

SMITHSONIAN INSTITUTION
RADIOCARBON MEASUREMENTS V*

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INTRODUCTION

Included in this list are analyses made during 1967 and the first half of 1968 with equipment and techniques previously employed here. All methane was produced in the bomb reactor.

Unless otherwise noted, all samples were submitted by Smithsonian staff members, each of whom supplied information pertaining to the samples and contributed generously to discussion of results.

SAMPLE DESCRIPTIONS

I. ARCHAEOLOGIC SAMPLES

A. Eastern United States

Piscataway site series, Maryland

Charcoal and fresh water mollusk (*Ellipto complanatus solander*, id. by Joseph Rosewater) from Site 18PR7 (38° 45' N Lat, 77° 00' W Long), in Prince Georges County. Samples from 30 × 20 cm oval pit 23 cm deep, 38 to 61 cm below ground surface in Unit 32-I. Assoc. cultural materials include pottery, projectile points, and blades of Middle to Early Woodland types. Coll. 1966 and subm. by G. E. Phebus.

SI-449. Charcoal

1750 ± 90

A.D. 200

SI-450. Mollusk

2460 ± 100

510 B.C.

General Comment: dates of fresh water mollusks are less reliable than charcoal because $^{14}\text{C}/^{12}\text{C}$ of pond in which they grew may not be equilibrated with atmosphere. This pair of co-assoc. samples, chosen to check their comparability at this site, illustrates this effect.

SI-58. Fraser site, Virginia

790 ± 100

A.D. 1160

Charcoal from refuse pit 43 to 56 cm below surface at site in Fairfax County (39° 03' 06" N Lat, 77° 17' 56" W Long). Assoc. with a few steatite-tempered sherds of Marcey Creek series and with majority of sand-tempered, badly eroded reddish sherds (Slattery, 1946, p. 263), similar to Accokeek ware. Coll. 1962 by R. G. Slattery; subm. by Clifford Evans. *Comment:* fits within upper range of Accokeek component, but does not appear related to steatite-tempered series (Stephenson and Ferguson, 1963, p. 186-188).

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

** Present address: University of Arizona, Tucson.

630 ± 100**SI-216. Briarfield site, Virginia****A.D. 1320**

Charcoal (Sample 65-1) from midden pit (37° 01' 00" N Lat, 76° 25' 06" W Long), near Hampton, Virginia. Pit (Feature 2) was filled with oyster shells, animal bones, pottery fragments of shell-tempered type, and black soil. Dominant pottery was of Chickahominy series; site appears to belong to Late Woodland. Coll. 1964 by H. A. MacCord, Virginia State Archaeologist, Richmond, and R. M. Owen, Virginia State Library, Richmond; subm. by Clifford Evans.

670 ± 120**SI-329. Ingles Bottom site, Virginia****A.D. 1280**

Charcoal from Site MY-11 (37° 05' N Lat, 80° 05' W Long), near Radford, on E bank of New R. Sample from 46 to 61 cm depth. Pottery at this site is mainly Radford series (limestone-tempered) dated A.D. 1600 ± 200 (SI-129, Radiocarbon, 1965, v. 7, p. 245), (Evans, 1955, p. 8, 105). Coll. 1963 and subm. by C. G. Holland.

5880 ± 1200**SI-364. Jeffrey Harris Rockshelter, Virginia****3930 B.C.**

Charcoal (J-H-2) assoc. with chipped stone and arrowheads in pre-pottery horizon at site in Loudoun County (39° 15' 30" N Lat, 77° 32' W Long). Sq. E-3; depth 81 cm. Coll. 1964 by A. F. Johnson and Janet Curtis; subm. by Clifford Evans. *Comment* (A.F.J.): 2 small arrowheads assoc. with this sample and SI-363, 3170 ± 160 B.C. most closely resemble those of Lamoka culture in New York State (Ritchie, 1932, pls. 14 #7, 34 #1). Lamoka dates run somewhat later, but still in same general time frame, 3000 to 2000 B.C.

East Mound series, Virginia

Charcoal samples from John East mound in Augusta County, near Churchville (38° 12' 45" N Lat, 79° 08' 00" W Long), Middle Woodland complex. Coll. 1965 and subm. by H. A. MacCord.

1050 ± 290**SI-365.****A.D. 900**

No. 27, 91 cm below mound top, from sub-mound pit presumably representing earlier part of mound's construction.

640 ± 150**SI-366.****A.D. 1310**

No. 79, 91 cm below surface, in sub-mound pit with partially cremated bones of Burial 116. Should represent earlier part of mound's construction.

730 ± 90**SI-367.****A.D. 1220**

No. 95, 51 cm below mound top; 15 cm below Burial 11; represents late part of mound construction.

General Comment (H.A.M.): this mound is similar to Hirsch mound

(A.D. 1030 \pm 240, SI-127) and Lewis Creek mound (A.D. 1090 \pm 240, SI-218; A.D. 1370 \pm 200, SI-219). Mound contained flexed and bundle burials, usually covered by layer of angular and river-washed cobbles, and several cremated burials; 142 individual burials were recovered, plus scattered bones of ca. 12 others, destroyed in previous digging. Artifacts found with burials consisted of clay and stone pipes, shell beads, flaked quartzite knives, triangular chert projectile points, and trianguloid celts. Potsherds in mound fill are chert- and quartz-tempered, representing Albemarle series (Evans, 1955).

Front Royal series, Virginia

Charcoal from flood plain of Habron site (44 WR 1) on left bank of S Fork of Shenandoah R. (38° 56' 30" N Lat, 78° 13' 00" W Long). Coll. 1966 by H. A. MacCord; subm. by Clifford Evans.

SI-451.

**7390 \pm 100
5440 B.C.**

Sq. 9-20, 173 cm depth, assoc. with LeCroy- and Stanley-type projectile points. *Comment* (H.A.M.): date seems in line with current estimate of age of LeCroy- and Stanley-type projectile points.

SI-452.

