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REPORTS ON SURFACE GEOLOGY

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REPORTS ON SURFACE GEOLOGY BETWEEN JOLIETTE AND QUEBEC CITY, 1958

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CONTENTS

SURFACE GEOLOGY OF OUAREAU AND ASSOMPTION RIVERS IN THE VICINITY OF JOLIETTE AND CRABTREE MILLS

The area is limited by latitudes 73° 35', 73° 25' and longitudes 46° 05', 45° 55' 30". The city of Joliette is about 42 miles north-east of Montreal.

The rocks of the area are of Ordovician age and belong mainly to the Trenton group. The northerly part of the map area is underlain by Beekmantown sediments.

It should be mentioned here that the divisions used in the Trenton group were made on a lithological basis and not on paleontological grounds. This may explain some discrepancies with previous mapping in the area.

The Trenton was divided into four formations: Upper Trenton (Tetreauville), Middle Trenton (Montreal), Lower Trenton (Deschambault) and Basal Trenton.

STRATIGRAPHY

Upper Trenton

The Tetreauville is a dense bluish-black limestone in beds 6" thick interbedded with shaly limestones up to 4" thick. In many of the outcrops the beds are characterized by a strong petroliferous odour.

Fossils are abundant in certain beds of the Assomption River. Mainly conularia and brachiopods were seen.

The attitude of the Upper Trenton in this area is quite flat; dips average between 1 and 2 degrees to the south. The contact between the Middle and Upper Trenton, south of the "Crabtree Mills" fault is not exposed. The contact between the same formations on the Ouareau River is also approximate, but it should be correct within 1000 feet.

Middle Trenton (Montreal)

In general the Montreal is a dark grey, fine-grained to dense, impure limestone, thinly bedded (4") and interbedded with shaly limestone. Many beds have a strong petroliferous odour. Fossils are abundant and brachiopods, crinoids, trilobites, cephalopods, gastropods and bryozoan were noted.

The contact between the Montreal and the Lower Trenton (Deschambault) on the Assomption River was not seen but should be correct within 600 feet of where it is plotted.

On the upper part of the Ouareau River, between Crabtree Mills and the bridge, no outcrops of Montreal were seen, but they are numerous enough on the Red River to plot the contact within 300 feet. The approximate thickness of Montreal in this area is about 170 feet.

South of the "Crabtree Mills" fault and again on the St. Pierre Brook, the Montreal is present with a little Deschambault exposed at the base.

Deschambault

The Deschambault formation is composed of a coarse grained, thickly bedded brownish-grey limestone, grading to medium grey in places.

In general this formation forms canyon type exposures and the weathering makes it difficult to take accurate strikes and dips.

Fossils are quite abundant. Brachiopods, cephalopods, bryozoans and Crinoids were noticed.

Certain exposures on the Assomption River which had been previously mapped as Montreal were assigned to the Deschambault on the basis of lithology. These rocks are coarsely crystalline, fossiliferous, pure limestones and differ from typical Deschambault only in that they are thinly bedded.

It is possible that they could be assigned to the St. Casimir Formation which is also thinly bedded and coarsely crystalline in part. However, the typical Montreal lithology of finely crystalline, impure limestones is not developed anywhere within the area assigned here to Deschambault.

The thickness measured on the Assomption River is 300 feet.

Basal Trenton

The only outcrops of Basal Trenton seen were on the Ouareau and Red Rivers. Lithologically it is a dense microcrystalline impure limestone. Erosion has made impossible to see the bedding of these outcrops on the Ouareau River.

The contact between the Basal Trenton and the Black River Formation on the Ouareau River is difficult to pick, however, it is felt that the contact as shown on the map is not displaced too much.

An impure limestone, thickly bedded (4 to 8") with an abundant content of gastropods outcrops on the S.E. side of the Joliette Fault on the Assomption River. This limestone is argillaceous. The lithology seems to fit the Leray member quite well and these outcrops were assigned to the Black River. The outcrop is, however, too thick to be Black River in its entirety and the section was mapped as undivided Basal Trenton - Black River.

The thickness of Basal Trenton on the Ouareau River is estimated to be about 60' thick; Clark estimates 120' and Husain 22'. This divergence is explained by the fact that this member is transitional between the Black River and typical Trenton, and the contact would seem to be quite arbitrary.

Black River

The Black River can be divided into the usual three members of Leray, Lowville and Pamelia which are recognizable in the field. These units total 50' in thickness.

The Leray is an irregularly bedded, impure limestone, argillaceous and sometimes arenaceous, with many gastropods.

The Lowville is a dense, thinly bedded lithographic limestone. Corals (Tetradium clarki) are characteristic of this member.

The Pamelia is almost absent in this area and only averages about 3' thick. It is a dark grey dolomitic limestone.

The contact between the Black River and the Chazy was seen only on the Ouareau River, but the same thickness of Black River is assumed to be present on the Assomption River.

Chazy

Very few outcrops of Chazy were seen on the Ouareau River. The lithology is a dark grey, very slightly argillaceous limestone.

