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CHASTE - MAZARIN AREA, ABITIBI-EAST ELECTORAL DISTRICT

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DEPARTMENT OF MINES

Honourable W. M. COTTINGHAM, Minister

GEOLOGICAL SURVEYS BRANCH

GEOLOGICAL REPORT 88

CHASTE-MAZARIN AREA

ABITIBI-EAST

ELECTORAL DISTRICT

by

Marcel TIPHANE



QUÉBEC
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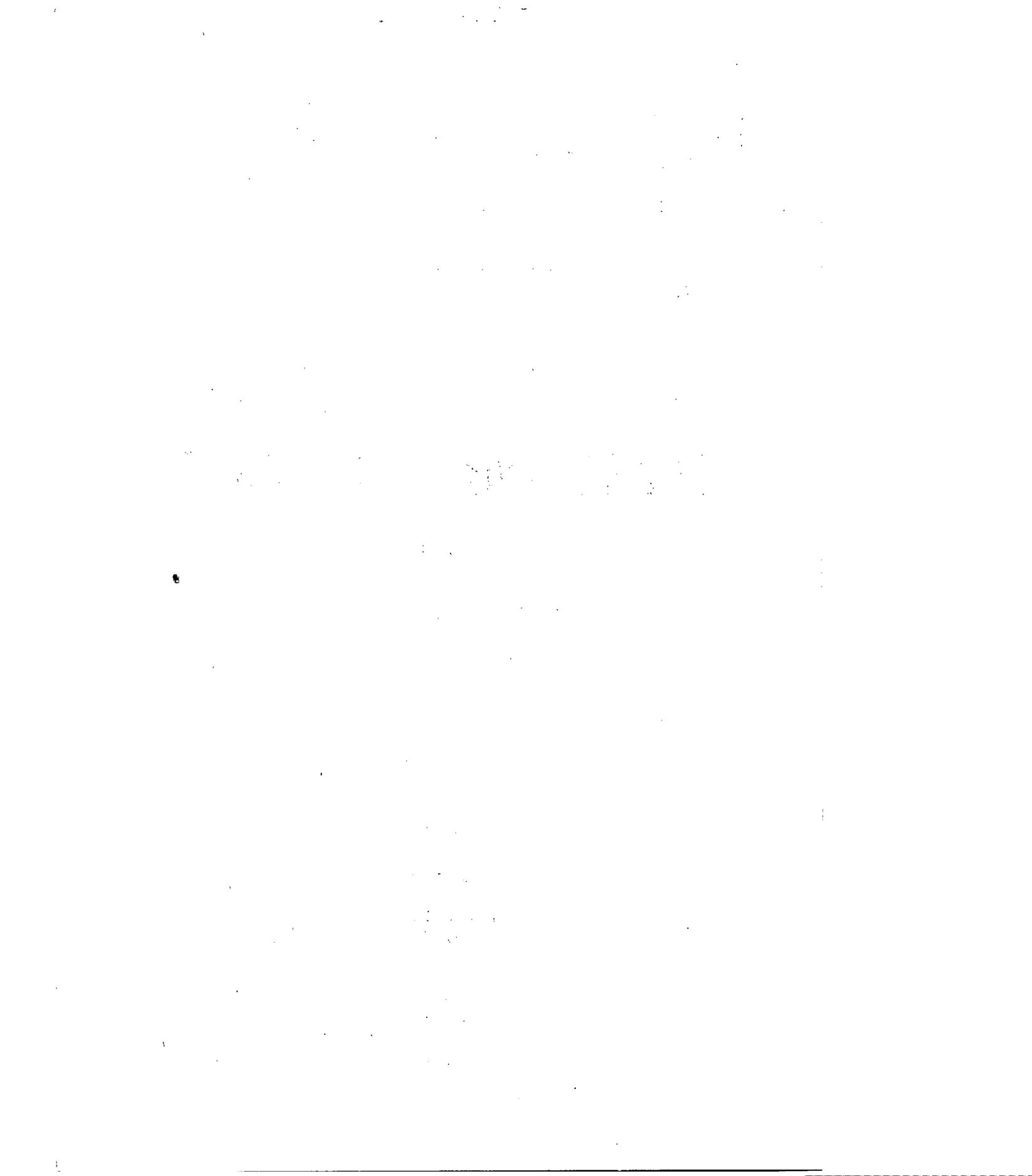


