

**SMITHSONIAN INSTITUTION  
RADIOCARBON MEASUREMENTS VIII\***

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INTRODUCTION

This list includes samples completed to July, 1972. All samples are counted for at least 2500 min., and X<sup>2</sup> analyses are made on 100-min. print-outs. Errors quoted are 1 $\sigma$ , derived from sample, background, and NBS oxalic acid standard measurements, adjusted where appropriate for small-sample dilution.

Shell samples are pretreated with 1N HCl to remove outer portion, and sample CO<sub>2</sub> is evolved using 50% H<sub>3</sub>PO<sub>4</sub>. Except where noted, all other samples are pretreated with hot 2% NaOH and 2N HCl. CO<sub>2</sub> is converted to CH<sub>4</sub> in a static bomb reactor with ruthenium metal catalyst, using H<sub>2</sub> generated from "dead" H<sub>2</sub>O. Radon is extracted from CH<sub>4</sub> by passing it through charcoal at -30°C, following the technique of H. W. Krueger of Geochron Laboratories.

SAMPLE DESCRIPTIONS

I. GEOLOGIC AND PALEONTOLOGIC SAMPLES

**Alboran Basin series, W Mediterranean**

Samples from several localities on sediment surface in Alboran Basin, W Mediterranean. Coll. 1970 and 1971 and subm. by D. J. Stanley, Smithsonian Inst.

**SI-664. Xaven Bank, 300m** **13,430 ± 360**  
**11,480 B.C.**

Coarse carbonate sands, 90% shell, dredged from 300m water depth, 0 to 30cm sediment depth, on Xaven Bank (33° 26' N Lat, 4° 15' 42" W Long).

**SI-665. Xaven Bank, 234m** **11,605 ± 235**  
**9655 B.C.**

Coarse calcareous sand, 90% shell, dredged from 234m water depth, 0 to 30cm sediment depth, on Xaven Bank (35° 25' 30" N Lat, 4° 22' 12" W Long).

**SI-666. W Alboran Ridge, 86m** **3840 ± 120**  
**1890 B.C.**

Coarse brown carbonate sand, 90% shell, Shipek grab sample from 86m water depth, 0 to 20cm sediment depth, on W Alboran Ridge (35° 34' N Lat, 3° 33' E Long).

**SI-667. Alboran Ridge, 97m** **6605 ± 180**  
**4655 B.C.**

Coarse calcareous sand, 90% shell, Shipek grab sample from 97m

\* Published with the approval of the Secretary of the Smithsonian Institution.

water depth, 0 to 20cm sediment depth, on Alboran Ridge (36° 00' 05" N Lat, 2° 50' 48" E Long).

**SI-668. E Gibraltar Strait, 823m** **9400 ± 185**  
**7450 B.C.**

Coarse calcareous sand, 90% shell, from 823m water depth, 0 to 20cm sediment depth, in E Gibraltar Strait (35° 57' 48" N Lat, 5° 23' 24" E Long).

**SI-884. Algal ball, 50m** **295 ± 45**  
**A.D. 1655**

Algal ball on sediment surface, 50m water depth, in Alboran Sea (33° 55' N Lat, 3° 00' W Long).

**SI-885. Algal ball, 30m** **101.5% modern**

Algal ball on sediment surface at 30m water depth in Alboran Sea (36° 00' N Lat, 3° 00' W Long).

**SI-886. Calcareous algae, 50m** **11,385 ± 145**  
**9435 B.C.**

Calcareous algae from sediment surface, 50m water depth on Xaven Bank (35° 25' N Lat, 4° 00' W Long).

#### **Alboran split series, W Mediterranean**

Three portions of a single sample, water depth 50m, on sediment surface in Alboran Basin (35° 10' N Lat, 3° 10' W Long), W Mediterranean. Sample was sorted by shell varieties, and each portion dated. Coll. 1970 and subm. by D. J. Stanley.

**SI-881. Alboran gastropods** **6590 ± 280**  
**4640 B.C.**

**SI-883. Alboran coralline algae** **6930 ± 240**  
**4980 B.C.**

**SI-882. Alboran ectoprocts** **3085 ± 160**  
**1135 B.C.**

*General Comment:* while dates for gastropods and coralline algae agree ( $340 \pm 370 = 0.9\sigma$ ), date for ectoprocts differs significantly ( $3675 \pm 245 = 15\sigma$ ) from average age of other fractions ( $6760 \pm 185$  yr). Difference casts some doubt upon reliability of ages obtained on undifferentiated shell samples in these and other series.

#### **Mediterranean core series**

Foraminifera from sphincter cores in W Alboran Basin, Mediterranean. Coll. 1969 and subm. by D. J. Stanley (Huang, Stanley, and Stuckenrath, 1972).

W Alboran Core 92 (35° 42' N Lat, 4° 15' W Long)

**SI-669. Core 92, 340 to 360cm** **11,280 ± 230**  
**9330 B.C.**

From pelagic clay beneath upper sand layer.

- 14,620 ± 410**  
**12,670 B.C.**
- SI-670. Core 92, 558 to 578cm**  
From pelagic clay beneath lower sand layer.
- 15,780 ± 470**  
**13,830 B.C.**
- SI-671. Core 92, 710 to 730cm**  
From gray pelagic clay, lowest part of core.
- W Alboran Core 95 (35° 39' 12" N Lat, 4° 08' 42" W Long)
- 2835 ± 155**  
**885 B.C.**
- SI-672. Core 95, 50 to 70cm**  
From yellow-brown pelagic clay near sediment surface.
- 8275 ± 195**  
**6325 B.C.**
- SI-673. Core 95, 295 to 315cm**  
In gray pelagic clay beneath upper sand layer. *Comment:* small sample, diluted.
- 9560 ± 250**  
**7610 B.C.**
- SI-674. Core 95, 420 to 440cm**  
From gray pelagic clay in upper part of bioturbated layer. *Comment:* small sample, diluted.
- 10,780 ± 270**  
**8830 B.C.**
- SI-675. Core 95, 490 to 510cm**  
From gray pelagic clay beneath bioturbated layer.
- 13,895 ± 345**  
**11,945 B.C.**
- SI-676. Core 95, 680 to 700cm**  
From gray pelagic clay, deepest part of core. *Comment:* small sample, diluted.
- W Alboran Core 107 (36° 03' N Lat, 4° 25' W Long)
- 725 ± 105**  
**A.D. 1225**
- SI-677. Core 107, 0 to 20cm**  
From yellow-brown pelagic clay near sediment surface.
- 19,055 ± 695**  
**17,105 B.C.**
- SI-678. Core 107, 450 to 470cm**  
From gray pelagic clay above turbidite layer.
- Ward Hunt Ice Shelf series, Ellesmere I., Canada**
- Shells, id. by Joseph Rosewater, from Ward Hunt I. (83° N Lat, 74° W Long), N.W.T., Canada. Samples are part of study to determine formation and growth of the ice shelf with climatic change, and to establish a rebound curve for N coast of Ellesmere I. Coll. 1960 by J. B. Lyons; subm. by J. E. Mielke, (Lyons and Mielke, mss. in preparation).
- 7755 ± 150**  
**5805 B.C.**
- SI-718. Ward Hunt I., 38m**  
*Hiatella arctica* Linné from emerged beach at +38m, N side Ward Hunt I. *Comment:* cf. L-248A: 7200 ± 200 (Science, 1956, v. 124, p. 162).

- SI-720. Ward Hunt I., 5m** **5950 ± 155**  
**4000 B.C.**  
*Hiatella arctica* Linné from emerged beach at +5m, E side Ward Hunt I.
- SI-721. NE Ward Hunt I., basement ice** **6815 ± 190**  
**4865 B.C.**  
*Astarte* and *Vermetus* from basement ice at junction with moat ice near ridge and trough system 1.6km NNE of NE tip of Ward Hunt I.
- SI-722. SE Ward Hunt I., ice thrust** **3990 ± 130**  
**2040 B.C.**  
*Hiatella arctica* Linné, *Astarte*, and *Vermetus* in ice thrust structures at SE end Ward Hunt I.
- SI-723. Camp Creek ice rise** **4775 ± 120**  
**2825 B.C.**  
*Hiatella arctica* Linné found beneath Camp Creek ice rise from till being uncovered by ablation.
- SI-724. Rambow Hill** **5735 ± 110**  
**3785 B.C.**  
*Hiatella arctica* Linné from area between Rambow Hill and Camp Creek ice rise, +10m.
- SI-725. Camp Creek** **7045 ± 190**  
**5095 B.C.**  
*Hiatella arctica* Linné, *Astarte*, and *Vermetus* from 0.8km above mouth of Camp Creek, +30m.
- SI-727. Ellesmere I., basement ice** **3680 ± 100**  
**1730 B.C.**  
*Hiatella arctica* Linné and *Astarte* from basement ice near moat near Ellesmere I., S edge of ice shelf.
- Ward Hunt I. series, N.W.T.**  
Shell and sponge material from ice-thrust structures on SE shore of Ward Hunt I. (83° 04' N Lat, 74° 05' W Long), N.W.T. Age may represent time of extinction due to brackish- or fresh-water poisoning of marine bottom fauna beneath original Ward Hunt Ice Shelf. Coll. 1969 and subm. by J. E. Mielke.
- SI-638. Shell** **3645 ± 120**  
**1695 B.C.**  
*Astarte*, *Hiatella arctica* Linné, and *Limatula*.
- SI-719-A. Sponge, carbonate fraction** **13,200 ± 440**  
**11,250 B.C.**  
Calclutite assoc. with siliceous sponge material.
- SI-719-B. Sponge, organic fraction** **3400 ± 140**  
**1450 B.C.**  
Organic fraction of same sponge as SI-719-A, above. *Comment*: cf. L-284: 400 ± 150 (Science, 1956, v. 124, p. 162).

**Lake "A", Ellesmere I., N.W.T.**

Two samples of saline water from bottom of unnamed lake in raised fiord on N coast Ellesmere I. (83° N Lat, 75° 20' W Long), N.W.T. This is the density stratified lake, 16km SW of Ward Hunt I., discussed by Hattersley-Smith *et al.* (1970). Dates entrapment of seawater by isostatic rebound. Present sill alt. is 5m. Coll. 1969 and subm. by J. E. Mielke.

**SI-730.** **4590 ± 150**  
**2640 B.C.**

**SI-731.** **4315 ± 140**  
**2365 B.C.**

**SI-729. Lake "C", Ellesmere I., N.W.T.** **4590 ± 155**  
**2640 B.C.**

Unnamed density stratified lake in emerged fiord on N coast Ellesmere I. (82° 52' N Lat, 78° W Long). This is Lake "C" discussed by Hattersley-Smith *et al.* (1970), S of Bromley I. in Taconite Inlet. Age of seawater dates entrapment. Coll. 1969 and subm. by J. E. Mielke.

**Blake Plain Core C-4 series, W Atlantic**

Fine carbonates in turbidite layers from Core C-4 (26° 27' N Lat, 75° 53' W Long), in Blake Plain sediments, W Atlantic. Coll. 1971 and subm. by J. W. Pierce, Smithsonian Inst.

**SI-957. Blake Plain C-4, 129 to 145cm** **25,365 ± 2370**  
**23,415 B.C.**  
 $\delta C^{13} = -1.26\%$

Fine carbonates, 129 to 145cm sediment depth, Core C-4. *Comment:* small sample, diluted.

**SI-958. Blake Plain C-4, 215 to 231cm** **31,365 ± 2040**  
**29,415 B.C.**  
 $\delta C^{13} = +3.0\%$

Fine carbonates, 215 to 231cm sediment depth, Core C-4. *Comment:* small sample, diluted.

**SI-959. Blake Plain C-4, 315 to 340cm** **>40,800**  
 $\delta C^{13} = +1.26\%$

Fine carbonates, 315 to 340cm sediment depth, Core C-4. *Comment:* small sample, diluted.

