



ROAD LOG
for the
FRIENDS OF THE PLEISTOCENE

ANNUAL MEETING
DRUMMONDVILLE REGION, QUEBEC, CANADA

May 26, 27

1956

Leader

Nelson R. Gadd

Geological Survey of Canada

INTRODUCTION

This field trip was organized in order to illustrate to the group the basic glacial and post-glacial history of the central part of the St. Lawrence Valley. Stop 2, 3 and 4 illustrate nearly the complete history as it is known for five contiguous one-mile map-areas. Publication by the Geological Survey of Canada is pending for preliminary maps of the Becancour (31 I/8), Aston (31 I/1) Three Rivers (31 I/7), Yamaska (31 I/2), and Upton (31 H/15). These were mapped during the seasons 1950-55 by the writer. In these areas the glacial and post-glacial history described below is valid.

The first glaciation of the two recognized in these areas was represented by red till, and some red pro-glacial varves. Ice advanced across the St. Lawrence Lowland in a southerly direction distributing till locally coloured red by the incorporation of large amounts of the soft red Becancour River Formations. The southern limit of this glaciation is not known.

Retreat of the ice left sparse record in outwash, but thick deposits of varves, commonly with red winter layers near the bottom of the sequence, are abundant (e.g. the Pierreville section, lower varves).

The St. Pierre Interglacial Interval followed the red till glaciation. This was a period of fresh-water deposition in a system resembling the present St. Lawrence drainage. Its moist cool climate was cooler than that of the present, but warmer than that of Two Creeks time; (Jaan Terasmae, Geological Survey of Canada, will expand on this on Saturday evening).

An erosional interval of long duration, represented by eroded surfaces of bedrock and red till on which are laid "old" gravels, preceded a period at the end of the interglacial time during which extensive bog deposits developed. Their age is probably greater than 29,630 (Y-256) or 40,000 (W-189) C₁₄ years; thus older than any known Wisconsin deposits. They would appear to be late Sangamon or older, making the red till and associated sediments pre-Wisconsin(?).

Deposition of sands and gray glacial varves in the valleys eroded during St. Pierre time closed the interglacial interval and initiated the second glacial episode. An ice sheet moving southward to southwestward overrode the pro-glacial lake and deposited calcareous sandy gray till over most of the area. It occupied the St. Lawrence Valley through most of Wisconsin time.

The southern limit of the gray till apparently is the Drummondville moraine, (but further work south of the moraine may prove this to be erroneous), which extends in an arc through Drummondville to Yamaska Mountain and beyond, trending towards Covey Hill. Ultimate correlation of the stratigraphy of this area hinges upon correlation between this Wisconsin glaciation involving the Drummondville moraine and the mechanism of drainage of the Glacial Great Lakes.

It is very probable, from evidence in some areas, some of which are visited on this tour, that fresh-water conditions existed for a short period after the recession of the second ice sheet. Marine invasion of the entire lowland did, however, follow closely upon recession of ice from the Drummondville moraine. Sharp transition to brackish-water environments are shown by gradations from markedly stratified to massive, fossiliferous silts at the base of many marine clay sections (e.g. Riviere aux Vaches Section). Fluctuations of the ice-front within the marine basin are being studied in the vicinity of the St. Narcisse moraine.

Several facies of marine sediment record a single marine episode in the central part of the St. Lawrence Lowland. There is no support in these areas for hypotheses of an Ottawa Sea or a Quebec Sea. Recession of marine waters from their highest levels in the Drummondville region was a relatively rapid, continuous episode. Conditions changed from marine to estuarine and culminated in fluvial conditions now represented by the youthful drainage system of the St. Lawrence River.

Acknowledgements

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ROAD LOG

FIRST DAY - Saturday, May 26, 1956

Manoir Drummond Hotel, Drummondville, P.Q.

The hotel is uphill from the intersection of Highways 22 and 9, beside the Anglican Church and Cemetery. Parking in the hotel parking lot and in municipal free parking areas across the park in front of the hotel, beside the R.C. church, and below the escarpment behind the hotel, should provide ample accommodation for all vehicles.

From the front of the hotel go downhill to the junction of Highway 9 and 22 and downhill (right) to the lower parking lot at the side of Highway 9.

STARTING POINT: The caravan will assemble at the parking lot beside Highway 9 at the foot of the escarpment directly behind Manoir Drummond Hotel. Enter NW end of lot and form behind lead car that will stand at SE exit. Assembly at 7:45 A.M. to move off at 8:00 A.M.