There is no outcrop of Chazy on the St. Pierre Brook, and only one outcrop was noted on the Assomption River. This is a small outcrop of sandstone with a calcareous cement, probably of the lower part of the formation. Clark mapped this as Black River, but because the sandstone is fairly coarse it is considered here to be Chazy. Okulitch (1935), and Dufresne mentioned the existence of Chazy on the Assomption, in Joliette.

Beekmantown

The only outcrop of Beekmantown seen was on the Assomption River in the northerly part of the map area. It is a very fine crystalline, brownish grey, silty dolomite, probably from the lower part of the formation.

No strikes and dips could be taken and the contacts of this formation are placed arbitrarily on the map.

STRUCTURE

There is no evidence of folding in this area. The beds have a shallow monoclinal dip ranging between 0° and 5°, all to the south east.

There are at least two major faults in the area. The "Joliette Fault", apparently an extension of the St. Cuthbert fault, is a normal gravity fault striking northeast with the downthrow to the southeast. The vertical displacement on the Assomption River is calculated to be 120 feet.

A second major fault is to be found on the Ouareau River near Crabtree Mills. This fault is downthrown to the northeast and the vertical displacement is in the order of 280 feet. The location of this fault is only approximate but is probably correct within 2000 feet.

Jean Lajoie

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SURFACE GEOLOGY SHOWING PORTION OF CHACOURA, YAMACHICHE, ST-MAURICE AND AU LARD RIVERS

Introduction

The map covers about 125 square miles of the St. Lawrence Lowlands, the center point being about 18 miles northwest of Three Rivers.

In dealing with the river mapping, the usual practice was to start at the mouth and drive along the river roads upstream, to check for outcrops on the river. Everytime outcrops were found these were traversed by foot. These rivers are very muddy, outcrops are rare and Clark's map proved very helpful in locating them. The map made covers only the part where outcrops were found, although these rivers were traversed completely.

UTICA

The only outcrops of Utica seen were on the St. Maurice River. The Utica is black shale, very slightly dolomitic, interbedded every 5' or so by a 6" bed of light grey, fine grained argillaceous dolomite.

The general strike is N 70 E with a 2° dip to the SE.

The contact between the Utica shale and the Upper Trenton was nowhere seen in this map area and was therefore plotted according to Clark's interpretations.

THE TRENTON GROUP

Upper Trenton (Tetreauville)

The Tetreauville is exposed on the Chacoura River, which flows into Riviere du Loup about 1 1/2 miles north east of Louiseville, in Maskinonge County.

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It is typical Tetreauville: dense, bluish black limestone, 4" to 6" thick, interbedded with shaly limestone stringers up to 3" thick. No fossils were seen.

The general strike is N 70 E and dips are 3° NW south of the fork (see map), becoming 3° SE north of the fork, hence, indicating a small syncline.

The top of the Tetreauville on the Chacoura River appears to be a generally flat platform, with minor undulations. Three wells were drilled south of the map area; one by Canso (Canso-St. Maurice, St. Leon #1) on the Chacoura, 3 miles south east of the fork. This well had Tetreauville bedrock. The other two wells are Sweet Grass #1 (1 mile north of Yamachiche) and Sweet Grass #4 (3 miles north-northeast of the #1 well). These two wells also have Tetreauville bedrock, hence, showing a 5 mile generally flat platform of Tetreauville. Since this is the case, it is felt that a fault exists along the Yamachiche River where the Tetreauville is upthrown against Utica. (1 1/2 miles east of Sweet Grass #4, Caxton #1 encountered Utica as bedrock).

This fault is not shown on Clark's map since he did his mapping before these wells were drilled.

The Tetreauville-Montreal contact is everywhere drift covered, but it should be correct within 2000' of the line of contact plotted here.

Middle Trenton (Montreal)

Trenton limestones of Montreal type are exposed in the St. Maurice quarry, 3 miles northwest of St. Louis de Champlain.

They are dark grey slightly silty, argillaceous limestones, interbedded with lighter grey interbeds. Beds are 6" thick, the weathering is

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bluish black. Few fossils were found, brachiopods are predominant, crinoids are present but rare.

The beds being flat, no possible strike could be taken.

The Montreal-Deschambault contact was not seen, however its accuracy on this map is probably within 2000', considering the position of the Deschambault on the Yamachiche and Riviere au Lard.

Lower Trenton (Deschambault)

This formation is exposed along the Yamachiche (9 miles north northeast of Yamachiche) and Au Lard rivers.

It is Deschambault type, though different from the outcrops noted in Joliette. Instead of fairly coarse homogeneous crystalline limestone, these outcrops show a very coarse crystalline, very fossiliferous (90% brachiopods) limestone in beds 2' thick, interbedded with very fine crystalline non-fossiliferous limestone. Some outcrops contain black, non-calcareous pebbles from 2" to 8" in size. This bedding is very regular,

The general strike is N 70 E, dips average 2° to the south east on both rivers.

The Deschambault-Basal Trenton contact was seen on the Riviere au Lard. It is the only Basal Trenton seen in the area.

