

## GEOCHRON LABORATORIES, INC. RADIOCARBON MEASUREMENTS II

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### INTRODUCTION

The following list presents dates on a small fraction of the total number of measurements made during 1964 and 1965 as well as data on some samples previously dated but not published. Results not appearing have not been released by our clients.

Procedures of analysis are essentially unchanged from those reported previously (Geochron I). Additional counting equipment identical to that previously described has been installed during the past year. Details of the apparatus and procedure for separating collagen from the bone samples may be found in Krueger (in press).

### SAMPLE DESCRIPTIONS

#### I. GEOLOGIC SAMPLES

##### A. Eastern United States

<b>GX-16. Waterville, Maine shells</b>	<b>12,770 <math>\pm</math> 320</b>
	<b>10,820 B.C.</b>
	<b>12,210 <math>\pm</math> 290</b>
	<b>10,260 B.C.</b>

##### Duplicate of above

Shells of *Hiatella arctica*, from pit on Drummond Ave., Waterville, Maine (44° 34' N Lat, 69° 38' W Long). Found in shelly till. Coll. 1957 and subm. by C. A. Kaye, U.S.G.S., Boston, Mass. *Comment* (C.A.K.): shells from the same lot dated previously at 12,450  $\pm$  250 (L-677, unpub.), intermediate between the two new measurements (see also W-737, USGS V; W-947, W-1011, USGS VII; GSC-89, GSC-101, GSC-102, GSC II).

<b>GX-17. West Lynn, Mass. shells</b>	<b>13,230 <math>\pm</math> 320</b>
	<b>11,370 B.C.</b>

Plates of barnacle *Balanus hameri* (Ascanius) from Blakely clay pit, West Lynn, Massachusetts (42° 38' N Lat, 69° 59' W Long). Embedded in blue-gray clay (see Kaye and Barghoorn, 1964, p. 75 for details). Coll. 1957 and subm. by C. A. Kaye. *Comment* (C.A.K.): sample is part of that reported as Sample L by Kaye and Barghoorn (1964) and dated at 14,250  $\pm$  250 (W-735) and at 13,800  $\pm$  300 (L-598A). New date is compatible with latter but not former. Shells differing in age by several hundred years may have been present in original whole sample.

##### Madison County, New York series

Peat cores, SW Madison Co., New York (42° 40' 30" N Lat, 75° 50' W Long). From swamp in narrow through valley, gradational from basal

calcareous silty clay to overlying silty peat. Coll. 1964 and subm. by C. D. Holmes, Tulley, New York.

**GX-205. Peat, depth 8'9" to 9'3" 10,415 ± 145  
8465 B.C.**

**GX-206. Peat, depth 12'6" to 13'6" 10,930 ± 150  
8980 B.C.**

*Comment* (C.D.H.): pollen evidence for this locality suggests a cooler interval following an early postglacial warming trend. Dates are early postglacial for this locality.

### Chesapeake Bay oyster beds series

Shells of oyster *Crassostrea virginica* dredged from Chesapeake Bay localities as part of a study of the development of oyster biostromes. Coll. 1964 and subm. by R. B. Biggs, Chesapeake Biological Lab., Solomons, Maryland.

**GX-424. 2010 ± 105  
60 B.C.**

Chesapeake Bay, Tangier Sound, S of Sharkfin Shoal light (38° 11' 30" N Lat., 75° 57' 40" W Long). Composite from 23 to 27 ft below MSL, water depth 19 ft.

**GX-425. 1845 ± 115  
105 B.C.**

From Choptank R. off town of Oxford (38° 40' 12" N Lat, 76° 13' 03" W Long). Composite from 20 to 24 ft below MSL, water depth 16 ft.

**GX-426. 2090 ± 110  
140 B.C.**

Chesapeake Bay, 1 mi N of Baltimore Light Station (39° 04' 17" N Lat, 76° 24' 32" W Long). Composite from 24 to 29 ft below MSL, water depth 14 ft.

**GX-427. 545 ± 90  
A.D. 1045**

Chesapeake Bay 1 mi E of Hart Island (39° 13' 17" N Lat, 76° 22' 24" W Long). Composite from 17.5 to 21 ft below MSL, water depth 14 ft.

**GX-428. 285 ± 155  
A.D. 1665**

From mouth of Manokin R., Tangier Sound (38° 02' 35" N Lat, 75° 55' 15" W Long). Composite from 20 to 25 ft below MSL, water depth 15 ft. *Comment* (H.W.K.): these large composite samples were cleaned, crushed, and mixed and an aliquot was taken for roasting at 500°C in oxygen.

**GX-459. Reef algae 19,200 ± 650  
17,250 B.C.**

Reef algae *Lithothamnion* from a protuberance (reef) on the continental shelf off North Carolina (33° 40' N Lat, 76° 40' W Long). Coll.

1965 by R. J. Menzies; subm. by O. H. Pilkey, Duke Univ., Durham, North Carolina. *Comment* (O.H.P.): it is possible that sample may have been contaminated with small amounts of living *Lithothamnion*.

**1365 ± 90**

**GX-331. Florida Bay core**

**A.D. 585**

Recent carbonate mud from a core in Florida Bay, Crossbank, 6 km W of Tavernier (25° 00' 42" N Lat, 80° 35' 12" W Long). Lowest layer in a 1.55 m core. Coll. 1964 and subm. by G. Müller, Min.-Pet. Inst., Heidelberg, Germany. *Comment* (G.M.): date will be used in a study of the mineralogy and petrology of the core.

*B. Minnesota*

**Lake Agassiz Peatlands series**

Peat samples from a bog in Lake Agassiz Peatlands Natural Area, NE¼, Sec. 2, T64N, R25W, Koochiching Co., Minnesota (48° 05' N Lat, 93° 30' W Long). Coll. 1964 and 1965 and subm. by M. L. Heinselmann, Lake States Forest Experiment Station, Grand Rapids, Minnesota.

**3160 ± 75**

**GX-429. Sphagnum peat, 4.30 m**

**1210 B.C.**

Base of upper sphagnum peat layer, 4.30 m beneath top of raised bog. *Comment* (M.L.H.): should date initiation of raised bog development in this peatland.

**10,310 ± 260**

**GX-498. Decomposed peat, 7.60 m**

**8360 B.C.**

Decomposed peat from the first largely organic layer above substratum, depth of 7.60 m beneath top of raised bog. *Comment* (M.L.H.): should date beginnings of peat formation in this portion of peatland and establish that Lake Agassiz had abandoned this site by ca. 10,310 B.P. or earlier.