Mileage for the trips is logged as follows: left-hand column trip mileage; right-hand column - mileage between entries in log.

8:00 A.M. Please remember to BRING LUNCH!

0.0 0.0 START OF TOUR: Move off from parking lot and go NW (Left) on Highway 9, 100 yards approximately to traffic light at T-intersection in front of bank.

TURN RIGHT (NE) in front of bank - go to end of street

TURN LEFT (NW) pass straight through intersection with flashing overhead signal (YIELD RIGHT OF WAY) and go to stop sign at Highway 9.

TURN RIGHT (NE) follow Highway 9 to right-angled curve at outskirts of Drummondville.

2.7 2.7 TURN LEFT (SW) and continue along Highway 9 for 10 miles.

C.W.G. This stretch of Highway 9 roughly parallels the Drummondville moraine. At the beginning of the stretch the highway is on a broad, flat part of the moraine smoothed by wave action. Concentrations of "Laurentian" boulders mark the morainic ridges and beach bars and spits have been built up on them. Some outcrops of Limestone and shale along this stretch are parts of what appears to be a ridge of bedrock on which the moraine is superposed and that may have been a major influence in localizing the moraine.

On the left side of the highway (SE) in the last two miles of the 10-mile run, relief gradually increases to reveal low, subparallel morainic ridges striking SW.

12.7 10.0 TURN LEFT - SE - on gravel road

C.W.G. Morainic ridges strike SW across road travelled. Smoothed crests and sharp escarpments are due to wave action late in the Champlain Sea episode (sea level was at about 600 feet at the beginning of the Champlain Sea episode; between 375 and 300 feet

when this erosion took place). A typical section at the crest of one of these ridges would show a few feet (rarely more than 5) of fossiliferous gravel or coarse sand grading downward to sandy gray till. Hollows between morainic ridges have marine clay or sand deposits of varying thickness.

- 13.9 1.2 STOP SIGN - TURN LEFT - NE - along black-topped Highway 20 parallel to railway.
- 14.3 0.4 TURN RIGHT - SE - on gravel road. Duncan Station level crossing within 300 feet of corner.
Caution - Level Crossing - the single track railroad is the main line of the C.N.R. Watch carefully for trains!
Hidden approaches!
- 14.6 0.3 C.W.G. go up over Champlain Sea shore escarpment - elevation at base about 300 feet above sea level.
- 16.8 2.2 STOP NO. 1: Gravel pit in Champlain Sea shore deposit - so-called "Saxicava" sand - formed by wave action on SW-facing flank of a morainic ridge near the southern limit of the Drummondville moraine. The floor of the pit is gray glacial till from which the gravel deposits was derived. Marine shells, Hiatella (Saxicava ??), Macoma and Mytilus edulis are common, and are concentrated near the contact between the gravel and underlying till.
View West and Northwest: From the west end of the pit there is a good view of the Drummondville moraine extending SW.
- 16.8 0.0 Return northward to Highway 9 by the same route via Duncan Station.
- 19.0 2.2 STOP SIGN. TURN LEFT - SW - on Highway 22
- 19.4 0.4 TURN RIGHT - NW - on gravel road across Drummondville moraine.
- 20.6 1.2 STOP SIGN. TURN RIGHT - NE - on paved Highway 9; 5.6 miles to Highway 22.
- 26.2 5.6 TURN LEFT - NW - Intersection of Highways 22, 9 - go left, NW, on black-topped Highway 22.
C.W.G. For the next 3.3 miles we travel over morainic belt that comprises the Drummondville moraine.
- 27.7 1.5 C.W.G. Marine bar or spit parallel to Highway 22 on left side of road; farmhouses stand on the ridge.
- 29.5 1.8 C.W.G. Northern limit of the morainic belt; proximal side of the Drummondville moraine. From this point northward to the St. Lawrence River the area is essentially a marine plain interrupted here and there by knobs of till and bedrock and by marine features such as storm beaches, low escarpments and associated dunes and, near the St. Lawrence, river-trimmed escarpments and terraces.
- 31.7 2.2 STOP NO. 2: Brief stop at roadside ditch, right side of Highway 22 to observe typical sandy gray till, which is not well exposed in other sections to be observed during the course of the day. A small amount of fill and about four feet of gravel, presumably derived from the till overlie the outcrop.

31.7 0.0 Continue NW along Highway 22.

33.3 1.6 C.W.G. Stabilized dunes in beach ridge, right side of road.