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CHASTE-MAZARIN AREA

ABITIBI-EAST ELECTORAL DISTRICT

by

Marcel Tiphane

INTRODUCTION

Location

Chaste-Mazarin area, examined by the writer during the summers of 1948 and 1949, is bounded by latitudes 49°00' and 49°15' and longitudes 77°45' and 78°20', thus covering an area of 550 square miles. It includes all of Chaste and Glandelet townships, two-thirds of Soissons, Maizerets, and Mazarin townships, and smaller parts of Barrin, Dalet, Desboues, Miniac, Coigny, and Bernetz townships, all in Abitibi-East electoral district.

Means of Access

The area may be reached by plane or water from Amos, a town situated at the intersection of Harricana river and the Quebec-Cochrane line of the Canadian National Railways. Float planes may land on Harricana river at the intersections with Octave and Gale rivers, respectively 40 and 56 miles north of Amos. Gale river flows into the Harricana a short distance north of the northern boundary of the area. Bigniba (Aymar) lake in Chaste township and the small lake in the western part of Soissons township also may be used for landings.

Access to the area is also provided by road. A motor road 22 miles long leads from Amos to Range X of Béarn township. This is followed by a 9-mile tractor trail leading to the Harricana at the mouth of Berry river, only 6 miles from the south-central boundary of the area. A winter road leads to the bank of Octave river in the southeast corner.

Harricana river is navigable throughout the length of the area, and the only rapid, avoided by a 100-foot portage, is 4 miles south of the mouth of Octave river.

Other canoe routes within the area are Gale and Octave rivers, which gave access to the northwestern and southwestern parts of the area, respectively, and Tanshell brook giving access to the north-central part. East of the Harricana, Coigny river leads to the east-central and the southeastern parts of the area.

During the dry season canoeing along most of these rivers becomes difficult and hazardous. Octave river is navigable throughout the season and has only one small rapid. Coigny river has several natural rock barriers three of which cannot be ascended by canoe.

Other parts of the area may be reached along township and range lines cut by the Surveys Branch of the Quebec Department of Lands and Forests.

Field Work

All outcrops shown on the map were located by systematic traverses spaced half a mile apart. Township and range lines were used as tie points and the traverses were sometimes modified with the help of aerial photographs to obtain the optimum information. Elevations of hills and boulder beaches were measured with barometers. Some contacts were determined by a magnetometer survey.

The base map is a compilation of data taken from aerial photographs from the Department of National Defence, Ottawa, and survey plans of the Quebec Lands and Forests Department.

Acknowledgments

In 1948, the writer was assisted by S.J. Melihercsik, Maurice Lauzon, and L.J. D'Aigle, all student-assistants, J. Macko, cook, and A. D'Aigle and R. Boutet, packers. In 1949, A.B. Gray, A.W. Mullan, and R. Paquet served as student assistants, J. Macko as cook, and M.C. Lemire and J.C. Boulanger as labourers. All capably fulfilled their assignments.

Previous Work

Reconnaissance surveys were conducted along Harricana river (Tanton, 1919), and along Coigny river as far as Bigniba lake and river and to the north along Indienne river up to the northern limit of the area (Freeman, 1940). Between 1922 and 1930, Cooke, Mawdsley, and James gathered information on the Rouyn-Harricana area. This was published in Memoir 166 (1931) of the Geological Survey of Canada. Auger (1939) went as far as Bigniba lake while mapping the Lower Laflamme River area. Wilson (1939) mapped a part of the area west of longitude 78°00'.

