

## QUEBEC RADIOCARBON MEASUREMENTS II

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### INTRODUCTION

Experimental procedures and calculation remain almost as previously described in R, 1977, v 19, p 326-331. The only difference is in the counting equipment. We now use a Beckman LS-230 counter where samples are counted for a total count of about 30,000.

### ACKNOWLEDGMENT

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### I. GEOLOGIC SAMPLES

#### A. Quebec, Canada

#### Richmond Gulf series

These samples were coll 1972 and subm by D Lagarec (except QU-140 coll by H Samson).

**QU-140. Richmond I** **4960 ± 120**

Wood and peat from contact between silt and peat on a palsa E of Richmond gulf (56° 08' N, 75° 55' W), +132m. *Comment (DL)*: date is minimum for emergence since a lagoon occupied site after marine stage and since time must also be allowed for peat growth.

**QU-141. Richmond II** **1950 ± 90**

Basal peat from bog N of Richmond gulf (56° 32' N, 76° 25' W), +12m.

**QU-142. Richmond III** **4720 ± 120**

Roots from contact between silt and peat in a palsa S of Richmond gulf (56° 7' N, 76° 28' W), +84m.

**QU-143. Nastapoka River** **7760 ± 130**

Basal peat of a palsa near mouth of Nastapoka R (56° 48' N, 76° 13' W), +186m.

**QU-144. Boniface River** **4870 ± 180**

Wood from base of 255cm peat layer of palsa near Boniface R (57° 47' N, 76° 17' W), +135m.

*General Comment (DL)*: from above dates we can expect that deglaciation is much older than 7500 BP as proposed by Prest (1970). On the other hand, taking into account time differences between site emergence and

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peat growth and differences between dates from shells and organic samples, uplift curve based on these dates agrees with those of Walcott (1972). N of Poste-de-la-Baleine.

**QU-145. Mont Jacques-Cartier** **1420 ± 150**

Wood underlying a non-sorted stripe at lower limit of occurrence of phenomenon on Mont Jacques-Cartier (49° 00' N, 65° 57' W), +1110m. Coll 1973 by F Boudreau and subm by DL. *Comment* (DL): minimum for non-sorted stripe period of activity in that area.

**Lake Mimi series**

**QU-54. Lake Mimi I** **7700 ± 310**  
400 to 410cm

**QU-70. Lake Mimi II** **9460 ± 280**  
425 to 435cm

**QU-56. Lake Mimi III** **10,180 ± 330**  
455 to 460cm

**QU-67. Lake Mimi IV** **9770 ± 260**  
470 to 480cm

**QU-55. Lake Mimi V** **11,050 ± 460**  
500-515cm

Five samples of gyttja coll by P Poulin with a Livingstone sampler in 1971, from site ca 4km NW of village of Les Eboulements, Quebec (47° 29' 50" N, 70° 22' 35" W). *Comment* (PP): QU-55 give a minimum age for ice retreat in Mont des Eboulements area. QU-56 dates inversion of AP-NAP curve in pollen diagram (Richard & Poulin, 1976) and suggests slight climatic deterioration for the time. The 3 other dates help confirm the others, and also help to estimate rate of sedimentation for that lake.

**Baie-des-Sables/Trois-Pistoles series**

Samples of present series coll and subm by J Locat, Baie-des-Sables/Trois-Pistoles region (Locat, 1976).

**QU-261. Price** **11,100 ± 370**

Shells (*Mytilus edulis* dominant but assoc with *Macoma balthica*, *Hiatella arctica*, *Mytilu edulis*, *Balanus* sp *Mya arenaria*) coll in gravelly sand layer. Site (48° 36' 38" N, 68° 06' 20" W), +62m, in littoral sands and gravels below Price delta (+76m). Sea level assoc with these fossils was between 62 and 76m above present sea level. Shorelines at this site are very well-defined, and disappear at +70m. *Comment* (JL): date is maximum for marine water level assoc with position of present +62m contour line.

