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PRELIMINARY REPORT ON PRIME LAKE AREA (WEST HALF), RIMOUSKI COUNTY

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Énergie et Ressources naturelles
Québec

P. R. NO. 448

PROVINCE OF QUEBEC, CANADA

DEPARTMENT OF NATURAL RESOURCES

HONOURABLE RENÉ LÉVESQUE, MINISTER

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GEOLOGICAL SURVEYS BRANCH

H. W. McGERRIGLE, CHIEF

PRELIMINARY REPORT

ON

PRIME LAKE AREA (WEST HALF)

RIMOUSKI COUNTY

BY

JEAN LAJOIE

QUEBEC
1961

P. R. NO. 448

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PRIME LAKE AREA (West Half)

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by

Jean Lajoie

INTRODUCTION

The west half of the Prime Lake area was mapped by the writer during the summer of 1960. It is located south of the St. Lawrence river in the Appalachian mountain belt, and is bounded by latitudes 48°15' and 48°00', and by longitudes 68°30' and 68°15'. Part of the adjoining Wild Goose area, bounded by latitude 48° and the New Brunswick-Quebec boundary, and by longitudes 68°15' and 68°23', was also mapped. The area is 240 square miles in extent and includes parts of Duquesne, Flynn, Laroche and Varin townships.

The western half of the area is reached by the Rimouski - Cabano highway and the eastern half by the Price Brothers Company road. which follows East-Rimouski river as far south as the New Brunswick border. From these two main roads, several secondary roads branch towards the centre of the area.

The area is almost entirely wooded, cleared land being found only around La Trinité-des-Monts.

PHYSIOGRAPHY

The land surface is a dissected upland. Drainage is effected by numerous brooks flowing into Rimouski river which, in turn, flows northerly into the St. Lawrence. The best exposures are found along the main streams.

The relief is controlled by the lithology and structure of the bedrock. As a rule, conglomerates, orthoquartzites and intrusive rocks stand out as linear ridges. These are clearly seen on aerial photographs.

The maximum relief calculated from the highest point

(2,050' +) at the fire tower lookout near the centre of the area, and the lowest point, on Rimouski river, is 1,400 feet.

GENERAL GEOLOGY

The rocks of this region are Ordovician, Silurian, and Devonian in age. Except for a few dioritic sills and (or) dykes, which have intruded Silurian sedimentary rocks in the southern portion of the area, the rocks are all of sedimentary origin and mainly detrital. These include conglomerates, sandstones, siltstones and shales.

The Ordovician Trinité group is lithologically similar to the Matapedia group of southwestern Gaspé (1) but, because the Trinité occurs in a different belt, this new name is used.

The Silurian is believed to rest unconformably on the Ordovician. The maximum thickness of the Silurian sequence is 10,000 to 12,000 feet. The fine to coarse clastics of the basal Cabano formation (Lower Silurian) grade, in the northern portion of the area, into the fine clastics of the unnamed unit 5. In the southern portion of the area, the Cabano grades into the fine to coarse clastics of the Lac Raymond formation, which also is Lower Silurian. The oldest Middle Silurian (Val Brillant formation) is a clean, silica-cemented, quartz sandstone. It grades into a silty limestone (Sayabec formation) which, in turn, grades into a greenish grey siltstone (St-Léon formation).

The Siluro-Devonian contact appears to be transitional where it can be seen. Towards the south, where it is not so well exposed it may be a fault or an unconformity. The Devonian sequence is at least 15,000 feet thick. The oldest Devonian rocks are calcareous shales and argillaceous limestones of the Cape Bon Ami formation. They grade into Grande Grève calcareous siltstones and sandstones, which, in turn, grade into non-calcareous sandstones and black siltstones of the York River formation. The two youngest Devonian formations crop out only in the southeastern part of the area.

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(1) Oral communication from J. Béland, Que. Dept. of Mines.