Detailed geological studies of adjacent areas were made only lately because of the relative inaccessibility of the region. Denis (1938) mapped Désboves area which adjoins to the south; Béland (1946) and Maurice (1946) examined Taibi Lake area to the northeast and Razilly area to the north respectively. In 1952, Ross mapped the Celoron-Carqueville area to the west.

DESCRIPTION OF THE AREA

Topography

The area is in the "Clay belt" of northeastern Ontario and western Quebec. Hence, except for a belt 6 miles near the western boundary of the area, the relief is low. Here and there, rock and esker ridges stand one hundred feet or so above the level of the plain. The plain is approximately 1,000 feet above sea-level.

In Dalet township in the northwestern part of the area, the Douaumont hills (Plates IA, IB) trend northeasterly from Lot 43, Range III, to the eastern boundary of the township in the middle of Range VI. Each ridge, however, trends north, parallel to the trend of the underlying rocks. Most ridges are less than 200 feet above the level of the Harricana. The highest peak is in Lot 49, Range IV, and is slightly more than 300 feet above the Harricana. The writer has no explanation for the attitude of these ridges. Observed dips do not suggest any possible fold structures and, except for peridotite, the underlying rocks have the same mineralogical composition as those found in other parts of the area.

In the west-central part of the area, the Baldwin hills extend eastward from Range VI, Mazarin township, to Range VIII, Glandelet township, and form an arc concave towards the northwest. They have approximately the same elevation as the Douaumont hills, and the highest peak is about 250 feet above the level of Harricana river.

In the southwestern corner, a series of granite hills rising about 200 feet above the level of Octave river contrasts with the surrounding plain. Between these series of ridges outcrops are fairly numerous, although they do not reflect on the general topography. Elsewhere in the area outcrops are rare.

Drainage is directed towards James bay via Harricana and Bell rivers. The height of land between these two rivers follows a sinuous line trending northwesterly from the southeast corner of the area to a point on the northern boundary about 5 miles east of Harricana river. The part east of this line is drained by streams flowing into Bigniba, Indienne and Daniel rivers, which are tributaries of the Bell.

Immediately west of this water divide, Coigny river drains the southeastern part of the area and several smaller streams flow directly to Harricana river. West of Harricana river, waters from the southwest corner run into Octave river and its tributary, Miller brook, and the northwestern part of the area is drained by Gale river and Tanshell brook. Precipitation can cause marked variations in the water level of these streams owing to the rapid run-off on the

impervious clay. Several of the smaller streams dry up during the summer.

Lakes are rare, small, and shallow; swamps are numerous and extensive.

Most of the area is mantled by clay and sandy clay which give the water of the streams its characteristic grey colour. Sandy gravel covers parts of Chaste, Maizerets, and Soissons townships east of the Harricana. A zone of sand crosses the area east of Bigniba lake.

Resources and Inhabitants

Stands of black spruce prevail over most of the area; grey pine and balsam predominate where the soil is sandy. Aspen and birch are rare and scattered. Alders and dwarf maples are ubiquitous.

The fauna consists mainly of moose, beaver, a few muskrat, and abundant partridges and ducks.

Although fish are not common in the streams, because of the suspended clay, there are some pike, sturgeon, pickerel, suckers and whitefish.

Four Indian families live along Harricana river. A camp at the mouth of Coigny river is their supply centre. Their cemetery is close to the bank of the Harricana near the Maizerets-Glandelet Township line (Plate IIA).

GENERAL GEOLOGY

General Statement

The Chaste-Mazarin area may be divided into two parts along a north-south line near the Dalet-Maizerets and Mazarin-Glandelet township boundaries. East of this line outcrops are scarce and scattered, and most contacts can only be approximated. They are more abundant along Harricana river, Coigny river and one of its tributaries, and on low hillocks in the central and northeastern parts of the area. Outcrops are more common in the second or western part, a belt five to six miles wide towards the western boundary of the area.

Beaches composed of rounded pebbles of different rock types were observed along the slope of a few hills. Their elevations, according to barometric measurements, is 150 feet above the level of Octave river.