**QU-262. Mont-Joli 11,380 ± 410**

Shells (*Mytilus edulis* & *Balanus* sp) coll in coarse sand overlain by oxidized fine sand. At this site (48° 35' 35" N, 68° 12' 32" W), +75m, 1.5km W of Mont-Joli, littoral sediments form a terrace in which sec was cut. *Comment* (JL): result dates maximum of sea level at +75m.

**QU-263. St-Anaclet 12,220 ± 450**

Shells (*Mya* sp separated from several species) from fresh ditch in clayey sand overlain by thin littoral fine to medium sand, W of St-Anaclet (48° 29' 00" N, 68° 22' 40" W), +82m. Sediments may be closely related to St-Anaclet delta (+125m) to the S. *Comment* (JL): age is maximum for position of sea level at +82m.

**QU-264. St-Donat 13,360 ± 320**

Shells (*Hiatella arctica*, *Mya truncata* & *Balanus hameri*), bivalves well-preserved, from marine clay grading upward into lacustrine varved sediments (48 couplets), in turn overlain by fluvial sand and gravel (48° 30' 11" N, 68° 15' 55" W), ca +90m. *Comment* (JL): result is close to time of deglaciation, ca 13,500 BP, as suggested by Elson (1969) for Rivière-du-Loup/Trois-Pistoles area. It also dates time of maximum marine inundation in Luceville/St-Donat area and must be related to Luceville delta at +126m.

**QU-265. Baie-des-Sables 2240 ± 140**

Shells (*Mesodesma arctica*) from littoral sediments made of gravelly sand near village of Baie-des-Sables on Ste-Flavie terrace (48° 43' 37" N, 67° 53' 00" W), +4m. Species encountered has never been found in higher deposit. Only unbroken valves (ca 50% were used. *Comment* (JL): result dates marine level (+4m) coinciding with terrace surface.

**QU-266. Luceville 10,400 ± 320**

Shells (*Mytilus edulis*) from gravel pit in littoral sediments at ca 3km SW of Luceville (48° 30' 21" N, 68° 21' 30" W), +70m. Gravel pit extends ca 50m into marine terrace lying at ca +73m in area. *Comment* (JL): result dates marine level assoc with +73m terrace.

**QU-267. Grand Métis 11,590 ± 430**

Shells (*Macoma balthica*, unbroken valves, and gastropods and *Mya* sp) coll near Grand Métis, ca 10km E of Mont-Joli, on Bic terrace, near SE edge of old channel (48° 36' 47" N, 68° 06' 00" W), +30m. *Comment* (JL): date seems too old; possible reworking of higher and older deposits suggested by location of site within erosion channel. Main sea level assoc with this site is ca +53m, corresponding to adjacent shorelines. Shells may also have been contaminated by humic acid or carbonate fertilizers.

**QU-268. St-Octave 11,360 ± 290**

Shells (*Mytilus edulis*) from medium sand to medium gravel near village of St-Octave-de-Métis (48° 36' 48" N, 68° 06' 22" W). Top of sec

ca 2.4m above fossiliferous layer and is crest of a emerged beach deposit. *Comment* (JL): result dates marine level assoc with present position of +62m contour line.

**QU-271. St-Fabien I** **13,390 ± 690**

**QU-272. St-Fabien II** **12,300 ± 260**

Shells (*Hiatella arctica* for QU-271 assoc with *Balanus hameri*, *Macoma balthica* and *Mya arenaria* for QU-272) coll in fossiliferous till inclusion incorporated into ice-contact sediments in St-Fabien delta near St-Fabien (48° 18' 25" N, 68° 51' 12" W), +138m. Delta reaches maximum alt of 155m which corresponds to maximum sea level. This very interesting site is highest Quaternary marine macrofossil locality in Gaspé. Dates come from shells coll from 2 different inclusions; QU-271 is more reliable. *Comment* (JL): results date marine level assoc with position of present +138m contour line.

### James Bay series

All samples in this group were coll 1973-5 by L Hardy.