47.0 13.7 STOP SIGN. TURN RIGHT - NE - along Highway 3 to St. Francois du Lac village. The highway here traverses a river-trimmed terrace lightly veneered with alluvium and underlain by marine clay. Borings at St. Lawrence River level at Nicolet (about 20 miles downstream) indicate about 100 feet of extra-sensitive marine "clay".

53.2 6.2 Leave Highway 3: From the W end of the bridge over the St. Francis River leave Highway 3 (Which at this point curves left across the bridge) and continue South on a gravel road along the W bank of the St. Francis River to the Riviere aux Vaches.

57.1 3.9 STOP NO. 3: West bank of St. Francis River at mouth of Riviere aux Vaches. Cross narrow bridge over the Riviere aux Vaches and park at the top of the hill. Leave cars and cross fields to top of section at river bank.

RIVIERE AUX VACHES SECTION

Thickness (Ft)

Buff alluvial sand 0.3

Light gray marine silt; this so-called "Leda" clay has perceptible horizontal colour-texture banding reminiscent of varving. It is fossiliferous (chiefly Yoldia), calcareous, tough and brittle when dry, very soft, pliable when wet. This material is subject to flow-type landslide..... 21.

Gray to brownish or reddish-gray sandy silt that grades upward into gray silt. The transition is abrupt but gradational. Microfossils (chiefly Foraminifera) are abundant near the base of this section 2.5

Stratified red and gray silts and sands. Regular banding is probably varving 1.5

Sandy, reddish-gray till. (In most other sections along the St. Francis River, the till in this stratigraphic position is gray like that seen at Stop 2) 8

Buff sand; stratified and cross-bedded 3

Buff and gray coarse varves of sand and silt grading downward into typical gray silt varves 14

Gray varved silts; thin-bedded near base. Red winter layers are erratically distributed in thin varves (10 or more to the inch) in the lower few feet of the varve section 16

Coarse sandy brick-red till to low water level 16

(Red and green shales of the Becanour River Formation outcrop in the channel of the St. Francis River here).

- 57.1 0.0 Return to cars and retrace route to W end of bridge at St. Francois du Lac.
- 61.0 3.9 TURN RIGHT - NE - cross bridge over St. Francis River to the village of Pierreville.
STOP. PIERREVILLE VILLAGE. Ten minute stop for purchase of drinks and/or other lunch requirements. Next stop is lunch stop.
- 61.2 0.2 TURN RIGHT - S - at Hotel Traversy - opposite Fina gas station, follow gravel road along E side of the St. Francis River.
- 62.2 1.0 C.W.G. River-trimmed escarpment and beach ridge at right angles to the St. Francis River - paired with St. Francis River terrace. These terraces formed simultaneously at a high level stage of the St. Lawrence River.
- 63.1 0.9 C.W.G. right side of road. Pierreville section in ravine to be visited on second stop following lunch.
- 68.0 4.9 LUNCH STOP - Grove of ~~Large~~ Pines on the East bank of the St. Francis River. Caution: There is some POISON IVY in deeply shaded areas.

Apologies are extended to "Friends" of long standing who may feel shocked at having to eat lunch in other than the traditional gravel pit. Gravel pits are restricted to Drummondville moraine areas in the region traversed during this meeting. Some gravel is dredged from the channel of the St. Francis near the bank opposite our lunch site - so those who hold with tradition are invited to "wade in".

- 68.0 0.0 AFTER LUNCH: Follow foot-path down ravine to water's edge.

STOP NO. 4: East bank of the St. Francis River to right of foot-path. "Old" gravels on eroded surface of red till.

	<u>Section</u>	<u>Thickness (Ft)</u>
2.1	Stratified sands; alluvial	ca. 20
2.2	Varved silts	ca. 30
8	Cross-bedded coarse and medium sands	ca. 10
8	Coarse sand and "old" gravel with abundant flat pebbles; deposited on eroded surface of red till. This "old" gravel probably represents interglacial erosion and deposition	3
15	Sandy red till	10
16	Bedrock. Red and green sandstone of Ordovician Becancour River Formation (Upper Richmond)	10

- 68.0 0.0 Retrace route to Pierreville Section

- 72.9 4.9 STOP NO. 5: PIERREVILLE SECTION

<u>Riverbank Section:</u>	<u>Thickness (Ft)</u>
Gray sandy till	6
Varved fine brown sand, very fine sand and silt, banding most pronounced at depth	16
Compressed peat, some wood	1
Stratified buff to brownish sand	10
grading downward into:	
Gray varved silts	16
Section covered	22
Slump block at water's edge:	
Stratified sands	7
Compressed peat	1
Gray varves	8
to low water level	

PIERREVILLE SECTION: S bank of ravine 100 feet from River's edge.