Basal Trenton

As mentioned previously, the only outcrops of Basal Trenton are on Riviere au Lard. The limestones are medium grey, thinly bedded, slightly silty, and argillaceous. Fossils are abundant, some gastropods and brachiopods were seen.

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The general strike is N 80 E and dips are 1° to the south east.

The Basal Trenton-Black River contact, as plotted here should be accurate within 50', on the Riviere au Lard. There appears to be no Basal Trenton on the St. Maurice and Yamachiche Rivers.

Black River

The Black River is exposed on Riviere au Lard. It is a fine grained, crystalline, bluish-black, impure limestone, interbedded with shaly limestone. Beds of limestone are from 4" to 1' and from 1' to 3" for the Shaly limestone.

Gastropods, cephalopods and corals are quite abundant.

The general strike is N 80° E;dips are 1° to the SE.

No Chazy was seen in this area and wells drilled to the south also found no Chazy.

Beekmantown

Only one outcrop, very weathered, of Beekmantown, was seen on the St. Maurice River, about 2000' south east of the power house.

It is a medium grained, dark grey silty dolomite, probably of the St. Theresa member.

No possible strike could be taken.

The Beekmantown-Potsdam contact was not seen, but the Potsdam cannot be very thick since Precambrian outcrops 1000' north of this outcrop.

Potsdam

According to Clark there is no Potsdam in this area, however, three outcrops of conglomeratic sandstone were seen three miles north west of the power house. These show a subarkosic sandstone, containing 75% of quartz

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particles and 20% of feldspar and acid igneous rock fragments. The individual grains are subrounded to subangular. The matrix is made up of quartz, of iron oxides and kaolin; no cement is present. This might suggest rapid deposition because feldspars dissolve quickly and would not be present in prolonged sedimentation.

Structure

The only evidence of folding was seen in the Tetreauville on the Chacoura River and was discussed under "Tetreauville".

Two faults are present; one along Yamachiche River, which was discussed earlier. The second one strikes NE, and is situated in the south east corner of the map. It was not seen in the field and has been plotted after Clark's interpretation.

Jean Lajoie

July 18, 1958

NOTES ON GEOLOGY - GRONDINES AREA

This report concerns the surface geology done on the Grondines sheet east of the Ste Anne River, and on the Ste Anne River itself.

The Ordovician sediments in this area appear to be all of Trenton age.

Basal Trenton

This dense cryptocrystalline to very fine crystalline limestone, argillaceous and containing few fossils, has an exposed thickness of only 5', and directly underlies the Deschambault.

Deschambault Formation

The rock varies from medium to coarse crystallinity, and is a very fossiliferous light brown limestone. Fossils are mainly brachiopods, crinoids, and some bryozoans. The outcrop belt extends from the vicinity of St. Marc and strikes in a northwesterly direction to the Ste Anne River where it outcrops from St. Alban (by the bridge) to a point 2 1/2 miles south.

The sequence is interrupted for about 1/2 mile by the presence of some Middle Trenton situated a mile downstream from the St.Alban bridge mapped by Clark as St. Casimir.

Middle Trenton

The lithology of the St. Casimir and Neuville formations being quite similar they were mapped as a unit under "Middle Trenton".

These Middle Trenton exposures lie just south of the Deschambault on the map. The lithology is very much like the Montreal further west. It is a fine crystalline dark grey fossiliferous limestone. Prasopora type bryozoans are particularly abundant in this formation.

Tetreauville

South of the "Middle Trenton" exposures down to the St. Lawrence River, the rock is a dark calcareous shale with a few interbeds of dense grey limestone.

The lithology is the same as the Tetreauville mapped around Cap Santé.

The Tetreauville formation in this area east of the Ste Anne River had previously been mapped by Clark as Utica.

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Faults

The St. Alban Fault which crosses the Ste Anne River was not located as the water was still quite high. However, we believe that the fault is present as previously mapped, in order to explain the absence of the Deschambault one mile from the St. Alban bridge, where the Middle Trenton outcrops. The Deschambault is present again 1/2 mile further downstream.

No trace of Clark's St. Marc and Deschambault faults were found, however, the water level in the Ste Anne River was too high to see all the outcrops necessary to determine the contacts accurately.

The Tetreauville is the bedrock at Bald Mountain's well at Ste Geneviève de Batiscan, which substantiates this interpretation of the position of the Tetreauville in this area.

Raymond Legault

June 12, 1958.

NOTES ON THE GEOLOGY OF THE PORTNEUF AREA

These notes and map (Scale 2"=1 mile) concern the field work done by Messrs. Legault and Drapeau in the Portneuf Area of the St. Lawrence Lowlands. The outcrop localities checked are designated by letters (a), (b), etc. so they can easily be found on the map.

Locality (a)

A few scattered outcrops of dense sublithographic dark brown calcareous shale, slightly graptolitic were found between the abandoned CNR railway and the road 1000' north of it. They were poorly exposed. We have assigned these to the Tetreauville.