**3210 \pm 120
1260 B.C.**

Sq. 9-19, 127 cm depth, assoc. with Morrow Mountain-type projectile points. *Comment* (H.A.M.): date seems too recent. It is possible that Morrow Mountain points continued in use in this region later than elsewhere but further finds at other sites are needed to clarify this point.

SI-338. Asbury Thorton site, Georgia

**1450 \pm 100
A.D. 500**

Charcoal from site 9CL52 (31° 45' N Lat, 85° 03' W Long), Clay County. Sample 210 from bottom of Pit F-10, ca. 1m below original ground surface. Coll. 1960 by H. A. Huscher; subm. by Clifford Evans. Pottery types at this site include Gulf Woodland-Weeden Island and Inland Wilson checked-stamped types with high percentage of West Florida Cord Marked. *Comment* (H.A.H.): date acceptable for early part of Weeden Island range, confirms Willey and Wimberley placement of Deptford and McLeod Deptford.

SI-337. Robert Burtz site, Alabama

**1310 \pm 120
A.D. 640**

Charcoal from Site 1BR68 (31° 55' N Lat, 85° 09' W Long), in Barbour County. Sample 2613 from F-2, pit containing Perico Island and Tchefuncte-like pottery, overlain by 60 cm of featureless soil. Coll. 1960 by H. A. Huscher; subm. by Clifford Evans. Perico Island ceramics according to Willey (1949) belong to Late Deptford phase, A.D. 1 to 500. *Comment* (H.A.H.): date acceptable for aberrant Inland Woodland variant of what would be Late Deptford type on Gulf Coast.

950 ± 140**SI-339. Lynn's Fish Pond site, Alabama****A.D. 1000**

Charcoal from Site 1BR21 (31° 58' N Lat, 85° 05' W Long), Barbour County. Samples 24, 38 from Pit F-1 containing Weeden Island Plain ceramic ware. Coll. 1960 by H. A. Huscher; subm. by Clifford Evans. Site is Woodland-Mississippian transition (Huscher, 1959, p. 10). *Comment* (H.A.H.): date acceptable for Inland phase of Weeden Island with skull burials, and comparatively unaffected by Mississippian.

570 ± 100**SI-340. Spann's Landing site, Alabama****A.D. 1380**

Charcoal from Site 1HE34 (31° 38' N Lat, 85° 05' W Long), Henry County. Sample (FN) 2999 from F-8, circular storage pit assoc. with Early Roods Landing ceramic ware (Huscher, 1959). Coll. 1960 by H. A. Huscher; subm. by Clifford Evans. *Comment* (H.A.H.): date acceptable for fully developed Mississippian with lobed pots, which characterized this sample.

1220 ± 120**SI-341. Uchec site, Alabama****A.D. 730**

Charcoal from Site 1RU58 (32° 18' N Lat, 85° 58' W Long), Russell County. Sample 457 from Pit F-2 which extended from 46 to 122 cm below ground surface. Coll. 1959 by H. A. Huscher; subm. by Clifford Evans. Assoc. ceramic ware included Weeden Island Plain with few Swift Creek sherds. *Comment* (H.A.H.): date acceptable for dominant Weeden Island Plain pottery, confirms field data.

*B. Northern Great Plains***Ben Standing Soldier series, North Dakota**

Charred and uncharred wood from Site 32S17 (46° 10' 30" N Lat, 100° 37' 30" W Long), Sioux County. Site is Middle Missouri tradition, Extended Middle Missouri horizon. Coll. 1965 and subm. by J. J. Hoffman.

1050 ± 150**SI-368.****A.D. 900**

No. 2, 15 cm below surface in Feat. 3, top of refuse near House 1.

560 ± 150**SI-369.****A.D. 1390**

No. 3, 40 to 70 cm below surface in Feat. 3, floor pit of House 1.

370 ± 150**SI-370.****A.D. 1580**

No. 4, 20 to 29 cm below surface in Feat. 25, collapsed superstructure on floor of House 1.

SI-371. **510 ± 140**
A.D. 1440

No. 5, 1.16 to 1.45m below surface, Feat. 20, Post 107, W wall of House 5 floor pit.

SI-372. **1170 ± 100**
A.D. 780

No. 6, 67 cm below surface, Feat. 30, collapsed superstructure of House 7.

SI-373. **1620 ± 150**
A.D. 330

No. 7, 67 to 133 cm below surface, Feat. 28, Post 138, House 5.

SI-374. **1030 ± 150**
A.D. 920

No. 8, 61 to 92 cm below surface, Feat. 30, Post 3, House 7.

General Comment (J.J.H.): A.D. 1230 (SI-312) obtained from nearby, culturally related Fire Heart Creek site is regarded as early but acceptable age for beginnings of Extended Middle Missouri horizon in dist. Although Ben Standing Soldier Samples SI-369, 370, and 371 are compatible with, though later than, early date from Fire Heart Creek, these results are beclouded by close assoc. with Samples SI-368, 372, 373, and 374 which average some 700 yrs earlier. Samples from House 5, e.g., show range of 1110 yrs, from very early A.D. 330 (SI-373) to more acceptable A.D. 1440 (SI-371).

Huff site series, North Dakota

House timbers (oak) from House 25 (Thad Hecker) or House 5 (Ray Wood) at 32MO11 (40° 37' 05" N Lat, 100° 38' 35" W Long), in Morton County. Samples from same timber that G. F. Will dated by tree ring method Will, 1946). Coll. by Thad Hecker; subm. by N. J. Paulson, North Dakota Historical Society.

SI-446. Tree ring date **390 ± 130**
A.D. 1513 **A.D. 1560**

SI-447. Tree ring date **500 ± 130**
A.D. 1518 **A.D. 1450**

SI-448. Tree ring date **600 ± 300**
A.D. 1509 **A.D. 1350**

General Comment (W.R.W.): 2 dates (SI-446 and 447) appear reasonable in terms of current impressions of archaeologic sequence, although difference between their ages is rather great for single structure. SI-448 seems much too early to be regarded reliable, although each of tree ring dates is within standard deviation of C¹⁴ date.

