

Radiocarbon

1964

UNIVERSITY OF MICHIGAN RADIOCARBON DATES IX

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The following is a list of dates obtained since the time of the compilation of List VIII in December 1962. The method is essentially the same as that used for the work described in the previous list. Two $\text{CO}_2\text{-CS}_2$ Geiger counter systems are used. The equipment and counting techniques have been described elsewhere (Crane, 1961a, 1961b). The dates and the estimates of error in this list follow the practice recommended by the International Radiocarbon Dating Conference of 1962, in that (a) dates are computed on the basis of the Libby half life, 5570 years, (b) A.D. 1950 is used as the zero of the age scale and (c) the errors quoted are the standard deviations obtained from the numbers of counts only. In previous Michigan date lists up to and including VII we have quoted errors at least twice as great as the statistical errors of counting, in order to take account of other errors in the over-all process. If the reader wishes to obtain a standard deviation figure which will allow ample room for the many other sources of error in the dating process, we suggest he double the figures that are given in this list. Where there is no comment, it is because the submitter of the sample had none to make.

We wish to acknowledge the help of Patricia Dahlstrom in preparing chemical samples and Roscoe Wilmeth in preparing the descriptions. The descriptions and comments are essentially those of persons submitting the samples.

SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

M-355. Shell Point, Florida

1550 $\pm$ 250
A.D. 400

Plant material, *Spartina alterniflora*, from Shell Point (30° 02' N Lat, 84° 22' W Long), Wakulla Co., Florida. Area is a salt marsh meadow covered with *Distichlis*. First 3 ft of soil contain only *Distichlis* rhizome peat. Below this, a narrow layer of *Juncus* peat, above a layer containing only *Spartina alterniflora* and 5 ft deep. Marsh ends at depth of 4.5 ft with light-colored clean sand below. Sample from upper 2 or 3 in. of sand layer. Site at that time probably emerging barrier ridge, or possibly edge of meandering tidal channel eroding into bordering flatwoods (Kurz and Wagner, 1957). Coll. 1954 by K. A. Wagner and Herman Kurz; subm. by K. A. Wagner, Powell Laboratories Division, Carolina Biological Supply Co., Gladstone, Oregon. *Comment*

(K.A.W.): date yields aggradation rate of 3.48 in./100 yr. Artifacts from a Fort Walton shell midden in same general area, suggested a rate of 1 in./60 yr.

M-1252. Ontonagon Beach Site, Michigan

**5990 $\pm$ 200
4040 B.C.**

Wood fragments, one with bark (aspen?) from a Lake Superior beach (46° 52' 36" N Lat, 89° 18' 40" W Long) in NW ¼ Sec. 30, T52N, R39W, on the E side of Ontonagon, Ontonagon Co., Michigan. Sample from a well in the beach, 75 ft from water's edge and 8 ft above level of Lake Superior, obtained at well depth of 35.5 ft. Drilling encountered 22 ft of sand, 13 ft of clay, wood (the sample), 11 ft of sand, 1 ft of clay, more wood, 13 ft of sand, and more wood. Wood at depths of 48 ft and 61 ft insufficient for collecting. Sample indicates a change in water level of Lake Superior of at least 30 ft, due either to uplift of N shore or a low stage in the lake's history. Coll. 1961 and subm. by A. E. Slaughter, Michigan Dept. of Conservation.

M-1344. Challenger Bank, Bermuda

**485 $\pm$ 100
A.D. 1465**

Coralline algal ball with marine shell inclusions from Challenger Bank (32° 07' 42" N Lat, 65° 03' 42" W Long), in 54.5 m of water, off Bermuda. Algal balls form dominant bottom feature on off-shore banks and at 50 to 60 m depth around Bermuda. Date permits estimate of rate of growth of algae and of productivity of area (Frederick, 1963). Coll. 1960 and subm. by J. J. Frederick, Dept. of Botany, Univ. of Michigan. *Comment* (J.J.F.): date indicates growth rate of approx. 100 mu/yr, which agrees with estimates based on thickness of the discontinuous layers. Also indicates that algal balls are not necessarily Pleistocene, but may be modern.