All the consolidated rocks of the area are Precambrian in age. Keewatin-type volcanic rocks and slates, the latter probably of sedimentary origin, occupy about 85 per cent of the area and are intruded by younger granitic masses and by

diabase dykes. Feldspar porphyry, aplite, and pegmatite dykes are also found in places. Peridotite occurs in the north-central part of the area and is assumed to be post-volcanic in age.

Granitic rocks form a stock-like mass near the northwestern corner, cropping out over an area of about $4\frac{1}{2}$ square miles, and a batholithic mass near and along the southern boundary in a zone up to 3 miles wide. The batholithic mass seems to be the extension of the "Bernetz gneiss" (Longley, 1946). A small area underlain by granitic rocks diagonally cuts the northeast corner, and appears to join with the granitic masses of Harricana and Bell rivers.

Table of Formations

Cenozoic	Pleistocene and Recent	Clay, sandy clay, sand and gravel
Precambrian	Keweenawan?	Diabase dykes
	Post-Keewatin	Feldspar porphyry dykes, and pegmatite dykes Biotite granite, hornblende-biotite granite, and gneissic granite
	Post-Keewatin?	Peridotite, quartz-tremolite veins
	Keewatin	Massive and pillowed andesite and basalt, volcanic breccia Slate, tuff, and chert Diorite to gabbro

Keewatin-type Rocks

General Statement

Most of the area is underlain by Keewatin-type rocks, mainly strongly metamorphosed lavas with the composition of andesite or basalt. Associated with these are minor amounts of coarser-grained rock classed as diorite or gabbro, a little trachyte, and local bands of slate, tuff and chert.

Basic Volcanic Rocks

The andesite-basalt rocks are greyish green to dark green, fine- to coarse-grained, and generally slightly schistose. A marked schistosity was observed in several exposures along Harricana and Coigny rivers, on Miller brook in Lot 38 Range III of Mazarin township, and east of Bigniba lake. The coarse-grained diorite or gabbro is usually massive. Pillows may be recognized in a few outcrops, but they are so highly deformed that their attitudes could not be determined. The best exposures of pillow lavas are in Range VII along the boundary between Glandelet and Mazarin townships, and in the northeastern corner of the area in the central part of Range V and the eastern end of Range II of Soissons township.

The dark minerals of these basic lavas have been replaced by amphibole or chlorite, and the rocks now are composed mainly of hornblende and plagioclase feldspar. Locally, chlorite, epidote, zoisite, quartz, calcite, and a brownish alteration product of the mafic minerals may be seen. In places, the plagioclase is more abundant than hornblende. In one thin section, quartz is associated with calcite in rounded aggregates that suggest the shape of nodules. Epidote may be distributed throughout the rock or be in veins as in the feldspathic lava in an exposure along Harricana river.

Trachyte

Rare bands of trachytic lavas alternate with the basic lava flows here and there but they do not extend over long distances. They were seen mainly in Maizerets township, near the boundary between Mazarin and Glandelet townships, and as scattered outcrops in the eastern part of the area. The rock is very fine-grained and only thin plates of muscovite can be identified.

Diorite to Gabbro

Medium- to coarse-grained volcanic rocks which may be described as diorite or gabbro occur in Lot 10, Range VII, Glandelet township, in the northeast corner of Chasté township, east and southeast of Bigniba lake, and east of the swamp covering part of Range VI of Soissons and Maizerets townships. These coarser-grained facies appear to be the result of slow crystallization of thick lava flows rather than of sill-like intrusions. This interpretation is supported by the absence of sharp contacts and of thermal metamorphic effects. Instead, grain gradations, as seen in Lot 46, Range III of Dalet township, are common. In this locality, the grain size decreases westward and therefore seems to indicate that the top of the flow is to the west. If this interpretation be applied to outcrops of coarse-grained lava in Lot 10, Range VII, Glandelet township, it could be said that they represent the lower part of a thick flow.