**Blake Plain Core C-6 series, W Atlantic**

Fine carbonates in turbidite layers from Core C-6 (26° 05' N Lat, 75° 46' 30" W Long), in Blake Plain sediments, W Atlantic. Coll. 1971 and subm. by J. W. Pierce.

**SI-960. Blake Plain C-6, 908 to 920cm** **>39,700**  
 $\delta C^{13} = -2.4\%$

Fine carbonates, 908 to 920cm sediment depth, Core C-6.

**SI-961. Blake Plain C-6, 987 to 998cm** **>42,500**  
 $\delta C^{13} = -1.7\text{‰}$

Fine carbonates, 987 to 998cm sediment depth, Core C-6.

**Blake Plain Core C-19 series, W Atlantic**

Fine carbonates in turbidite layers from Core C-19 (25° 35' N Lat, 77° 01' W Long), in Blake Plain sediments, W Atlantic. Coll. 1971 and subm. by J. W. Pierce.

**SI-962. Blake Plain C-19, 90 to 105cm** **4130 ± 100**  
**2180 B.C.**  
 $\delta C^{13} = +1.9\text{‰}$

Fine carbonates, 90 to 105cm sediment depth, Core C-19.

**SI-963. Blake Plain C-19, 236 to 246cm** **7170 ± 60**  
**5220 B.C.**  
 $\delta C^{13} = -1.26\text{‰}$

Fine carbonates, 236 to 246cm sediment depth, Core C-19.

**SI-964. Blake Plain C-19, 328 to 338cm** **15,995 ± 210**  
**14,045 B.C.**  
 $\delta C^{13} = -1.1\text{‰}$

Fine carbonates, 328 to 338cm sediment depth, Core C-19.

**North Carolina shelf series**

Mollusks, id. by Blake Blackwelder, picked from samples of cemented sandstone and magnesium calcite from break of continental shelf off coast of N Carolina. Samples coll. at depths 30m or greater, and have temperate affinities. Coll. 1967 and subm. by I. G. Macintyre, Smithsonian Inst. (Milliman and Emery, 1968; Macintyre and Milliman, 1970).

**SI-1095. N Carolina Shelf 7845** **15,105 ± 310**  
**13,155 B.C.**

Fragments of *Busycou* sp. and *Mactra* sp., Site 7845 (34° 06' 30" N Lat, 76° 15' 30" W Long), 73 to 74m water depth.

**SI-1096. N Carolina Shelf 7848** **11,190 ± 185**  
**9240 B.C.**

Fragments of *Columbella mercatoria* Linné, *Glycermeris pectinata* Gmelin, *Colubraria lanceolata* Meuke, *Cuprarea spurca acicularis* Gmelin, *Glycermeris americana* DeFrance, *Olivella* sp. cf. *O. mutica* Say, *Fasciolaria* sp., *Prunum spicinum* Menke, and *Vernerocardia perplana* Conrad, Site 7848 (34° 09' 06" N Lat, 76° 11' W Long), at 68 to 95m water depth.

**SI-1097. N Carolina Shelf 8085** **22,265 ± 980**  
**20,315 B.C.**

Fragments of *Trivis pediculus* Linné, *Astarte nana* Dall, *Turritella exoleta* Linné, *Glycermeris pectinata* Gmelin, *Glycermeris americana* DeFrance, *Vernerocardia perplana* Conrad, *Turbo castaneus* Gmelin,

*Nassarius ambiguus* Pulteney, and *Prunum aspicium* Menke, Site 8085 (34° 03' 33" N Lat, 76° 15' 53" W Long), at 92 to 102m water depth.

**SI-1098. N Carolina Shelf 8200** **12,365 ± 270**  
**10,415 B.C.**

Fragments of *Glycermeris pectinata* Gmelin, *Olivella* sp., cf. *O. Mutica* Say, *Astarte nana* Dall, *Nassarius ambiguus* Pulteney, *Trivia* sp. cf. *T. pediculus* Linné (worn), *Cypraea* sp. (juvenile), *Pitar* (juvenile), *Cylichna* sp., *Busycou* sp., *Prunum aspicinum* Menke, *Vernerocardia tridentata* Say, *Vernerocardia perplana* Conrad, and *Turbo castaneus* Gmelin, Site 8200 (33° 58' 24" N Lat, 76° 22' 24" W Long), at 99 to 108m water depth.

**SI-1099. N Carolina Shelf 2737** **12,485 ± 210**  
**10,535 B.C.**

Fragments of *Glycermeris pectinata* Gmelin, *Astarte nana* Dall, *Olivella* sp. cf. *O. mutica* Say, *Vernerocardia tridentata* Say, *Cylichna* sp., and *Nassarius ambiguus* Pulteney, Site 2737 (34° 01' 24" N Lat, 76° 17' 54" W Long), at 88 to 89m water depth.

#### Secas Island series, Panama

Calcareous corals (*Pocillopora* sp.), id. by P. W. Glynn, from 2 adjacent sites on coral reef in Secas I. (7° 57' N Lat, 82° 01' W Long), Panama. Samples dated to estimate rate of accretion of coral reef for comparison with predation attrition rates. Coll. 1971 and subm. by P. W. Glynn, Smithsonian Trop. Res. Inst.

#### Secas sequence 1

<b>SI-893. Secas-1, 0.5m</b>	<b>Modern</b>
Apparent age: 25 ± 150.	
<b>SI-894. Secas-1, 1.0m</b>	<b>Modern</b>
Apparent age: 50 ± 105.	
<b>SI-895. Secas-1, 2.0m</b>	<b>400 ± 70</b> <b>A.D. 1550</b>
<b>SI-896. Secas-1, 2.7m</b>	<b>130 ± 85</b> <b>A.D. 1820</b>

#### Secas sequence 2

<b>SI-897. Secas-2, 0.3m</b>	<b>101.4% modern</b>
<b>SI-898. Secas-2, 0.6m</b>	<b>105.1% modern</b>
<b>SI-899. Secas-2, 0.9m</b>	<b>104.6% modern</b>
<b>SI-900. Secas-2, 1.2m</b>	<b>610 ± 110</b> <b>A.D. 1340</b>
<b>SI-901. Secas-2, 1.5m</b>	<b>285 ± 110</b> <b>A.D. 1665</b>

**SI-902. Secas-2, 1.7m** **400 ± 65**  
**A.D. 1550**

**SI-1049. Mt. Katahdin bog, Maine** **7070 ± 90**  
**5120 B.C.**

Organic material from bottom sediment of 3 adjacent cores of bog on E slope Mt. Katahdin (45° 55' N Lat, 68° 53' W Long), 100m W of Halfway Rock, 100m N of Roaring Brook Trail, Maine. Bog surface +700m. Cone of *Picea mariana*, id. by R. B. Davis, from bottom of 3rd core, 8.8m below bog surface. Coll. 1971 and subm. by H. W. Borns Jr., Univ. Maine. *Comment*: NaOH-soluble portion, SI-1049A: 6700 ± 155.

**SI-1048. Norse Pond, Maine** **12,175 ± 120**  
**10,225 B.C.**

*Mytilus* fragments from 4.35 to 4.5m below sediment surface in Norse Pond (42° 30' N Lat, 67° 07' W Long), Maine. Sample believed to represent offlap of sea during emergence of land. Coll. 1971 and subm. by R. B. Davis, Univ. Maine.

**SI-970. Madison Dunes, Maine** **245 ± 60**  
**A.D. 1705**

Charred wood from 2cm bed of charred organic matter in buried soil, developed on and overlain by fine-grained eolian sand, 4m below sparsely vegetated top surface at Madison Dunes (44° 47' N Lat, 69° 47' W Long), 6km E of Madison, Maine. Sample dated to determine if this period of dune activity was a recent reactivation. Coll. 1971 by J. B. McKeon; subm. by H. W. Borns, Jr.

#### **Orton Ranch series, SE Alaska**

Samples from vicinity of Orton Ranch (55° 36' N Lat, 131° 35' W Long), on Naha R., Revillagigedo I., SE Alaska. Id. by Joseph Rosewater. Coll. 1971 and subm. by Robert Stuckenrath.

**SI-905. Orton Ranch Shell Bed 1** **8420 ± 130**  
**6470 B.C.**

*Saxidomus nuttalli* Conrad from bed of Naha R. at Orton Ranch, est. at +10m. Living examples are found intertidally from S Alaska to California.

**SI-906. Orton Ranch Shell Bed 2** **7230 ± 115**  
**5280 B.C.**

*Cardium cilliatum* Fabricius from same shell bed as SI-905, above. Living examples are distributed circumpolarly.

**SI-911. Orton Ranch, 35cm** **575 ± 80**  
**A.D. 1375**

Charred wood from 35cm below surface in test pit beside Naha R. shell bed, land surface 2.7m above R. Sample from 10cm band of fine gray-brown sand, below 25cm brown loam, and overlying coarse gray pebbly sand.



**SI-912. Orton Ranch, 40cm** **995 ± 80**  
**A.D. 955**

Twigs from 40cm below surface in upper part of coarse gray pebbly sand underlying SI-911, above, and overlying brown peat.

**SI-913. Orton Ranch, 75cm** **1660 ± 100**  
**A.D. 290**

Twigs from brown peat, 75cm below surface, underlying coarse gray pebbly sand of SI-912, above. Peat grades into gray clay and local water table 30cm below sampling point.

#### **Karta Bay series, SE Alaska**

Shell samples from SE tip of Sandy Point (55° 31' N Lat, 132° 30' W Long), at junction of Karta Bay and Twelvemile Arm, Kasaan Bay, Prince of Wales I., SE Alaska. Coll. 1971 and subm. by Robert Stuckenrath.

**SI-914. Karta Bay, 1m** **500 ± 45**  
**A.D. 1450**

Shell fragments from bed at +1m, overlain by 10cm forest soil.

**SI-915. Karta Bay, modern intertidal** **Modern**

Shell fragments from intertidal Zone 30 E of site of SI-914, above, as modern control. Apparent age: 35 ± 150.

#### **Extinction series, Alaska**

Samples from specimens of extinct mammals in collns. of Am. Mus. Nat. Hist., New York. Coll. by O. W. Geist; subm. and id. by R. D. Guthrie, Univ. Alaska.

**SI-837. Fairbanks Creek Bison I** **20,445 ± 885**  
**18,945 B.C.**

*Bison* horn sheath (1042) from Fairbanks Cr. (65° 04' N Lat, 147° 10' W Long), Fairbanks Co., Alaska. Coll. 1952.

**SI-838. Fairbanks Creek Bison II** **17,170 ± 840**  
**15,220 B.C.**

*Bison* horn sheath (1014) from Fairbanks Cr., same locality as SI-837, above. Coll. 1952.

**SI-843. Fairbanks Bison** **31,980 ± 4490**  
**30,030 B.C.**

*Bison preoccidentalis* horn sheath (30530) from unknown site near Fairbanks, Alaska. *Comment*: small sample, diluted.

**SI-839. Cripple Creek Bison I** **21,065 ± 1365**  
**19,115 B.C.**

*Bison* horn sheath (4037) from Cripple Cr. (64° 49' N Lat, 148° 01' W Long), Alaska. Coll. 1947. *Comment*: small sample, diluted.

**SI-840. Cripple Creek Bison II** **>39,000**

*Bison* horn sheath (4038) from Cripple Cr., same locality as SI-839, above. Coll. 1947.