**QU-248. Fort George I** **4470 ± 170**

Shells (*Hiatella arctica* and probably *Clinocardium ciliatum*) in sandy silt, 16km E of Fort George (53° 45' 30" N, 78° 52' 30" W), +16m.

**QU-121. Fort George II** **4110 ± 120**

Shells (*Hiatella arctica*) in beach gravel 22km E of Fort George (53° 44' 25" N, 78° 45' 10" W). *Comment* (LH): dates position of Tyrrell sea at present +40m contour line.

**QU-256. Fort George III** **5080 ± 180**

Shells (*Hiatella arctica*) in coarse beach gravel 50km E of Fort George (53° 40' N, 78° 20' W), +99m. *Comment* (LH): dates position of Tyrrell sea at present 99m contour line.

**QU-119. Fort George IV** **5560 ± 130**

Shells (*Hiatella arctica* and debris of probable *Pecten* sp) in shore deposits of Tyrrell sea 65km E of Fort George (53° 43' N, 77° 58' W), +172m. *Comment* (LH): dates position of Tyrrell sea at present 172m contour line.

**QU-247. Fort George V** **6910 ± 350**

Shells (*Hiatella arctica*) in beach gravel, 85km E of Fort George (53° 44' N, 77° 52' W), +183m. *Comment* (LH): dates position of Tyrrell sea at present 183m contour line.

**QU-245. Fort George VI** **7110 ± 180**

Shells (*Hiatella arctica*) in nearshore sandy silt deposit 85km E of Fort George (53° 42' N, 77° 52' W), +166m. *Comment* (LH): maximum age for retreat of water plane of Tyrrell Sea at position of present 166m

contour line. From field relations, it dates approx position of Tyrrell sea at present 185m contour line.

**QU-246. Mattagami-La Grande Road, Mile 363 7220 ± 330**

Shells (*Hiatella arctica*) coll in reworked fluvio-glacial gravelly sand, (53° 34' 40" N, 77° 40' W), +171m. *Comment* (LH): minimum age for deglaciation and arrival of sea at this point.

**QU-249. Mattagami-La Grande Road, Mile 356 6660 ± 190**

Shells (*Hiatella arctica*) in nearshore deposit of Tyrrell sea (53° 28' N, 77° 30' W), +164m. *Comment* (LH): from field relations dates position of Tyrrell sea at present 175m contour line.

**Mattagami-La Grande Road, Mile 344**

**QU-122. 7880 ± 160**

(*Chlamys islandicus*), +162m

**QU-124. 7750 ± 180**

(*Hiatella arctica* and other broken shells), +162.1m

Shells from 2 different levels in glacio-marine sandy silt underlying beach gravel and overlying Sakami moraine material, 4.5km W of Mile Post 344 (53° 21' N, 77° 34' W). *Comment* (LH): these 2 dates should give approx time of marine invasion in James bay lowlands.

**QU-250. Mattagami-La Grande Road, Mile 292 6930 ± 190**

Shells (*Hiatella arctica* and probably *Chlamys islandicus*) in nearshore sandy and pebbly silt (52° 46' 30" N, 77° 18' 00" W), +195m. *Comment* (LH): dates position of Tyrrell sea at present 195m contour line.

**QU-253. Mattagami-La Grande Road, Mile 275 6950 ± 210**

Shells (*Hiatella arctica* and *Mya truncata*) in beach sand (52° 34' N, 77° 20' W), +200m. *Comment* (LH): dates position of Tyrrell sea at present 200m contour line.

**QU-258. Mattagami-La Grande Road, Mile 263 7440 ± 210**

Shells (*Hiatella arctica*) in nearshore sandy silt (52° 25' N, 77° 55' W), +200m. *Comment* (LH): from field relations, dates position of Tyrrell sea at present 215m contour line.