Plate I



A. The highest point in the Douaumont hills, as seen from Gale river.



B. One of the Douaumont hills (average height), as seen from Gale river.



A. Indian cemetery on the bank of Harricana river, near the Maizerets - Glandelet township line.



B. Glacial striae in Range II, Maizerets township, on the bank of Harricana river. Direction, S.30°E.



A. Banded, cherty zone associated with Keewatin-type volcanic rocks in the Baldwin hills; Range VII, Malzerets - Glandelet township line.



B. Peridotite showing with serpentine veins carrying chrysotile; the veins fill joint spaces. The knife blade points to the north.



A. Beach on a hill in Lot 41, Range I, Mazarin township;
elevation 150 feet above Octave river.



B. Beach on one of the Baldwin hills, Lot 46, Range VII,
Mazarin township; elevation 150 feet above Octave
river.

The diorite or gabbro is commonly jointed to such degree that, locally, the rocks crop out as a series of isolated blocks. Both the joints in these coarser-grained rocks and the schistosity of the fine-grained lavas were perhaps produced by the same regional stress.

Agglomerate

Bands of fragmental rock and agglomerate were seen in places, the best exposures being in Lots 27 to 30, Range IV, Dalet township. The bands are made up of light-coloured fragments set in a darker matrix. In thin section, both the fragments and the matrix are seen to have essentially the texture of the acidic lava, but the fragments can be distinguished by their higher content of epidote.

Slate

A highly schistose, black, very fine-grained slate is interlayered with the volcanic rocks at the first portage on Coigny river, Range VI, Chaste township. The cleavage is well developed, and the planes are commonly marked by narrow quartz veinlets. The rock contains magnetite and disseminated pyrite.

Chert

Zones of black to white chert up to 20 feet thick occur in Dalet and Mazarin townships. They are best seen in the Baldwin hills and particularly on Range VII, along the Mazarin-Glandelet Township boundary (Plate IIIA). The chert zone at this locality parallels the adjacent volcanic rocks and can be traced for 3 miles or more. The individual beds are up to 2 inches thick. The zone has been displaced here and there by transverse normal or reverse faults with slips of the order of 10 feet. A similar chert zone, well exposed near Lot-post 55-56 on Range-line VI-VII, Dalet township, is only 2 to 3 feet thick.

Ultrabasic Intrusive Rocks

Small masses of peridotite occur in the northwestern part of the area in Ranges I, II, and V of Dalet township, and three isolated outcrops have been found in Range III, Maizerets township. The rock is nearly black, massive, fine-grained, and has a rough, rusty weathered surface.

The peridotite in Dalet township is composed of rounded olivine grains surrounded by serpentine minerals and a few grains of augite and enstatite. Magnetite is associated with the serpentine minerals particularly along the grain boundaries or fracture planes, and there are some octahedral grains of dark chromite. At the north end of the main mass in Dalet township, the proportion of augite shows a slight decrease. Olivine is optically positive or has a 2V angle

near 90°, which implies that it is more magnesian or near the composition of chrysolite ($\text{Fo}_{80}\text{Fa}_{20}$). The exposures in Maizerets township appear to be more serpentinized than those described above.

The main body in the eastern part of Range V, Dalet township, is cut by veinlets of serpentine, most of which strike north (Plate IIIB). The middle of some of these veinlets is filled with cross-fibres of chrysotile (asbestos) of an average length of 1/8 to 1/4 inch. Chrysotile was seen mainly on Lot 55, along Range-line IV-V, and seems to become less abundant to the north.

The body of peridotite in Ranges I and II of Dalet township is in strike with that of Range V. Both are concordant with the surrounding formations and it is possible that they may be part of the same sill. In this last mass, the rock is serpentinized but no chrysotile was seen.

The shape of the bodies in Range III, Maizerets township, cannot be defined, and only the outcrops along the banks of Harricana river are serpentinized.

The peridotite is probably younger than the associated volcanic rock. No age relationship could be established with the granites, which are considered to be post-Keewatin in age from a correlation with similar intrusive rocks of the surrounding areas.

Post-Keewatin

Three occurrences of granitic rocks were found within the area and a fourth, near the western boundary of Barrin township, was outlined by a magnetometer survey. Aplite and feldspar porphyry dykes occur here and there.