- 29,295 ± 2440**  
**27,345 B.C.**
- SI-842. Cripple Creek Bison III**  
*Bison* horn sheath (46928) from Cripple Cr., same locality as SI-839 and SI-840, above. Coll. 1940. *Comment*: small sample, diluted.
- 18,000 ± 200**  
**16,050 B.C.**
- SI-841. Manley Hot Springs bison**  
*Bison* horn sheath (4002) from Manley Hot Springs (65° N Lat, 149° W Long), Alaska. Coll. 1948.
- >35,000**
- SI-844. Little Eldorado Cr. bison**  
*Bison* horn sheath (46890) from Little Eldorado Cr. (65° 06' N Lat, 147° 41' W Long), Alaska. Coll. 1938.
- 5340 ± 110**  
**3390 B.C.**
- SI-845. Goldstream bison**  
Horn sheath of *Bison preoccidentalis* (46884) from Goldstream area (64° 57' N Lat, 147° 35' W Long), Alaska. Coll. 1939. *Comment*: date obviously does not represent *Bison preoccidentalis*.
- 25,090 ± 1070**  
**23,140 B.C.**
- SI-850. Upper Cleary Cr. symbos**  
*Symbos* horn sheath (A-235-1002) from Upper Cleary Cr. (65° 05' N Lat, 147° 20' W Long), Alaska. Coll. 1939. *Comment*: small sample, diluted.
- 17,695 ± 445**  
**15,745 B.C.**
- SI-851. Dome Cr. symbos**  
*Symbos* horn sheath (A-651-3006) from Dome Cr., Fairbanks Co., Alaska, exact site unknown. Coll. 1952.  
*General Comment*: all samples were pretreated with cold 2% NaOH followed by cold 2N HCl.
- 470 ± 90**  
**A.D. 1480**
- SI-852. Chester Cr. bison, Alaska**  
Horn sheath of *Bison occidentalis*, id. by R. D. Guthrie, from exposure 3m downstream from Chester Cr. Bridge along Campbell Airstrip Rd. (61° N Lat, 150° W Long). Anchorage, Alaska. Coll. 1969 by Frederick Hadley-West; subm. by R. D. Guthrie. *Comment*: pretreated with cold 2% NaOH and cold 2N HCl. Date obviously does not represent *Bison occidentalis*.
- Natazhat Glacier series, Yukon Terr.**  
Samples from deposit between 2 tills at terminus of Natazhat Glacier (60° 36' N Lat, 140° 54' W Long), 48km SW of Koidern, Yukon Terr. Bed, 1.1m thick, lies above modern timberlane, and provides key stratigraphic horizon for area, dating glacier retreat and higher treeline. Coll. 1970 and subm. by G. H. Denton, Univ. Maine.

- SI-1100. Natazhat Glacier, bed base** **3050 ± 55**  
**1100 B.C.**  
 $\delta C^{13} = -24.5\text{‰}$   
 Wood, probably white spruce, id. by B. F. Kukachka, from base of forest bed deposit.
- SI-1101. Natazhat Glacier, peat** **2675 ± 85**  
**725 B.C.**  
 Organic silt and peat from base of forest bed deposit.
- SI-1102. Natazhat Glacier, bed top** **3060 ± 50**  
**1110 B.C.**  
 Wood, probably white spruce, from top of forest bed deposit.
- SI-1103. Capps, White R. Valley, Alaska** **11,100 ± 120**  
**9150 B.C.**  
 Organic silt from base of peat bog in Capps sec. at confluence of White R. and North Fork Cr. (60° 45' N Lat, 141° 35' W Long), Alaska. Bog, 12m deep, rests on Macauley till; date is minimum for recession of Late Wisconsin (Macauley) ice from White R. valley. Coll. 1970 and subm. by G. H. Denton. *Comment*: NaOH-soluble portion was dated 8220 ± 145 ( $\delta C^{13} = -25.0\text{‰}$ ).

- SI-903. Prudhoe Bay wood, Alaska** **>43,300**  
 Larch (*Larix*, id. by B. F. Kukachka) brought to surface from depth 183m in drilling operations at Prudhoe Bay area (69° 30' N Lat, 146° 30' W Long), Sec. 1, Twp. 1, Range 12E, Alaska. Coll. 1971 by B. P. Alaska, Inc.; subm. by E. S. Rogers, Natl. Geog. Soc., Washington, D.C. *Comment* (B.F.K.): rings shown by specimen are broader than those in Pleistocene specimens, suggesting more equitable growth conditions.

## II. ARCHAEOLOGIC SAMPLES

### *A. Iran*

#### **Tepe Ganj Dareh series, Iran**

Charcoal from Level E at Tepe Ganj Dareh (34° 15' N Lat, 47° 30' E Long), near Qeysevand in Kermanshah, Iran. Assoc. with faunal remains, early Neolithic flint artifacts, and occasional clay figurines, but no solid architecture. Coll. 1971 and subm. by P.E.L. Smith, Univ. Montreal (Young and Smith, 1966; Smith, 1970).

- SI-922. Level E, 6.7 to 6.8m** **8570 ± 210**  
**6620 B.C.**  
 Charcoal from depth 6.7 to 6.8m in zone immediately below living floor at 6.55m.
- SI-923. Level E, 7.5 to 7.6m** **8625 ± 195**  
**6675 B.C.**  
 Charcoal from depth 7.5 to 7.6m, from top zone of large fire pit at base of mound, dug into virgin soil, and partially filled with stones covering an accumulation of ash and charcoal.

**SI-924. Level E, 7.6 to 7.8m** **8640 ± 90**  
**6690 B.C.**

Charcoal from depth 7.6 to 7.8m, from lower zone of same firepit as SI-923, above.

**SI-925. Level E, below 7.6m** **8385 ± 75**  
**6435 B.C.**

Charcoal from firepit, just above virgin soil at base of mound, 7.6m depth.

*General Comment:* cf. other dates from Level E, GaK-807: 10,400 ± 150 and GaK-994: 8910 ± 170 (R., 1967, v. 9, p. 61); and P-1484: 8968 ± 100, P-1485: 9239 ± 196, and P-1486: 8888 ± 98 (R., 1970, v. 12, p. 579).

*B. Turkey*

**St. Sophia series, Istanbul**

Portions of structural and decorative timbers from St. Sophia (41° 00' 16" N Lat, 28° 59' 04" E Long), Istanbul, Turkey, dated to determine times of repair. Coll. 1969 and subm. by R. L. Van Nice, Dumbarton Oaks, Washington, D.C.

**SI-778. SW pier** **85 ± 55**  
**A.D. 1865**

Wood from decorated box surrounding timber in partition joining SW pier and buttress in S gallery.

**SI-779. S gallery** **195 ± 50**  
**A.D. 1755**

Wood from decorated box surrounding built-in strut in arch spanning small opening above secondary columns, S gallery.

**SI-781. SW secondary pier** **1545 ± 85**  
**A.D. 405**

Decorated box surrounding timber connecting SW secondary pier and coupled columns, W side, N end.

**SI-782. Timber, SW secondary pier** **1320 ± 80**  
**A.D. 630**

Working timber connecting SW secondary pier and coupled columns, N end.

*General Comment:* outer surfaces were removed to avoid possible contamination by varnish and pigeon droppings. SI-778 and SI-779 may represent replacements with old wood during renovations of A.D. 1847 to 1849. SI-781 and SI-782 may represent initial construction of A.D. 532 to 537, or early repairs.

*C. British Isles*

**Dun Ailinne series, Ireland**

Charcoal from stratified hill fort at Dun Ailinne (53° 13' N Lat, 6° 35' W Long), Knockaulin Townland, Kilcullen, Co. Kildare, Ireland. Coll. 1969 and subm. by Bernard Wailes, Univ. Mus., Philadelphia.

- 2165 ± 70**  
**215 B.C.**
- SI-977. Dun Ailinne 1**  
Charcoal from 1 of last 3 Iron age levels.
- 1950 ± 80**  
**1 B.C.**
- SI-979. Dun Ailinne 3**  
Charcoal, occupation material from 1 of last 3 Iron age levels.
- 2490 ± 85**  
**540 B.C.**
- SI-981. Dun Ailinne 5**  
Charcoal from occupation in 1 of last 3 Iron age levels.
- 2075 ± 80**  
**125 B.C.**
- SI-986. Dun Ailinne 10**  
Charcoal from fill of Feature 36, Iron age Phases 4, 5, and 6.
- 1855 ± 50**  
**A.D. 95**
- SI-987. Dun Ailinne 11**  
Charcoal from fill of Feature 33, Iron age Phases 4, 5, and 6.
- 1755 ± 90**  
**A.D. 195**
- SI-985. Dun Ailinne 9**  
Charcoal from fill of Trench A, Iron age Phases 3 and 4.
- 1930 ± 85**  
**A.D. 20**
- SI-978. Dun Ailinne 2**  
Charcoal from fill of Trench B, Iron age Phases 3 or 4. Expected to be contemporary with SI-980, below.
- 1900 ± 85**  
**A.D. 50**
- SI-980. Dun Ailinne 4**  
Charcoal from fill of Trench A, Iron age Phases 3 and 4.
- 2370 ± 85**  
**420 B.C.**
- SI-983. Dun Ailinne 7**  
Charcoal from occupation contemporary with Iron age Phases 2, 3, and 4.
- 2200 ± 50**  
**250 B.C.**
- SI-984. Dun Ailinne 8**  
Charcoal from fill of Feature 60, Iron age Phases 2 and 3.
- 3220 ± 55**  
**1270 B.C.**
- SI-982. Dun Ailinne 6**  
Charcoal from shallow pit, assoc. with sherds of food vessel of Late Neolithic or Early Bronze age.

#### **Silbury Hill series, England**

Fractions of cut sod buried in course of secondary construction of Silbury Hill (51° 25' N Lat, 1° 52' W Long), England. Samples dated to determine feasibility of dating prehistoric earthworks by dating sod

or turf buried during construction. Coll. 1969 by Bernard Wailes; subm. by Robert Stuckenrath.

	<b>4675 ± 110</b>
<b>SI-910-A. Silbury Hill sod, 2mm</b>	<b>2725 B.C.</b>
Organic matter from sod, retained on 2mm screen.	
	<b>5995 ± 185</b>
<b>SI-910-AH. Silbury Hill, 2mm NaOH</b>	<b>4045 B.C.</b>
NaOH-soluble portion of SI-910-A, above.	
	<b>4315 ± 110</b>
<b>SI-910-B. Silbury Hill sod, 1 to 2mm</b>	<b>2365 B.C.</b>
Organic matter from sod, retained on 1mm screen, passed by 2mm screen.	
	<b>4570 ± 120</b>
<b>SI-910-C. Silbury Hill sod, 0.5 to 1mm</b>	<b>2620 B.C.</b>
Organic matter from sod, retained on 0.5mm screen, passed by 1mm screen.	
	<b>4465 ± 130</b>
<b>SI-910-CH. Silbury Hill, 0.5-1mm, NaOH</b>	<b>2515 B.C.</b>
NaOH-soluble portion of SI-910-C, above.	
	<b>4530 ± 110</b>
<b>SI-910-D. Silbury Hill, &lt;0.5mm</b>	<b>2580 B.C.</b>
Organic matter from sod passed by 0.5mm screen. <i>Comment:</i> sample impossible to filter after boiling in 2% NaOH; reacidified and date is for whole sample.	
<i>General Comment:</i> no explanation is offered for SI-910-AH; excluding this date, average age of series is 4510 ± 50 yr.	