Locality (b)

A small section of shale, strike N 50° E, dip 26° S is exposed along the abandoned CNR bank at (b), 1000' SW from (a). Although not fossiliferous, this outcrop resembles (a) in lithology, and is therefore considered to be Tetreauville.

Locality (c^W) where ^{W}stands for west of road

A 4' section is found about 250' west of road in brook for some 35'. The rock weathers grey and is a dark brown micro crystalline limestone slightly fossiliferous (mostly crinoids). Some calcite vugs are also found at this locality. This section appears to belong to the Montreal formation. The formation strikes N 20° E and dips 6° W.

Locality (c^e)

At 300' east along brook from the road what we believe to be Montreal formation outcrops again, in small exposures, also at 335' and 400'. The lithology is the same as above. Stikes and dips were not possible.

Locality (d)

As no outcrop was found at locality (m) we visited a quarry about a mile north east of St. Basile Station. 115' of Montreal limestone is exposed there, with 20' of Tetreauville overlying it. Three vertical faults were located in the quarry the main one strikes N 14° W and the two others are about parallel striking N 45° W. A gas seep was reported from this quarry a few years ago from the Montreal section. The beds strike N 30° W and dip 3° W. The Montreal type rock is dark brown micro crystalline and very dense, no porosity is seen. The Tetreauville is a dark grey calcareous shale.

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Notes on the Geology of
the Portneuf Area

Locality (e)

In the same quarry at the bottom of the pit there is a small spring taking sulphur to the surface which gives a yellow colour to the surrounding rocks when it precipitates.

Locality (f)

The fresh surface is a dark calcareous shale which we assign to Tetreauville. No fossils were encountered. Strike of beds is N 3° E and dip is 3° W. This 20' vertical section is situated due north of the highway east of the De Chatillon Motel.

Locality (g)

1/4 mile east of (f) along highway. The top of the section is more fissile than the bottom but the lithology is as above.

Locality (h)

Is located in brook west of the road fork. The section is 4' high and 90' long. Fresh surface is a dark grey hard limy shale with graptolites noted; the beds indicating Tetreauville. At 170' from last outcrop going west another 30' exposure is encountered of the very same formation. The strike is N 59° E with a dip of 3° N-W.

Locality (n)

Is encountered about 200' from above. Lithology and attitude of formation is same as above.

Locality (o)

No outcrop was seen south where the above stream goes into the Portneuf River.

Locality (j)

No outcrop was found from the railroad and powerline intersection down to the stream fork about a mile south east.

Locality (k)

No outcrop was ever encountered from streak fork to road.

Locality (l)

Two miles due west of Deschambault town along the railway, no outcrop seen.

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Notes on the Geology of
the Portneuf Area

Locality (i)

At Cap Santé, the supposed outcrop 'high' was checked. It is just about where the Bald Mountain Cap Santé well was drilled. This well penetrated 5' of drift and 25' of Utica before entering Trenton. Everything is covered by drift there. There is a topographic high due north some 100' from where the well was drilled.

The Montreal encountered is everywhere micro crystalline and very dense, thus showing no noticeable porosity.

Samples were taken from all the outcrop that could be found and were discussed with Mr. J. V. Hill who agrees with our interpretation of the area.

Raymond Legault

June 12, 1958.

REPORT ON QUEBEC MAP AREA

INTRODUCTION

The area mapped covers 240 square miles of the St. Lawrence Lowlands on the north shore of the St. Lawrence River and extends from 1 mile west of Neuville to 3 miles east of Quebec City.

In making this report Osborne's compilation (1) of all prvious work done in the area was used for the understanding of the Quebec group. Some minor changes were made in his compilation with respect to the Quebec Lowlands.

The Trenton was also divided into its usual formations - Tetreauville, Middle Trenton and Deschambault, the Basal Trenton is not developed or was not recognized in this area.

Some outcrops in the area were not visited as it was impossible to check all the rivers and brooks in the district. However, the exposures examined are numerous enough for a reasonable interpretation of the structure and stratigraphy.

GENERAL GEOLOGY

According to Osborne (I.P. 159) "Three of the great physiographic divisions of North America occur within five miles of the center of Quebec". The city of Quebec rests on the Quebec group which is characteristic of the Appalachian Highlands. The Quebec group is separated from Ordovician sediments of the Lowlands by the Logan Thrust. Seven miles northwest of the fault, Precambrain outcrops abound.

All the Paleozoic sediments in the area are believed to be of Cambrian or Ordovician age, but are of two distinct types: those representing the eastern limit of the Lowlands basin are considered miogeosynclinal, while those from the north rim of the Appalachian basin are eugeosynclinal in type, being deposited in a much less stable basin. Thus the rock types from each "province" differ considerably in lithology and structure, and were brought into contact with each other by the Logan Thrust.