Hornblende-biotite Granite

Hornblende-biotite granite underlies approximately $4\frac{1}{2}$ square miles in the northwestern corner of the area. Contacts with the adjacent volcanic rocks were not seen.

The rock is light-coloured, massive, and variable in composition. However, all specimens examined contain a highly chloritized plagioclase, hornblende, and biotite; the last is, in part, an alteration product of hornblende. The ferromagnesian minerals make up 5 to 20 per cent of the rock. Locally, hornblende may be the only dark mineral; in other places, it is biotite.

Gneissic Hornblende Granite

The gneissic hornblende granite, part of a large mass that extends to

the south and southeast (Denis 1938, Longley 1946), forms a band along the southern boundary of the area. This band is, in general, $1\frac{1}{2}$ miles wide but, in Mazarin township, the contact swings to the northwest and the width increases to 3 miles.

The rock is commonly pink, with some grey, and is medium-grained and porphyritic. It is composed of 5 to 25 per cent quartz, 5 to 25 per cent microcline, 50 per cent oligoclase (An_{28}), and 10 per cent hornblende with apatite and titanite as accessory minerals. The alteration of feldspars and mafic minerals yielded sericite, chlorite, and epidote. The gneissic structure becomes more accentuated near the contact with the volcanic rocks to the north, and is parallel to the schistosity.

Quartz becomes less abundant near the contact with the volcanics and, in consequence, the rock suggests a gneissic syenite. Along the Harricana, bands of gneissic quartz syenite alternate with bands of massive biotite granite.

Only one exposure of granite was found in the northeast corner, and it is believed to be along the transitional or contact zone between granite and the volcanics. This exposure is composed of lenses of biotite granodiorite and marginal facies. The feldspars are altered and epidote is present. The term "granite" is used mainly to suggest a correlation with the geology of adjacent areas. The contact was outlined by a magnetometer survey.

Feldspar Porphyry Dykes

Dykes of feldspar porphyry that intrude the volcanic rocks were found along the Chaste-Soissons Township line, east of Lot 21, and in Range II, Barrin township. The rock has a fresh appearance and is composed of zoned plagioclase phenocrysts set in a fine-grained, grey to light green matrix of quartz, feldspar, and greenish brown biotite. The zoning in the phenocrysts shows a composition range of An_{30} to An_{22} from the core to the edge. Myrmekitic plagioclase surrounds some of the plagioclase phenocrysts. The near-by occurrence of granite to the east suggests that the porphyry dykes and the granite may be related.

A similar dyke or sill was seen in the schists along Coigny river, near the Glandelet-Chaste Township line. The rock is schistose and more altered than that of the other dykes and has a rusty-weathered surface. It contains 80 per cent carbonate (ankerite), which seems to be a product of hydrothermal replacement that took place when the surrounding schists were sheared.

Keweenawan(?)

Diabase Dykes

Three diabase dykes, from 8 inches to one foot thick, were found along

Harricana river, near Range-line II-III, Maizerets township. Two of the three dykes are on the east bank of the river, and strike N.40°E.; the third, on the west bank strikes N.45°W. The rock is very fine-grained, massive, black on the fresh surface, and greenish weathering.

The dykes cut volcanic rocks. The age relationship between the diabase dykes and the granitic rocks could not be established. Since similar dykes are known to intrude granites and gneisses in other areas, the writer assumes that they are Upper Precambrian and perhaps Keweenawan.

PLEISTOCENE AND RECENT

During the retreat of the last ice sheet, the melt water accumulated to form Barlow-Ojibway lake, in which the clay covering a large part of the area was deposited. This mantle of clay is generally thick and has a variable composition from place to place.

In Dalet township, where the relief is most pronounced, the clay deposits are confined to valleys, and beaches of rounded cobbles are commonly seen on the southern flanks of several of the hills. These beaches are all at an altitude of about 150 feet above the general level (Plates IVA, IVB).