**QU-368. Eastmain River 7440 ± 180**

Shells in silty clay at base of marine (Tyrrell sea formation) N bank of Eastmain R, 7.3km upstream from its junction with Opinaca R (52° 13' 20" N, 77° 55' W), +9m. *Comment* (LH): dates approx time of marine invasion (Tyrrell sea in James bay lowlands). Also a minimum age for deglaciation at this point.

**QU-254. Eastmain River 7140 ± 210**

Shells (*Hiatella arctica*) in beach gravel. 1km S of Eastmain R along Matagami-La Grande Rd (52° 18' 30" N, 77° 05' W), +218m. *Comment* (LH): dates position of Tyrrell sea at present 225m contour line.

**QU-252. Mattagami-La Grande Road, Mile 236 7030 ± 210**

Shells (*Hiatella arctica*) in nearshore sandy silt (52° 13' N, 77° 08' W), +222m. *Comment* (LH): dates position of Tyrrell sea at present 230m contour line.

*B. Spitzbergen, Svalbard***West Spitzbergen series**

These 2 samples were coll 1973 and subm by J Fabiszewski and K Pekala, Polish Spitsbergen Expedition.

**QU-156. Ralstranda bog 450 ± 90**

Basal part of peat bog, 1.7m under surface, containing remains of tundra plants, accumulated on 3rd marine terrace at Ralstranda (77° 0' 50" N, 15° 19' 55" E), ca +25m. *Comment* (JF): result indicates fast peat accumulation in polar conditions and dates older *Salix* tundra, existing during previous glacier readvance.

**QU-157. Eimfiellet nunatak 560 ± 90**

Organic layer under 60cm of morainic material around Glacier Werenskioldbreen nunatak (77° 03' 45" N, 15° 20' 15" E), ca +370m. *Comment* (JF): age of tundra growing on nunatak before deposition of morainic material; also maximum age for recent glacial activity in area.

## II. SOIL SAMPLES

*A. Quebec, Canada*

All soil samples were pretreated by collectors and subm as strontium carbonate. Ages when present are only apparent ages. <sup>14</sup>C concentrations are given as % modern relative to 0.95 NBS oxalic acid.

**Horizon A series**

Samples coll 1974 and subm by Y A Martel and P LaSalle. Bulk samples were taken from 0 to 18cm topsoil, Ap horizon, of a cultivated clay loam soil classified as Kamouraska series and in Gleysolic order (47° 20' N, 70° 02' W). *Comment* (YAM): studied to determine stability of soil organic matter in cultivated topsoil.

**QU-131. Kamouraska, topsoil 117 ± 2% modern**

Total soil organic matter. Roots were removed by water flotation and carbonates by 1N HCl treatment.

**QU-129. Kamouraska, humic acids 1220 ± 150  
86 ± 2% modern**

Fraction of QU-131 extracted with 0.5N NaOH and precipitated at pH 2 with 1N HCl.

**QU-130. Kamouraska, Humin I 113 ± 2% modern**

Fraction of QU-131 unextractable with 0.5N NaOH.

**QU-185. Kamouraska, Humin II** **180 ± 100**  
**98 ± 1% modern**

Fraction of topsoil, different from QU-131, unextractable with 0.5N NaOH.

**QU-132. Kamouraska, nonhydrolyzable** **1530 ± 110**  
**83 ± 1% modern**

Total soil was hydrolyzed using 0.5N and 6N HCl (Martel Paul, 1974). Nonhydrolyzable residue is dated.

### Horizon C series

Soil samples, coll 1975 and subm by YAM and PL, were taken below root zone and total soil organic matter was dated after carbonates were removed with 1N HCl. *Comment* (YAM): studied to determine utility of such dates in estimating age of soil formation in zone of Champlain sea. QU-310 is shell sample related to corresponding soil.

**QU-188. De L'Anse** **1850 ± 90**  
**79 ± 1% modern**

Soil coll at 210 to 240cm below surface, on De L'Anse soil series, Micmac terrace, at La Pocatière (47° 22' N, 70° 03' W), +6m.