TABLE OF FORMATIONS

		St. Lawrence Lowlands	Quebec Group
ORDOVICIAN	Upper	Lorraine	
	Middle	Utica - - - - - - - - - - - - -	Quebec City
		Trenton — Upper: Tetreauville	
		Trenton — Middle: Neuville, St. Casimir	
		Trenton — Lower: Deschambault	
	Lower	- - - - - - - - - - - - - - - -	Levis
CAMBRIAN	Upper / Middle	- - - - - - - - - - - - - - - -	Lauzon
	Lower	- - - - - - - - - - - - - - - -	Charny

ST. LAWRENCE LOWLANDS

All the rocks of the Lowlands in the vicinity of Quebec City are of Ordovician age. Trenton, Utica and Lorraine are present. Osborne mentioned the existence of Black River sediments in his report (p. 163), but it appears that no Black River is present west of the Montmorency River. At Loretteville and above Montmorency Falls, a very definite Trenton-Precambrian contact was seen.

TRENTON LIMESTONE

The Trenton was divided according to lithology into four formations: Upper Trenton (Tetreauville), Middle Trenton (Neuville and St. Casimir) and Lower Trenton (Deschambault). The Basal Trenton is not developed in this area or has been eroded before the deposition of the Lower Trenton.

For the purpose of this report, the area underlain by Trenton has been divided into three districts: 1- "Montmorency District", 2-"Charlesbourg District", and 3- "Neuville Typical Section".

"Montmorency District"

In this district two quarries (Verrault in Giffard and St. Lawrence cement in Courville) were examined, also some sections along the Montmorency and Du Moulin rivers, as well as several dispersed outcrops.

It was concluded that the Deschambault formation is the lowermost Trenton at most localities, but is almost always poorly developed. Above the Montmorency Falls, Neuville limestone rests directly on Precambrian, so there was no Deschambault developed there at all.

The Deschambault is generally not more than 50 feet thick. It is mostly a coarsely crystalline, buff brown, clastic limestone. Beds of shaly limestone are present, but rare. The weathering surface is, in general, smooth. Beds are from 4" to 1' thick, but are not fossiliferous. This is quite a contrast with the same formation studied 70 miles west where numerous fossils are found in the Deschambault.

The general strike along the Montmorency is N 5° E varying to the north upstream to N 50 W.

The formation rests on a undulating surface of Precambrian as shown on the Montmorency River.

The contact between Deschambault and Neuville was only seen in vertical section along the Montmorency River. It was plotted using dips, but should be accurate within 100'.

Neuville Type

This is, no doubt, the most widely developed formation of the Trenton Group in this district and reaches a thickness of 400'.

The Neuville is mostly a dark grey, slightly silty, argillaceous, finely crystalline limestone interbedded with a shaly limestone. Outcrops along "Riviere Du Moulin", show the limestone in an 80% proportion with shale, diminishing to 50% along Montmorency River. Beds are from 2 to 4 inches thick and weather light grey. Although Neuville fossils are rare in Verrault's Quarry, they are quite abundant in St. Lawrence cement Quarry and plentiful along "Riviere Du Moulin" and Montmorency River; trilobites, crinoids and bryozoans are common; brachiopods are present but rare. A few big, up to 1 feet long and 3 inches in diameter, Endoceras we re also noted.

The section along Riviere Du Moulin is quite identical in lithology and paleontology to the typical Neuville section in Neuville; therefore there is no doubt about the limestone near Quebec City being of Neuville type.

There is no visible Neuville-Tetreauville contact in this district. The Tetreauville is very thin over most of the area and is eroded completely east of the "Du Moulin Fault".

It should be noted that Osborne plotted a fault between Lorraine and Utica. The outcrops were checked along "Riviere Du Moulin", which exposes a complete succession of rock types from Lorraine to Neuville. High dips are present every where except in the Neuville formation itself, which is quite flat. It seems evident in the field, therefore, that there is no faulting between the Lorraine and Utica though there seems to be one between the Utica and the Tetreauville (which is very thin or absent). A very definite normal fault can be seen between the Neuville and the Tetreauville. Utica is downfaulted against Neuville and the Tetreauville was probably caught in the movement, forming a wedge-shape block between the two formations.

Tetreauville Type

The Tetreauville as exposed in this district is a bluish-black, argillaceous, dense limestone, interbedded with shaly limestone (dense limestone up to 60% with shale). No fossils were noted. Beds are from 4 to 6 inches thick.

The same description applies to the thin locally developed Tetreauville below Montmorency Falls.

"Trenton in the Charlesbourg District"

In this district, Page's Quarry (1 mile west of Charlesbourg) and the section along the St. Charles River were examined.

As exposed on the river, the Deschambault formation marks the base of the Trenton Group and at the Trenton-Precambrian contact a 2 foot bed of conglomeratic limestone is developed. Fragments are composed of metamorphic rocks and coarse grained limestone. This is supposedly a re-worked regolith.

In this area, as in the Montmorency District, the Deschambault is quite thin. Only 28 feet is represented in the section measured on the St. Charles River.

The Deschambault is similar to that of the Montmorency District except that here it is quite fossiliferous. (Bryozoans: Hallopora and Prasopora Brachiopods were conspicuously scarce.)

