 4
Miles *Milles*

- Preliminary Geological Map -

MATTAGAMI LAKE AREA

MATTAGAMI LAKE MAP-AREA

EASTERN SECTION

by P.E. AUGER

LOCATION, ACCESS, AND GENERAL FEATURES

The area examined by the writer during the 1938 field season is in the Bell-Nottaway river basin, lying between 77°10'W and 77°30'W., and 49°47'N. and 49°55'N. It includes the eastern part of Mattagami lake and the northwestern part of Olga lake, and extends for some 3½ miles south and 3 miles north of the former lake.

The area has not been subdivided into townships, but traversing it are two good survey lines which were used as base-lines in making the geological map. Mattagami lake can be reached by canoe from Senneterre by way of the Bell river, or from Rochebeaucourt by way of the Laflamme and Bell rivers.

A preliminary geological map of a larger region that includes the present map-area was published by the Mines and Geology Branch of the Federal Department of Mines and Resources in 1937, together with brief descriptive notes by G.W.H. Norman (1).

For the most part, the area has the flat topography characteristic of the northern clay belt, within which it is situated. Along the southern boundary, however, is a line of hills extending eastward from Mount Laurier, just outside the western limit of the map-area, to about half way to Olga lake. Rock outcrops are sparse, except along and adjacent to the lake shores and in the vicinity of the hills. Elsewhere, bedrock is generally concealed beneath a blanket of unconsolidated glacial and recent deposits.

GENERAL GEOLOGY

The rocks underlying the area are all of Precambrian age. Broadly speaking, the southern half is occupied by Keewatin volcanics and related rocks, and the northern half by intrusive rocks, mainly granite. In addition, there are restricted occurrences in several places of sedimentary rocks that are thought to be of Temiscamian age.

Keewatin

Keewatin rocks form a belt about 3 miles wide extending from west to east across the south half of the map-area and bounded both to north and south by granite. In the western part of the area, the southern shore of Mattagami lake forms the northern exposed limit of this belt as far eastward as the mouth of Anita bay. The northern shore of this section of the lake is underlain by granitic rocks, and the contact between the two formations is believed to be close to the south shore of the lake.

At the eastern side of Anita bay, granitic rocks appear on the south shore of the lake, and from here the contact between the granite and Keewatin rocks trends about due east, although it is actually exposed only at Red chute, at the north end of Olga lake.

The southern margin of the Keewatin belt also has a west-east trend, from the vicinity of Mount Laurier to Olga lake.

It is known that this belt of Keewatin rocks extends far to west and east, with considerably greater width than it has in the present map-area.

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(1) West Half, Waswanipi Map-Area, Quebec; Paper 37-8, 1937.

The Keewatin rocks are mainly lava flows, but associated with these are numerous bands of tuff. The flows range in composition from basic to acidic, but basic to intermediate types greatly predominate. Thus, most of the hills extending eastward from Mount Laurier are composed in the main of basaltic and andesitic lavas, but flows of trachyte and rhyolite are also included. Excellent cross-sections of the lavas were seen at a number of localities in the western section of the area, showing sharp contacts between successive flows, definite variation from coarse-grained bottom to fine-grained top in individual flows, and brecciated rhyolitic tops. The central portion of some of the thicker flows has the appearance of relatively coarse diorite or gabbro, and the rock might be mistaken for an intrusive sill were it not for the gradual change to the fine-grained normal volcanic type toward the flow top. In some places, especially in the central part of the area, along the south shore of Mattagami lake, the lavas have well developed pillow structure.

Tuffs are widespread throughout the area, interbedded with the lavas. Similar fragmental rocks also occur in considerable amount within the banded sedimentary formation, described below, along both the north and the south shore of Mattagami lake.

Sedimentary Rocks (Temiscamian?)

A band of conglomerate outcrops along the north shore of Mattagami lake, about midway across the map-area. The rock contains pebbles of quartz and of two or more types of granite embedded in a matrix of rhyolitic appearance. The pebbles are either more or less spherical or they are elongated and oriented with their length east-west in the direction of regional schistosity. The main northern body of granite is not far north of the conglomerate outcrop and doubtless the igneous appearance of the matrix is the result of granitization.

