

SIMON FRASER UNIVERSITY RADIOCARBON DATES I

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The SFU Archaeology Department has constructed a small radiocarbon dating facility to serve its own needs and, to the extent that time is available, the needs of other archaeologists and earth scientists. All dates reported here were processed by our laboratory from October 1979 to September 1980. The ^{14}C measurements are made using conventional techniques for liquid scintillation counting of benzene. The samples are burned in a Phonon Mark IV combustion bomb and the resultant CO_2 is purified and converted to Li_2C_2 using a reaction vessel based on the design of Polach, Gower, and Fraser (ms). Acetylene is formed by hydrolysis with distilled H_2O which has been aged for a minimum of three months. The acetylene is trimerized to benzene with the Mobil Durabead I catalyst. The conversion efficiency of CO_2 to C_6H_6 is typically 95%. Gas chromatographic analysis of typical samples of the synthesized benzene indicates 99.8% purity with toluene produced in trace amounts.

Five milliliters of this benzene (or the amount of benzene available plus the amount of 'dead' benzene to make 5 milliliters) are filled into specially constructed teflon vials similar to those of Calf and Polach (ms). To this is added 0.4 mls of "dead" benzene containing butyl-PBD at a concentration of 100 g/l. These vials are counted in a slightly modified Packard model 3255 LS counter situated in a sub-basement room under six meters of sand. In its present configuration, the counter has a background of $1.99 \pm 0.03\text{cpm}$ and a normalized oxalic activity (Aon) of $8.50 \pm 0.03\text{cpm}$ at a ^{14}C counting efficiency of 72%.

The background standard is synthesized from anthracite taken from the deepest vein of the Black Mountain coal deposit in Pennsylvania. This standard is approximately 0.1 cpm higher than our "dead" benzene stock. This is likely due to the ^3H in the water used for hydrolysis. Appropriate corrections are made for each sample as required.

SAMPLE PRETREATMENT

Charcoal samples are boiled in 0.2N NaOH and 0.2N HCl with intermediate rinsing and boiling with distilled water. The sample is finally washed to neutrality and dried at 90°C before combustion. Wood samples are treated in the same manner after being ground to 20 mesh in a Wiley mill. Organic sediments and peat are treated with 0.2N HCl. For sediments of low organic composition oxidation in the bomb is improved by using KMnO_4 in water solution (0.01-0.05N) instead of pure distilled water (H Jungner, pers commun). Carbonate samples are ultrasonically cleaned in distilled water, dried at 90°C and reacted with HCl for CO_2 production. Collagen is extracted according to Longin (1971) for large samples. This method is modified according to Pieter Grootes (pers commun) when smaller samples are being prepared.

Dates are quoted in years BP and are calculated using the Libby half-life of 5568 years. The uncertainties reported reflect 1) counting statistics in unknown, standard, and background during the period in which the activity of the unknown was determined, and 2) an estimate of the uncertainty in the relative counting efficiencies as determined using an external γ -emitter to examine each sample (the "external standard" method). Since no mass spectrometer is available, isotopic fractionation measurements have been obtained from other laboratories only for bone samples and standards. Where $\delta^{13}\text{C}$ values are reported, they have been incorporated in the date calculation. In other cases, no correction has been made. The laboratory working standard is the ANU sucrose which burns well in the combustion bomb. We have not made a systematic study of the relative activities of the NBS oxalic acid standards *vs* the ANU sugar standard. Dates are calculated using the calibration factor of 1.5007 ± 0.0052 as reported by Polach (1979).

INTER-LABORATORY CHECK SAMPLES

Marion Lake wood

Wood coll and subm by Rolf Mathewes, Dept Biol, Simon Fraser Univ.

SFU-T01. **2920 \pm 100**

I-10,045 — 3050 \pm 95.

Revelstoke wood

Wood samples from uncovered larch tree at Revelstoke Dam Project described below in Revelstoke series.

SFU-T02a. **44,000 \pm 1800**
 $\delta^{13}\text{C} = -24.0\%$

SFU-T02b. **45,000 \pm 1600**
 $\delta^{13}\text{C} = -24.0\%$

QL-1543 — 45,100 \pm 600.
 $\delta^{13}\text{C} = -23.5\%$.