M-1402. Scotts Musk Ox, Michigan

**11,100 $\pm$ 400
9150 B.C.**

Fourth lumbar vertebra of *Symbos cavifrons* from Scotts (42° 12' N Lat, 85° 25' W Long), Sec. 25, T3S, R10W, Kalamazoo Co., Michigan. From marl deposit, uncovered in excavation. Associated with fossil pollen and fossil invertebrates. Specimen, consisting of complete skull and numerous post-cranial elements, loaned to Mus. of Paleontology, Univ. of Michigan, for study. Lumbar vertebra donated for C¹⁴ analysis by A. A. Praus, Director, Kalamazoo Public Mus. (see Hibbard and Hines, 1960). Coll. 1961 by R. D. Struble, Jr.; subm. by C. W. Hibbard, Univ. of Michigan. *Comment* (C.W.H.): date agrees with earlier predictions (Semken, Miller, and Stevens, ms.).

II. ARCHAEOLOGIC SAMPLES

A. Upper Mississippi Valley and Great Lakes

M-1343. Casey's Mound Group (13WB6), Iowa

**785 $\pm$ 100
A.D. 1165**

Bone from Casey's Mound Group (42° 20' N Lat, 94° 01' 20" W Long), NW ¼ SE ¼ Sec. 20, Webster Township, Webster Co., Iowa. From adult female burial in a sub-floor pit 15 in. below original ground level in conical mound. Two flexed burials in this mound with red ochre, *Marginella* shells, and two conch shell tablets in association. Pit excavated to natural sand stratum.

Neighboring mound contained bundle burial associated with a Great Oasis vessel (Flanders, 1963). Coll. 1961 by R. E. Flanders; subm. by Flanders for Marshall McKusick, State Univ. of Iowa. *Comment* (R.E.F.): close to date expected as representative of Late Woodland in NW Iowa.

Hilltop Site (23SC50) series, Missouri

Charcoal from Hilltop Site (38° 48' N Lat, 90° 29' W Long), St. Charles Co., Missouri. From pits containing sherds and numerous artifacts. Should give date for the Late Woodland occupation in the St. Charles area, as well as confirm the date of M-619 (Michigan V, p. 36). Coll. 1956 by Leonard Blake; subm. by J. M. Shippee, Univ. of Missouri.

M-620. Hilltop Site, Excavation Unit Pit D **930 ± 100** **A.D. 1020**

Charcoal from lower 10 in. of Excavation Unit Pit D, bell-shaped, extending from 18 in. to 38 in. below the surface. The flat, roughly oval bottom measured 4 ft by 5 ft. Associated material included a cord-marked restorable pot with subconical base, and rim sherds of 15 or more pots, generally large and heavy, cord-marked and tempered with clay or shale and some grit. Sherds usually very hard, with square fracture, while others flake badly. Wood id. by R. Yarnell, Mus. of Anthropology, Univ. of Michigan, as white oak group, red oak group, and hickory.

M-621. Hilltop Site, Excavation Unit Pit E **1180 ± 100** **A.D. 770**

Charcoal from Excavation Unit Pit E, 24 ft from Pit D, extending from 19 to 27 in. below the surface. Sherds recovered similar to those from Pit D. Wood id. by R. Yarnell as red oak group and white oak group.

General Comment (J.M.S.): questionable that Pit D is this much later than Pit E and Pit A (M-619), as cultural material in all three was similar. Date for Pit D seems too late for this complex in view of other evidence.

M-1214. Aztalan, Wisconsin **580 ± 100** **A.D. 1370**

Charcoal from Aztalan (43° 04' N Lat, 88° 55' W Long), Jefferson Co., Wisconsin. From Pit 10, in the NE quadrangle of the village area. Coll. 1960 by Lee Parsons; subm. by S. F. de Borhegyi, Milwaukee Pub. Mus. *Comment* (S.F.B.): date appears reasonable in the light of others obtained at this site.

M-515. North Site, Illinois **1060 ± 100** **A.D. 890**

Charcoal from tomb at the North Site (38° 35' N Lat, 89° 21' W Long), 2 mi N of Posey on SE bank of Kaskaskia River, Clinton Co., Illinois. Sample taken from remains of fired log tomb in small mound ca. 3 ft high, 25-30 ft in diam. Tomb probably 1 ft high, 6 to 8 ft in diam. In the center of the tomb were a large copper adze, two sheets of mica 6 and 8 in. in diam, and a small copper awl. In another mound of this group a bone and stone gorget, platform pipe, and human bone fragments from several burials were found. Coll. by R. North and G. Perino; subm. by G. Perino, Thomas Gilcrease Foundation. *Comment* (G.P.): this is an extremely late Hopewell site but should not be as late as the C date indicates. Investigator cannot account for the apparent error.