*C. Alaska*

**Central Alaska series**

Samples from various sites in Central and South Central Alaska coll. 1957 to 1964 and subm. by T. L. Péwé, Arizona State Univ., Tempe, Arizona (unless noted otherwise). Page references are to Péwé (1965).

**10,565 ± 225**

**GX-249. Pingo peat**

**8615 B.C.**

Pingo peat from along Denali highway at mile 40.8, Alaska (63° 2' N Lat. 147° 30' W Long). Taken at base of unparched peat layer in contact with underlying pure ice and ice-rich silt (see p. 91). *Comment* (T.L.P.): date is a minimum age for withdrawal of Donnelly glaciation on S side of Alaska range in this area.

**GX-250. Chatanika Cut, 8 m** **14,760 ± 850**  
**12,910 B.C.**

Rodent's nest (*Citellus undulatus*) from bank of Chatanika R. ¼ mi N of Elliott highway crossing, Alaska (65° 5' N Lat, 147° 45' W Long). From 8 m below surface in Wisconsin organic silt. *Comment* (T.L.P.): dates a ground squirrel living in thawed layer above frozen ground (see p. 34).

**GX-251. Chatanika Cut, 5 m** **8530 ± 115**  
**6580 B.C.**

Wood twigs from same locality as GX-250, depth 5 m below surface in lower part of retransported, perennially frozen silt of post-Wisconsin age (see p. 34). *Comment* (T.L.P.): oldest date received for post-Wisconsin frozen silt overlying Wisconsin permafrost.

**GX-252. Ready Bullion Creek, 20 m** **>38,000**

Root fragments from Ready Bullion Creek, Alaska (64° 51' N Lat, 148° 01' W Long). Found 20 m below surface in retransported, perennially frozen silt of Wisconsin age (see p. 23). *Comment* (T.L.P.): provides minimum date of lower Wisconsin sediments in Ready Bullion Creek.

**GX-253. Ready Bullion Creek, 8 m** **14,300 ± 1200**  
**12,350 B.C.**

Organic fragments in silt from same site as GX-252, depth 8 m below surface in Wisconsin silt (see p. 23). *Comment* (T.L.P.): occurred in upper part of Wisconsin sediments.

**GX-254. Fowler Road Pit** **2565 ± 295**  
**615 B.C.**

Charcoal from Fowler Road pit, ¼ mi from junction with Richardson highway, milepost 296.7, Alaska (64° 15' N Lat, 146° 02' W Long). From 2 m below surface in Wisconsin-to-recent loess (see Fig. 4-22). *Comment* (T.L.P.): upper loess layers are younger than heretofore thought at this locality. Older loess could have been washed off the hill.

**GX-255. Shaw Creek Flats** **8040 ± 190**  
**6090 B.C.**

Charcoal from Tanana R. bank at Shaw Creek Flats, Alaska (64° 15' N Lat, 145° 59' W Long). Found in loess at depth of 1.2 m (see p. 53). *Comment* (T.L.P.): gives minimum age of the underlying Wisconsin sand dunes adjacent to Tanana R. Loess is post-Wisconsin in age.

**GX-257. Banner Creek** **3920 ± 75**  
**1790 B.C.**

Wood from log along Banner Creek, 220 ft downstream from Richardson highway crossing, Alaska (64° 15' N Lat, 146° 25' W Long). In Banner Creek Gravels at depth of 1.2 m (see p. 45). Coll. by M. Blackwell. *Comment* (T.L.P.): dates upper part of Banner Creek gravel.

**GX-277. Canyon Creek****3005 ± 75****1055 B.C.**

Wood from mouth of Canyon Creek at mile 300 on the Richardson highway, Alaska (64° 15' N Lat, 146° 25' W Long). From 17 ft below surface at base of a silt layer and on top of gravel layer (see p. 44-45). Coll. by M. Blackwell. *Comment* (T.L.P.): minimum date on lower terrace of Tanana R. near Fairbanks.

**GX-360. Engineer Creek Mammoth site****>39,000**

Wood from mining cut near junction of Engineer Creek and Steese highway, Alaska. Thought to be in silt of Wisconsin age (see p. 9). Coll. by R. D. Guthrie.

*D. Canada***GX-73. Sable Island, N.S. shells****1430 ± 125****A.D. 520**

Scallop shells (*Aequipecten irradians sablensis* Clarke) from beach of Sable Is., Nova Scotia (44° N Lat, 60° W Long). Coll. 1962 by F. Andrews Schuk; subm. by A. H. Clark, Jr., Natl. Mus. of Canada, Ottawa, Ontario. *Comment* (A.H.C.): date is on an extinct subspecies of scallop.

**GX-201. Hemlock Park, Ont., horse bone, collagen****815 ± 110****A.D. 1135****310 ± 115****Same, carbonate****A.D. 1640**

Horse bone, unaltered in appearance, from gravel pit near Hemlock Park, Farm, Ontario (44° 18' 40" N Lat, 76° 28' 20" W Long). Apparently in glacial outwash. Coll. 1963 and subm. by W. A. Gorman, Queens Univ., Kingston, Ontario. *Comment* (W.A.G.): structure of the teeth suggested a fossil horse. Experience in dating bone suggests that collagen date is far superior in cases of discordance (see Krueger, in press).

**29,200 + 8100****- 4000****GX-102. Twin Cliffs, Alberta, wood****27,250 B.C.****GX-210. Repeat on new sample, same material****>36,600**

Partially carbonized wood from bank of S. Sask. R., near Medicine Hat, Alberta (50° 04' N Lat, 110° 38' W Long). From uppermost beds of preglacial Saskatchewan gravels. Coll. 1963 and 1964 by J. A. Westgate; subm. by J. A. W. and R. E. Follinsbee, Univ. of Alberta, Edmonton, Alberta. *Comment* (J.A.W. and R.E.F.): GX-102 was considered a maximum for glacial drift in this area, but repeat analysis shows that the gravels are older than 36,600 B.P. Latter date (GX-210) agrees with other unpublished dates on this horizon and finite date is now considered to be due to contamination (see Westgate, 1965).

**GX-438. Vancouver Island peat** **390 ± 90**  
**A.D. 1560**

Silty peat from Long Beach, W coast Vancouver Is., B.C. (74° 10' N Lat, 125° 45' W Long). Basal silty peat from 1.5 m depth below surface, overlying clay and supposedly glacial gravel. Coll. 1965 by L. K. Wade; subm. by G. E. Rouse, Univ. of British Columbia, Vancouver.