*E. Labrador-Newfoundland*

	<b>2200 ± 120</b>
<b>SI-875. Red Rock Point, Labrador</b>	<b>250 B.C.</b>
Charcoal from hearth 0 to 8cm below surface in Dorset Site GeBk-2, Red Rock Point 2 (54° 41' 30" N Lat, 57° 44' W Long), Labrador. Assoc. with one of the later Dorset tool assemblages in Hamilton Inlet area. Coll. 1969 and subm. by W. W. Fitzhugh, Smithsonian Inst. (Fitzhugh, 1972).	
	<b>4810 ± 115</b>
<b>SI-877. Sandy Cove 4, Labrador</b>	<b>2860 B.C.</b>
Charcoal from hearth in Site GcBk-4, Sandy Cove 4 (54° 18' N Lat, 57° 45' W Long), Labrador. Hearth, 15cm below surface, was overlain by sterile sandy layer. Assoc. with Sandy Cove complex materials, stemmed points, quartz knives, ground slate tools, and red ocher—all characteristic of early subdivision of Maritime Archaic in central Labrador. Coll. 1969 by S. L. Cox; subm. by W. W. Fitzhugh (Fitzhugh, 1972). <i>Comment</i> (W.W.F.): 1st date for early Maritime Archaic Sandy Cove complex in Hamilton Inlet. Date agrees with geologic estimate based on	

emergence of 14m terrace on which Sandy Cove sites were found. Cf. dates for Maritime Archaic at Saglek, N Labrador,  $4530 \pm 105$  and  $3890 \pm 110$  (written commun., J. A. Tuck, Mem. Univ., St. Johns, Newfoundland).

#### **Hound Pond 4 series, Labrador**

Charcoal from hearths in Site GcBi-18, Hound Pond 4 ( $54^{\circ} 27' 30''$  N Lat,  $57^{\circ} 28' W$  Long), Groswater Bay, Hamilton Inlet, Labrador, +12m. Samples from cultural zone in leached gray sand beneath 20 to 30cm peat layer. Present surface vegetation is tundra with permafrost, but believed to have been spruce forest. Assoc. with lanceolate biface of red quartzite, asymmetric knives, and ground slate celt. Coll. 1971 and subm. by W. W. Fitzhugh (1972).

**SI-927. Hound Pond 4, Pit 1** **3195  $\pm$  120**  
**1245 B.C.**

**SI-928. Hound Pond 4, Pit 3** **3095  $\pm$  105**  
**1145 B.C.**

*General Comment* (W.W.F.): dates confirm age estimates of Charles complex in Lake Melville, and indicate a camp site here considerably above active beach line, unusual in sites found thus far in Hamilton Inlet area.

#### **Rattlers Bight 1 series, Labrador**

Rattlers Bight 1 ( $54^{\circ} 27' N$  Lat,  $57^{\circ} 26' W$  Long), Groswater Bay, Hamilton Inlet, Labrador, is a large summer occupation site, +6.7m of Rattlers Bight phase of Maritime Archaic in central Labrador. There is also a small Dorset component in one area of site. Coll. 1971 and subm. by W. W. Fitzhugh (1972).

**SI-929. Rattlers Bight, Hearth 2** **4525  $\pm$  155**  
**2575 B.C.**

Charcoal from Hearth 2, from cultural zone beneath large slab cooking rock, 28cm below surface, at N end of site. Assoc. with chipped Ramah chert stemmed points, ground slate tools, burned animal bone, and red ocher. *Comment* (W.W.F.): earliest date for this site, and represents an occupation earlier than elsewhere on site. It dates a phase transitional between Sandy Cove complex (SI-877, above) and Rattlers Bight phase of Maritime Archaic. Lower portion of hearth is believed to have been used soon after emergence of the tombolo terrace on which site is located.

**SI-932. Rattlers Bight hearth** **3890  $\pm$  145**  
**1940 B.C.**

Charcoal from beneath rotting slab of hearth rock, beneath peaty level, and 12 to 18cm below surface, +5.5m. This is lowest alt. for Maritime Archaic materials found at site, and should be terminal date for occupation since water-worn artifacts were found below this level. Assoc. with ground red slate knife and Ramah chert tools of Rattlers Bight phase.

**2720 ± 125**  
**770 B.C.**

**SI-930. Rattlers Bight Dorset**

Hearth charcoal from Dorset component within area of Maritime Archaic occupation. Scattered charcoal beneath small slab rock 16cm below surface. Assoc. Dorset materials are typical of early Dorset found in Groswater Bay. *Comment* (W.W.F.): Maritime Archaic materials were found in this square, and the fact that this date is several hundred yr earlier than date for Dorset components elsewhere in site (SI-931, below) suggests some contamination of sample by admixture with earlier Maritime Archaic material.

**2255 ± 55**  
**305 B.C.**

**SI-931. Rattlers Bight Dorset 2**

Hearth charcoal from Dorset component, from lower level of peaty zone. Maritime Archaic materials appeared in this square, but only in sandy soil levels below peaty Dorset zone.

**2310 ± 50**  
**360 B.C.**

**SI-1105. Rattlers Bight Shell 1**

Green sea urchin, *Hiatella arctica*, *Balanus balanus*, *Mytilus edulis*, *Lacuna vinta* Montague, *Littorina obtusata*, and *Acmaea testudinalis*, id. by W. W. Fitzhugh, from within extensively frost-worked beach deposit, 0 to 0.5m thick, +4m.

**2545 ± 55**  
**595 B.C.**

**SI-1106. Rattlers Bight Shell 2**

Green sea urchin, *Pyramidella fusca*, *Aporrhais occidentalis*, *Mytilus edulis*, *Balanus balanus*, *Littorina obtusata*, and *Hiatella arctica*, id. by W. W. Fitzhugh, from within extensively frost-worked beach deposit, 0 to 0.5m thick, +5m.

**5610 ± 115**  
**3660 B.C.**

**SI-1104. Grenfell Mission shell, Labrador**

*Mytilus edulis*, id. by Wesley Blake, from shell lens in 10cm clay-shell matrix 30 to 40cm below surface in front of hospital at Internatl. Grenfell Mission, 140m NE of North West R. (53° 31' 30" N Lat, 60° 08' 40" W Long), Labrador. Beach sands and sand-cobble mixtures lie both above and below sample horizon, believed extensive. Horizon lies at +4.9m in Lake Melville. Coll 1968 and subm. by W. W. Fitzhugh (Fitzhugh, 1972). *Comments*: sample cleaned and pretreated at Geological Survey of Canada Lab. (W.W.F.): date seems far too old for this alt.

*F. New Brunswick*

**Cow Point series, New Brunswick**

Charcoal samples from Site BIDn-2, Cow Point (45° 52' 30" N Lat, 66° 11' W Long), near hwy. between Grand Lake and Maquapit Lake, New Brunswick. Assoc. with late Laurentian Archaic material in burial complex. Coll. 1970 and subm. by David Sanger, Univ. Maine.



**SI-988. Cow Point, Burial 4**Charcoal. *Comment*: small sample, diluted.**3630 ± 135****1680 B.C.****SI-989. Cow Point, Burial 13**

Charcoal.

**3835 ± 115****1885 B.C.***G. United States***SI-789. Eddington Bend, Maine**

Charcoal from gray crematory fill, 140cm below surface, at Eddington Bend site (44° 49' 30" N Lat, 68° 42' W Long), Penobscot Co., Maine. This is a middle to late Archaic cemetery under later habitation site. Coll. 1970 and subm. by D. R. Snow, SUNY, Albany. *Comment* (D.R.S.): dates near end of Moorehead complex; see M-90: 3350 ± 400 (Science, 1956, v. 124, p. 668); and Byers (1959).

**3430 ± 145****1480 B.C.****Indian I. series, Maine**

Charcoal from Indian I. site (44° 57' N Lat, 68° 39' W Long), Penobscot Co., Maine. Coll. 1970 and subm. by D. R. Snow.

**SI-790. Indian I., 32**

Charcoal from Feature 32, 70cm below surface, from hearth assoc. with dentate rocker-stamped pottery and a medicine bundle containing shark teeth, rolled copper beads, human deciduous teeth, and red ocher.

**1600 ± 115****A.D. 350****SI-791. Indian I., 30**

Charcoal from Feature 30, burned post mold assumed part of Penobscot Indian stockade, destroyed by English in A.D. 1723. Assoc. with fragments of white kaolin pipe.

**155 ± 100****A.D. 1795****Hathaway site series, Maine**

Charcoal samples from Hathaway site (45° 11' N Lat, 68° 35' W Long), Penobscot Co., Maine. Site initially excavated by W. H. Moorehead in 1912; later excavations indicate site assoc. with a cemetery. Coll. 1969 and subm. by D. R. Snow (Byers, 1959; Snow, 1969).

**SI-878. Hathaway, Burial 40**

Charcoal from Burial 40, 30cm below surface, assoc. with red ocher, gouges, and a plummet.

**5165 ± 185****3215 B.C.****SI-880. Hathaway, hearth**

Charcoal from small hearth 24cm below surface. *Comment* (D.R.S.): age suggests contamination by remains of 19th century lumber camp.

**102.4% modern**

- 3355 ± 125**  
**1405 B.C.**
- SI-887. Hathaway, ossuary**  
Charcoal from possible ossuary, 40cm below surface, assoc. with shattered artifacts and burned bone.
- 3620 ± 150**  
**1670 B.C.**
- SI-888. Hathaway, Feature III**  
Charcoal from Feature III, burial pit, assoc. with red ocher and tooth enamel.
- 2920 ± 135**  
**970 B.C.**
- SI-889. Hathaway, Feature VI**  
Charcoal from Feature VI, burial pit assoc. with red ocher and tooth enamel.
- 3840 ± 155**  
**1890 B.C.**
- SI-890. Hathaway, Feature VII**  
Charcoal from Feature VII, burial pit assoc. with red ocher and tooth enamel.

*General Comment* (D.R.S.): SI-878 is oldest radiocarbon date for Moorehead complex, and supports Y-2624:  $5000 \pm 140$  from same site. Burial 40, with Burials 1-17, form earlier Archaic component of site. SI-887 from a possible ossuary dates the later Archaic component. SI-888 is stratigraphically the oldest of 3 burial pits, SI-889 is stratigraphically the youngest, and SI-890 is between SI-888 and SI-889. All 3 pits are assigned to the later Archaic component of site.

#### **Healy Lake series, Alaska**

Charcoal samples from Village site ( $64^{\circ} 00' N$  Lat,  $144^{\circ} 30' W$  Long), on Healy Lake in central Alaska. Coll. 1970 and subm. by J. P. Cook, Univ. Alaska.

- 10,150 ± 210**  
**8200 B.C.**
- SI-737. Chindadn complex, 30 to 36cm**
- 8210 ± 155**  
**6260 B.C.**
- SI-738. Chindadn complex, 46 to 48cm**
- 10,040 ± 210**  
**8090 B.C.**
- SI-739. Chindadn complex, 51 to 58cm**
- 955 ± 125**  
**A.D. 1095**
- SI-742. Sag Bluffs I, Alaska**

Charcoal from stone-lined hearth, 14cm below surface at Sag Bluffs I site ( $69^{\circ} 27' N$  Lat,  $149^{\circ} 29' W$  Long), N Slope, Alaska. Coll. 1970 by D. E. Derry; subm. by J. P. Cook. Assoc. with stemmed points and flakes of possible Kavik or Ekseavik affinities.

#### **Gallagher Flint sta. series, Alaska**

Charcoal from Gallagher Flint Sta. ( $68^{\circ} 44' N$  Lat,  $148^{\circ} 58' W$  Long), in drainage of Sagavanirktok R., N Slope, Alaska. Upper stratigraphic level is a thin black-brown organic soil, 1 to 8cm thick. Directly under

this surface organic layer is a blanket of loess, 20 to 30cm deep, deposited sometime after Banded Mountain-Siruk Cr. stage of Itkilik glaciation. Coll. 1971 by James Dixon; subm. by J. P. Cook.

**2920 ± 155**  
**970 B.C.**

**SI-972. Gallagher, Hearth 1**

Charcoal from Hearth 1, Loc. II. Hearth lay on a few flat stones, partially in surface organic layer and in upper loess. Assoc. with unground burins, burin spalls, drills, end blade, side blades, stemmed points, and unifacial knife. Artifacts appear to bear strong relationship to Choris. *Comment*: nitration pretreatment for removal of roots. Additional portion was given standard NaOH and HCl pretreatment, SI-972-A: 2125 ± 70.