**QU-232. Kamouraska** **11,730 ± 310**  
**23 ± 1% modern**

Soil coll at 240 to 270cm below surface, on Kamouraska soil series at La Pocatière (47° 20' N, 70° 02' W), +115m.

**QU-312. Fouquette** **10,180 ± 270**  
**28 ± 1% modern**

Soil coll at 150 to 180cm below surface on Fouquette soil series at St-Hélène de Kamouraska (47° 35' N, 69° 45' W), +140cm.

**QU-313. Ste-Rosalie** **16,170 ± 230**  
**13 ± 1% modern**

Soil col at 300 to 330cm below surface on Ste-Rosalie soil series at L'Acadie (45° 19' N, 73° 16' W), +150m.

**QU-311. St-Rédempteur** **12,340 ± 340**  
**22 ± 1% modern**

Soil coll at 260cm below surface at St-Rédempteur (46° 43' N, 71° 17' W), +60m.

**QU-310. St-Rédempteur, shells** **9210 ± 130**  
**32 ± 1% modern**

Shells coll at same location and depth as QU-311.

### III. ARCHAEOLOGIC SAMPLES

All archaeological samples were coll within prov of Quebec and subm by people from Provincial Cultural Affairs Dept.

## A. Quebec, Canada

**Rivière-au-Bouveau series**

Samples from Rivière-au-Bouveau, Quebec (50° 17' N, 65° 30' W). Coll and subm by D Chevrier.

**QU-114. Rivière-au-Bouveau I** **1770 ± 110**

**QU-115. Rivière-au-Bouveau II** **2870 ± 180**

**QU-116. Rivière-au-Bouveau III** **3220 ± 240**

Charcoal assigned to Middle Woodland because of archaeol assemblage. Two periods of occupation postulated, not separated by a long time. *Comment* (DC): QU-114 seems post probable date; other 2 dates are too old. Last 2 samples very small. Benzene obtained was minimal.

**QU-234. Rivière-au-Bouveau IV** **1280 ± 170**

Charcoal from site which should have had 2 periods of occupation; opinion based on pedol, geomorphol, and bot reasons. *Comment* (DC): dates 1st occupation.

**QU-236. Rivière-au-Bouveau V** **1620 ± 340**

Charcoal from site which should have been occupied before 5000 BP. *Comment* (DC): date too young. Probable contamination by rootlets or humic acids.

**QU-237. Rivière-au-Bouveau VI** **310 ± 70**

Charcoal from site which should have been occupied between 1000 and 1500 BP. *Comment* (DC): sample was not directly linked to archaeol levels; date tends to confirm that sample does not belong to prehistoric occupation.

**QU-238. Rivière-au-Bouveau VII** **1140 ± 210**

Charcoal from site which should have been occupied certainly before 6000 BP. *Comment* (DC): date too young, probably contaminated by rootlets or humic acids.

**QU-117. Chambly I** **1130 ± 90**

**QU-118. Chambly II** **1160 ± 110**

Charcoal from a site (45° 23' 36" N, 73° 15' 30" W) which clearly should have been occupied during Archaic period. Coll by G Frenette and N Clermont. *Comment* (NC): dates should be 1500 yr older. Small rootlets present in zone of coll together with fertilization of topsoil could have contaminated samples.

**QU-235. Lotbinière** **1630 ± 310**

Charcoal from a site (46° 31' 00" N, 71° 53' 30" W) which seems to correspond to same assemblage of artifacts as those of Owasco culture, New York (Ritchie, 1965) coll by R Ribes. *Comment* (RR): date does not

agree with opinion expressed above, but seems to agree with that obtained on charcoal at a site near Trois-Rivières, Bourassa site, which corresponds to Middle Woodland.

#### **St-André-de-Kamouraska series**

Samples coll by P Dumais near St-André.

##### **QU-357. Rivière-des-Caps 3670 ± 90**

Charcoal from prehistoric hearth (47° 43' 29" N, 69° 40' 21" W). *Comment* (PD): date agrees well with late Archaic typological and lithic assemblage.