Two Creeks wood, Wisconsin

Wood from forest bed horizon as described by Broecker and Farrand (1963).

SFU-T03. **11,790 \pm 160**

L-607A — 11,850 \pm 100.
WAT-57 — 11,860 \pm 170.
GSC-2166 — 11,810 \pm 100.

ARCHAEOLOGIC SAMPLES

*A. Canada**British Columbia***Namu series**

Charcoal from EISx site, shell midden deposit (51° 51' 32" N, 27° 51' 50" W). Extensive secs of site lie beneath large abandoned bunkhouse

(built in 1946) just N of mouth of Namu R. Samples coll and subm by Roy Carlson, Dept Archaeol, Simon Fraser Univ.

- SFU-1.** **3830 ± 110**
Charcoal from 280cm depth; subm to date major shell accumulation.
- SFU-10.** **2720 ± 80**
Charcoal from 100cm depth; subm to date top of Stratum IVB.
- SFU-17.** **3280 ± 100**
Charcoal from 140cm depth; subm to date salmon remains.
- SFU-19.** **3500 ± 100**
Combination sample; charcoal from 120cm and 130cm depths.

Beach Grove Series 1

Charcoal, wood, and human bone from DgRs-1 site, large shell midden, Point Roberts Peninsula, Delta Municipality (49° 01' 55" N, 123° 03' 30" W). Samples coll and subm by Bruce Ball and Stan Copp, Dept Anthropol, Vancouver Community Coll, Vancouver, British Columbia.

- SFU-2.** **3130 ± 130**
Charcoal from 89cm depth.
- SFU-3.** **1050 ± 110**
Douglas Fir bark.
- SFU-4.** **310 ± 120**
Burned wood.
- SFU-5.** **730 ± 110**
Charcoal.
- SFU-26.** **2720 ± 80**
 $\delta^{13}C = -12.8\%$
Collagen from human burial at 45cm depth. *Comment:* previous excavations in other secs of site yielded materials and ^{14}C dates indicative of Marpole-phase occupations. Our results indicate that this sec dates prior to or beginning of Marpole phase.

Beach Grove Series 2

Charcoal from DgRs-1 site, described above. Samples coll and subm by R G Matson, Dept Anthropol, Univ British Columbia, Vancouver.

- SFU-39.** **640 ± 80**
Charcoal from 30 to 40cm depth, assoc with shell matrix.
- SFU-40.** **190 ± 80**
Charcoal from 40cm below unit datum.
- SFU-41.** **1270 ± 160**
Charcoal from 45cm below unit datum to date shell layer.

SFU-42. **1480 ± 80**
Charcoal from 50cm below unit datum.

Pitt River Series 1

Wood and charcoal from DhRq-21 site, Pitt River, Port Coquitlam (44° 14' N, 122° 46' W). Samples coll and subm by Michael Broderick, Dept Archaeol, Simon Fraser Univ.

SFU-6. **220 ± 80**
Unburned wood from steaming-pit feature used to process deerberries (*Mianthemum dilafalum*).

SFU-7. **2890 ± 80**
Charcoal from midden deposit; confirms Marpole phase.

Pitt River Series 2

Waterlogged wood and charcoal from DhRq-21 site, described above. Samples coll and subm by Valerie Patinaude for Heritage Conservation Branch, Victoria, British Columbia.

SFU-43. **2930 ± 80**
Waterlogged wood believed to be stake; assoc with basketry and other wooden items.

SFU-90. **2960 ± 120**
Charcoal from 324cm asl.

SFU-91. **2860 ± 120**
Charcoal from 351cm asl; subm to date faunal material above sample.

SFU-92. **3560 ± 180**
Charcoal from 265cm asl.

Anahim Lake series

Charcoal from Sites FdSi-29 and FdSi-31. FdSi-29 is at NW side of outlet of Anahim Lake (52° 32' 05" N, 125° 23' 11" W). FdSi-31 (52° 31' 10" N, 125° 23' 11" W) is N of FdSi-29, with 100m separating sites at their nearest points. Samples coll and subm by Morley Eldridge for Heritage Conservation Branch, Victoria.