Strikes are, in general, N 55 E and dips average 15° to the S-E. The Deschambault-Neuville contact was seen on the St. Charles River.

Neuville (Middle Trenton)

The Neuville in the Charlesbourg District outcrops along the St. Charles River near Loretteville, and in Page's Quarry.

In general it is similar to the Neuville of the Montmorency District. It is a finely crystalline limestone, dark grey, interbedded with shaly limestone up to 40%. Beds are from 4" to 6" thick. Brachiopods are abundant here (Dalmanella and Rafinesquina) also bryozoans (Prasopora). Trilobites appear to be absent.

The Neuville-Tetreauville contact was seen in Page's Quarry, 125 feet from the top of the exposure and has been extrapolated to the surface using formational dip. It should be correct within 200'.

Tetreauville (Upper Trenton)

The Tetreauville as exposed in Page's Quarry is a bluish-black, argillaceous, dense limestone; interbedded with shaly limestone up to 40%. Beds are from 7 to 8 inches thick. No fossils were noticed. A few coarse grained, but barren, limestone stringers were seen in this formation.

There are no conformable Utica-Tetreauville contacts in this district, but faulted contacts involving these two formation are present (see discussion under structure).

"Trenton Group in the Neuville District"

According to Husain there is a complete section of Trenton in this area, though due to the lack of time it was not possible to locate all the outcrops he mentions.

No Deschambault outcrop was seen in this district but it is reported to rest on the erosionalPrecambrian surface. The contact was plotted according to Husain's assumed thickness of 100' plus.

The Middle Trenton of this district is divided into two formations which outcrop generally along the St. Lawrence shore and in nearby farmers' fields. The Middle Trenton has not been divided on the map. The St. Casimir and Neuville are plotted under Middle Trenton, although a dividing boundary has been drawn where actually seen on the Neuville shore.

St. Casimir (Lower Middle Trenton)

The St. Casimir formation is for themost part a thin-bedded, coarse grained, buff brown, clastic limestone interbedded with a very fine grained

to dense limestone. Beds are about 4 to 6 inches thick and weather brownish grey.

Fossils are abundant, mostly trilobites (Isolitus) and bryozoans.

On the St. Lawrence shore, the St. Casimir forms a succession of small anticlines and synclines, probably due to compressional forces caused by movement along the Neuville Fault.

Neuville (Upper Middle Trenton)

The Neuville formation is similar to that of the other areas and is a dark grey, argillaceous limestone, slightly more pure than in other districts. The limestone is thinly bedded (2 to 6 inches) interbedded with black shaly limestone up to 40%.

Brachiopods are predominant, cephalopods are represented by some big Endoceras. A few trilobites were also seen.

The Neuville formation is undulatory but the dip flattens westward. Dips are from 2 to 3° towards the south.

Tetreauville (Upper Trenton)

A considerable area formerly believed to be underlain by Utica shale is now plotted as Tetreauville showing a much greater thickness of Tetreauville than previously believed to be present.

UTICA FORMATION

This formation outcrops along the Montmorency River (below the falls) and along the Du Moulin and St. Charles rivers. It is also exposed on the east side of the Neuville fault.

The contact between Tetreauville limestone and Utica shales is very well shown along the Montmorency River. A complete section of Utica is exposed at this locality.

The Utica is a black, fissile, dolomitic shale interbedded with medium grey dolomite bands, comprising 15% of the exposed section. Beds of dolomite vary from 2 inches to 2 feet in thickness. The Utica of this locality is less bituminous than that studied along the St. Maurice River.

A few fossils are present in the formation. Graptolites were found along "Riviere Du Moulin", but no trilobites were seen at any Utica locality.

Strikes vary with the localities, but the formation dips are always quite strong, (from 25° south to 55° south), due to the face that the Utica here is everywhere downfaulted against older formations and the exposures are always near these normal faults.

The Utica-Lorraine contact was seen on the Montmorency and Du Moulin rivers, and although difficult to pick with precision, it should be very close to the line as plotted on the map.

Outcrops seen on the St. Charles River and in the vicinity of Neuville indicate that the displacement along the Neuville fault decreases to the northeast, so that the sectionof Utica measured near Neuville is thicker than that observed near Loretteville.

LORRAINE FORMATION

In the vicinity of Quebec City, the Lorraine is the uppermost formation of the St. Lawrence Lowlands.

The formation outcrops on the Montmorency, Du Moulin and St. Charles rivers, also on the St. Lawrence shore, 2½ miles west of Cap Rouge.

The Lorraine, as developed here, is a grey silty shale, quite calcareous in the vicinity of Quebec. Osborne estimates the thickness to be 700 feet.

COMMENTS ON LOWLANDS STRUCTURE IN THIS AREA

A - Faulting

Four normal faults are plotted on the map, three of which have a N 60 E strike. These are the Montmorency fault, the Charlesbourg and Neuville faults and, what is called the "Du Moulin" fault strikes N 70 W. A flexure is shown near Loretteville, striking N 70 W.

Along the Montmorency fault the Lorraine is down faulted against Neuville type limestone, with the bulk of the movement towards the north east.