A banded formation which is believed to be of sedimentary origin is exposed at points along both the north and the south shore of Mattagami lake, on the large island near the north shore of the lake, and at Red chute at the extreme east of the area. At Red chute, these banded rocks are in actual contact with granite; on the island in Mattagami lake they are traversed by granitic dykes; and where exposed elsewhere they are not far distant from granite. Evidently as a result of this close association with granite, the banded rock is highly granitized.

Similar granitized banded rock occurs near the south boundary of the map-area, or the southern slopes of the Mount Laurier series of hills. Although no contacts were seen here, the large body of granite that bounds the map-area on the south is not far distant.

Igneous Rocks

Portions of four large bodies of granite occur within the map-area. One of these extends from the north shore of Mattagami lake to, and far beyond, the northern limit of the area. The granite outcrops at a number of points on and near the lake shore. It is a pink coloured, massive rock containing a high percentage of quartz and a very minor amount of ferromagnesian minerals.

A second large body of granite, the western limit of which is half a mile north of Anita bay, extends along the south shore of the lake eastward to the Waswanipi river and beyond the limit of the map-area. This granite is almost white in colour, foliated, and composed of sodic plagioclase and biotite with minor quartz.

Another mass extends from the eastern side of Anita bay on the south shore of Mattagami lake south-eastward to and beyond Olga lake. Its southern margin forms the northern limit of the belt of Keewatin rocks here. This is a massive hornblende granite, pink in colour and low in quartz. Lastly, paralleling the south boundary of the map-area is the northern margin of a granite batholith the contact of which is south of Mount Laurier and which extends eastward to and across the southern part of Olga lake. This mass forms the southern limit of the belt of Keewatin rocks. The rock is a pink, gneissoid granite containing both biotite and hornblende, and usually also secondary epidote.

Besides these main batholithic bodies, small masses of granite intrude the Keewatin rocks at several places in the country to the south of Mattagami lake.

STRUCTURE

The area as a whole has been subjected to regional orogeny which has given the formations a general east-west schistosity.

The Keewatin rocks exposed along the south shore of Mattagami lake in the western part of the area dip to the north, whereas those along the southern boundary of the area dip generally to the south. At the west end of the area, it was possible to determine with some certainty the attitude of the flows. In those exposed along the south shore of Anita bay and about one mile south of the shore, the tops appear to face south. These observations indicate a broad normal anticlinal fold in the south part of the area followed on the north by a reversed anticline on the point between Anita bay and the lake.

The conglomerate and the banded rocks of presumed sedimentary origin everywhere conform in strike with the general schistosity, and for the most part they dip to the south.

Toward the east end of the map-area, north of Mattagami lake, the granite in places holds dyke-like xenoliths of the banded sedimentary rock. The strike of these inclusions, instead of having the normal east-west direction, is deflected strongly toward the northeast, and their dip also is to the north.

Faults were observed at a number of points. Of those seen, the two most notable are in the hills in the southwestern part of the area. Both have a northwesterly strike and practically vertical dip.

Shear-zones in the Keewatin are best developed near their contact with the granite masses.

ECONOMIC GEOLOGY

Up to the present, no ore deposits of economic importance have been found in the area, but the Keewatin rocks in many places contain disseminated pyrite, pyrrhotite, and chalcopyrite. Several strong shear-zones in these rocks were seen, containing quartz and mineralized with sulphides. Two of the more interesting occur on the long point near the most westerly island adjacent to the south shore of Mattagami lake, and on the north shore of Anita bay. Assays of samples from these two zones gave an average of 25 cents in gold per ton.

At Red chute, on the Waswanipi river, at the eastern boundary of the map-area, a sulphide zone about 35 feet wide on the east side of the river and 12 feet wide on the west side, occurs at the contact between granite and banded sedimentary rocks. Along the shear-zone the rock has been converted to a garnetiferous schist, which is mineralized with glassy quartz and pyrite. The presence of garnet indicates that this is a fairly high temperature deposit. A somewhat similar zone was seen about two miles to the southwest, in the same banded formation. Arsenopyrite as well as pyrite is present in this deposit, the outcrop of which is marked by rusty gossan. Assays indicate that gold values in these two zones are unimportant.