##### **QU-358. St-André I 630 ± 80**

Fragmented charcoal from test pits (47° 40' 22" N, 69° 44' 38" W). *Comment* (PD): site considered to be from Archaic period so date appears too young. Sample may have been contaminated by later human activities at site.

##### **QU-359. St-André II 370 ± 90**

Fragmented charcoal from test pits (47° 43' 26" N, 69° 40' 36" W). *Comment* (PD): date seems too young as material recovered bore no sign of European occupation. Sample may have been contaminated and not even related to archaeol site.

#### **Lanoraie series**

Samples coll by G Barré.

##### **QU-218. Lanoraie I 660 ± 100**

##### **QU-220. Lanoraie III 810 ± 160**

Wood and charcoal from a site (45° 57' N, 73° 13' W) whose occupation has been assigned to early stage of Iroquois prehistory. *Comment* (GB): dates confirm interpretation given above.

##### **QU-219. Lanoraie II 1610 ± 160**

##### **QU-221. Lanoraie IV 1790 ± 280**

Wood and charcoal from pit and post mold in Iroquois long house (45° 59' 15" N, 73° 8' 50" W). *Comment* (GB): based on artifacts and other features found at site, dates do not seem to correspond with occupation of sites which should have been somewhere in 14<sup>th</sup> century.

#### **Tracy series**

Samples coll by J Mandeville near Tracy (45° 59' 5" N, 73° 8' 50" W) and subm by G Barré.

**QU-222. Tracy I** **410 ± 120**

Charcoal from carbonized habitation post assoc with Iroquois artifacts dated archaeol ca 1500 AD. *Comment* (GB): date confirms interpretation given above.

**QU-223. Tracy II** **710 ± 130**

Charcoal from carbonized piece of wood separating 2 skeletons in Iroquois burial. *Comment* (GB): date, which should be ca 1500 AD, appears slightly too old.

**N Gaspé Peninsula series**

Samples coll 1974 by J Benmouyal from 3 archaeol sites on N shore of Gaspé peninsula.

**QU-347. Ste-Anne** **5960 ± 100**

Charcoal assoc with probable hearth. Habitation site (49° 07' 35" N, 66° 27' 32" W) on a +45m terrace which has given remains of late Paleo-Indian tradition. *Comment* (JB): age estimate, one of earliest dates for a prehistoric site, in Quebec, seems acceptable, although an older one would not have been surprising.

**QU-373. Cap-au-Renard, B-10** **5270 ± 90****QU-227. Cap-au-Renard, B-1** **4940 ± 170****QU-228. Cap-au-Renard, B-2** **4170 ± 150****QU-229. Cap-au-Renard, B-4** **3750 ± 180****QU-372. Cap-au-Renard, B-7** **2500 ± 80**

Five charcoal samples, thought to belong to local "Middle-Archaic" tradition, coll on a +25m terrace (49° 11' 51" N, 66° 13' 16" W). This living site has yielded lithic remains in podzol, in A<sub>2</sub> and B horizons but mainly underlying humic level, overlying leached (A<sub>2</sub>) soil. *Comment* (JB): results range rather widely in time; problem cannot be solved by assoc material. Some samples may represent forest fires, or may be contaminated. However, 2 samples, QU-228 and -229 are assoc with hearth; they were deeply buried in A<sub>2</sub> horizon, 27 to 32cm below surface. They probably best date human occupation.

**QU-226. Cap-au-Renard, A-12** **3030 ± 470****QU-225. Cap-au-Renard, A-6** **2280 ± 230****QU-374. Cap-au-Renard, A-5/7** **1880 ± 110****QU-224. Cap-au-Renard, A-1** **1490 ± 210**

Four charcoal specimens coll on small, badly drained terrace at +18m, underlying QU-373 group one. Material remains were under dark humic layer, in dark sand rich in decaying organic matters. *Comment* (JB): 2 samples, QU-225 and -374, drawn from hearth with fire-cracked rocks, faunal, and other cultural remains, must be favored.

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