	<u>Thickness (Ft)</u>
Thin-bedded varved silt and sand	38.5
Compressed peat with some wood (Source bed of Y-256; dated greater than 29,630 C ₁₄ years)	1
Silt and fine sand coloured brown with abundant organic matter and containing twigs and chips of wood	1
Compact blue-gray to greenish-gray silty fine sand grading downward to medium sand	2
Medium-grained to coarse-grained cross-bedded sands ...	4
Erosional Unconformity	
Gray varved silts	31.5
Varves with gray summer layers, red winter layers, varving poor in lower 5 feet	15.6
Brownish-gray silt and silty clay	5.0
Brick-red silt.....	4.0
Boring at river's edge from low water level:	
Slumped, contorted varves	6
Variegated varves; gray with bands of red	6
Silty red till	3

- 72.9 0.0 Retrace route to Pierreville.
- 74.8 1.9 STOP SIGN. TURN RIGHT on Highway 3 to Baieville (La Baie).
- 78.8 4.0 Level Crossing.
- 82.9 4.1 TURN RIGHT at main intersection in Baieville, go to top of river-trimmed escarpment to stop near R.C. Church.
- OR
- Those who may wish to visit the site of the famed Nicolet Landslide may break with caravan here and proceed 8 miles East along Highway 3. Return to Drummondville via Baieville is recommended as the shortest route.
- 83.0 0.1 STOP NO. 6: Baieville R.C. Church. Observe damage to structure caused by differential settlement of foundations in extra-sensitive marine clay. Thickness of the deposit is unknown but probably is of the order of 100 feet.
- 83.0 0.0 Continue SW from Baieville along new highway.
- 87.5 4.5 C.W.G. Wooded till knoll lightly veneered with sand. Many huge "Laurentian" erratics along S-curve through this area.
- 95.1 7.6 C.W.G. Beach ridge of early stage of St. Lawrence River, or estuary. Longitudinal section in pit shows steep cross-bedding striking NE along the strike of the ridge. (Optional stop, time permitting).
- 106.1 11.0 STOP SIGN. TURN RIGHT -W- at St. Cyrille de Wendover. Travel black-topped Highway 9 to Drummondville.
- 111.0 4.9 END OF DAY'S TOUR: parking lot below Manoir Drummond Hotel.
- ANNUAL DINNER. 7:00 P.M.; Main Dining Room, Manoir Drummond Hotel.

SECOND DAY: Sunday, May 27.

- 7:45 A.M. RENDEZVOUS - Parking lot below Manoir Drummond Hotel as before.
- 8:00 A.M. START OF TRIP.
- 0.0 0.0 TURN RIGHT from exit of parking lot and proceed E across bridge and NE along Highway 9.
- 12.3 12.3 TURN LEFT - NW - after passing through the village of Notre Dame du Bon Conseil and crossing bridge over SW Branch Nicolet River.
- 13.3 1.0 C.W.G. Look right rear to see wooded ridge that is most prominent part of the Drummondville moraine. Continue across marine sand and clay plain.
- 14.0 0.7 STOP SIGN - continue straight across red gravel road and go NW along gravel road through morainic belt comprising a large part of the Drummondville moraine.
- 16.6 2.6 Level Crossing - Main line C.N.R. at Ste. Perpetue Station.

- 17.0 0.4 C.W.G. Recessional moraine ridges trending at right angles to the road. The ridges are cored with gray till and may have several feet of lag gravels in the crest that result from marine wave action during the Champlain Sea submergence. Depressions between till ridges have shallow deposits typically comprising sand, marine clay, reworked till, in descending order, but any or all may be absent.
- 20.4 3.4 STOP NO. 1: Gravel pit in marine beach ridge. Borings at the base of the pit indicate that material becomes coarser with depth and more dense, grading downward to gray till.
- 20.4 0.0 Continue NW along gravel road to Ste. Perpetue village.
- 21.2 0.8 TURN LEFT - SW - from Ste Perpetue village. Follow road to Ste. Brigitte des Saults.
- 21.7 0.5 C.W.G. Marine or estuarine terraces and escarpments with beach ridges and stabilized shore dunes.
- 27.5 5.8 TURN LEFT to Southwest Nicolet River at water-powered grist and saw-mill. Park in sawmill area and walk through farm gate to river-bank exposure below village of Ste. Brigitte des Saults.