Stanley County series, South Dakota

Wood assoc. with circular house components from Site 39ST232 (44° 15' 30" N Lat, 99° 54' 30" W Long). Coll. 1963 by J. J. Hoffman; subm. by R. W. Neuman. See (Hoffman, 1963).

550 ± 210**A.D. 1400****SI-214.**

No. 3, top of 30 cm of culturally disturbed loess. Early circular house component.

710 ± 90**A.D. 1240****SI-215.**

House 5, Post 1, bottom of 60 cm of culturally disturbed loess. Small circular house component.

600 ± 100**A.D. 1350****SI-242. La Roche site, South Dakota**

Charcoal and wood from Site 39ST9 (44° 13' 30" N Lat, 99° 55' 30" W Long), from post butt of House 3, 35 to 80 cm below surface. Coll. 1963 by J. J. Hoffman; subm. by R. W. Neuman. *Comment*: previously dated samples from site include SI-95, A.D. 1680 ± 50; SI-97, A.D. 1660 ± 60; SI-104, A.D. 1520 ± 60; SI-105, A.D. 1380 ± 55; SI-106, A.D. 1620 ± 55 (Radiocarbon, 1965, v. 7, p. 248) and SI-169, A.D. 1500 ± 120; SI-170, A.D. 1390 ± 150 (Radiocarbon, 1967, v. 9, p. 369-370).

1090 ± 200**A.D. 860****SI-375. Calamity Village, South Dakota**

Charcoal from Site 39DW231 (45° 25' 30" N Lat, 100° 19' 02" W Long), assoc. with Thomas Riggs and Fort Yates potteries. Coll. 1964 and subm. by Oscar L. Mallory. *Comment* (O.L.M.): date is 500 to 600 yrs earlier than accepted range from similar sites elsewhere on the Missouri.

1100 ± 150**A.D. 850****SI-377. Jandreau site, South Dakota**

Wood from Site 39LM225 (44° 05' 30" N Lat, 99° 39' W Long), in Lyman County. Sample from exterior of rotted Post 30, 1.0 to 1.6m below surface in Feat. 9, a rectangular house. Assoc. ceramics, bone, and stone artifacts place feature in Initial Middle Missouri horizon of Middle Missouri tradition. Coll. 1962 by Richard Carter; subm. by Warren W. Caldwell. *Comment* (W.W.C.): Jandreau site is component of Grand Detour phase, which, on basis of radiocarbon dates (M-843, I-1186, I-1187, SI-51, SI-54, and SI-57) from related components and other comparative data, is thought to fall within 12th and 13th centuries. Thus, A.D. 850 is considered ca. 3 centuries too early.

690 ± 140**A.D. 1260****SI-378. John Ketchen site, South Dakota**

Charcoal (No. 123) from 39ST223, Stanley County (44° 17' 40" N Lat, 100° 03' 55" W Long). Excavation Unit 2, Feat. 3, post assoc. with rectangular house, 0.9 to 1.1m depth. Coll. and subm. by David T. Jones.

Cultural materials at site closely related to Extended Horizon component at Cattle Oiler site (39ST224). *Comment* (D.T.J.): ceramics from Ketchen place site late in Extended Horizon of Middle Missouri tradition and show some relationship to potteries of subsequent Initial Coalescent tradition; sample appears dated ca. 200 yrs too early.

SI-379. Cattle Oiler site, South Dakota **1030 ± 190**
A.D. 920

Wood (No. 560) from 39ST224 in Stanley County (44° 18' N Lat, 100° 04' W Long). Post assoc. with rectangular house in Feat. 3. Depth 1.2 to 1.4m Coll. 1965 and subm. by Daniel E. Moerman. Cultural materials at site represent both Initial and Extended Horizon Middle Missouri tradition. Sample represents latter. *Comment* (D.T.J.): A.D. 920 is much too early for Extended Middle Missouri Horizon component. Related sites in central South Dakota dated late 15th and early 16th centuries, fully 500 yrs later than sample.

SI-380. McClure site, South Dakota **670 ± 140**
A.D. 1280

Charcoal (No. 142) from 39HU7 in Hughes County (44° 20' 08" N Lat, 100° 11' 58" W Long), late circular house village. From cache pit fill 27 to 80 cm below surface in Feat. 3, below floor of House 2. Coll. 1965 and subm. by Richard B. Johnston. *Comment* (R.B.J.): McClure village represents late phase of Coalescent tradition; date appears ca. 400 yrs too early for archaeologic context.

SI-381. Bowman site, South Dakota **Modern**

Charred corn plant remains (No. 58) from 39HU204 in Hughes County (44° 16' 30" N Lat, 99° 55' 56" W Long), late circular house site. From cache pit below floor of House 1, Feat. 3, 30 to 46 cm below present surface. Coll. 1965 and subm. by Richard B. Johnston. *Comment* (R.B.J.): Bowman site is prehistoric, ceramic data and other considerations suggest occupation ca. A.D. 1600.

SI-382. McKensy Village site, South Dakota **510 ± 100**
A.D. 1440

Juniper (id. by W. W. Caldwell) No. 12 from 39AR201 in Dewey County (44° 46' 30" N Lat, 100° 35' 30" W Long). McKensy Village dated A.D. 1501 by tree ring date of this sample. Exterior 8 to 12 rings (bark absent) used for SI-382. Sample coll. 18 cm below surface from XU1, long, rectangular house, part of timber which was principal support post for ridge pole; part of original house construction. Coll. 1960 and subm. by W. W. Caldwell (1966).

SI-209. Lungren site, Iowa **6280 ± 120**
4330 B.C.

Charcoal (No. 61) from fire pit Feat. 4 Site 13ML224 (41° 06' 43" N Lat, 95° 46' 19" W Long), 3.1m below ground surface. Assoc. with

Archaic assemblage of side-notched, basal-ground projectile points and plano-convex end scrapers. Coll. 1963 by Lionel A. Brown; subm. by Robert W. Neuman.