Stilwell Site series, Illinois

Wood charcoal from the Stilwell Site, Pk-18 (39° 29' 8" N Lat, 90° 36' 6" W Long), SE ¼ SE ¼ Sec. 3, T7S, R2W, Pike Co., Illinois. From redepositional fill in storage-refuse pits yielding pottery of the recently defined Apple Creek Series. Excavations at the type site (8 mi from Stilwell) by S. Struever during 1962 and 1963 provide basis for recognition of the Apple Creek Phase, lower Illinois Valley expression contemporaneous with Weaver in the central Illinois Valley. Vessel forms and the relationship of decorative elements on the exterior of Apple Creek vessels duplicate those of earlier Hopewell Series. These and other stylistic carry-overs indicate that Apple Creek, like Weaver, immediately post-dates the Classic Havana (i.e., "Hopewell") Phase. Estimated dates for the Apple Creek Phase are A.D. 350 to 600.

Stilwell is habitation site in which 22 pits were excavated. Besides the Apple Creek component, a later Jersey Bluff manifestation occurs at the site. Coll. 1961 and subm. by S. Struever, Univ. of Chicago.

M-1262. Stilwell Site, Illinois

1330 ± 120
A.D. 620

Wood charcoal from Feature #9, a storage-refuse pit beginning at 14 in. below ground surface, continuing to depth of 52 in. below ground surface. Pit circular, 40 in. in diam. Sample from lower 18 in. of pit fill.

M-1263. Stilwell Site, Illinois

1550 ± 120
A.D. 400

Wood charcoal from Feature #14, a storage refuse pit beginning at 12 in. below surface, continuing to depth of 42 in. below surface. Roughly circular, 44 in. in diam. Sample from pit fill at depth of 18 to 30 in. below ground surface.

General Comment (S.S.): both dates fall within the estimated time span of the Apple Creek Phase.

M-1307. Fill Site (20B2-5), Illinois

720 ± 100
A.D. 1230

Charred wall post (IAS-30) from Fill Site (38° 45' 24" N Lat, 90° 05' 30" W Long), Madison Co., Illinois. Found during scraper operations along S shore of Long Lake, associated with pottery at a depth of approx. 50 to 80 cm below the surface. Exact provenience data unavailable. Should be equivalent to sample M-1301 from the same site (Michigan VIII, p. 232) and help to date the maximum expansion of Middle Mississippian in the Mitchell area. Coll. 1960 and subm. by James Porter, Southern Illinois Univ. *Comment* (J.P.): difference in dates for M-1307 and M-1301 (910 ± 150; Michigan VIII, p. 232) suggests possibility of greater time depth at Fill Site than was anticipated on the basis of other evidence. Maximum and final expansion in the Mitchell area should come sometime after M-1301 date. Occupation at Fill Site, even if two phases present, still regarded as short, the differences in the dates being accounted for by the range in error.

Cahokia Site series, Illinois

Charred wood and wood fragments from the Cahokia Site (38° 39' N Lat, 90° 03' 57" W Long), Madison Co., Illinois (Fowler, ed., 1962, p. 15-30, 52-57). Coll. 1960-1961 and subm. by W. L. Wittry, Illinois State Mus.

M-1332. Cahokia Site, Tract 15B, House 43 515 ± 100
A.D. 1435

Charred wood (IAS-1) from timbers on floor of House 43, at 1.3 ft below surface and 0.4 ft below plow zone. Late (?) Mississippian.

M-1333. Cahokia Site, Tract 15B, House 44 825 ± 100
A.D. 1125

Charred wood (IAS-2) from central floor area of House 44, at 1.8 ft below surface and 0.9 ft below plow zone. "Bluff" Culture.

M-1334. Cahokia Site, Tract 15B, House 59 385 ± 90
A.D. 1565

Charred wood (IAS-3) from floor of House 59, at 1.7 ft below surface and 0.8 ft below plow zone. Late (?) Mississippian.

M-1335. Cahokia Site, Tract 15B, House 77 765 ± 200
A.D. 1185

Charred wood (IAS-4B) from House 77, floor level to 1.0 ft above. "Bluff" Culture.

M-1336. Cahokia Site, Tract 15B, House 113 885 ± 200
A.D. 1065

Charred wood (IAS-5B) from House 113, 5 ft test square 280 L 285, 1.0 to 1.5 ft below plow zone. "Bluff" Culture.