STOP NO. 2 river bank exposure below village.

<u>Section</u>	<u>Thickness (Ft)</u>
Massive, brownish-weathered gray calcareous silt; probably marine	2
Varved gray-brown and brown silt and fine sand; calcareous	4
Cross-bedded coarse sand and fine gravel outwash; calcareous	14
Brownish-gray calcareous sandy till with lenses of gravel, sand, silty sand	16
Coarse sands and gravels, exhibiting steep cross-bedding; calcareous	39

low water level

- 27.5 0.0 Return to village, TURN RIGHT, on main street, continue down steep hill, cross bridge; TURN RIGHT and continue along north bank of SW Nicolet River to St. Leonard d'Aston.
- 28.2 0.7 C.W.G. Left side (N) of road - Meander core isolated by Nicolet River.
- 32.4 4.2 STOP SIGN: Continue straight ahead to St. Leonard d'Aston.
- 32.6 0.2 C.W.G. After crossing highway look S and SE (right) to observe the Drummondville moraine.
- 34.1 1.5 LEVEL CROSSING
- 34.8 0.7 Cross-roads shrine; local colour.
- 36.5 1.7 STOP SIGN. TURN LEFT on Highway 13.

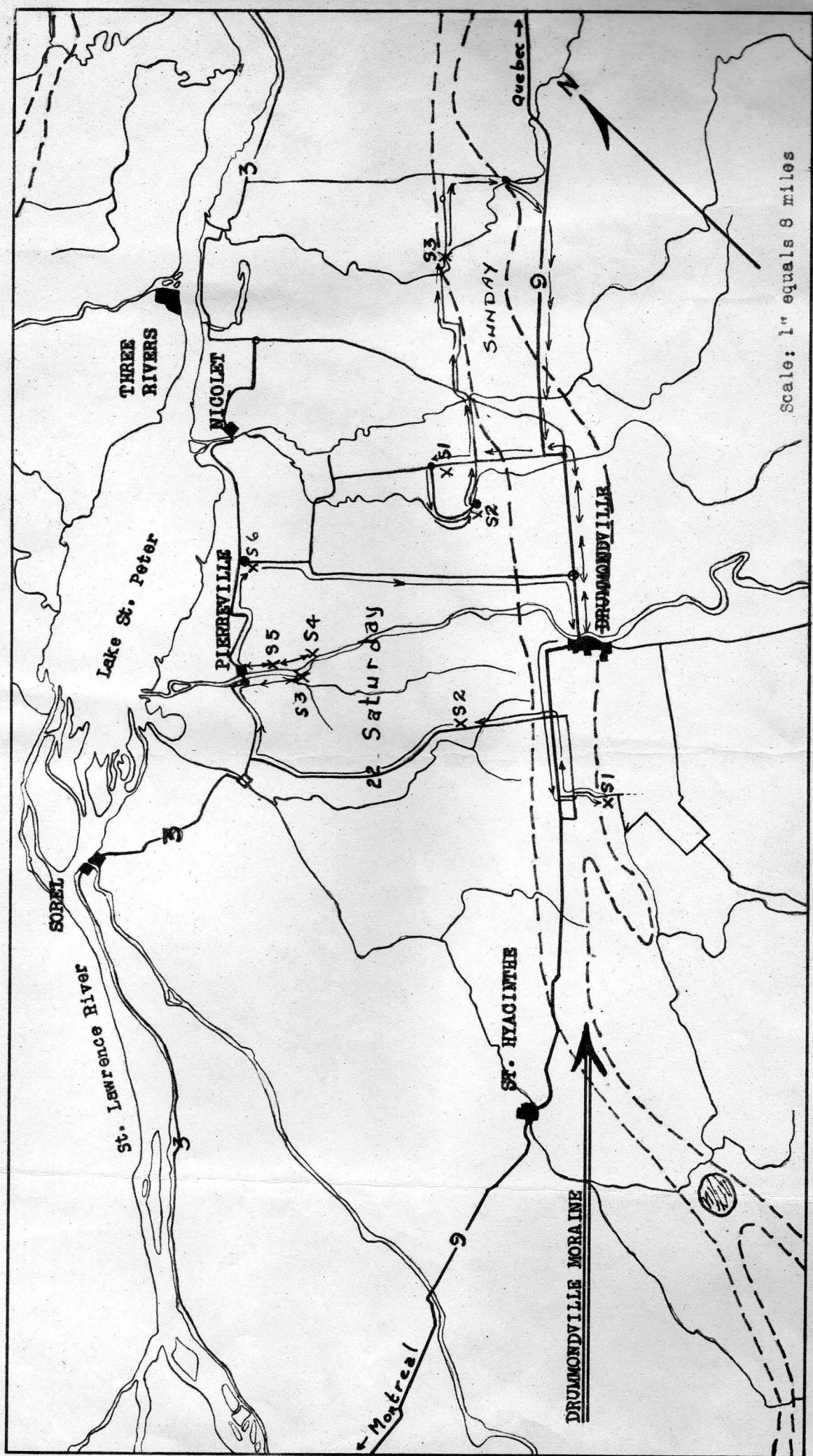
- 37.0 0.5 NARROW BRIDGE. GO SLOWLY over main branch Nicolet River at entrance to St. Leonard d'Aston.
- 37.2 0.2 LEVEL CROSSING. Main line C.N.R. Beyond railway crossing at T-intersection; TURN LEFT, about 100 yards then, TURN RIGHT to main street of village. Continue north.
- 37.8 0.6 TURN RIGHT - NE - between service station and private home just short of Ry. crossing and go NE along gravel road, crossing spur railway line about 300 feet from corner. The St. Leonard Veneer Company is on your left after you cross the tracks.
- 42.8 5.0 STOP SIGN. TURN LEFT - NW - to St. Wenceslas village.
- 43.8 1.0 St. Wenceslas Village - TURN RIGHT - NE - on gravel road towards Bécancour River.
- 46.4 2.6 LEVEL CROSSING: C.N.R. main line.
- 46.8 0.4 STEEP GRADE. LOW GEAR !! Sediments folded into near vertical attitude.
- 47.0 0.2 BÉCANCOUR RIVER in bedrock channel that probably existed at least as early as interglacial time and has been re-excavated and deepened since the marine invasion. Continue up terraced north bank of river to marine plain beyond. These terraces are paired with terraces along the St. Lawrence River.
- 49.0 2.0 STOP NO. 3: Amphitheatre Section; north bank of Bécancour River.