*E. Central America*

**GX-284. Lago de San Marcos wood** **22,300 + 6200**  
**- 3400**  
**20,350 B.C.**

Twig or root from Lago de San Marcos, Jalisco, Mexico (20° 16' N Lat, 103° 33' 30" W Long). From Pleistocene lake beds at 5 ft depth. Coll. 1964 by H. Smith; subm. by J. R. Macdonald, Los Angeles Co. Mus., Los Angeles, California.

**GX-279. Cachí damsite wood** **14,260 ± 160**  
**12,310 B.C.**

Fossil wood from near damsite of Cachí Hydroelectric Project, Reventazón R., Costa Rica (9° 50' 30" N Lat, 83° 48' W Long). In fluvio-lacustrine deposits covered by the youngest lava flow of Irazú volcano. Coll. 1964 and subm. by J. E. Umaña, Inst. Costarricense de Electricidad, San José, Costa Rica. *Comment* (J.E.U.): date establishes time of damming of the river which gave rise to fluvio-lacustrine deposits near Cachí damsite.

*F. Europe*

**GX-248. Gösing Site charcoal** **>38,200**

Charcoal fragments from Gösing site, Wagram region, NW of Vienna, Austria. Associated with mammoth bone in main Würm interstadial complex. Coll. 1964 and subm. by K. Hölzl, Vienna, Austria. *Comment* (K.H.): date is related to the transition from Middle Paleolithic. Sample was very small. A finite date of 47,500 B.P. was obtained at one standard deviation, but it is not considered reliable (H.W.K.).

II. ARCHAEOLOGIC SAMPLES

*A. Southeastern United States*

**Lake George site series**

Materials excavated at the Lake George site (21-N-1), T11N, R5W, Sec. 11, Yazoo Co., Mississippi (32° 46' N Lat, 90° 45' W Long), by Harvard Peabody Mus. expedition directed by Stephen Williams, 1958-1960. The major occupations at this large ceremonial center span a thousand years from ca. A.D. 500 to 1500.

**635 ± 65**

**GX-494. Mound F' structure** **A.D. 1315**

Charcoal, fragments of rafter from a burned rectangular house associated with Plaquemine culture.

**370 ± 115**

**GX-495. Mound E** **A.D. 1580**

Charcoal, mainly cane fragments, from trash pit associated with Late Coles Creek ceramics. *Comment* (S.W.): these two dates were run to check the materials previously run from the site at Humble lab. (unpub.). GX-494 was from structure dated between A.D. 1000 and 1200 by samples from same log. New date falls within range of the later of the two Humble dates. The other date, GX-495, is a real puzzle as there is nothing but Coles Creek material in this portion of the mound, and this phase of construction should date around A.D. 1000 and correlate with Balmoral date (GX-485). No possible explanation for this date comes to mind; site was indeed occupied nearly this late, as other Humble dates indicate, but the late period is marked by a very distinctive ceramic complex not found in Mound E.

**Upper Tensas Basin series, Louisiana**

This series of dates are from excavations carried out in the course of an archaeological survey of the region, 1963-1964. They were selected to compliment the sequence previously worked out in the adjacent Lower Yazoo Basin, N of Vicksburg, Mississippi, and dated by Humble Lab. This project was part of Lower Mississippi Survey of Harvard Peabody Mus. with Stephen Williams directing the field work. All samples subm. by Stephen Williams.

**1390 ± 85**

**GX-483. Marsden site** **A.D. 560**

Charcoal fragments from Marsden site (23-K-4) Sec. 6, T18N, R10E, Richland Parish, Louisiana (31° 29' N Lat, 91° 29' W Long). From a firepit associated with Deasonville culture layer. Coll. 1964 by A. Toth.

**1480 ± 85**

**GX-484. Neely site** **A.D. 470**

Wood charcoal from a single charred log, Neely site (22-K-10), Sec. 13, T20N, R10E, West Carroll Parish, Louisiana (32° 43' N Lat, 91° 24' W Long). From firepit associated with Deasonville ceramics. Coll. 1964 by J. S. Belmont.

**970 ± 85**

**GX-485. Balmoral site** **A.D. 980**

Wood charcoal from Balmoral site (24-L-1), Sec. 58, T13N, R12E, Tensas Parish, Louisiana (32° 08' N Lat, 91° 14' W Long). From test pit in Mound C, associated with Balmoral phase, Late Coles Creek culture. Coll. 1963 by G. Tourtellot.

**GX-486. Transylvania site** **735 ± 90**  
**A.D. 1215**

Charcoal fragments from Transylvania site (22-L-3), Sec. 34, T20N, R12E, E. Carroll Parish, Louisiana (32° 42' N Lat, 91° 13' W Long). Associated with burned structure of Plaquemine-Mississippi period. Coll. 1963 by W. Kean.

**GX-487. Panther Lake site** **1770 ± 190**  
**A.D. 180**

Charcoal fragments from Panther Lake site (22-K-20), Sec. 21, T18N, R11E, Madison Parish, Louisiana (32° 32' N Lat, 91° 21' W Long). From mound summit, associated with Tchefuncte and Marksville ceramics. Coll. 1964 by W. L. Kean.

**GX-488. Canebrake site** **1390 ± 115**  
**A.D. 560**

Charcoal fragments from Canebrake site (24-J-9), Sec. 35, T15N, R9E, Madison Parish, Louisiana (32° 15' N Lat, 91° 31' W Long). From large posthole in mixed level, but probably associated with Issaquena phase, Marksville culture. Coll. 1964 by J. E. Terrell.

**GX-489. Hilly Grove site** **310 ± 115**  
**A.D. 1640**

Charcoal fragments from Hilly Grove site (24-L-7), Sec. 22, T12N, R12E, Tensas Parish, Louisiana (32° 01' N Lat, 91° 14' W Long). From large hearth associated with late Plaquemine ceramics. Coll. 1964 by D. J. Hally. *Comment* (S.W.): dates in general correlate very well with those previously obtained at the Lake George site (see GX-494 and GX-495). Earliest date (GX-487) most likely dates Marksville not Tchefuncte material at Panther Lake. Two dates for Deasonville (GX-483 and GX-484) are internally consistent for early and late portions of this culture and give ample time for the subsequent development of the Coles Creek culture, a late phase of which is dated by GX-485. The subsequent Plaquemine culture is dated by GX-486 and GX-489, although latter date is later than expected as no historic materials are known from the site. The only anomalous date is GX-488, which is ceramically associated with Issaquena and should date around A.D. 200-300. No ceramic materials from this pit would seem to fit the date obtained.