**3280 ± 155**  
**1330 B.C.**

**SI-973. Gallagher, Hearth 1, A**

Charcoal from same hearth as SI-972, above. *Comment*: small sample, diluted. Nitration pretreatment for removal of roots. Additional portion was given standard NaOH and HCl pretreatment, SI-973-A: 905 ± 35.

**10,540 ± 150**  
**8590 B.C.**

**SI-974. Gallagher, Loc. I**

Charcoal from Loc. I in loess deposit, 20 to 25cm below surface. No apparent hearth, but assoc. with unifacial core and blade industry. No type core recognized, but artifacts show possible cultural connections with Anangula types. *Comment*: nitration pretreatment for removal of roots.

**2620 ± 175**  
**670 B.C.**

**SI-975. Gallagher, Loc. I-A**

Charcoal from Loc. I-A, intrusive upon locality I, 3 to 9cm below surface, no apparent hearth. Assoc. with end blade fragment, drill, and 2 bifacial point fragments, probably post-Choris affinities. Notable lack of burins and spalls. *Comment*: small sample, diluted.

**Akun I. series, Aleutians**

Samples from 2 adjacent sites on Akun I. (54° 08' N Lat, 165° 38' W Long), Aleutian Is. Coll. 1971 and subm. by C. G. and J. A. Turner, Arizona State Univ.

**570 ± 65**  
**A.D. 1380**

**SI-965. Chulka matting**

Carbonized beach grass matting from burned pithouse roof. Assoc. with prehistoric Aleut hunting and cooking tools; no Russian material found at this level. *Comment*: sample from block of midden which may have slumped out of original position.

**820 ± 60**  
**A.D. 1130**

**SI-966. Chulka Level 3**

Charcoal from wood fire, originated as driftwood since no trees

grow at site now. Assoc. with food refuse in trash midden, with mixed bone and stone tools.

**SI-967. Chulka Level 4** **1170 ± 90**  
**A.D. 780**

Charcoal from wood fire, originated as driftwood. Assoc. with pre-historic Aleut hunting and cooking tools. Human burial in this stratum showed no evidence of Russian or American trade goods.

**SI-968. Islelo** **3105 ± 55**  
**1155 B.C.**

Charcoal from wood fire on Islelo site, separated from Chulka midden by shallow channel 95m wide. Assoc. with bifacial knives, unretouched flakes, no bone tools.

#### **Izembek series, Alaska**

Izembek, Site IZM-3 (55° 10' N Lat, 162° 58' W Long), is a single component, extended occupation Eskimo house site within Izembek Nat. Wildlife Refuge, near Cold Bay on tip of Alaskan Peninsula. Coll. 1971 and subm. by A. P. McCartney, Univ. Arkansas.

**SI-916. Izembek, House 1 hearth** **1005 ± 105**  
**A.D. 945**

Charcoal from hearth area of House 1.

**SI-917. Izembek, House 1 fill** **390 ± 95**  
**A.D. 1560**

Charcoal from fill, 15cm above floor of House 1. *Comment* (A.P.M.): ground squirrel burrows in fill may account for anomalously young age.

**SI-918. Izembek, House 2 fill** **1235 ± 105**  
**A.D. 715**

Whale bone from fill of House 2, 40cm below surface. *Comment*: date determined on collagen fraction extracted in 8% HCl wash, prolonged heating at pH = 3, and centrifugation after Longin (1971). Age at least 300 yr older than expected.

**SI-919. Izembek, House 2 floor** **905 ± 50**  
**A.D. 1045**

Charcoal from floor of House 2, 75cm below surface.

**SI-920. Izembek, House 2** **925 ± 95**  
**A.D. 1025**

Charcoal from House 2, 40cm below surface.

**SI-921. Izembek, House 1** **760 ± 90**  
**A.D. 1190**

Charcoal from House 1, 45cm below surface.

#### *H. Cuba*

#### **Mogote de la Cueva series, Cuba**

Charcoal from occupation and burial site (22° 44' 18" N Lat, 83° 30' 31" W Long), Pinar del Rio, Cuba. Assoc. with typical Ciboney-

Cayo Redondo cultural material in Burial Cave 2. Coll. 1966 by J. M. Guarch; subm. by Clifford Evans (Osgood, 1942).

<b>SI-424. Trench 1, 35cm</b>	<b>1620 ± 150</b> <b>A.D. 330</b>
<b>SI-425. Trench 1, 1.25m</b>	<b>650 ± 200</b> <b>A.D. 1300</b>

#### **Residuario Funche series, Cuba**

Charcoal from Midden 1, 50m diam., 2.5m high, 10m from mouth of Cueva Funche R., (21° 54' 12" N Lat, 84° 20' W Long), Pinar del Rio, Cuba. Assoc. with typical Ciboney-Guayabo Blanco cultural materials, including crude hammerstones, flint chips, shell vessels and gouges, and very crude ceremonial stones. Coll. 1966 by J. M. Guarch; subm. by Clifford Evans (Rouse, 1942).

<b>SI-426. Block II, Sec. A, 0.5m</b>	<b>2070 ± 150</b> <b>120 B.C.</b>
<b>SI-427. Block II, Sec. D, 0.55m</b>	<b>2510 ± 200</b> <b>560 B.C.</b>
<b>SI-428. Block III, Sec. A, 1.4m</b>	<b>3110 ± 200</b> <b>1160 B.C.</b>
<b>SI-429. Block III, Sec. A, 1.72m</b>	<b>4000 ± 150</b> <b>2050 B.C.</b>

#### *I. Ecuador*

#### **Quijos Valley series, Ecuador**

Samples from group of adjacent sites related to Cosanga ceramic phase in Quijos Valley (0° 30' S Lat, 77° 50' W Long), Napo Prov., Ecuador. Coll. 1967 and 1968 by P. I. Porras, C. Univ. Quito; subm. by Clifford Evans (Porras, Evans, and Meggers, ms. in preparation).

<b>SI-589. Borja-Minda, 0 to 10cm</b>	<b>690 ± 80</b> <b>A.D. 1260</b>
Charcoal from 0 to 10cm below surface in Borja-minda, Site BO-1.	
<b>SI-690. Borja-Minda, 30 to 40cm</b>	<b>2390 ± 165</b> <b>440 B.C.</b>
Charcoal from 30 to 40cm below surface. <i>Comment:</i> small sample; NaOH pretreatment omitted; diluted.	
<b>SI-591. Borja-Minda, 50cm</b>	<b>140 ± 100</b> <b>A.D. 1810</b>
Charcoal from 50cm below surface.	
<b>SI-594. Borja-Minda, 70 to 80cm</b>	<b>450 ± 90</b> <b>A.D. 1500</b>
Charcoal from 70 to 80cm below surface.	

- SI-590. Mamallacta, 10 to 20cm** **860 ± 100**  
**A.D. 1090**  
Carbonized material adhering to potsherds at 10 to 20cm below surface in Mamallacta, Site BA-7.
- SI-685. Mamallacta, 20 to 30cm** **3445 ± 140**  
**1495 B.C.**  
Charred material scraped from potsherds 20 to 30cm below surface.
- SI-686. Mamallacta, 40 to 50cm** **2615 ± 100**  
**665 B.C.**  
Charred material scraped from potsherds 40 to 50cm below surface.
- SI-592. Mamallacta, 50 to 60cm** **1600 ± 100**  
**A.D. 350**  
Carbonized material adhering to potsherds 50 to 60cm below surface.
- SI-593. Mamallacta, 60 to 70cm** **2140 ± 120**  
**190 B.C.**  
Carbonized material adhering to potsherds 60 to 70cm below surface.
- SI-684. Banco Samana, 0 to 10cm** **1455 ± 170**  
**A.D. 495**  
Charred material from inner surface of pot 0 to 10cm below surface at Banco Samana, Site BA-4. *Comment:* very small sample; NaOH pre-treatment omitted; diluted.
- SI-687. Banco Samana, 30 to 40cm** **1985 ± 170**  
**35 B.C.**  
Charred material from potsherds 30 to 40cm below surface.
- SI-595. Nacimba-1, 40 to 50cm** **140 ± 80**  
**A.D. 1810**  
Charred material from potsherds 40 to 50cm below surface at Nacimba-1, Site BA-6.
- SI-596. Baeza Centro, 50 to 60cm** **Modern**  
Charcoal from 50 to 60cm below surface at Baeza Centro, Site BA-2.  
*General Comment (C.E.):* inconsistency of dates with seriated sequence of pottery types is unexplainable. Recent and modern samples from 40 to 50cm depth in middle of refuse may be because modern occupants of region charred points of fence posts before driving them into the ground. The charred point may leave modern charcoal in the older refuse; remainder posts then rot away, leaving no evidence of disturbance in heavy tropical rainforest.

*J. Peru*

**Pacompampa series, Peru**

Charcoal samples representative of Formative period at Pacompampa, Site P1-14 (6° 20' S Lat, 79° 01' W Long), Cajamarca, Peru. Coll. 1970 by H. Rosas La Noire; subm. by Clifford Evans.

**SI-792. Pacompampa, 40cm** **2765 ± 135**  
**815 B.C.**  
Charcoal, 30 to 45cm below surface. *Comment:* small sample, diluted.

**SI-793. Pacompampa, 65cm** **2855 ± 95**  
**905 B.C.**  
Charcoal, 65cm below surface.

**SI-794. Pacompampa, 1m** **2385 ± 155**  
**435 B.C.**  
Charcoal, 90cm to 1.5m below surface. *Comment (C.E.):* too recent; sample excavated at later period after cut was left open, with possible contamination from above.

#### **Pandanche series, Peru**

Charcoal, representative of Formative period at Pandanche, Site P2-B (6° 20' S Lat, 79° 01' W Long), Cajamarca, Peru. Coll. 1969 by Hermilio Rosas and Ruth Shady; subm. by Clifford Evans.

**SI-795. Pandanche, 52cm** **2185 ± 160**  
**235 B.C.**  
Charcoal, 45 to 60cm level. *Comment:* small sample, NaOH pretreatment omitted; diluted.

**SI-796. Pandanche, 1.58m** **2725 ± 150**  
**775 B.C.**  
Charcoal, 1.5 to 1.65m level. *Comment:* small sample, NaOH pretreatment omitted; diluted.

**SI-797. Pandanche, 1.75m** **2875 ± 150**  
**925 B.C.**  
Charcoal, 1.65 to 1.8m level. *Comment:* small sample, NaOH pretreatment omitted; diluted.

**SI-798. Alenya Formative, Peru** **345 ± 90**  
**A.D. 1605**  
Charcoal from Formative period site at Alenya, B2 (5° 37' 05" S Lat, 78° 30' W Long), Amazonas, Peru. Coll. 1969 by Hermilio Rosas; subm. by Clifford Evans. *Comment (C.E.):* too young; mixture unexplained.

#### *K. Brazil*

#### **do Caju series, Brazil**

Charcoal from do Caju site (21° 45' S Lat, 41° 18' W Long), Mun. Campos, Rio de Janeiro, Brazil. Assoc. with ceramics of Mucuri phase, Una tradition. Coll. 1968 by O. F. Dias and J. C. Oliveira, Inst. Arq. Brazil; subm. by Clifford Evans.

**SI-704. do Caju, 10 to 20 cm** **720 ± 95**  
**A.D. 1230**  
Charcoal from 10 to 20cm below surface. *Comment:* small sample, NaOH pretreatment omitted.

**SI-705. do Caju, 20 to 30cm** **1430 ± 65**  
**A.D. 520**  
 Charcoal from 20 to 30cm below surface.

**Sambaqui do Ury series, Brazil**

Charcoal from partially destroyed shell mound, Sambaqui do Ury (22° 21' S Lat, 41° 49' W Long), Mun. Macaé, Rio de Janeiro, Brazil. This is a non-ceramic midden in which samples are assoc. with Macaé phase quartz artifacts. Coll. 1968 by O. F. Dias; subm. by Clifford Evans.