300 ± 200

SI-357. Howard Goodhue site, Iowa

A.D. 1650

Charcoal from Site 13PK1 in Polk County (41° 32' N Lat, 93° 28' W Long). Sample F3B from Feat. 3, underground storage pit at N155/W150.9 coordinates, 0.46m below surface, assoc. with following Oneota cultural materials: clay pipe fragment, shell-tempered ceramics, trailed and punctuated ceramics, low and medium rim sherd ceramics, bone needles, worked shell, triangular points. Coll. 1965 by R. D. Gant; subm. by D. M. Gradwohl, Iowa State Univ., Ames.

Mohler Farm site series, Iowa

Charcoal from Site 13MA30 in Marion County (41° 27' N Lat, 93° 11' W Long) assoc. with following Oneota cultural materials: shell-tempered, trailed and punctuated ceramics; triangular points; scrapers. Coll. 1964 and subm. by D. M. Gradwohl.

450 ± 200

SI-358.

A.D. 1500

F5B in Feat. 5 storage pit at N1080.2/W871.4, 0.46m depth (same as GaK-698, 990 ± 80 B.P.).

270 ± 180

SI-359.

A.D. 1680

F23B in Feat. 23 storage pit at N1083.1/W886.4, 0.43m depth (same as GaK-699, 1260 ± 90 B.P.).

General Comment: previous dates on other Oneota sites indicated culture appeared in Iowa after A.D. 1300. Samples were split for replicate analysis here and at Gakushuin Univ. Both sets of results are given above.

1610 ± 150

SI-361. Platte County, Missouri

A.D. 340

Charcoal from stone vault at Site 23PL4 (39° 13' N Lat, 94° 48' W Long) depth 43 to 51 cm below surface. Coll. 1938 by W. R. Wedel, H. M. Trowbridge, and J. M. Shippee; subm. by W. R. Wedel. Assoc. with Hopewell (Middle Woodland) grit-tempered potsherds and cremated human bones. *Comment:* same as previous result from sample from same vault: M-1494, 1610 ± 130 B.P.

C. Cuba

1020 ± 100

SI-347. Mejias site

A.D. 930

Charcoal from Oriente Province (20° 37' 30" N Lat, 76° 01' 20" W Long), Midden 1, Trench 1, Sect. B, level 0.25 to 0.50m, assoc. with Mayari cultural materials; new group for Cuba. Sample analysis should verify correlation by means of pottery type, lacking griddle sherds, to

Arroyo del Palo site, dated 760 ± 60 B.P. (Y-1555) and 970 ± 80 B.P. (Y-1556) (Yale, unpubl.). Coll. 1965 by Depart. de Antropol., Acad. de Cienc. de Cuba, Havana; subm. by Clifford Evans.

SI-348. Laguna de Limones site **640 ± 120**
A.D. 1310

Charcoal from Taino-culture site in Oriente Province ($20^{\circ} 13' 18''$ N Lat, $74^{\circ} 10' 06''$ W Long), from Midden 2, Trench 2, Sec. D, level 0.25 to 0.50m. Coll. 1964 by Dept. de Antropol., Acad. de Cienc. de Cuba, Havana; subm. by Clifford Evans. *Comment:* historical records indicate Taino Indians arrived in Cuba ca. A.D. 1450 (Rouse, 1942). Recent archaeology of area suggests Taino Indians arrived in extreme E Cuba from 500 to 1000 yrs before recorded statement of Father Las Casas. C^{14} date tends to confirm interpretation.

Esterito site series

Charcoal from Sub-Taino site in Oriente Province ($20^{\circ} 53' 25''$ N Lat, $75^{\circ} 45' 01''$ W Long). Coll. 1965 by Dept. de Antropol., Acad. de Cienc. de Cuba, Havana; subm. by Clifford Evans. Assoc. with pottery, stone, and shell artifacts which could be earlier Sub-Taino rather than later Taino phase; no European objects found.

SI-349. **550 ± 150**
A.D. 1400

Midden 1, Trench 1, Sec. C, 0.25 to 0.50m.

SI-350. **500 ± 100**
A.D. 1450

Midden 1, Trench 1, Sec. D, level 1.00 to 1.25m.

SI-351. Barajagua site **590 ± 100**
A.D. 1360

Charcoal from Sub-Taino site in Oriente Province ($20^{\circ} 36' 40''$ N Lat, $75^{\circ} 59' 35''$ W Long), from Midden 1, Trench 1, Sect. B, level 0.75 to 1.00m. Assoc. with Sub-Taino pottery, stone and shell artifacts; no European objects. Coll. 1965 by Dept. de Antropol., Acad. de Cienc. de Cuba, Havana; subm. by Clifford Evans.

SI-352. Loma de la Forestal site **970 ± 100**
A.D. 980

Charcoal from Sub-Taino site in Oriente Province ($20^{\circ} 50' 33''$ N Lat, $76^{\circ} 18' 28''$ W Long), from Midden 9, Trench 1, Sect. A, level 0.50 to 0.75m; assoc. with Sub-Taino pottery, stone and shell artifacts; no European objects. Coll. 1965 by Dept. de Antropol., Acad. de Cienc. de Cuba, Havana; subm. by Clifford Evans.

SI-353. El Morrillo site **590 ± 90**
A.D. 1360

Charcoal from Sub-Taino site in Matanzas Province ($23^{\circ} 02' 45''$ N Lat, $81^{\circ} 30' 07''$ W Long), from Block Q-9, Sect. B, level 0.25 to 0.50m; assoc. with Sub-Taino pottery, stone and shell artifacts in kitchen midden.

European objects found within a few m lateral distance. This is Cuba's W-most Sub-Taino site and may have been location of Diego Velazquez' Indian settlement in A.D. 1519. Coll. 1966 by Dept. de Antropol., Acad. de Cienc. de Cuba, Havana; subm. by Clifford Evans.