SFU-8. **140 ± 80**
Charcoal from 45cm depth below unit. *Comment:* date is significant since it dates roasting pit at early historic period, dated at 1110 ± 160. This may indicate cultural continuity over time.

SFU-9. **230 ± 110**
Charcoal from 47cm depth below unit. Site consists of four dispersed cultural depressions. Sample was assoc with obsidian flake.

Chilko River Survey series

Charcoal from several survey locations along Chilko R (52° 0' 0" N, 123° 40' 0" W). Samples coll and subm by R G Matson.

SFU-14. **860 ± 80**

Charcoal from Chilko R Survey #92. Sample from 5 to 7cm depth, taken to date large lithic scatter site.

SFU-15. **360 ± 80**

Charcoal from Chilko R Survey #73. Sample from charred roof beam of housepit site.

SFU-16. **280 ± 80**

Charcoal from Chilko R Site E1Rw-4. Sample from 10 to 15cm depth; found with large cultural depressions on terraces above excavation units.

Monte Creek series

Charcoal from EdQx-15 site, on S bank of Thompson R, 27km E of Kamloops. Site is at 350m asl, less than 5m above river (50° 38' 57" N, 119° 56' 44" E). Samples coll and subm by Arnold Stryd, Cariboo Coll, Kamloops.

SFU-32. **450 ± 80**

Charcoal from circular storage pit, from 20cm above pit bottom.

SFU-33. **200 ± 80**

Charcoal from rectangular house pit, from fill on house pit floor.

SFU-34. **530 ± 80**

Charcoal from circular storage pit, from fill at bottom of pit.

SFU-35. **1450 ± 80**

Charcoal from house pit of unknown shape, from fill directly above house pit floor.

SFU-36. **190 ± 130**

Charcoal from rectangular house pit, from floor fill close to N wall at 18cm above bottom of house pit.

SFU-37. **1760 ± 130**

Charcoal from circular house pit, from fill in oval storage pit in house floor close to W wall.

SFU-38. **1030 ± 180**

Charcoal from rectangular house pit, from hearth floor at bottom of house pit. *Comment:* seven ¹⁴C dates place aboriginal occupation of site ca 1900 to 200 yr ago. Three archaeol units are represented at site, only two of which pertain to native occupation. Earliest Thompson-phase component dates from 1400 to 200 BP. During Historic period (post 1825) site was used primarily as pasturage for cattle by Euro-American ranchers.

Chilliwack series

Two mammoth tusks recovered from separate excavations at gravel pit adjacent to Chilliwack R (49° 05' 11" N, 121° 57' 00" W). Samples coll and subm by Richard Percy and Andrew Barton, Dept Archaeol, Simon Fraser Univ.

SFU-65. **21,400 ± 240**
 $\delta^{13}C = -20.9\%$

Collagen extracted from outer layers of tusk. Sample was 10m above bedrock at SE corner of pit.

SFU-66. **21,600 ± 240**
 $\delta^{13}C = -20.9\%$

Collagen extracted from outer layers of tusk. Sample was 3m above bedrock at SW corner of pit.

Bella Coola series

Charcoal and wood from FaSu-19 site, Bella Coola (50° 08' 28" N, 127° 28' 10" W), beach and multi-component site with primarily flaked stone artifacts. Samples coll and subm by Philip Hobler, Dept Archaeol, Simon Fraser Univ.

SFU-25. **5340 ± 100**
 Charcoal.

SFU-28. **320 ± 80**
 Wood from cover plank of human burial box.

SFU-30. **400 ± 80**
 Charcoal.

*B. Africa**Ghana***Daboya series**

Charcoal from Sites DbF-135, DbP-2, and DbD-150, Daboya (9° 30' N, 1° 20' W). Samples coll and subm by F S Kense, Dept Archaeol, Univ Calgary, Alberta.

SFU-11. **260 ± 80**

Charcoal from DbF-135 site. Sample taken from 90cm depth and measured to determine accumulation rate of rubbish deposition at former habitation site.