**SI-710. Sambaqui do Ury, 100cm** **3635 ± 135**  
**1685 B.C.**  
 Charcoal, 100cm below surface.

**SI-711. Sambaqui do Ury, 120cm** **3975 ± 160**  
**2025 B.C.**  
 Charcoal, 120cm below surface.

**Pedra Grande series, Brazil**

Pedra Grande, RS-SM-7 (29° 33' S Lat, 54° 15' W Long), a pre-ceramic rock shelter in Mun. São Pedro do Sul, Rio Grande do Sul, Brazil. Petroglyphs pecked or engraved on rock walls, stylistically are believed, later than those of Abrigo do Canhemborá. Coll. 1971 by J. P. Brochado; subm. by Clifford Evans.

**SI-1002. Pedra Grande, 4** **605 ± 40**  
**A.D. 1345**

Charcoal from refuse in Level 4, 30 to 40cm below surface, below Tupiguarani sherd level. Assoc. with retouched flakes and chopping tools. *Comment* (C.E.): date is reasonable for Tupiguarani level, but too recent for preceramic horizon, and mixture is assumed.

**SI-1003. Pedra Grande, 7** **800 ± 40**  
**A.D. 1150**

Charcoal from refuse in Level 7, 60 to 70cm below surface, and assoc. with retouched flakes, chopping tools, and projectile points. *Comment* (C.E.): date is reasonable for Tupiguarani level, but too recent for preceramic horizon; mixture is assumed.

**SI-1004. Pedra Grande, 8** **2795 ± 55**  
**845 B.C.**

Charcoal from hearth in Level 8, 70 to 80cm below surface, and lowest level in this rock shelter. Assoc. with flakes and artifacts of pre-ceramic Canhemborá phase.

**Abrigo do Canhemborá series, Brazil**

Abrigo do Canhemborá, RS-MJ-14 (29° 25' S Lat, 53° 15' W Long), is preceramic rock shelter in Mun. Nova Palma, Rio Grande do Sul, Brazil. Rock shelter contains zoomorphic petroglyphs pecked or engraved on rock walls, stylistically believed older than those of Pedra Grande



rock shelter, and are rare in S Brazil. Coll. 1971 by J. P. Brochado; subm. by Clifford Evans.

**SI-1000. Abrigo do Canhemborá, 5** **1165 ± 35**  
**A.D. 785**  
Charcoal from Level 5, 40 to 50cm below surface.

**SI-1001. Abrigo do Canhemborá, 7** **2945 ± 85**  
**995 B.C.**  
Charcoal from Level 7, 60 to 70cm below surface, and assoc. with Altoparanense bifaces and flakes, and zoomorphic petroglyphs.  
*General Comment* (C.E.): dates are too recent.

#### **Guarata ceramic series, Brazil**

Charcoal assoc. with Guaratã phase of Tupiguarani Corrugated ceramic tradition in 3 adjacent sites, Mun. de Restinga Seca, Rio Grande do Sul, Brazil. Coll. 1969 by J. P. Brochado; subm. by Clifford Evans.

**SI-999. J. Cantarelli** **Modern**  
Charcoal from House A in J. B. Cantarelli Tupiguarani village (29° 49' 26" S Lat, 53° 23' W Long), RS-MJ-42.

**SI-819. J. B. Cantarelli, 20 to 50cm** **Modern**  
Charcoal from Levels 1 and 2, 20 to 50cm below surface, assoc. with sherds of corrugated jar in House A.

**SI-815. J. B. Cantarelli, 60cm** **A.D. 1820**  
Charcoal from Level 2, 60cm below surface, House A.

**SI-997. Silva Cantarelli, 20cm** **Modern**  
Charcoal from 20cm below surface, House C, Silva Cantarelli Tupiguarani village, RS-MJ-47-C (29° 51' S Lat, 53° 22' 48" W Long).

**SI-816. Silva Cantarelli, 20 to 30cm** **530 ± 120**  
**A.D. 1420**  
Charcoal under Urns 1 and 2, Burial 1, 20 to 30cm below surface.

**SI-998. Dal Pra** **Modern**  
Charcoal from bottom of post hole in House B of Dal Pra, a large Tupiguarani village, RS-MJ-50 (29° 41' 21" S Lat, 53° 33' W Long).

**SI-818. Dal Pra, 20 to 40cm** **345 ± 105**  
**A.D. 1605**  
Charcoal found near burial urns, 20 to 40cm below surface, 50m ENE of House B.

**SI-817. Dal Pra, 40 to 50cm** **110 ± 100**  
**A.D. 1840**  
Charcoal from interior of posthole in remains of House B.  
*General Comment* (C.E.): all dates are too recent.

- 950 ± 80**
- SI-812. Mangueira Nova-1, Brazil** **A.D. 1000**  
 Charcoal from 120 to 135cm below surface, assoc. with ceramics of Guatambu phase, Taquara tradition in Mangueira Nova-1, RS-P-27 (28° 36' S Lat, 50° 06' W Long), Mun. Bom Jesus, Rio Grande do Sul, Brazil. Coll. 1969 by E. T. Miller; subm. by Clifford Evans.
- 1810 ± 85**
- SI-813. Fazenda Carvalho-2, Brazil** **A.D. 140**  
 Charcoal from 15 to 20cm below surface, assoc. with ceramics of Guatambu phase, Taquara tradition, in Fazenda Carvalho-2, RS-P-12 (28° 29' 48" S Lat, 49° 50' 49" W Long), Mun. Bom Jesus, Rio Grande do Sul, Brazil. Coll. 1969 by E. T. Miller; subm. by Clifford Evans.
- 575 ± 80**
- SI-804. Morro da Flecha-1, Brazil** **A.D. 1375**  
 Charcoal from 15 to 20cm below surface, assoc. with lithic artifacts of preceramic Camuri phase in Morro da Flecha-1, RS-S-308 (29° 26' 30" S Lat, 50° 24' W Long), Mun. São Francisco de Paula, Rio Grande do Sul, Brazil. Coll. 1966 by E. T. Miller; subm. by Clifford Evans. *Comment* (C.E.): too recent. Small sample, pretreated in cold 2% NaOH.
- Bugres-1 series, Brazil**  
 Charcoal from Bugres-1, RS-A-2 (29° 18' S Lat, 50° 21' W Long), Mun. São Francisco de Paula, Rio Grande do Sul, Brazil. Samples are from excavated pit house, assoc. with ceramics of Taquara phase, Taquara tradition. Coll. 1966 by E. T. Miller; subm. by Clifford Evans.
- 1515 ± 105**
- SI-805. Bugres-1, 53 to 59cm** **A.D. 435**  
*Comment:* small sample, pretreated with cold 2% NaOH.
- 1385 ± 95**
- SI-806. Bugres-1, 65 to 70cm** **A.D. 565**
- 970 ± 95**
- SI-808. Bugres-1, 75 to 77cm** **A.D. 980**  
*Comments:* small sample, NaOH pretreatment omitted. (C.E.): too recent.
- 3935 ± 60**
- SI-707. Parizinho, Brazil** **1985 B.C.**  
 Charcoal assoc. with ceramics of Irapua phase of Tupiguarani Painted tradition in Parizinho, RS-VZ-45 (27° 19' S Lat, 53° 44' W Long), Mun. Tenete Portela, Rio Grande do Sul, Brazil. Coll. 1968 by Eurico Miller; subm. by Clifford Evans. *Comments:* small sample, NaOH pretreatment omitted. (C.E.): too old.
- 1220 ± 120**
- SI-708. Linha Uruguai Sul, Brazil** **A.D. 730**  
 Charcoal assoc. with ceramics of Irapua phase of Tupiguarani

Painted tradition in Linha Uruguai Sul, RS-VZ-4 (27° 49' S Lat, 55° 03' W Long), Mun. Pôrto Lucena, Rio Grande do Sul, Brazil. Coll. 1968 by Eurico Miller; subm. by Clifford Evans.

**675 ± 50**

**SI-799. Barro do Turvo, Brazil**

**A.D. 1275**

Charcoal from Barro do Turvo 3, RS-VZ-52 (27° 18' S Lat, 54° 06' W Long), Mun. Tres Passos, Rio Grande do Sul, Brazil. Assoc. with stone tools 30 to 35cm below surface in non-ceramic Caaguaçu phase, last preceramic phase of area. Coll. 1968 by Eurico Miller; subm. by Clifford Evans. *Comment* (C.E.): too recent.

**3525 ± 145**

**SI-800. Porto das Laranjeiras, Brazil**

**1575 B.C.**

Charcoal from Porto da Laranjeiras, RS-IJ-62 (29° 00' S Lat, 56° 25' W Long), Mun. Itaquí, Rio Grande do Sul, Brazil. Assoc. with Itaquí phase Altoparaense biface and bones of Pleistocene fauna 2.3 to 2.35m below surface in same horizon as bone of SI-801, below. Coll. 1968 by Eurico Miller; subm. by Clifford Evans. *Comment*: very small sample, NaOH pretreatment omitted; diluted.

**12,770 ± 220**

**SI-801. Lageado dos Fosseis, Brazil**

**10,820 B.C.**

Bone of *Paramilodon*, id. by E. Miller, from RS-I-50 (29° 35' S Lat, 55° 42' W Long), Mun. Alegrete, Rio Grande do Sul, Brazil. Assoc. with Ibicuí phase lithic artifacts in horizon containing extinct Pleistocene fauna. *Comment*: sample leached in 50% acetic acid under vacuum before CO<sub>2</sub> evolution with HCl. Small sample, diluted.

**Parizinho series, Brazil**

Charcoal from 2 adjacent sites in Mun. Tenete Portela, Rio Grande do Sul, Brazil, assoc. with ceramics of Taquarucu phase of Taquara tradition. Coll. 1968 by Eurico Miller; subm. by Clifford Evans.

**830 ± 60**

**SI-598. Parazinho-1**

**A.D. 1120**

Charcoal from 20 to 30cm below surface at Parazinho 1 (28° 18' S Lat, 53° 44' W Long).

**160 ± 70**

**SI-599. Parazinho-2**

**A.D. 1790**

Charcoal from 10 to 20cm below surface at Parazinho 2 (28° 18' S Lat, 53° 45' W Long).

**400 ± 100**

**SI-600. Boa Vista-2, Brazil**

**A.D. 1550**

Charcoal from 20 to 25cm below surface, assoc. with ceramics of Taquara phase of Taquara tradition in Boa Vista-2 (27° 46' S Lat, 54° 58' W Long), Mun. Pôrto Lucena, Rio Grande do Sul, Brazil. Coll. 1968 by Eurico Miller; subm. by Clifford Evans. *Comment* (C.E.): too recent.

**1300 ± 70**

**SI-601. Tres Arvores, Brazil**

**A.D. 650**

Charcoal from 65 to 70cm below surface, assoc. with ceramics of Taquara phase of Taquara tradition in Tres Arvores (28° 10' S Lat, 52° 29' W Long), Mun. Passo Fundo, Rio Grande do Sul, Brazil. Coll. 1968 by Eurico Miller; subm. by Clifford Evans.

**1520 ± 90**

**SI-607. Fazenda Sao Marcos, Brazil**

**A.D. 430**

Charcoal from hearth Im below surface in subterranean Pithouse B, RS-40 (29° 10' S Lat, 51° 12' W Long), Mun. Caxias do Sul, Rio Grande do Sul, Brazil. Assoc. with Caxias phase ceramics, possible equivalent of Taquara phase of Taquara tradition. Coll. 1966 by P. I. Schmitz; subm. by Clifford Evans.

**Caxias do Sul series, Brazil**

Charcoal samples from a complex of pithouses and mounds at RS-127 (29° 15' S Lat, 51° W Long), Mun. Caxias do Sul, Rio Grande do Sul, Brazil. Coll. 1968 by P. I. Schmitz; subm. by Clifford Evans.