A large esker crosses the area in a north-south direction. It enters the area at the north near the lake located in Range VII of Maizerets township. From there it trends southeasterly as far as Range II of Soissons, where it is joined by a branch that follows a series of lakes to the north. From the intersection, the main esker ridge trends south across Chaste township. This esker is known to cross Sauvé and Douay townships to the north and Coigny, Castagnier, and Duvernoy townships to the south. The eastern branch originates in Razilly and Veza townships to the north.

Another series of sand and gravel ridges trending north-south occurs in the eastern parts of Chaste and Soissons townships. These ridges contain boulders of granite up to 5 feet in diameter and may be morainic deposits.

Two sets of glacial striae with respective directions S.30°E. and S.5°W. were observed in the area. The latter seems to predominate in the eastern third. These observations support the conclusion that the Labrador and Keewatin ice sheets merged somewhere between Bell and Harricana rivers.

STRUCTURE

The schistosity of the volcanic and associated sedimentary rocks of the central and southern parts of the area trend east-west with minor local deviations

to north or south. A major exception is in the eastern part of the Baldwin hills, where the trend is northeast. In the northern part of the area the schistosity trends northward. Near the contacts with granitic masses the schistosity of the volcanic rocks is always parallel to the foliation of the granite. Steep dips prevail and are commonly vertical. The ultrabasic bodies of Dalet township seem to be concordant with the surrounding volcanic rocks.

Grain gradations and occasional pillows were the only criteria used to determine the attitude of the formations and the majority indicate that tops are to the north or northwest.

Shear zones were observed along Miller brook, on Lot 38, Range III, Mazarin township; on the first portage along Coigny river; and east of Bigniba lake. They are somewhat similar occurrences and are sheared to various degrees.

Minor transverse faults cross the chert beds associated with the volcanics particularly in Baldwin hills. Joints intersecting in a triangular pattern are common in the massive rocks.

ECONOMIC GEOLOGY

Many quartz veins and lenses were found, particularly in the Baldwin hills. They are composed mainly of quartz with tremolite and minor amounts of zoisite.

A few narrow veins and lenses of quartz and carbonate were seen in the northwestern corner of the area. They contain small amounts of pyrite, pyrrhotite, and, locally, some chalcopyrite. Several other quartz-carbonate veins found elsewhere in the area appeared to be barren.

In the shear zone along Coigny river and east of Bigniba lake, the rocks contain some pyrite in cubes as well as disseminated. The pyrite has been leached out in several places, leaving a pitted rock with the cavities filled with rust.

Galena occurs in the schists at the second portage on Coigny river, in Range V, Chaste township.

A magnetic anomaly was outlined in Ranges IX and X of Chaste township about 2 miles east of its western limit. The cause of this anomaly was not established.

Asbestiform chrysotile occurs in veins filling joints in the ultrabasic body near Range-line IV-V, Dalet township. Where the spacings between the veins

are of the order of 15 to 18 inches the veins are about one inch thick and, in many cases, contain centres that have been converted to chrysotile fibres 1/8 to 1/4 inch long. Where the spacings are closer the veins generally are thinner. The veins trend north parallel to the long axis of the body. No fibrous chrysotile was seen in the other bodies of ultrabasic rocks although they are locally serpentized.

RECOMMENDATIONS

Little prospecting has been done because of the thick mantle of clay and the consequently small number and extent of the exposures. Geophysical instruments and diamond drilling are the only feasible means of exploration in this area. The occurrence of chrysotile suggests that further exploration of the area is warranted.

APPENDIX TO GEOLOGICAL REPORT 88

ECONOMIC GEOLOGY

Mining Developments 1949-1959

by J.-E. Gilbert

A limited amount of prospecting and exploration work was carried out in the Chaste-Mazarin area between the years 1949 and 1957. However, during 1957 and 1958, a group of mining companies and syndicates covered most of the area by airborne magnetic and electromagnetic surveys supplemented, in some cases, by ground surveys. A limited amount of diamond drilling was also done, the results of which appear to have been inconclusive.

QUEBEC, July 15, 1959.

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