Residuario Funche series

Charcoal from Pinar del Rio Province (21° 54' 12" N Lat, 84° 20' 00" W Long), assoc. wth typical Ciboney-Guayabo Blanco cultural materials including crude hammerstones, flint chips, shell vessels and gouges, and very crude ceremonial stones (Rouse, 1942). Samples from Midden I, 50m diameter, 2.5m high, 10m from mouth of Cueva Funche. Coll. 1966 by Dept. de Antropol., Acad. de Cienc. de Cuba, Havana; subm. by Clifford Evans.

SI-426.

Block II, Sec. A, 0.50m depth.

2070 ± 150
120 B.C.

SI-427.

Block II, Sec. D, 0.55m depth.

2510 ± 200
560 B.C.

SI-428.

Block III, Sec. A, 1.40m depth.

3110 ± 200
1160 B.C.

SI-429.

Block III, Sec. A, 1.72m depth.

4000 ± 150
2050 B.C.

D. Mexico

San Jose Mogote site series

Charcoal from Formative site near Guadalupe Etla (17° 13' N Lat, 96° 50' W Long), Valley of Oaxaca. Coll. 1966 and subm. by K. V. Flannery.

SI-462.

Sq. I-10, strat. Zone C₁, 100 to 120 cm depth.

2640 ± 120
690 B.C.

SI-463.

Sq. I-12, strat. Zone C₂, 140 to 160 cm depth.

2730 ± 120
780 B.C.

SI-464.

Sq. I-11, strat. Zone C₃, 140 to 160 cm depth.

3120 ± 120
1170 B.C.

SI-465.

Sq. I-11, strat. Zone C₄, 160 to 180 cm depth.

2930 ± 120
980 B.C.

SI-466.

Sq. J-11, strat. Zone D₁, 180 to 200 cm depth.

2990 ± 120
1050 B.C.

SI-467. **2810 ± 120**
860 B.C.
Sq. J-11, strat. Zone D₂, 200 to 220 cm depth.

E. South America

SI-383. Boyaca, Columbia **1330 ± 100**
A.D. 620
Charcoal nucleus of Chibcha-style gold objects from Santo Domingo (5° 31' N Lat, 73° 58' W Long). Artifacts assoc. with burial. Coll. 1966 by Museo del Oro, Banco de la Republica, Bogota; subm. by Alicia Dussan de Reichel via Clifford Evans.

SI-384. Cundinamarca, Columbia **1090 ± 100**
A.D. 860
Charcoal nucleus of gold objects from Cogua (5° 05' N Lat, 73° 59' W Long), from tomb with Muisca-style gold objects. Coll. by Museo del Oro, Banco de la Republica, Bogota; subm. by Alicia Dussan de Reichel via Clifford Evans.

SI-354. Chilibulo site, Ecuador **850 ± 120**
A.D. 1100
Charcoal and charred maize from shoe-shaped refuse storage pit in Pichincha Province (0° 14' S Lat, 78° 50' W Long). Assoc. pottery is of Integration Period type. Coll. 1965 by P. I. Porras; subm. by Clifford Evans.

Ilha dos Bichos series, Brazil

Charcoal flecks mixed with soil from Site PA-J-21 on Marajo Is. (0° 50' S Lat, 48° 55' W Long). Pottery analysis by seriation by Clifford Evans and Betty J. Meggers into sequence for Marajoara culture. Coll. 1964 by Mario F. Simoes and N. Figueiredo; subm. by Clifford Evans.

SI-199. **1260 ± 200**
A.D. 690
Cut C, level 78 to 98 cm.

SI-200. **550 ± 500**
A.D. 1400
Cut C, level 1.35 to 1.75m.

SI-201. **2020 ± 280**
70 B.C.
Cut B, level 2.00 to 2.25m.

General Comment (C.E.): Marajoara phase dates are inconsistent. SI-200 is too recent; SI-201 too early. SI-199 is similar in magnitude to SI-386 and SI-387 (this date list) but earlier than anticipated.

Frei Luis series, Brazil

Charcoal flecks mixed with soil from Site PA-J-36 on Marajo Is. (0° 50' S Lat, 40° 50' W Long). Pottery seriates in early portion of Mara-

joara phase sequence. Coll. 1965 by Mario F. Simoes; subm. by Clifford Evans.

1470 ± 200

SI-386.

A.D. 480

Cut A, level 45 to 60 cm.

1370 ± 200

SI-387.

A.D. 580

Cut A, level 60 to 75 cm.

General Comment (C.E.): SI-386 and SI-387 are similar in magnitude to SI-199 but earlier than anticipated for Marajoara phase.

2930 ± 200

SI-385. Castanheira site, Brazil

980 B.C.

Charcoal from habitation site of Ananatuba phase on Marajo Is. (1° 00' S Lat, 48° 40' W Long). Cut A, level 40 to 50 cm. Coll. 1965 by J. C. Cardoso; subm. by Clifford Evans. *Comment* (C.E.): SI-385 is acceptable for Ananatuba phase which represents earliest ceramic complex on Marajo Is.

Gaspar series, Brazil

Shell midden on coast of S Brazil (26° 58' S Lat, 48° 55' W Long), in Santa Catarina. Cut 1, 65 cm below surface. Coll. 1966 by W. F. Piazza; subm. by Clifford Evans.

5230 ± 350

SI-362-c.

3280 B.C.

Erodona mactroides (id. by J. P. E. Morrison).

5270 ± 300

SI-362-o.

3320 B.C.

Organic material assoc. with SI-362-c.

General Comment: *E. mactroides* is brackish clam from S Brazil to La Plate R. of Argentina; presents possibility of biased C¹⁴ age. Analysis on co-assoc. organic material confirms shell date and indicates little or no age bias in *mactroides* sp. Important in correlation of other shell middens dated in Santa Catarina and Parana. Confirms general ideas of coastline changes in Brazil under study by J. J. Bigarella and R. W. Fairbridge.

970 ± 100

SI-433. Guaratiba site, Guanabara, Brazil

A.D. 980

Charcoal samples from Site Gb-3 (23° 01' S Lat, 43° 36' W Long), assoc. with Guaratiba phase of Tupiguarani ceramic tradition. Cut E, level 10 to 25 cm. Coll. 1965 by O. F. Dias, Jr.; subm. by Clifford Evans.