**630 ± 70**

**SI-604. Mound 1, 55cm**

**A.D. 1320**

Charcoal, 55cm below surface in level of red burned soil, assoc. with stone flakes and Taquara tradition ceramics.

**1140 ± 40**

**SI-602. Mound 1, 80 to 100cm**

**A.D. 810**

Charcoal 80 to 100cm below surface in dark soil level, assoc. with a few sherds of Taquara tradition and stone flakes.

**1480 ± 70**

**SI-603. Pithouse A**

**A.D. 470**

Charcoal from base of hearth on original floor of Pithouse A, 80 to 100cm below surface, assoc. with ceramics of Taquara tradition.

**840 ± 60**

**SI-606. Pithouse B**

**A.D. 1110**

Charcoal from level of black soil under reddened dirt in Pithouse B, assoc. with Taquara tradition ceramics.

**1330 ± 100**

**SI-605. Pithouse B, 80 to 100cm**

**A.D. 620**

Charcoal from floor of pithouse at site of large burned tree, assoc. with Taquara tradition ceramics. Pithouse cut into decomposed basalt. *General Comment* (C.E.): site belongs to Caxias phase (possible equivalent to Taquara phase) of Taquara tradition.

**Itapiranga series, Brazil**

Itapiranga, SC-U-6 (27° 12' S Lat, 53° 25' W Long), Mun. Itapiranga, Santa Catarina, Brazil, is a stratified site. The upper 1m contains ceramics of Tupiguarani tradition, and remaining 7.3m contains

preceramic Altoaranense tools. Coll. 1968 by J. A. Rohr; subm. by Clifford Evans.

**SI-993. Itapiranga, 5m** **7145 ± 120**  
**5195 B.C.**

Charcoal from hearth in red clay, 5m below surface, assoc. with percussion-made flake tools.

**SI-994. Itapiranga, 6m** **8095 ± 90**  
**6145 B.C.**

Charcoal from hearth in red clay, 6m below surface, assoc. with percussion-made flake tools.

**SI-995. Itapiranga, 7.3m** **8640 ± 95**  
**6690 B.C.**

Charcoal from hearth in red clay, 7.3m below surface, assoc. with percussion-made flake tools.

#### **Itá series, Brazil**

Charcoal from Itá, SC-VP-38 (27° 16' 15" S Lat, 52° 30' 30" W Long), Mun. Itá, Santa Catarina, Brazil. Coll. 1969 by W. F. Piazza; subm. by Clifford Evans.

**SI-826. Itá, 0 to 15cm** **590 ± 100**  
**A.D. 1360**

Charcoal from 0 to 15cm below surface, assoc. with ceramics of Ita phase, Tupiguarani Corrugated tradition.

**SI-827. Itá, 3.5m** **5930 ± 140**  
**3980 B.C.**

Charcoal from 3.5m below surface, assoc. with artifacts of pre-ceramic Tamanduá phase.

**SI-825. Pinheiro Preto II, Brazil** **975 ± 95**  
**A.D. 975**

Charcoal from Pinheiro Preto II, SC-VP-35 (27° 16' S Lat, 52° 10' 30" W Long), Mun. Concordia, Santa Catarina, Brazil. Assoc. with ceramics of Xaxim phase, Taquara tradition, 0 to 20cm below surface. Coll. 1969 by W. F. Piazza; subm. by Clifford Evans.

**SI-597. Vacas Gordas, Brazil** **330 ± 90**  
**A.D. 1620**

Charcoal from 60cm below surface at Vacas Gordas, SC-CL-10 (28° 08' S Lat, 49° 40' W Long), Mun. Urubici, Santa Catarina, Brazil. Assoc. with Xaxim phase of Taquara tradition. Coll. 1967 by W. F. Piazza; subm. by Clifford Evans. *Comment:* (C.E.): too recent.

#### **Passo da Cadeia series, Brazil**

Charcoal samples from Passo da Cadeia, SC-CL (28° 29' S Lat, 50° 05' 40" W Long), Mun. Sao Joaquim, Santa Catarina, Brazil. Coll. 1969 by E. T. Miller; subm. by Clifford Evans.

**1085 ± 80**

**SI-810. Passo da Cadeia, 55 to 60cm** **A.D. 865**  
 Charcoal assoc. with ceramics of Guatumbu phase, Taquara tradition, 55 to 60cm below surface.

**1920 ± 50**

**SI-811. Passo da Cadeia, 120 to 140cm** **A.D. 30**  
 Charcoal from 120 to 140cm below surface, assoc. with lithic materials.

**Rio Iguaçu series, Brazil**

Charcoal samples from 3 adjacent sites along Iguaçu R., Mun. Bituruna, Parana, Brazil. Coll. by Igor Chmyz; subm. by Clifford Evans.

**3110 ± 140**

**SI-802. R. Iguaçu, PR-UV-4** **1160 B.C.**  
 Charcoal from 50 to 60cm below surface, assoc. with preceramic lithic Iguaçu phase materials (26° 00' S Lat, 51° 00' W Long). Coll. 1968.

**1035 ± 90**

**SI-803. R. Iguaçu, PR-UV-3** **A.D. 915**  
 Charcoal from 35 to 45cm below surface, assoc. with preceramic lithic Iguaçu phase materials (26° 00' S Lat, 51° 00' W Long). Coll. 1962. *Comment* (C.E.): too recent.

**605 ± 120**

**SI-691. R. Iguaçu, PR-UV-12, 40-60** **A.D. 1345**  
 Charcoal from 40 to 60cm below surface, assoc. with subterranean house complex.

**810 ± 90**

**SI-892. R. Iguaçu, PR-UV-12, 60-80** **A.D. 1140**  
 Charcoal from 60 to 80cm below surface.

**255 ± 100**

**SI-692. R. Iguaçu, PR-UV-12, 80-100** **A.D. 1695**  
 Charcoal from 80 to 100cm below surface. *Comment*: too recent in terms of stratigraphic position.

**Rio Ivai, PR-FL-5 series, Brazil**

Charcoal from PR-FL-5 (23° 30' S Lat, 52° 30' W Long), Mun. Paraiso do Norte, Paraná, Brazil, representing Umuarama phase of Tupiguarani Painted ceramic tradition. Coll. 1968 by Igor Chmyz; subm. by Clifford Evans.

**300 ± 115**

**SI-693. R. Ivai, 60 to 80cm** **A.D. 1650**

**470 ± 100**

**SI-694. R. Ivai, 80 to 100cm** **A.D. 1480**  
*General Comment* (C.E.): both dates are too recent.

**Rio Ivai, Condor phase series, Brazil**

Charcoal from 4 adjacent sites (23° 30' S Lat, 52° 30' W Long), Mun. Indianópolis and Mirador, Paraná, Brazil. Sites represent painted Condor phase of Tupiguarani Painted ceramic tradition. Coll. 1968 by Igor Chmyz; subm. by Clifford Evans.

**SI-695. PR-ST-1, 0 to 10cm** **1065 ± 95**  
**A.D. 885**

**SI-696. PR-ST-1, 10 to 20cm** **610 ± 120**  
**A.D. 1340**

**SI-697. PR-QN-2, 15 to 30cm** **540 ± 60**  
**A.D. 1410**

**SI-698. PR-FL-13, 0 to 20cm** **135 ± 120**  
**A.D. 1815**

*Comment* (C.E.): too recent.

**SI-699. PR-FL-15, 0 to 20cm** **590 ± 70**  
**A.D. 1360**

**SI-700. PR-FL-23, Tamboara, Brazil** **560 ± 60**  
**A.D. 1390**

Charcoal from Site PR-FL-23 (23° 30' S Lat, 52° 20' W Long), on R. Ivai, Mun. Doutor, Paraná, Brazil. Assoc. with ceramics of Tamboara phase of Tupiguarani Corrugated tradition, 2 to 20cm below surface. Coll. 1968 by Igor Chmyz; subm. by Clifford Evans.

**SI-701. Jaboticaba, Brazil** **225 ± 55**  
**A.D. 1725**

Charcoal from Jaboticaba, RS-VZ-41 (27° 10' S Lat, 53° 44' W Long), Mun. Tenente Portela, Rio Grande do Sul, Brazil. Assoc. with ceramics of Comandai phase of Tupiguarani Corrugated tradition. Coll. 1967 by Eurico Miller; subm. by Clifford Evans. *Comment* (C.E.): too recent.

**SI-702. Ilha Comandai, Brazil** **215 ± 105**  
**A.D. 1735**

Charcoal from Ilha Comandai, RS-VZ-12 (27° 48' S Lat, 55° 06' W Long), Mun. Pôrto Lucena, Rio Grande do Sul, Brazil. Assoc. with ceramics of Comandai phase of Tupiguarani Corrugated tradition. Coll. 1968 by Eurico Miller; subm. by Clifford Evans. *Comment* (C.E.): too recent.

**Sambaqui do Rio S. Joao series, Brazil**

Sambaqui do Rio S. Joao (25° 30' S Lat, 49° 30' W Long), shell mound site in Mun. de Antonina, Paraná, Brazil, built on a barrier reef and boulder sand. The surface shows humus underlain by oyster shell; below these are burned oyster shell and gray boulder sand, a compact stratum of oyster shell, and *Modiolus Brasiliensis*, id. by J. W. Rauth. Coll. 1967 by J. W. Rauth; subm. by Clifford Evans.

- SI-1020. Humus stratum, 0 to 0.25m** **Modern**  
Charcoal from topmost humus layer, 0 to 0.25m from surface, assoc. with stone scrapers and human burial.  
**4070 ± 105**
- SI-1021. Oyster stratum, 0.75 to 1m** **2120 B.C.**  
Charcoal from upper layer of oyster shell, 0.75 to 1m below surface, from hearth.  
**4960 ± 110**
- SI-1022. Oyster stratum, 1.25 to 1.5m** **3010 B.C.**  
Charcoal from lower portion of compacted oyster shell, 1.25 to 1.5m below surface.  
**4810 ± 100**
- SI-1023. Bottom level, 1.5 to 2m** **2860 B.C.**  
Charcoal from bottom level, overlying boulder sand terrace, assoc. with *Modiolus Brasiliensis*, 1.5 to 2m below surface.  
**4665 ± 90**
- SI-1024. Bottom level, 1.75m** **2115 B.C.**  
Charcoal from 2nd trench, unknown distance from SI-1023, above, 1.75m below surface in lowest stratum overlying boulder sand terrace and barrier reef.
- Sambaqui do Godo series, Brazil**  
Sambaqui do Godo (30° 26' S Lat, 49° 30' W Long), preceramic shell mound in Mun. de Antonina, Paraná, Brazil. Coll. 1968 by J. W. Rauth; subm. by Clifford Evans.
- SI-1025. do Godo, 50 to 75cm** **3815 ± 50**  
Charcoal from 50 to 75cm below surface, assoc. with human bones and lithic artifacts.  
**1865 B.C.**
- SI-1026. do Godo, 1 to 1.25m** **2980 ± 130**  
Charcoal from 1 to 1.25m below surface, assoc. with lithic artifacts.  
**1030 B.C.**  
*Comment:* small sample, diluted.
- SI-1027. do Godo, 1.5 to 2m** **3000 ± 90**  
Charcoal from 1.5 to 2m below surface, assoc. with fish bones and lithic artifacts.  
**1050 B.C.**
- SI-1028. do Godo, 2.25 to 2.5m** **3365 ± 85**  
Charcoal from 2.25 to 2.5m below surface, assoc. with fish and animal bones and lithic artifacts.  
**1415 B.C.**
- SI-1028-A. do Godo, 2.25 to 2.5m, A** **3300 ± 95**  
Oyster shell from same sample as SI-1028, above.  
**1350 B.C.**