TABLE OF FORMATIONS

ERA	PERIOD	FORMATION (thickness in feet)	DESCRIPTION
Cenozoic	Pleistocene and Recent		Drift, erratics, minor till; Stream deposits.
UNCONFORMITY			
Palaeozoic	Lower Devonian	YORK RIVER (thickness unknown)	Greenish grey sandstones; black siltstone.
		GRANDE GRÈVE (9,000' approx.)	Dark grey, calcareous siltstone; some calcareous, grey sandstone and calcarenite.
		CAPE BON AMI (2,000')	Argillaceous limestone; calcareous siltstone and shale.
	Upper Silurian	ST. LEON (4,000')	Greenish grey calcareous siltstone; volcanic and intraformational conglomerates; some sandstone.
	Middle Silurian	SAYABEC (1,500')	Argillaceous, silty fossiliferous limestone; some volcanic conglomerate.
		VAL BRILLANT (400' to 600')	Orthoquartzite
	Middle or Lower Silurian	Unnamed (2,000')	Green, calcareous siltstone; green sandstone; shale.
	POST-LAC RAYMOND intrusive		Diorite.
	Lower Silurian	LAC RAYMOND (5,000')	Conglomerate (2,000'); dark grey siltstone; green shale; volcanic sandstone; orthoquartzite and chert.
		CABANO (3,000'-4,000')	Grey, slaty siltstone; grey, foliated, fragmental sandstone; conglomerate.
	UNCONFORMITY		
	Ordovician	TRINITÉ GROUP	Ribbon limestone; black, phyllitic shale; some black slates and green and red phyllitic shale.

ORDOVICIAN

Trinité group

The best exposures of this group are found on Rimouski river, northeast and southeast of La Trinité-des-Monts, and on Brisson brook.

Two assemblages can be distinguished. The first is characterized by a light to medium grey, finely crystalline limestone in ½- to 3-inch beds alternating with greenish grey, finely-laminated, slightly calcareous siltstones. Rare, green and red phyllitic shales are also found.

The second assemblage consists mainly of black, phyllitic shales interbedded with black slates. Southeast of La Trinité-des-Monts, on Rimouski river, a very thick brecciated zone suggests a fault. Graptolites (including Amphigraptus sp.) from the black slates, identified by L.M. Cumming of the Geological Survey of Canada, Ottawa, indicate an Ordovician age.

SILURIAN

Cabano formation

The distinctive lithology of the Cabano formation is a fine- to medium-grained, dark grey, foliated, fragmental, locally calcareous sandstone. The sand grains consist mainly of phyllites, slates and siltstones. Quartz grains locally make up about 15 per cent of the sandstone. On Rimouski river, dark grey, slaty, commonly cross-bedded and locally calcareous siltstone or shale is intercalated in the sandstone. In general, beds are 1 inch to 3 inches thick although they may be as much as 3 feet.

Conglomerate occurs at two different horizons. One is at the base and has a lateral extent of about 3 miles. It forms a topographic high in the centre of the area which is known locally as "A la lunette" mountain. It is 2,000 to 2,500 feet thick and is composed of subangular to subrounded, cobble to pebble conglomerate, interbedded with a coarse, foliated sandstone. Cobbles and pebbles include quartzites, finely laminated calcareous siltstones, finely crystalline limestones and black slates. Beds vary in thickness from 1 foot to 25 feet. Imbrication of fragments was seen in most of the larger outcrops.

The second conglomeratic horizon crops out near the Cabano-Lac Raymond contact, and is best exposed along l'Orient brook. The zone is 100-150 feet thick. It consists of pebble-cobble conglomerate in beds up to 3 feet thick interbedded with coarse sandstone which, in a few places, is faintly graded. The lithology of this zone closely resemble that of the basal conglomeratic zone.

On Rimouski river, the Cabano is in a succession of synclines and anticlines. This deformation made it impossible to compute

the exact thickness of the formation, but it is estimated to be between 3,000 and 4,000 feet.

Fossils found in Cabano rocks in the Lake Temiscouata area to the southwest date them as Silurian.