**SI-434. Praia do Engenho Velho site,
Guanabara, Brazil**

800 ± 100

A.D. 1150

Charcoal from Site Gb-6 (22° 48' S Lat, 43° 14' W Long), assoc. with Guaratiba phase of Tupiguarani ceramic tradition. Level 90 to 100 cm. Coll. 1965 by O. F. Dias, Jr., subm. by Clifford Evans.

SI-435. Guaratiba site, Guanabara, Brazil **Modern**

Charcoal from Site Gb-2 (23° 01' S Lat, 43° 36' W Long), assoc. with Guaratiba phase of Tupiguarani ceramic tradition. Test Cut D, level 0 to 10 cm. Coll. 1965 by C. C. Rodrigues; subm. by Clifford Evans. *Comment* (C.C.R.): too recent; proximity of sample to surface suggests intrusion of modern charcoal into site.

SI-436. Cabo Frio, Rio de Janeiro, Brazil **1060 ± 90**
A.D. 890

Charcoal from Site RJ-17 (22° 44' S Lat, 42° 01' 30" W Long), assoc. with Una phase representing non-Tupiguarani ceramic tradition. Level 80 to 90 cm. Coll. 1966 by O. F. Dias and J. C. de Oliveira; subm. by Clifford Evans.

South Pedro d'Aldeia series, Rio de Janeiro, Brazil

Charcoal from Site RJ-19 (22° 50' S Lat, 42° 07' 30" W Long), assoc. with Sernambitiba phase of Tupiguarani tradition and burials. Test Cut 5. Coll. 1966 by O. F. Dias; subm. by Clifford Evans.

SI-437. Level 20 to 30 cm **Modern**

SI-438. Level 40 to 50 cm **570 ± 100**
A.D. 1380

Uruguay River site series, Santa Catarina, Brazil

Charcoal from site near Itapiranga (27° 12' S Lat, 53° 25' W Long), containing preceramic Alto Paranaense cultural materials at 4m depth, sterile alluvium from 3 to 0.5m depth, and Tupiguarani ceramics of Mondai phase from 0.5 to 0m. Coll. 1966 by J. A. Rohr; subm. by Clifford Evans.

SI-439. 0.5 m level **770 ± 100**
A.D. 1180

SI-440. 4.0 m level **7260 ± 100**
5310 B.C.

SI-441. Alfredo Wagner site, Santa Catarina, Brazil **3000 ± 120**
1050 B.C.

Charcoal from Site VI-13 (27° 41' 30" S Lat, 49° 19' 30" W Long), Cut 1, 60 cm below surface. Cultural material of stone, wood, and basketry, but no ceramics. Coll. 1966 by W. F. Piazza; subm. by Clifford Evans.

SI-470. Salvador, Bahia, Brazil **2830 ± 130**
880 B.C.

Charcoal from Sambaqui da Pedra Oca site (12° 55' 34" S Lat, 38° 31' 12" W Long), in Periperi Dist. Sample from Cut A, level 2.8 to 3.0m, assoc. with pottery and lithic artifacts (Calderon, 1964). Coll. 1962 by Valentin Calderon; subm. by Clifford Evans.

- 680 \pm 130**
- SI-471. Campo Formoso, Bahia, Brazil** **A.D. 1270**
 Charcoal from Zacarias site (10° 30' 13" S Lat, 40° 24' 50" W Long), in Pocos Dist., from Cut A, level 20 to 35 cm depth, assoc. with Itapicuru phase cultural materials. Coll. 1965 by Valentin Calderon; subm. by Clifford Evans.

- 950 \pm 130**
- SI-472. Curaca, Bahia, Brazil** **A.D. 1000**
 Charcoal from Saloba cemetery site (8° 59' 27" S Lat, 39° 54' 41" W Long), from Burial 2, assoc. with non-Tupiguarani cultural materials. Coll. 1966 by Valentin Calderon; subm. by Clifford Evans.

- 4560 \pm 150**
- SI-473. Formosa, Goias, Brazil** **2610 B.C.**
 Charcoal from Gruta da Pedra site (15° 32' 24" S Lat, 47° 20' 08" W Long). Sample from Cut A, level 55 to 65 cm depth, in 1st preceramic site found in state of Goias. Coll. 1966 by Pedro Agostinho; subm. by Clifford Evans.

II. GEOLOGIC AND PALEONTOLOGIC SAMPLES

A. Canadian Arctic

Disraeli Fiord Driftwood series, Ellesmere Island

Driftwood trapped in Disraeli Fiord (83° N Lat, 74°W Long) by ice shelf of unknown age. As no large trees grow on the island, youngest driftwood date will give maximum date for closing off fiord. Minimum date so far is 3000 \pm 200 (L-254D, Science, 1956, v. 124, p. 162). All wood id. by W. T. Stern, Univ. of Maryland. Coll. 1967 by J. E. Keys; subm. by Austin Long.

- SI-566. *Larix*** **>35,000**
- SI-567. *Picea*** **>35,000**
- SI-568. *Larix*** **6280 \pm 140**
4330 B.C.

Lake Sediment series, Ellesmere Island

Mud from small lakes on Ellesmere Is. to evaluate rates of sedimentation. Each sample represents top foot of soft mud sediment in each lake. Coll. 1967 by Austin Long and J. E. Mielke; subm. by Austin Long.

- SI-570. Lake Tuborg** **21,250 \pm 650**
- SI-571. Ekblaw Lake** **21,380 \pm 400**
- SI-572. Rollrock Lake** **26,650 \pm 450**

Tanquary Fiord series, Ellesmere Island

Marine shells (various species) from present beach and emerged terrace near mouth of McDonald R. (81° 30' N Lat, 77° 30' W Long). Coll. 1967 by Austin Long and J. E. Mielke; subm. by Austin Long.