<u>Section</u>	<u>Thickness (Ft)</u>
Rusty weathered medium-grained buff alluvial sands	5.5
Stratified dark gray fine sand and silt in alternate horizontal beds. Sand layers up to about 1 inch thick, silt layers to about 5 inches. <u>Yoldia</u> and <u>Hiatella</u> are common in the sand partings of this stratified facies of the Champlain Sea deposit (so-called "Leda" clay).....	23
Coarse gravel	2.5
Very compact, coarse sandy gray till	5
Weathered sands, mostly slumped, contorted, with some irregular masses of gray till	14
Cross-bedded buff sand and fine gravel	55
Covered	30

(Springs issue at the base of the measured section of sand and gravel, but the cause has not been determined because the lower 30 feet of the section is deeply buried in loose, wet, slumped debris. In other sections nearby along the Bécancour River, red till is exposed near water level beneath thick sand deposits. Some of the sand deposits contain organic matter. In some few places coarse gravels with numerous flat stones, like the gravels at Stop 4 of Saturday's itinerary, rest on the eroded surface of the red till.)

- 49.0 0.0 Continue NE along gravel road to St. Sylvere.
- 51.4 2.4 Village of St. Sylvere; at main intersection in front of R.C. Church, JOG LEFT, THEN RIGHT to continue NE past NW side of Church.
- 53.6 2.2 STOP SIGN. TURN RIGHT - SE - to Maddington Falls.
(ALTERNATE ROUTE - Turn left to go NW via Ste. Gertrude 12.5 miles to Highway 3 for Three Rivers and Quebec."
- 57.6 4.0 MADDINGTON FALLS: TURN RIGHT to cross bridge over Bécancour River at the falls. Continue south through Daveluyville village.
- 60.6 3.0 HIGHWAY 9. STOP SIGN.
For Quebec City - TURN LEFT - NE
For DRUMMONDVILLE-MONTREAL - TURN RIGHT - SW
- 75.1 14.5 TURN LEFT: Highway 9 under construction beyond this point.
- 76.4 1.3 TURN RIGHT: SW - on Highway 9, 20, 13 through Notre Dame du Bon Conseil to Drummondville.
- 88.8 12.3 Drummondville Free Parking Lot below Manoir Drummond Hotel.

END OF EXCURSION. BON VOYAGE.



ROUTE - FRIENDS OF THE PLEISTOCENE - DRUMMONDVILLE, 1956