- 4740 ± 95**  
**2790 B.C.**
- SI-1029. do Godo, 2.5 to 3m**  
Charcoal from 2.5 to 3m below surface at base of mound, mixed with sandy clay.
- 908 ± 100**
- SI-709. Rio Paranapanema, Brazil** **A.D. 970**  
Charcoal, assoc. with ceramics of Cambará phase of Tupiguarani Painted tradition from Rio Paranapanema, SP-AS-14 (22° 50' S Lat, 51° 10' W Long), Mun. Iepé, Sao Paulo, Brazil. Coll. 1968 by Igor Chmyz; subm. by Clifford Evans. *Comment:* small sample, no NaOH pretreatment.
- 1195 ± 80**
- SI-1009. Rio Itarare, Brazil** **A.D. 775**  
Charcoal and charred nut shells from 10 to 20cm below surface, Site SP-BA-7 (23° 30' S Lat, 49° 30' W Long), Sao Paulo, Brazil. Assoc. with ceramics of Cambara phase of Tupiguarani tradition. Coll. 1965 by Igor Chmyz; subm. by Clifford Evans.
- 6620 ± 175**  
**4670 B.C.**
- SI-933. Barreiro, Brazil**  
Charcoal assoc. with lithic artifacts of Antas phase in preceramic site at Barreiro, RS-A-8 (28° 48' S Lat, 50° 29' 24" W Long), Mun. Bom Jesus, Rio Grande do Sul, Brazil. Coll. 1969 by E. T. Miller; subm. by Clifford Evans.
- 1055 ± 80**  
**A.D. 895**
- SI-828. Morro H, Brazil**  
Charcoal from 30cm below surface in single ceramic level of Cricaré phase of Tupiguarani Painted tradition at Morro H, Site 17 (20° 05' S Lat, 40° 14' W Long), Mun. Pium, Espirito Santo, Brazil. Coll. 1968 by Celso Perota; subm. by Clifford Evans.
- 170 ± 75**  
**A.D. 1780**
- SI-829. Estrada I, Brazil**  
Charcoal from 20cm below surface in single cultural level of Itaunas phase of Aratu ceramic tradition at Estrada I, Site 22 (20° 50' S Lat, 40° 44' W Long), Mun. Serra, Espirito Santo, Brazil. Coll. 1969 by Celso Perota; subm. by Clifford Evans.
- 240 ± 70**  
**A.D. 1710**
- SI-830. Campus, Brazil**  
Charcoal from 45 to 60cm below surface, assoc. with lithic and bone assemblage and Neobrazilian ceramic tradition in Campus, Site Cu-02 (20° 16' S Lat, 40° 17' W Long), Mun. Vitória, Espirito Santo, Brazil. Coll. 1969 by Celso Perota; subm. by Clifford Evans.
- 1435 ± 80**  
**A.D. 515**
- SI-831. Campus I, Brazil**  
Charcoal from 10cm below surface, assoc. with lithic and bone assemblage of Potiri phase of non-ceramic tradition in Campus-I, Cu-01

(20° 16' S Lat, 40° 17' W Long), Mun. Vitória, Espírito Santo, Brazil. Coll. 1969 by Celso Perota; subm. by Clifford Evans.

**560 ± 70**

**SI-832. Tucun, Brazil**

**A.D. 1390**

Charcoal assoc. with ceramics of Tucun phase of Tupiguarani Painted tradition in Tucun, ES-VI-20 (20° 16' S Lat, 40° 22' W Long), Mun. Cariacica, Espírito Santo, Brazil. Coll. 1970 by Celso Perota; subm. by Clifford Evans.

**110 ± 40**

**SI-833. Campus-3, Brazil**

**A.D. 1840**

Charcoal assoc. with ceramics of Tucun phase of Tupiguarani Painted tradition in Campus 3, ES-VI-11 (20° 17' S Lat, 40° 08' W Long), Mun. Vitória, Espírito Santo, Brazil. Coll. 1969 by Celso Perota; subm. by Clifford Evans. *Comment* (C.E.): too recent.

**220 ± 75**

**SI-834. Belem 3, Brazil**

**A.D. 1730**

Charcoal assoc. with ceramics of Itaúnas phase of Aratu tradition in Belem 3, ES-LI-14 (18° 34' S Lat, 39° 44' W Long), Mun. Conceição da Barra, Espírito Santo, Brazil. Coll. 1968 by Celso Perota; subm. by Clifford Evans.

**SI-835. Fazenda Salvador I, Brazil**

**Modern**

Charcoal assoc. with ceramics of Itaúnas phase of Aratu tradition in Fazenda Salvador I, ES-LI-4 (18° 21' S Lat, 39° 47' W Long), Mun. São Mateus, Espírito Santo, Brazil. Coll. 1969 by Celso Perota; subm. by Clifford Evans. *Comment* (C.E.): too recent.

**605 ± 70**

**SI-836. Vale, Brazil**

**A.D. 1345**

Charcoal assoc. with ceramics of Jacareipe phase of Aratu tradition in Vale, ES-VI-18 (20° 16' S Lat, 40° 15' W Long), Mun. Vitória, Espírito Santo, Brazil. Coll. 1970 by Celso Perota; subm. by Clifford Evans.

**305 ± 65**

**SI-820. Cariri, Brazil**

**A.D. 1645**

Charcoal from 0 to 20cm below surface, assoc. with ceramics of Itapicuru phase of Tupiguarani Painted tradition at Cariri, BA-19 (13° 45' 05" S Lat, 41° 15' W Long), Mun. Ituaçu, Bahia, Brazil. Coll. 1967 by Valentin Calderon; subm. by Clifford Evans.

**550 ± 95**

**SI-821. Joaquim Guilherme, Brazil**

**A.D. 1400**

Charcoal assoc. with Itapicuru phase ceramics of Tupiguarani Painted tradition, 0 to 20cm below surface at Joaquim Guilherme site, BA-26 (13° 45' 45" S Lat, 41° 15' W Long), Mun. Ituaçu, Bahia, Brazil. Coll. 1967 by Valentin Calderon; subm. by Clifford Evans.

**Raposo series, Brazil**

Charcoal assoc. with ceramics of Jeragua phase at Raposo, MG-GV-

19 (21° 10' S Lat, 45° 15' W Long), Mun. Nepomuceno, Minas Gerais, Brazil. Coll. 1969 by O. F. Dias; subm. by Clifford Evans.

**SI-822. Raposo, 0 to 10cm** **885 ± 90**  
**A.D. 1065**

**SI-824. Raposo, 20 to 30cm** **855 ± 70**  
**A.D. 1095**

**SI-823. Primavera, Brazil** **95 ± 100**  
**A.D. 1855**

Charcoal 30cm below surface, assoc. with ceramics in black earth at Primavera, MG-GV-39 (21° 05' S Lat, 45° 50' 30" W Long), Mun. Campo do Meio, Minas Gerais, Brazil. Coll. 1969 by O. F. Dias; subm. by Clifford Evans. *Comment* (C.E.): too recent.

**SI-1010. R. Iguaçú, PR-UV-11, Brazil** **680 ± 70**  
**A.D. 1270**

Charcoal and wood from 30 to 40cm below surface at Pr-UV-11 on R. Iguaçú (26° 00' S Lat, 51° 30' W Long), Parana, Brazil. Assoc. with non-Tupiguarani ceramics in subterranean houses and small mounds. Coll. 1966 by Igor Chmyz; subm. by Clifford Evans.

**SI-1015. R. Iguaçú, PR-UV-16, Brazil** **500 ± 45**  
**A.D. 1450**

Charcoal from 40 to 50cm below surface, assoc. with Tupiguarani ceramics at PR-UV-16 (26° 10' S Lat, 51° 00' W Long), Parana, Brazil. Coll. 1968 by Igor Chmyz; subm. by Clifford Evans.

**SI-1011. R. Ivai, PR-FL-21, Brazil** **1490 ± 45**  
**A.D. 460**

Charcoal from 0 to 20cm below surface, assoc. with ceramics of Tamboara phase of Tupiguarani tradition at PR-FL-21 on R. Ivai (23° 30' S Lat, 52° 20' W Long), Parana, Brazil. Coll. 1967 by Igor Chmyz; subm. by Clifford Evans.

**SI-1012. R. Ivai, PR-KA-2, Brazil** **Modern**

Charcoal from 0 to 20cm below surface with ceramics of Caloré phase of Tupiguarani tradition at PR-KA-2 on R. Ivai (23° 40' S Lat, 51° 30' W Long), Parana, Brazil. Coll. 1967 by Igor Chmyz; subm. by Clifford Evans.

**SI-1014. R. Ivai, PR-QN-1, Brazil** **5380 ± 110**  
**3430 B.C.**

Charcoal, 90 to 100cm below surface with lithic artifacts of non-ceramic Ivai complex at PR-QN-1 on R. Ivai (23° 30' S Lat, 52° 30' W Long), Parana, Brazil. Coll. 1967 by Igor Chmyz; subm. by Clifford Evans.

#### **Rio Parana series, Brazil**

Charcoal from Site MT-IV-1 on R. Parana (23° 30' S Lat, 52° 30' W Long), Mato Grosso, Brazil, assoc. with Tupiguarani ceramics. Coll. 1967 by Igor Chmyz; subm. by Clifford Evans.

**SI-1016. MT-IV-1, urn** **260 ± 70**  
**A.D. 1690**  
Charcoal, part of urn contents.

**SI-1017. MT-IV-1, 20 to 40cm** **475 ± 45**  
**A.D. 1475**

**SI-1018. MT-IV-1, 60 to 80cm** **180 ± 60**  
**A.D. 1770**  
Charcoal from 60 to 80cm below surface.

*General Comment* (C.E.): dates do not correspond to seriated order of stratigraphic excavations. Of this series, and SI-1019, below, only SI-1017 agrees with other dates from phases representing Corrugated sub-tradition of Tupiguarani ceramic tradition in S Brazil.

**SI-1019. R. Parana, MT-IV-2, Brazil** **110 ± 60**  
**A.D. 1840**

Charcoal from 20 to 40cm below surface, assoc. with Tupiguarani ceramics at MT-IV-2 on R. Parana (22° 40' S Lat, 53° 20' W Long), Mato Grosso, Brazil. Coll. 1967 by Igor Chmyz; subm. by Clifford Evans. *Comment* (C.E.): too recent. See general comment for Rio Parana series, above.

#### **Tuteceta series, Brazil**

Potsherds containing ashes of siliceous bark as temper from Tuteceta (11° 10' S Lat, 53° 25' W Long), on R. Suia-missu, Upper Xingu, Matto Grosso, Brazil. Sherds are Diauarum phase of Incised and Punctate tradition. Coll. 1966 by M. F. Simoes; subm. by Clifford Evans.

**SI-712. Tuteceta, 10 to 20cm** **1390 ± 140**  
**A.D. 560**

Sherds from 10 to 20cm below surface. *Comments*: small sample, NaOH pretreatment omitted. (C.E.): too old.

**SI-713. Tuteceta, 20 to 30cm** **830 ± 75**  
**A.D. 1120**

Sherds from 20 to 30cm below surface.

#### **Diauarum series, Brazil**

Charcoal and potsherds containing ash of siliceous bark as temper from Diauarum (11° 12' S Lat, 53° 30' W Long), on R. Xingu, Upper Xingu, Matto Grosso, Brazil. Ceramics are Diauarum phase of Incised and Punctate tradition. Coll. 1966 by M. F. Simoes; subm. by Clifford Evans.

**SI-714. Diauarum sherds, 30 to 40cm** **1470 ± 135**  
**A.D. 480**

Sherds from 30 to 40cm below surface. *Comments*: small sample, NaOH pretreatment omitted. (C.E.): too old.

**SI-716. Diauarum, 55cm**

Charcoal in burned soil, 55cm below surface.

**830 ± 90  
A.D. 1120****SI-717. Diauarum, 18cm**Charcoal in burned soil, 18cm below surface. *Comments (C.E.):* too old.**2095 ± 65  
145 B.C.**

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