SI-573. **3150 ± 130**
1200 B.C.

Sea level on present beach.

SI-574. **6500 ± 150**
4550 B.C.

Terrace 68m above present sea level.

SI-575. McDonald River, Ellesmere Island **2970 ± 130**
1020 B.C.

Peat composed of *Dryas integrifolia* and *Salix arctica*, id. by G. Hattersley-Smith. Sample from near mouth of McDonald R. (81° 30' N Lat, 77° 30' W Long), overlies cross-bedded fluvial deposits and is overlain by eolian deposits. Base of peat zone is at +21.4m. Coll. 1967 by Austin Long, J. E. Mielke, and Geoffrey Hattersley-Smith; subm. by Austin Long.

B. United States

SI-290. Upper Cleary Creek, Alaska **12,460 ± 320**
10,510 B.C.

Horn sheath of *Bison* (*Bison*) *preoccidentalis* from gold-bearing frozen muck near Upper Cleary Creek (65° N Lat, 148° W Long), Fairbanks County, Alaska. Coll. 1937 by Otto Geist; subm. by C. E. Ray. Specimen and area described by Skinner and Kaisen (1947).

SI-291. Little Eldorado Creek, Alaska **>40,000**

Dung (*Symbolus giganteus*), id by M. F. Skinner, from gold-bearing frozen muck near Fairbanks (65° N Lat, 147° 30' W Long). Specimen uncovered during hydraulic mining operation. Coll. 1939 by Otto Geist; subm. by C. E. Ray.

SI-355. Lost Chicken Creek, Alaska **26,760 ± 300**
24,810 B.C.

Equus bone, (id. by F. C. Whitmore) from Late Pleistocene and Holocene frozen muck deposits (64° 04' N Lat, 141° 51' 30" W Long). Two species of extinct horse and other extinct mammals such as *Panthera atrox* also found in muck in this small valley. Coll. 1965 by H. L. Foster; subm. by F. C. Whitmore, Jr., U. S. G. S.

SI-356. Canyon Creek, Alaska **3750 ± 380**
1800 B.C.

WA 65-1, wood from same horizon as bones of extinct mammals, in Canyon Creek (between 64° 07' and 64° 15' N Lat, 141° 18' W Long). From ca. 4.6m below surface in frozen muck. Coll. 1965 by H. L. Foster; subm. by F. C. Whitmore, Jr.

11,030 \pm 800
9080 B.C.

SI-331. La Grande, Oregon

Skull fragments (*Mylodon harlani*), id. by C. W. Quaintance, from 4 km SSE of La Grande (45° 17' 37" N Lat, 118° 03' 45" W Long). Specimen found with parts of right foreleg 2.1m below top of alluvial surface believed outwash fan. Coll. 1966 by C. W. Quaintance; subm. by C. E. Ray. *Comments*: sample washed in diluted HCl prior to burning. (C.W.Q.): in addition to dating presumed death of sloth, it dates point at which ca. 2/3 of outwash fan had been deposited (Quaintance, 1966).

6510 \pm 100
4560 B.C.

SI-469. Bristlecone Pine

Pinus aristata from Inyo Natl. Forest, California (37° 23' N Lat, 118° 10' W Long). Sample TRL 63-92E, rings 990 to 1000, on "floating" sequence. Coll. 1966 by C. W. Ferguson; subm. by Austin Long.

7230 \pm 150
5280 B.C.

SI-408. Wilcox Playa, Arizona

Black mud from 110 to 115 cm below surface of playa (32° 00' 35" N Lat, 109° 53' 00" W Long). Sample A, coll. 1966 and subm. by P. S. Martin, Univ. of Arizona. *Comment*: mud is high in carbonate and low in organic. Carbonates driven off with HCl, then NaOH added to neutralize excess acid. Sample dried and burned in several batches to provide sufficient CO₂ for analysis.

Hunter Marsh series, Virginia

Organic matter from core 3E in marsh on Rappahannock estuary (38° 06' 48" N Lat, 77° 00' 05" W Long). M. A. Buzas' analysis of foraminifera/thecamoebinidea ratio in core indicates higher salinity in estuary and hence greater rainfall in Virginia than at present during periods corresponding to core depths of 110 cm, 160 to 170 cm, and 250 to 260 cm. Coll. 1966 by Maynard Nichols and subm. by M. A. Buzas.

140 \pm 200

SI-442. Core depth 109 to 114 cm

A.D. 1810

SI-443. Core depth 159 to 164 cm

<1000

SI-445. Core depth 164 to 169 cm

<1000

1260 \pm 200

SI-444. Core depth 253 to 258 cm

A.D. 690

General Comment: low organic contents of samples SI-443 and SI-445 forbid more precise age calculations.

C. Brazil

10,200 \pm 100
8250 B.C.

SI-319. Rio Pirabeiraba, Brazil

Wood from sec. in bank of river near San Francisco do Sul (26° 08' S Lat, 48° 56' W Long), Santa Catarina. Sample is from sand and gravel

exposed at river level and overlain by 2m of clay-silt. Coll. 1963 and subm. by J. J. Bigarella, Inst. for Geol., Univ. of Parana, Curitiba. *Comment* (J.J.B.): specimen found in transition zone between 2 different types of deposits: lower one composed of gravel and sand deposited under semiarid climate; upper sediments composed mostly of silt and clay deposited under humid conditions. From age determination of similar event in varzea of Palmital R. in Estacao Experimental do Trigo (Curitiba) repetition of Pirabeiraba R. climatic condition happened ca. 2000 yrs ago.

SI-320. Henrique Laje, Brazil

>35,000

Wood from 3 km S of Henrique Laje (28° 16' S Lat, 48° 42' W Long), Santa Catarina. Sample from organic matter overlain by pebble layer, all enclosed in dune structure. Depth, 1m. Coll. 1963 and subm. by J. J. Bigarella, who assigns this stratum to humid phase just preceding semiarid phase. *Comment* (J.J.B.): sample from black layer rich in organic remains between 2 dune sequences. On island of Santa Catarina sand dune deposits are covered by deposits from pediment P¹ (Illinoian). This sample possibly indicates that large area of dune topography presently covered with vegetation is at least as old as Wisconsin.