Lac Raymond formation

The Lac Raymond - Cabano contact is transitional, as can be seen on l'Orient river and in the vicinity of Castor lake. The transition takes place through a gradual disappearance of the fragmental sandstones and introduction of green to greenish grey, tuffaceous sandstones and siltstones. The contact indicated on the map corresponds to the lowest bed of tuffaceous material.

The Lac Raymond formation is divided into two facies. The first, and most extensive, is composed of dark grey siltstones, green shales and green tuffaceous sandstones. The thickness of the beds varies from $\frac{1}{4}$ inch to 8 inches, and averages 1 inch. A zone 50 feet thick of banded chert occurs on l'Orient river about 500 feet above the base of the formation. Beds of orthoquartzite, about one foot thick crop out at various stratigraphic horizons; one, a mile east of des Echos lake, is at the top of the formation and could represent the Val Brillant formation.

The second facies is confined to the base of the formation, and is found only in the St-Jean and Castor lakes area. It is mainly a coarse sandstone to small pebble conglomerate, 2,000 feet thick. The fragments are sub- to well-rounded volcanic rocks and quartz, with roughly 10 per cent made up of quartzite, finely laminated siltstone, and chert. In general, beds are 3 feet thick, although they vary considerably along strike. Intercalated in the conglomerate are beds between 2 and 3 feet thick of dark grey, tuffaceous sandstone, weathering green with small white specks.

The Lac Raymond is believed to be about 5,000 feet thick, and to be Lower Silurian in age. A few small corals and brachiopods were found in the conglomerate facies.

Post-Lac Raymond intrusive rocks

Intrusive bodies, probably diorite, are found in the Lac Raymond strata. The largest, about one square mile in extent and perhaps 300 feet thick, lies between des Echos and Canard lakes. The flat contact between the intrusion and the underlying Lac Raymond strata suggests a sill.

The second largest intrusion crops out northeast of Castor lake as a northeasterly trending ridge. Five other small bodies of diorite crop out in this general locality.

Middle or Lower Silurian, Unnamed unit.

This unit crops out on East Rimouski river and along

the fire-tower road. It consists of greenish to reddish shale, calcareous siltstone, and fine-grained, green sandstone in 1- to 3-inch beds. The finer-grained facies are well cleaved.

The unit is about 2,000 feet thick. It conformably overlies, and grades into, the Cabano formation.

The abundant brachiopods and rare corals found in the sandstones and siltstones have not been dated more closely than Silurian as yet.

Val Brillant formation

The Val Brillant formation is well exposed near Duquesne, Ferré, Du Dépôt, and Porc-Epic lakes in the northern part of the area.

It consists of 400 to 600 feet of fine- to medium-grained, well sorted, well rounded, silica-cemented, quartz sandstone (orthoquartzite). The rock is generally white but may be reddish or greyish owing to minor impurities. Structures indicating shallow water deposition, such as crossbedding and ripple marks, are common. The thickness of the beds varies from 3 inches to 2 feet, but in general is about 1 foot.

The writer did not find any fossils in this formation; however, those found in adjoining areas to the northeast suggest a Middle Silurian age.

Sayabec formation

The Sayabec formation, some 1,500 feet thick, underlies the St. Léon and overlies the Val Brillant. Both contacts are transitional. The base of the Sayabec was placed at the first one-foot bed of limestone.

The formation consists mainly of dark grey, argillaceous and silty, fossiliferous limestones. Beds made up of fragments of limestone, organic and inorganic, amount to 20 per cent of the formation. The more silty beds weather buff. Near Pointu lake (northwestern corner of the area) a conglomeratic limestone, containing small pebbles of volcanic rocks, crops out near the top of the formation.

Stromatoporoids, brachiopods, cephalopods, and crinoid columnals occur in the limestones and suggest a Middle Silurian age.

St. Léon formation

In the northern part of the area, the St. Léon formation rests on the Sayabec and underlies the Cape Bon Ami. In the southern portion of Rimouski river, it appears to rest directly and conformably on the Lac Raymond formation.