**GX-316. Boyd Mound No. 2, Mississippi** **1080 ± 80**  
**A.D. 870**

Charred log from Boyd Mound No. 2, Natches Trace Parkway, Madison Co., Mississippi (32° 27' N Lat, 90° 04' W Long). From base of mound on surface of undisturbed clay. Coll. 1964 by C. F. Bohannon; subm. by J. W. Griffin, Natl. Park Service, Richmond, Virginia. *Comment* (J.W.G.): date seems to be 300 to 400 years too early for the ceramic and stratigraphic context.



**GX-315. Mayport Burial Mound, Florida** **1865 ± 95**  
**A.D. 85**

Charcoal from Mayport Burial Mound, Florida (30° 22' N Lat, 81° 25' 30" W Long). From gray-brown sand zone, 24 in. below surface at E edge of mound, possibly a fire pit. Coll. 1964 by R. L. Wilson; subm. by J. W. Griffin (see Wilson, in press).

**GX-287. Shoal Creek Rock Shelter, Alabama** **4445 ± 160**  
**2495 B.C.**

Charcoal fragments in sand from Shoal Creek rock shelter, Marshall Co., Alabama (34° N Lat, 86° W Long). From hearth at bottom of earliest occupational stratum, Dalton phase material in apparent association. Coll. 1964 and subm. by D. L. DeJarnette, Univ. of Alabama, University, Alabama. *Comment* (D.L.D.): in view of the well-established C<sup>14</sup> dates on Dalton material in this area, it is unlikely that date represents earliest occupation at the site (see DeJarnette *et al.*, 1962; Clayton, 1965).

**GX-414. Chucalissa site, Tennessee** **1600 ± 60**  
**A.D. 350**

Wood charcoal fragments from Chucalissa site, Unit 2 Village area on bluff, Memphis, Tennessee (35° 04' N Lat, 90° 08' W Long). From clay-lined roasting pit associated with mixed Mississippi and Woodland material. Coll. 1961 by M. Printup; subm. by C. H. Nash, Chucalissa Mus., Memphis, Tennessee. *Comment* (C.H.N.): charred corn and a few Baytown Plain sherds were mixed with the ash in the pit. Corn association seems good.

**GX-452. Arnold site, Brentwood, Tennessee** **270 ± 65**  
**A.D. 1680**

Bone (human femur) from Burial 38, Arnold site, Williamson Co., Tennessee (36° 01' 15" N Lat, 86° 48' 30" W Long). From intact skeleton in previously undisturbed burial in stone-box grave 18 in. from surface. Coll. 1965 by B. Ferguson; subm. by R. A. McGraw, Vanderbilt Univ., Nashville, Tennessee. *Comment*: date is on collagen from the bones.

*B. Western United States*

**Snaketown site, Arizona**

Samples from Snaketown site, Gila Indian Reservation, Arizona (33° 11' N Lat, 111° 55' W Long). Subm. by E. W. Haury, Arizona State Mus., Tucson, Arizona.

**GX-328. Snaketown, 11F** **1580 ± 105**  
**A.D. 370**

Charred wood scattered through trash, Sweetwater phase association based upon ca. 2000 sherds. Coll. 1964 by J. V. Sciscenti. *Comment* (E.W.H.): trash pit showed some mixed phases at top but this level was pure Sweetwater phase.

**GX-329. Snaketown, 10F**

**2375 ± 110**

**425 B.C.**

Charred wood scattered through trash pit. Pit produced ca. 11,000 sherds and the lower three levels, represented by sample, were Vahki phase. Coll. 1964 by J. A. Lancaster.

**Smith Creek Cave site, Nevada**

Samples from Smith Creek Cave site, R69E, T17N, White Pine Co., Nevada; coll. 1955 and subm. by J. R. Macdonald.

**GX-285. Smith Creek Cave, 0-6 in.**

**2170 ± 70**

**220 B.C.**

Charcoal fragments from cave section 12 NE, 0 to 6 in. depth.

**GX-286. Smith Creek Cave, 12-18 in.**

**1675 ± 90**

**A.D. 275**

Charcoal fragments from cave section 12 NE, 12 to 18 in. depth.

**Pine Spring Site, Wyoming**

Samples from Pine Spring Site, R10W, T14N, Sweetwater Co., Wyoming (41° 10' N Lat, 109° 45' W Long). Coll. 1964 and subm. by F. W. Sharrock, Univ. of Utah, Salt Lake City, Utah.

**GX-354. Pine Spring site, 39 in.**

**9695 ± 195**

**7745 B.C.**

Bone from articulated skeleton of *Bison sp.*, collagen fraction dated. Found 39 in. below surface in earliest of three occupational strata at the site.

**GX-355. Pine Spring site, 36-39 in.**

**11,830 ± 410**

**9880 B.C.**

Bone of *Bison sp.*, scattered through deposits in lowest occupational level, depth 36 to 39 in. Collagen fraction dated.

**GX-356. Pine Spring site, 18-24 in.**

**3650 ± 80**

**1700 B.C.**

Uncharred bone of *Ovis canadensis*, collagen fraction dated. Found in second of three occupational levels at depth of 18 to 24 in.

**GX-357. Caldwell Village site, Utah**

**1430 ± 70**

**A.D. 520**

Charred wood from timber of Pithouse 7 of Caldwell village, SW of LaPoint, Uinta Co., Utah (40° 24' N Lat, 109° 48' W Long). Coll. 1964 by J. R. Ambler; subm. by F. W. Sharrock. *Comment* (J.R.A.): date appears much too early for this site. The small amount of trade pottery recovered (Tusayan Black-on-red, Mancos Black-on-white, McElmo Black-on-white) indicates that site was occupied between ca. A.D. 1050 and 1200.

**1505 ± 95**

**GX-358. Snake Rock site, Utah** **A.D. 445**

*In situ* roof support post from pithouse at Snake Rock site,, Sec. 34, T23S, R5E, Sevier Co., Utah (38° 40' N Lat, 111° 20' W Long). Pithouse belongs to latest occupational level at site, presumably Fremont culture. Coll. 1964 by C. M. Aikens; subm. by F. W. Sharrock. *Comment* (C.M.A.): date does not accord well with what is known of Fremont chronology; it may be 400 to 500 yr too early.