The Du Moulin fault was discussed earlier in this report. As far as the Charlesbourg fault is concerned, it was not noted in the field, though its presence is necessary if the position of the Trenton is considered with respect to the Utica. The fault was plotted according to Osborne's interpretation.

The Neuville fault is very well developed along the Neuville shore and shows Utica, on the south, down faulted against Trenton (St. Casimir). As mentioned previously the movement apparently decreases to the north east. This fault serves as a contact between the Lowlands sediments and the Precambrian basement at its northeast extremity.

The flexure near Loretteville is strongly indicated by dips along the St. Charles River. The formations involved were probably dragged down by the movement of the faults in this vicinity.

B - Folds

Folds occur in Utica and Lorraine. These plotted on the map are roughly parallel to the Logan Thrust. The Utica and Lorraine are quite incompetent, and were probably disrupted by continued movements along the thrust belt.

It is doubtful if such pronounced folding is present in the more competent Trenton limestones.

A succession of small anticlines and synclines is also found along the shore line in Neuville. These are probably due to compressional movements along the Neuville fault.

APPALACHIAN HIGHLANDS

QUEBEC GROUP

The Quebec group was mapped in order to clarify the regional structural geology of the northeast end of the Lowlands sedimentary basin.

The Quebec group is composed of Cambrian and Ordovician rocks. Three formations of this group are present on the area mapped:

Uppermost Middle Ordovician: Quebec City Fm.
Lower Ordovician: Levis Fm.
Lower Cambrain: Charny Fm.

Quebec City Fm.

This formation outcrops in Quebec City along the St. Lawrence shore and in the northern part of the city.

The Quebec City formation is generally made up of thick bedded, black, argillaceous, dense limestones interbedded with black shales. Beds range in thickness from 1' to 3'.

Levis Fm.

Only two outcrops of the Levis Formation were seen. A limestone conglomerate was seen in Quebec. Osborne gives a very good description of this formation ((1) p. 181).

Charny Fm.

The Charny is the oldest formation of the Quebec group. It outcrops along the St. Lawrence shore from 2 miles west of Cap Rouge to the C.P.R. tunnel near Wolfe's Cove. Outcrops were also seen along the road from Quebec City to Cap Rouge.

It is mostly a red shale interbedded with grey and green siltstone. In general the formation forms a homocline with constant dips to the south.

Contacts between these three formations are faulted contacts. Two of these can be seen in the field, on Orleans Island. They are plotted here after Osborne.

August 1958 Jean Lajoie

Bibliography:

(1) Osborne, F.F. (1956) Geology near Quebec City

Extrait du Naturaliste Canadien - U.L.

GEOLOGICAL RECONNAISSANCE
LAKE ST. JOHN - CHICOUTIMI AREA
(TRENTON OUTLIERS)

From July 7-11th, Mr. George Drapeau and the writer were engaged in examining Trenton outcrops in the above mentioned area. Not only was our purpose to look for signs of porosity and interesting structures in the Trenton sediments, but also to determine which formations and members within the Trenton group were deposited in this area. We spent only three full days in this district, the mapping done is strictly of reconnaissance nature, and no doubt many interesting and pertinent outcrop localities were overlooked in our haste. However, we feel that we saw enough outcrops to grasp the general geological picture, and thus fulfilled the purpose of the reconnaissance.

It appears that sediments only of Upper and Middle Trenton age were deposited in these outliers. Samples were gathered from ten different localities (see enclosed map, actually no sample was taken at locality 10). The ten outcrop samples can be divided into four fairly distinct rock types, which are interpreted as follows:

(a) Platy, fissile but fairly hard brownish black shaly limestones with minor dark calcareous shale interbeds. This type appears equivalent to upper Tetreauville, and is very similar to the upper Trenton shales exposed around Neuville on the north shore of the St. Lawrence. This type of shaly limestone was collected at localities 5 and 8.

(b) Very dense and massive sublithographic buff brown limestone, yet quite fossiliferous with bryozoan, brachiopod, ostracod and gastropod fossils associated. This type of lithology resembles the thick bedded dense Tetreauville type limestones of the Donnacona district, except that these are quite fossiliferous, especially in the thin shale breaks, while those around Donnacona were practically barren of fossils. Usually the Tetreauville has a very scanty fauna, therefore the position in the section of this type in Lake St. Jean area is desirous. However, it is tentatively considered to be lower Tetreauville. This type of dense limestone was collected at localities 1, 2, 4 and 6.

(c) Microcrystalline to very fine crystalline, fragmental grey-brown limestone, more or less argillaceous, and fairly fossiliferous. Crinoids and brachiopods seem to be the predominant fossils. This type of lithology is very similar to the upper Montreal and Neuville type limestones. Since it has been seen to underlie (b), it is considered to be upper Montreal type. Samples of this have been collected at localities 3, 5 (a), 6 (a) and 11.