The Sayabec - St. Léon transitional contact is well exposed on Rimouski river north of Duquesne lake. Here, the lower limit of the St. Léon was placed below the lowest 6-inch bed of greenish grey siltstone.

Most of the formation is a grey to greenish grey, buff weathering, calcareous siltstone in 2-inch to 1-foot beds. Fine- to medium-grained sandstone is interbedded with the siltstone. Volcanic and intraformational conglomerates crop out on the shore of Pointu lake and in the immediate vicinity. Graded beds occur in the volcanic conglomerate, and rare crossbeds, in the siltstone.

The formation is about 4,000 feet thick and is believed to be of Upper Silurian age.

DEVONIAN

Cape Bon Ami formation

The transitional beds of the Cape Bon Ami - St. Léon are well exposed on the Rimouski - Cabano highway, near Shaw lake.

The formation is composed of dark grey, well cleaved, argillaceous, silty limestones and calcareous, buff weathering shale in faintly indicated beds. In general, the beds are ¼ inch to 3 inches thick.

The formation is estimated to be about 2,000 feet thick, and has been assigned a Lower Devonian age.

Grande Grève formation

The Grande Grève formation is best exposed along the Price Brothers Company - Fraser Company road, in the southeastern corner of the area. It consists of dark grey, highly calcareous siltstone in 1/8- to 3-inch beds and minor clastic limestone and calcareous sandstone in ½-inch beds. The assemblage represents a transitional facies between the Cape Bon Ami and York River formations.

Information (1) gathered east of the present area indicates that the belt of Grande Grève is part of the north limb of a synclinorium.

The formation has an estimated thickness of 9,000 feet and was assigned a Lower Devonian age by previous workers. Fossils (brachiopods) found in this area at one locality have not yet been identified.

York River formation

The Grande Grève grades upward into a non-calcareous, coarser, clastic rock which makes up the York River formation.

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(1) Oral communication from J. Béland, Que. Dept. of Mines.

The transition is marked by a gradual decrease in the carbonate content and a gradual increase in feldspathic sand. The York River formation proper consists of greenish grey, white weathering feldspathic sandstone in ½-inch to 3-foot beds with interbeds 2 inches thick of black, cleaved siltstone.

Brachiopods, as yet unidentified, were found at a few localities. The formation is believed to be Lower Devonian in age.

STRUCTURAL GEOLOGY

Two orogenies have affected the area. In the first, or Taconic, orogeny the pre-Silurian formations were strongly folded. In the second, or Acadian, orogeny the Siluro-Devonian sequence was folded, but to a relatively lesser extent.

The Ordovician is, as a rule, intensely folded, faulted and brecciated. The Siluro-Devonian generally has been folded into a series of northeasterly-trending, steep anticlines and broad, shallow synclines. However, there are two exceptions: the Pointu Lake syncline is overturned, and the southern Devonian formations are tightly folded into a broad synclinorium.

The folds generally plunge northeasterly. Arches trending northwest were observed in two synclines involving Silurian rocks. One arch passes about 3,000 feet northeast of des Echos lake, and the other 2,000 feet southwest of Caribou brook (Rimouski-East).

In the southern part of the area, what appears to be a major fault trending about N. 45° E. separates Lower Devonian and Lower Silurian strata. It is thought to be a high angle fault with the southern block downthrown. The continuation of this contact, in the adjoining area to the southwest, has been interpreted as an unconformity (Lespérance, 1959).

A major fault, trending northeasterly, is located in the centre of the area, south of Lunette mountain. The stratigraphic displacement is here relatively small. The fault branches into a second fault at Grand Matinal brook, thus giving rise to a graben-like structure.

ECONOMIC GEOLOGY

Petroleum

The Sayabec limestone has been considered elsewhere as a possible source of petroleum. In this area, the fossil content of the formation is relatively small and the writer did not find any reefy structures (bioherms or biostroms). However, structures involving Silurian rocks exist, and may be favourable to the retention of oil or gas.

Silica

Many and large exposures of the Val Brillant orthoquartzite are possible sources of silica.

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