**1065 ± 120**

**GX-359. Bear River site, Utah** **A.D. 885**

Bison bone containing abundant clean collagen which was dated, Bear River site No. 1, Sec. 18, T9N, R2W, Box Elder Co., Utah (41° 30' N Lat, 112° 05' W Long). Associated with Fremont pottery in a shallow pit at buffalo butchering site. Coll. 1964 by C. M. Aikens; subm. by F. W. Sharrock. *Comment* (C.M.A.): date accords well with temporal position assigned to site by ceramic cross-dating.

*C. Mexico*

**2045 ± 160**

**GX-397. Alabolal site, Mexico** **95 B.C.**

Charcoal from Mayan site of Alabolal, Territory of Quintana Roo, Mexico (21° 13' N Lat, 87° 03' W Long). Depth of 85 cm and mixed with potsherds under a limestone overhand and between two stelae. Coll. 1965 and subm. by G. Schmidt, Bruce Mus., Greenwich, Connecticut.

*D. Guatemala*

**Bilbao (Santa Lucia Cotzumalhuapa), Escuintla, series**

Excavation at Bilbao site (14° 20' N Lat, 91° 01' W Long) was conducted by Milwaukee Public Mus. and Science Mus. of St. Paul during 1961-62 and 1962-63 (see preliminary report, Parsons and others, 1963). Stephen F. de Borhegyi directed the project, which was financed by the National Science Foundation. Based upon both general comparative studies and the radiocarbon samples, the major occupational phases at Bilbao have been estimated as follows:

<i>Period</i>	<i>Phase Name</i>	<i>Estimated Duration</i>
Late Classic	Santa Lucia	A.D. 650-900
"Middle Classic"	Laguneta	A.D. 400-650
Late Preclassic and Proto Classic?)	Ilusiones	400 B.C.-A.D. 100

Santa Lucia phase at Bilbao corresponds roughly to Pamplona phase at Kaminaljuyu (Yale IV, p. 162), and San Juan plumbate phase at El Baul (Thompson, 1948, p. 42), as well as Marcos phase of La Victoria (Coe, 1961, p. 86). Laguneta phase at Bilbao is comparable to Esperanza phase and at least the first part of Amatle phase at Kaminaljuyu (Yale

IV, p. 162; Kidder and others, 1946), and the San Francisco and San Juan pre-plumbate phases at El Baul (Thompson, 1948, p. 42). Bilbao Ilusiones phase is approx. equivalent to the Providencia (Sacatepequez), Miraflores, and Arenal phases at Kaminaljuyu (Yale IV, p. 162-164; Shook and Kidder, 1952) as well as Crucero phase at La Victoria (Coe, 1961, p. 133).

At Bilbao there seems to be a lull in activity during Early Classic period, which is represented at Kaminaljuyu by the Aurora phase, where four radiocarbon dates significantly range from ca. A.D. 100-400 (Yale IV, p. 164). A previous radiocarbon sample from Bilbao (Texas Bio-Nuclear I, p. 60) yielded the date A.D. 527 with the standard deviation ranging from A.D. 391-663. Sample was recovered from a rubble platform surrounding Monument 21, Mound B-2. (All Bilbao monument numbers cited herewith refer to Thompson, 1948, who illustrated them under the site name Santa Lucia Cotzumalhuapa.) Associated pottery was Laguneta phase and earlier, therefore corroborating the Laguneta phase dates processed by Geochron.

It should be noted that the seven Geochron dates which extend from 510 B.C. to A.D. 85 (GX-125, 130, 131, 132, 134, and 260) are for the most part associated with mixed ceramic lots from mound fill, which include styles of both early (Ilusiones) and late (Laguneta or even Santa Lucia) phases. These radiocarbon samples therefore cannot be accepted as dating the deposition of the respective excavated levels (which correspond in time to the latest pottery), but may be considered instead as dating redeposited material of the earlier Ilusiones phase which had been gathered up in the course of mound construction. These seven dates, taken as a group, average ca. 150 B.C. which we are using as a more or less central date for the prevalent, but generally unstratified, Ilusiones phase pottery at Bilbao. Only GX-134 seems to be associated with a pure Ilusiones phase deposit (L.A.P.). Samples were coll. 1962 and 1963 by P. Jenson, S. Garrett and L. A. Parsons; subm. by L. A. Parsons, Milwaukee Public Mus., Milwaukee, Wisconsin.

**1350 ± 120**

**GX-123. Mound D-1, Santa Lucia phase A.D. 600**

Charcoal from layer of ash at base of upper structure. Ceramics 18% Santa Lucia phase, 55% Laguneta phase, remainder earlier. *Comment* (L.P.A.): upper part of the range, A.D. 600 to 700, seems correct for beginning of Santa Lucia phase.

**2070 ± 125**

**GX-131. Mound B-4, Santa Lucia phase 120 B.C.**

Charcoal from base of upper structure and just above the F-2 adobe floor. Ceramics: some Santa Lucia, much Laguneta and some Ilusiones. *Comment* (L.A.P.): sample must represent redeposited Ilusiones material.

**2075  $\pm$  230**

**GX-132. Monument Plaza, Santa Lucia phase** **125 B.C.**

Charcoal from 3 to 5 ft depth under center of W stairway and above F-8 adobe floor. Ceramics: 33% Santa Lucia and Laguneta, remainder earlier. *Comment* (L.A.P.): sample must represent redeposited Ilusiones material.

**2660  $\pm$  115**

**GX-135. Monument 19, Santa Lucia phase** **710 B.C.**

Charcoal from 20 in. below base of a plain altar stone in the front of Monument 19. Ceramics: almost exclusively Santa Lucia and Laguneta. *Comment* (L.A.P.): date is unacceptable considering the ceramic assemblage.

**1460  $\pm$  120**

**GX-124. Mound D-1, Laguneta phase** **A.D. 490**

Charcoal from mound fill near base of structure. Ceramics: Laguneta phase and earlier. *Comment* (L.A.P.): range of the standard deviation closely approximates our estimate for the span of Laguneta phase.

**2095  $\pm$  75**

**GX-125. Mound D-4, Laguneta phase** **145 B.C.**

Charcoal from mound fill near top of lower structure. Ceramics: 50% Laguneta and 50% Ilusiones or earlier. *Comment* (L.A.P.): sample must represent redeposited Ilusiones material.

**1865  $\pm$  110**

**GX-260. Mound C-2, Laguneta phase** **A.D. 85**

Charcoal from undisturbed mound fill. Ceramics: 75% Laguneta and 25% Ilusiones or earlier. *Comment* (L.A.P.): date must represent redeposited fill from Ilusiones phase.