(d) Fine, some medium granular crystalline buff brown limestone, cleaner and somewhat coarser textured than above. Brachiopods and crinoids particularly abundant. This texture is reminiscent of lower Montreal or St. Casimir lithology, and will be considered to be equivalent to same. Samples of this type were collected at localities 7 and 9. This limestone did not appear to be as coarsely textured or as thick bedded as the Deschambault usually is.

Included with this report are samples representative of a, b, c, d (above) together with a piece of the only porous rock seen. This porosity was patchy and isolated within a one foot bed of (b) or lower Tetreauville type limestone in the St. Anne Quarry at locality 4. In the coarser textured limestone, where one would expect to fine some porosity, none was apparent.

The only geological map which could be found for reference is the 1"-12 mile sheet, map 704A published by the Q.D.M. This map, in general, has been used to outline the Trenton outliers on the 2" - 1 mile map accompanying these notes.

Somediscrepancies were noted as follows:

1) Shaly limestones of type (a) have been mapped as Utica and it is felt that these are upper Tetreauville.

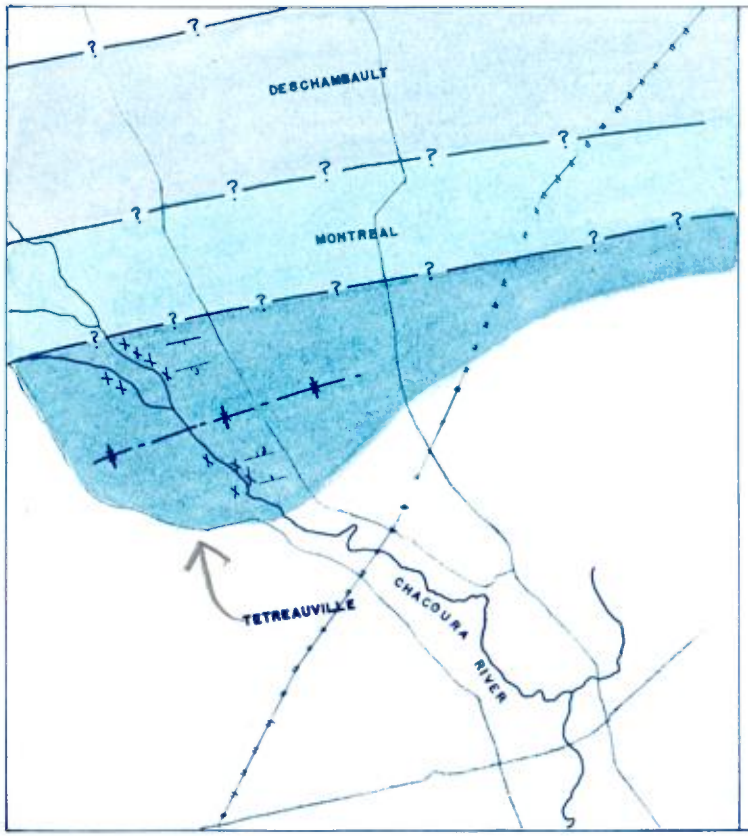
2) The most westerly lobe of Trenton entering about St. Prime is not as extensive as shown, as many Precambrian outcrops are to be found three miles N.W. of St. Prime, while the Government map shows Trenton extending almost to St. Felicien.

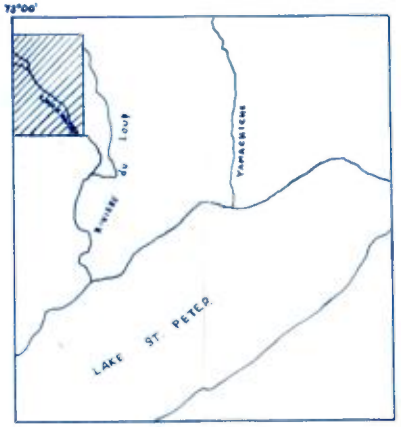
Unfortunately, no outcrop representative of the lobe centering Metabetchouan on Lake St. Jean could be found as the drift is very thick here.

Structure

Except for the 35° dip measured on Trenton at Chambord Junction on Lake St. Jean, dips are generally very low, as though the Trenton was deposited on a gently undulating Precambrian surface. No pronounced folding was noted. Only two faults were seen - one at locality 5 near the falls where Tetreauville on the west has been apparently down faulted and rests directly against Upper Montreal type sediments, and the other at Chambord Junction, where steeply dipping Montreal type sediments are in faulted contact with gently dipping lower Tetreauville type.

July 1958 J.V. Hill





PORTION OF THREE RIVERS MAP AREA
SHOWING
UPPER TRENTON SYNCLINE
ON THE CHACOURA RIVER

LEGEND

- UPPER TRENTON (TETREAUVILLE)
- MIDDLE TRENTON (MONTREAL)
- LOWER TRENTON (DESCHAMBAULT)
- CONTACT
- SYNCLINE
- STRIKE & DIP
- ROAD
- POWER LINE

SCALE : 1 MILE = 1"

DECLINATION : 16°30' WEST

GEOLOGY BY JEAN LAJOIE 1958

DRAUGHTING BY YVON GLOBENSKY