Rio Pirai series, Brazil

Wood from 3 secs. exposed in bank of Pirai R. near Joinville (26° 26' S Lat, 48° 50' W Long), Santa Catarina. Coll. 1965 and subm. by J. J. Bigarella. Bigarella believes SI-321 and SI-322 represent lowest of low terraces in valley and SI-323 represents highest of low terraces. Hence, SI-323 should be older than other two.

SI-321. No. 4 (SC)

2390 ± 90

440 B.C.

80 cm below terrace surface in silty clay.

SI-322. No. 5 (SC)

2700 ± 100

750 B.C.

70 cm below terrace surface in silty clay.

SI-323. No. 6 (SC)

2440 ± 90

490 B.C.

3.0m below terrace surface in silty clay.

General Comment (J.J.B.): samples were coll. for age determination of "varzea" terraces. They represent 2 stages of valley fill with flood-plain deposits. Down-cutting of valley flat after higher terrace of ca. 2m. Radiocarbon results indicate about same age for both levels. Wood from lower terrace may have come as reworked material from upper level. More likely lower level would have similar age to one in Tijucas R. valley.

1600 \pm 90**SI-324. Tijucas, Brazil****A.D. 350**

Wood from road cut between Tijucas and Canelinha (27° 14' S Lat, 48° 42' W Long), Santa Catarina, from 80 cm below surface in silt-clay sediments which, according to Bigarella, were deposited during humid conditions. Coll. 1965 and subm. by J. J. Bigarella. *Comment* (J.J.B.): wood was deposited during filling of lower varzea terrace of Tijucas R. indicating terrace is actually somewhat more recent. As area is flooded only by large floods it seems possible that rate of sedimentation was greater in past. Present river is inset in terrace itself and has present varzea in level below one dated here.

SI-325. Sao Luiz de Paraitinga, Brazil**Modern**

Wood from varzea terrace (23° 13' S Lat, 45° 23' W Long), Sao Paulo. Sample from 1.6m depth in clay-silt sediments which, according to Bigarella, were laid down under humid conditions. Should establish age of highest level of valley flat fill. Coll. 1965 and subm. by J. J. Bigarella. *Comment* (J.J.B.): piece of recent wood may have been picked from river bank.

18,330 \pm 800**SI-326. Sao Jose dos Pinhais, Brazil****16,380 B.C.**

Paleosol containing organic matter formed under humid conditions from Sao Jose dos Pinhais (25° 33' S Lat, 49° 05' W Long), Parana. Coll. 1965 and subm. by J. J. Bigarella. *Comments*: sample leached in HCl and dil. NH₄OH before burning. (J.J.B.): paleosol from depth 1.5m in cut for new highway between Curitiba and Paranagua, ca. 30 km SE of Curitiba.

3830 \pm 120**SI-327. Paranagua, Brazil****1880 B.C.**

Marine shell fragments from base of Tombolo of Caioba formation near Caioba (25° 52' S Lat, 48° 32' W Long), Parana, overlain by 4m of sand (Tombolo of Caioba). Coll. 1965 and subm. by J. J. Bigarella. *Comment* (J.J.B.): shells from drill core at depth 5m. Date is maximum for the tombolo, which was built up by sea level at least 1m above present.

*D. Israel***11,620 \pm 300****SI-295. Haifa, Israel****9670 B.C.**

Organic clay from +5m, 30 cm above Calcareous Sandstone II, at Kyriat Eliahu (near Haifa), Israel (33° N Lat, 35° E Long). According to A. Slatkine (Slatkine and Rohrlich, 1965), Calcareous Sandstone II was formed by the Late Monastirian Sea. Coll. 1965 by A. Slatkine, Israel Inst. of Technol., Haifa; subm. by Austin Long. *Comments*: C¹⁴ measurement

on oolite at top of Calcareous Sandstone II gave 35,000 (SI-191, Radiocarbon, 1967, v. 9, p. 380). (A.S.): date denies that the +5m level of abrasion terrace of Kyriat Eliahu corresponds to culmination of the Flandrian transgression (ca. 6000 B.P.).

III. GEOCHEMICAL SAMPLES

A. Columbia River

SI-No.	Location	1 CO ₂ extracted	Salinity	$\delta C^{13}\text{‰}$	‰ Modern C ¹⁴
522.	Columbia Park surface	1.10	—	-15.39	205 ± 6
523.	Astoria Pt. surface	.43	—	-12.45	200 ± 10
524.	off C. R. mouth (Sta. 010) 10m	.96	31.908	-7.03	145 ± 7
525.	off C. R. mouth (Sta. 006) 150m	.87	33.671	-5.96	91 ± 4
526.	off C. R. mouth (Sta. 001) surface	1.05	30.984	-49.31*	87 ± 4**
527.	off C. R. mouth (Sta. 006) surface	.63	32.316	-1.47	113 ± 5
528.	off C. R. mouth (Sta. 018) 10m	.68	32.284	-5.59	116 ± 4

* Clearly anomalous δC^{13} . May have been fractionated during extraction.

** Correction for corresponding C¹⁴ fractionation would bring ‰ modern C¹⁴ up to ca. 97 ‰ .

Samples coll. Nov. 1966 by Grant Gross; subm. by Austin Long.

B. Tree Rings

SI-No.	A-No.*	Tree-ring date	C ¹³ PDB	Raw C ¹⁴
389	821	A.D. 1450-1460	-24.93	460 ± 90
390	822	A.D. 1480-1490	-25.14	380 ± 90
391	823	A.D. 1510-1520	-23.25	280 ± 90
392	824	A.D. 1540-1550	-26.36	220 ± 100

* Arizona check dates not yet released.

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CORRECTION

The following dates appeared in error in *Radiocarbon*, 1967, v. 9, p. 376:

SI-259	should be	SI-269
SI-386	should be	SI-286