**1690  $\pm$  110**

**GX-126. Mound C-2, Laguneta phase** **A.D. 260**

Charcoal from mound fill, 7 to 10 ft below summit. Ceramics; 10% Laguneta, remainder earlier. *Comment* (L.A.P.): date appears ca. 200 yr too early for associated structure and pottery.

**1560  $\pm$  120**

**GX-127. Mound C-2, Laguneta phase** **A.D. 390**

Charcoal from level 20 to 22 ft below summit, and below original acropolis surface. Just below base of mound. Ceramics: 50% Laguneta and 50% Ilusiones or earlier. *Comment* (L.A.P.): perfectly acceptable date for first stage of this mound and for the building of the Bilbao acropolis, as well as for inception of Laguneta phase at this site. Structural features of mound resemble Esperanza phase mounds at Kaminaljuyu.

**1990  $\pm$  115**

**GX-128. Mound B-4, Laguneta phase** **40 B.C.**

Charcoal from below and behind base of Monument 18, and 2.8 ft below F-2 adobe which abuts rear of monument. Ceramics: 30% La-

guneta and 70% Ilusiones phase. *Comment* (L.A.P.): sample must represent redeposited Ilusiones fill.

**1980 ± 420**  
**30 B.C.**

**GX-130. Mound B-4, Laguneta phase**

Charcoal from fill of mound just above sterile zone. Ceramics: 31% Laguneta and 69% Ilusiones or earlier phases. *Comment* (L.A.P.): sample probably belongs to redeposited fill from Ilusiones phase.

**145 ± 120**

**GX-133. Monument Plaza, Laguneta phase A.D. 1805**

Charcoal from 5 to 7 ft depth under E edge of W stairway. Ceramics: 24% Laguneta, remainder earlier. *Comment* (L.A.P.): this was possibly a disturbed area. The Monument Plaza was extensively explored in the late 1870's. At any rate date is unacceptable for the supposed context.

**2460 ± 130**  
**510 B.C.**

**GX-134. Mound A-2, Ilusiones phase**

Charcoal from base of E side, 8 to 10 ft and below the F-8 adobe floor. Ceramics: Ilusiones phase only. *Comment* (L.A.P.): upper limit (380 B.C.) seems most reasonable for the date of the deposit.

#### *E. Peru*

#### **Peru series**

Samples from various sites in Peru, coll. 1958 to 1964 by F. Engel and others; subm. by F. Engel, Universidad Nacional Agraria, Lima, Peru.

**3610 ± 80**  
**1660 B.C.**

**GX-202. Village 24, charcoal**

Charcoal fragments from Village 24, close to S bank of Chilca R., 4 km from Pacific, Central Coast of Peru (12° 30' 12" S Lat, 76° 44' 06" W Long). From Level 2 inside hut. *Comment* (F.E.): may date first appearance of Chavin culture on the Central Coast since refuse at the site has yielded typical Chavinoid pottery. See also GX-228 and GX-275 below.

**3330 ± 240**  
**1380 B.C.**

**GX-203. Chanapata**

Charcoal in soil from Site 1, Chanapata, in outskirts of Cuzco, Peru (13° 32' S Lat, 71° 58' W Long). From test pit. *Comment* (F.E.): should confirm early spreading of Chavin culture all over Peru.

**2280 ± 110**  
**330 B.C.**

**GX-217. Site 100, Chilca Canyon**

Charcoal from Site 100, a large stone and conical adobe pyramidal village atop Llapa Llapa (Ciudadela) hill, Chilca canyon, Peru (12° 33' 12" S Lat, 76° 44' 00" W Long). From Level 600 in testpit. *Comment* (F.E.): pottery found in this site is post-fired and has not yet been de-

scribed; this type also found in nearby Omas drainage and higher up in Chilca canyon. Date fits in with the conical adobes.

**GX-218. Site 514, Paracas**

**5890  $\pm$  145**

**3940 B.C.**

Vegetable stalks and leaves from Site 514, village of reed huts, Paracas area, Peru ( $13^{\circ} 51' 50''$  S Lat,  $76^{\circ} 15' 00''$  W Long). Found inside a hut. *Comment* (F.E.): may date end of pre-bean period on South Coast of Peru.

**GX-219. Shell Mound, Km 127**

**2785  $\pm$  75**

**835 B.C.**

Small shell fragments in soil from a shell mound in dry arroyo, Km 127, S of Pan American Highway, Peru ( $12^{\circ} 56' 09''$  S Lat,  $76^{\circ} 28' 57''$  W Long). *Comment* (F.E.): date too young; no cotton, no pottery at site; should date 4500 or more.

**GX-228. Village 24, Cloth A**

**2495  $\pm$  95**

**545 B.C.**

Coarsely woven cloth from same site as GX-202. *Comment* (F.E.): site yields Chavinoid pottery; date does not agree with GX-202 and GX-275 from same site.

**GX-245. Owl's Cave**

**530  $\pm$  105**

**A.D. 1420**

Wood and nuts from Owl's Cave site, Monzon R., near Tingo Maria, Peru ( $9^{\circ} 16' 30''$  S Lat,  $76^{\circ} 04' 24''$  W Long). *Comment* (F.E.): dates Lathrop's modeled incised Hupa-ya pottery, found inside pit; also would date "Monzon coarse ware" and "Cave of the Owls fine ware" if a stratigraphic test should be tempted with further carbon dating.

**GX-264. Site 20, Plataforme**

**7270  $\pm$  125**

**5320 B.C.**

Carbonized and powdered matting wrapping a body in a grave, Site 20, Plataforme, on the Centinela hill, S end of Lurin drainage, Peru ( $12^{\circ} 16' 12''$  S Lat,  $76^{\circ} 52' 42''$  W Long). From test pit in refuse. *Comment* (F.E.): dates one more of numerous villages of similar age.

**GX-271. Site 22**

**990  $\pm$  85**

**A.D. 960**

Coarse fabric from Site 22, a Chavin terraced platform, reoccupied during at least two further periods, close to modern cemetery of Lurin, Peru ( $12^{\circ} 16' 28''$  S Lat,  $76^{\circ} 52' 23''$  W Long). Cloth was wrapping a bundle in Grave 1. *Comment* (F.E.): should date "Huaca Malena" post-Tiahuanaco period of the Rimao, Lurin, and Omas Drainages.

**GX-275. Village 24, Cloth B**

**3510  $\pm$  70**

**1560 B.C.**

Coarsely woven cotton cloth from same site as GX-202. *Comment* (F.E.): village yields Chavin pottery. Date confirms GX-202, but GX-228 is much younger. Refuse is shallow and reoccupation seems unlikely.