SFU-12. **1670 ± 190**

Charcoal from DbP-2 site. Sample from 360cm depth in mound-like area of old town site. Previous season's date from area some 100m further downslope produced ^{14}C date of 2080 BP—oldest from site.

SFU-13. **1790 ± 80**

Charcoal from DbD-150 site. Sample from 140cm depth assoc with animal bone and shell.

C. United States

Morrisroe series

Charcoal and organic material from sediment cores from Morrisroe site, Kentucky (37° 03' 45" N, 88° 14' 20" W), multi-component stratified site. Projectile point typology suggests occupational sequence from Early Archaic to Early Woodland, with major occupation during Middle Archaic. Samples coll and subm by Jack Nance, Dept Archaeol, Simon Fraser Univ.

SFU-23. **610 ± 120**

Organic material removed from sediment core.

SFU-29. **7450 ± 150**

Charcoal from 100 to 120cm depth. Sample provides age estimate for central portion of cultural deposit and is one of few ¹⁴C samples recovered *in situ* from Archaic site in Lower Tennessee R drainage.

II. GEOLOGIC SAMPLES

A. Canada

*British Columbia***Revelstoke series**

Well-preserved wood specimens were uncovered during construction activity on Revelstoke Dam, Revelstoke (51° 0' 0" N, 118° 12' 0" W). Samples coll by D E Nelson and subm with cooperation of British Columbia Hydro Power Authority.

SFU-18a. **42,000 ± 1800**

Debris assoc with uncovered tree (SFU-TO2a,b), 61m beneath extensive glacial deposit at site of earlier Columbia R channel.

SFU-18b. **39,000 ± 1300**

Wood debris assoc with SFU-TO2a,b.

SFU-20. **10,000 ± 80**

Wood (sp unknown) from 500m asl in Revelstoke dam site.

SFU-21. **1180 ± 80**

Wood from suspected recent Columbia R channel.

SFU-22. Richmond **3850 ± 80**

Cedar from Richmond Nature Park, Richmond (49° 11' 30" N, 123° 05' 30" W). Sample coll and subm by Vic Tyson to date strata of Burns Bog.

*Alberta***Castleguard Cave series**

Soda-straw from stalactites and bicarbonate extracted from groundwater from Castleguard Cave in Banff Natl Park (52° N, 117° W). Cave entrance is at 1970m asl rising to 2245m asl at loc of SFU-48 and -49.

Samples are all formed randomly in space and time; they are all post-glacial or Holocene deposits, since erosive action in cave during Late Wisconsin would have removed most older stalactites. ^{14}C ages are for comparison with uranium-series ages and ^{13}C content. Samples coll and subm and $\delta^{13}\text{C}$ values measured by Melvyn Gascoyne, Dept Geol, McMaster Univ, Hamilton, Ontario.

SFU-44. Soda-straw from Helictite Passage.	10,800 ± 100 $\delta^{13}\text{C} = -0.0\%$
SFU-45. Soda-straw from The Grottos.	11,900 ± 160 $\delta^{13}\text{C} = -0.4\%$
SFU-46. Soda-straw from The Grottos.	18,090 ± 280 $\delta^{13}\text{C} = -0.6\%$
SFU-47. Soda-straw from Crutch Passage.	18,200 ± 280 $\delta^{13}\text{C} = -0.3\%$
SFU-48. Soda-straw from Ice Blockage Passage.	13,620 ± 100 $\delta^{13}\text{C} = -1.6\%$
SFU-49. Soda-straw from Ice Blockage Passage.	15,590 ± 200 $\delta^{13}\text{C} = -1.5\%$
SFU-68. Bicarbonate extracted from groundwater at site of SFU-45.	4120 ± 400 $\delta^{13}\text{C} = -4.1\%$

B. United States

SFU-31. Wood from drill core at Monroe, 25km S of Corvallis, Oregon (44° 21' N, 123° 20' W). Sample from 90m depth; subm to date Pleistocene river terrace. Sample coll and subm by Michael Roberts, Dept Geol, Simon Fraser Univ.	36,000 ± 3000
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