*F. Europe*

**GX-393. Chassemy, France, La Tene Ia**

**2540 ± 60  
590 B.C.**

Fine charcoal in ashes from Chassemy (Aisne) France, "Le Saule Bailler" (54° 52' 12" N Lat, 1° 14' 25" E Long). Bottom of firepit in Bottom Hearth, Layer 5, resting on a sherd of La Tene I Plate (*assiente*), in a deposit relatively dated by other pottery to La Tene Ia, within the ground plan of a house. Coll. 1964 and subm. by R. M. Rowlett, Peabody Mus., Cambridge, Massachusetts. *Comment* (R.M.R.): estimated absolute dating by archaeological means would be 475 to 400 B.C. Date is somewhat older but agrees within two standard deviations.

*G. Africa*

**Northern Province, Sudan series**

Samples coll. 1964 by members of Univ. of Colorado Nubian Expedition; subm. by G. W. Hewes, Univ. of Colorado, Boulder, Colorado.

**GX-421. Site 11-I-16 shell**

**13,650 ± 300  
11,700 B.C.**

Shells of *Unio* sp. from Site 11-I-16, W bank Nile, S end Karagan Valley, Murshid W, N. Prov., Sudan (21° 39' N Lat, 31° 10' E Long). From compacted layer containing lithic implements and flakes of Upper Paleolithic facies, along with some fossilized bovid teeth and jaw fragments. Layer 20 to 30 cm thick and below 2 to 3 cm of windblown sand. *Comment* (G.W.H.): date accords well with age of lithic remains estimated by independent means, and with date for abandonment of old Nile Channel (see GX-422; Hewes, in press).

**GX-422. Karagan Valley Corbicula shells**

**12,970 ± 300  
11,020 B.C.**

Shells of *Corbicula* sp. from ancient western channel of Nile, W bank, near Murshid, N. Prov., Sudan (21° 42' N Lat, 31° 10' E Long). Found on or near a relict Nile silt surface, in original living position, valves upward and in conjunction. *Comment* (G.W.H.): date of these shells should indicate date of abandonment by R. Nile of this high western channel, after which river did not again reach this elevation. Date agrees with several other molluscan shell dates from similar high terraces or channels (see Hewes, in press).

**GX-423. Site 11-I-16, charcoal**

**4935 ± 130  
2985 B.C.**

Charcoal from same site as GX-421, from hearths in living surface area, 25 to 30 cm below surface, associated with plain potsherds, quartz implements, and some animal bones. *Comment* (G.W.H.): clear association with late Neolithic cultural level including pottery, animal bones, crude quartz implements, and some ground stone milling implements. Agrees with expectations (see Hewes, in press; Carlson, in press).



**GX-445. Site 6-8-36, Wadi Halfa, bone****6485 ± 160  
4535 B.C.**

Fossil bone from Site 6-B-36 burials, 2.5 km W of Nile R., opposite Wadi Halfa, Sudan (21° 57' 28" N Lat, 31° 19' 10" E Long). From deliberate burials in two adjacent grave areas, with living site debris intermixed; animal bones (bovine) and epipalaeolithic stone tools associated. *Comment* (G.W.H.): chipped stone tools of an epipalaeolithic facies, with some ground stone milling implements are in association. Reported date seems 2000 to 3000 yr too recent. *Comment* (H.W.K.): date is on the carbonate fraction of bone in part permineralized. Our experience indicates that this is a minimum age. See also Hewes *et al.* (1964); Saxe (in press).

**Engaruka series, Tanzania**

Samples from sites at Engaruka, W side of Rift Valley, Tanzania (2° 59' S Lat, 35° 57' E Long. Coll. 1964 and subm. by H. Sassoon, Dar Es Salaam, Tanzania.

**GX-247. Stone circle, ci****490 ± 90  
A.D. 1460**

Charcoal from 45 cm below surface associated with pottery and animal bones in 30 ft stone circle. *Comment* (H.S.): subsequent study showed that deposits had been much disturbed, possibly by treasure seekers.

**GX-347. Hillside A2-A3****1230 ± 120  
A.D. 720**

Charcoal from 45 cm below surface of terrace platform on hillside; associated with some potsherds. *Comment* (H.S.): unexpectedly early; should not be accepted until confirmed.

**GX-348. Hillside, A2-A4****1620 ± 90  
A.D. 330**

Charcoal from 60 cm below surface of terrace platform on hillside. *Comment* (H.S.): unexpectedly early; should not be accepted until confirmed.

**GX-224. Prospect Farm, Kenya****10,560 ± 1650  
8610 B.C.**

Small sample of charcoal from Prospect Farm, Elmenteita, Kenya (0° 35' 30" S Lat, 36° 10' 03" E Long). Locality II, Trench 1, 14 to 20 in. below surface; associated with stone tools of Kenya Capsian Industry in volcanic tuff. Coll. 1964 and subm. by B. W. Anthony, Peabody Mus., Cambridge, Massachusetts. *Comment* (B.W.A.): this is first date on a Kenya Capsian horizon.

**GX-267. Peers Cave, So. Africa****>35,600**

Charcoal from Peers Cave, Fish Hoek, Cape Province, South Africa (34° 07' 11" S Lat, 18° 24' 52" E Long). Associated with "Stillbay" assemblage in cave earth at depth of 72 in. Coll. 1963 and subm. by B. W. Anthony. *Comment* (B.W.A.): first date from new excavations.

**GX-398. Kilwa I, Tanzania** **1825 ± 110**  
**A.D. 125**

Charcoal from Kilwa Kisiwani, Tanzania (8° 57' S Lat, 39° 31' E Long). From lower strata, pre-Shirazi settlement. Coll. 1964 and subm. by H. N. Chittick, British Inst. Hist. and Archaeol. E. Africa, Nairobi. *Comment* (H.N.C.): date too early. Deposit unlikely to be earlier than 9th century A.D.

*H. Japan*

**Hokkaido, Japan series**

Samples from sites on Hokkaido; coll. 1963 and 1964 by T. Oba; subm. by C. S. Chard, Univ. of Wisconsin, Madison, Wisconsin.

**GX-281. Omagari Cave** **6795 ± 150**  
**4845 B.C.**

Charcoal from Omagari cave, W of Abashiri, Hokkaido, Japan (44° 00' N Lat, 144° 15" E Long). In layer of ash associated with tsunamon type pottery. *Comment* (C.H.C.): provides date for tsunamon style (ropemarked) pottery, considered to be one of the very early wares of Hokkaido. Date consistent with this.

**GX-282. Rankoshi site** **1215 ± 85**  
**A.D. 735**

Charcoal from Rankoshi, Chitose site, Hokkaido, Japan (42° 45' N Lat, 141° 40' E Long). House pit No. 1 assigned to Satsumon culture. *Comment* (C.H.C.): extends time range of Satsumon culture, the latest prehistoric culture on Hokkaido. Prior dates centered around 900 to 1000 B.P.

**GX-283. Eniwa site** **1520 ± 65**  
**A.D. 430**

Charcoal from Eniwa, Chitose County, Hokkaido, Japan (42° 47' N Lat, 141° 37' E Long). House pit No. 1 assigned to Satsumon culture. *Comment* (C.H.C.): see GX-282.

*I. Pacific Islands*

**GX-394. Kipuka Ki, Hawaii** **2170 ± 200**  
**220 B.C.**

Disintegrated charcoal and ash from 70 cm depth, Kipuka Ki, Hawaii Volcanoes Natl. Park (19° N Lat, 155° W Long). Coll. 1965 by D. Mueller-Dombois; subm. by D. L. Hamilton, Hawaii Volcanoes Natl. Park, Hawaii.

**GX-276. Maupiti burial No. 6** **760 ± 90**  
**A.D. 1190**

Human bone from burial on Paeao Is., Maupiti, Fr. Polynesia (16° 27' 30" S Lat, 152° 11' 40" W Long). Site No. Ma3 burial 6, female from a multiple burial associated with adzes. Coll. 1963 by Y. Sinoto; subm by K. P. Emory, Bishop Mus., Honolulu, Hawaii, *Comment* (K.P.E.): this clearly prehistoric burial ground produced adzes, fishhooks, and orna-

ments as well as 15 burials. Adzes were clearly prototypes of modern adzes while shaped whale-tooth ornaments were identical to those found in Wairau Bar burials in New Zealand. See Emory and Sinoto (1964).

## REFERENCES

## Date lists:

- |                     |  |
|---------------------|--|
| Geochron I          | Krueger and Weeks, 1965                |
| GSC II              | Dyck and Fyles, 1963                   |
| Texas Bio-Nuclear I | Chandler, Kinningham and Massey, 1963  |
| USGS V              | Rubin and Alexander, 1960              |
| USGS VII            | Ives, Levin, Robinson, and Rubin, 1964 |
| Yale IV             | Deevey, Gralenski, and Hoffren, 1959   |
- Carlson, R., in press, Report on a late occupation surface, Site 11-I-16: KUSH, v. 14.  
 Chandler, J. B., Kinningham, R., and Massey, D. S., 1963, Texas Bio-Nuclear radiocarbon measurements I: Radiocarbon, v. 5, p. 56-61.  
 Clayton, M. V., 1965, Bluff shelter excavations on Sand Mountain: Jour. Alabama Archeol., v. 11.  
 Coe, M. D., 1961, La Victoria, an early site on the Pacific coast of Guatemala: Papers, Peabody Museum, v. 53.  
 Deevey, E. S., Gralenski, L. J., and Hoffren, V., 1959, Yale natural radiocarbon measurements IV: Radiocarbon, v. 1, p. 144-172.  
 DeJarnette, D. L., Kurjack, E. B., and Cambron, J. W., 1962, Stanfield-Worley bluff shelter excavations: Jour. Alabama Archeol., v. 8.  
 Dyck, W., and Fyles, J. G., 1963, Geological Survey of Canada radiocarbon dates II: Radiocarbon, v. 5, p. 39-55.  
 Emory, K. P., and Sinoto, Y. H., 1964, Eastern Polynesian burials at Maupiti: Jour. Polynesian Soc., v. 73, p. 143-160.  
 Hewes, G. W., in press, Preliminary report on prehistoric sites in Batn el Hagar, Republic of Sudan, University of Colorado Nubian Expedition, 1964-65 season: KUSH, v. 14.  
 Hewes, G. W., Irwin, H., Papworth, M., and Saxe, A., 1964, A new fossil human population from the Wadi Halfa area, Sudan: Nature, v. 203, p. 341-343.  
 Ives, P. C., Levin, B., Robinson, R. D., and Rubin, M., 1964, U. S. Geological Survey radiocarbon dates VII: Radiocarbon, v. 6, p. 37-76.  
 Kaye, C. A., and Barghoorn, E. S., 1964, Late Quaternary sea-level change and crustal rise at Boston, Massachusetts, with notes on the autocompaction of peat: Bull. Geol. Soc. Am., v. 75, p. 63-80.  
 Kidder, A. V., Jennings, J. D., and Shook, E. M., 1946, Excavations at Kaminaljuyu, Guatemala: Carnegie Inst. Washington Pub. 561, 248 p.  
 Krueger, H. W., in press, The preservation and dating of collagen in ancient bones: Proc. Internatl. C-14 and H-3 Dating Conference, Pullman, Washington, June 1965.  
 Krueger, H. W., and Weeks, C. F., 1965, Geochron Laboratories, Inc. radiocarbon measurements I: Radiocarbon, v. 7, p. 47-53.  
 Parsons, L. A., de Borhagyi, S. F., Jenson, P. S., and Ritzenthaler, R., 1963, Excavaciones en Bilbao, Santa Lucia Cotzumalhuapa, Guatemala: Informe Preliminar: Antro. e Hist. Guatemala, v. 15, p. 3-14.  
 Péwé, T. L., 1965, Guidebook for Field Conference F, Central and South Central Alaska: INQUA, 141 p.  
 Rubin, M., and Alexander, C., 1960, U. S. Geological Survey radiocarbon dates V: Am. Jour. Sci. Radioc. Supp., v. 2, p. 129-185.  
 Saxe, A., in press, Preliminary report on a fossil man site near Wadi Halfa, Republic of the Sudan: KUSH, v. 14.  
 Shook, E. M., and Kidder, A. V., 1952, Mound E-III-3, Kaminaljuyu, Guatemala: Carnegie Inst. Washington Pub. 596.  
 Thompson, J. E. S., 1948, An archaeological reconnaissance on the Cotzumalhuapa region, Escuintla, Guatemala: Carnegie Inst. Washington Pub. 574.  
 Westgate, J. A., 1965, The Pleistocene stratigraphy of the Foremost-Cypress Hills area, Alberta: Alberta Soc. Petrol. Geol. 15th Ann. Field Conference Guidebook, p. 85-111.  
 Wilson, R. L., in press, Excavations at the Mayport Mound, Florida: Cont. Florida State Mus.