M-1337. Cahokia Site, Tract 15A, House 2 805 ± 100
A.D. 1145

Charred wood (IAS-6) from burned posts in wall trench of House 2. Late Mississippian.

M-1338. Cahokia Site, Tract A, House 32 725 ± 100
A.D. 1225

Charred wood (IAS-7) from 0.2 ft above floor of House 32, at 1.7 ft below surface. Mississippian.

M-1339. Cahokia Site, Tract A, House 35 685 ± 100
A.D. 1265

Charred wood (IAS-8) from 0.3 ft above floor of House 35, at 1.7 ft below surface. Late (?) Mississippian.

M-1340. Cahokia Site, Tract 15A, House 74 1025 ± 100
A.D. 925

Charred wood (IAS-9) from House 74, floor level to 0.3 ft above floor, at 1.2 to 1.5 ft below surface. "Bluff" Culture.

M-1341. Cahokia Site, Tract 15A 905 ± 120
A.D. 1045

Combined sample of charred wood and wood fragments from fill of Feature 174 (IAS-10A), at 0.9 to 2.3 ft below surface, and fill of Feature 134 (IAS-10B), at 0.9 to 3.9 ft below surface. Both features are post pits from a circle 480 ft in diam. Probably Early Mississippian.

General Comment (W.L.W.): Late Woodland "Bluff" Culture apparently survived quite late in the Monk's Mound area, at a time when the Powell Mound area and the Mitchell Site area were occupied by Mississippians. M-1341 is most interesting date, since it indicates that huge circles, of which four were located partly on Tract 15A, were one of the earliest forms of ceremonialism

at Cahokia and probably antedate most of the mound-building activities. See also comment in Fowler (ed., 1962, p. 56-57).

M-1355. Klunk Mound 8, Illinois

**1350 ± 110
A.D. 600**

Wood charcoal, id. by R. Yarnell as white oak group, from Klunk Mound 8 (39° 12' 35" N Lat, 90° 32' 48" W Long), Calhoun Co., Illinois. From Crematory B, situated on a low platform of earth, 12 to 16 in. high, constructed in Mound 8 between primary Mounds A and B. Mounds A and B subsequently covered with 2 ft secondary cap which created a linear mound. Crematory B rectangular, 9.5 ft long and 7 ft wide. At each end of crematory floor lay carbonized logs; sample part of northernmost log. On fire-reddened crematory floor lay charred remains of disarticulated skeleton. Dating essential for placing this phase of Late Woodland Complex in its proper sequence. Few artifacts recovered from Mound 8 indicate Late Woodland group existing between disappearance of Hopewell and before advent of Mississippian-influenced Late Woodland groups such as the Jersey Bluff Culture. Mound 8 and its 32 burials appear to belong to an early Late Woodland group. Few potsherds recovered belong to "Canteen Wares" category. None of the brighter Jersey Bluff pottery was found (see Titterington, 1935, 1942; Fowler, 1953; Shalkop, unpub.). Coll. 1961 and subm. by Gregory Perino, Thomas Gilcrease Foundation. *Comment* (G.P.): date also significant in that it tends to date earliest common use of bow and arrow. Crematory A, Mound 8, contained charred flexed male burial with grave goods including a burned side-notched arrow head made from an edge-retouched flake. With another of the 32 burials under the mound were found Late Hopewell-like large projectile points and a barbed stemmed variety, as well as a vertical-handle type pipe common to the later Jersey Bluff foci.

M-772. Riverside Cemetery, Michigan

**1300 ± 200
A.D. 650**

Charcoal from Riverside Cemetery (45° 15' N Lat, 87° 44' W Long), Menominee Co., Michigan. From Feature 10, a burial, possibly flexed, well below old soil zone. No trace of pit above. Recognizable mandible fragment and probably part of a long bone. Faint stain of ochre, 1 ft by 2 ft, seems to have been placed on top of bone. Few scraps of copper associated. Possibly disturbed by excavation of Feature 9. Coll. 1957 by A. C. Spaulding; subm. by J. B. Griffin, Univ. of Michigan. *Comment* (J.B.G.): date indicates this burial associated with the Late Woodland occupation at the site.

Lookout Site series, Michigan

Charcoal from the Lookout Site, 20IR30 (48° 9' 34" N Lat, 88° 29' 17" W Long), on Greenstone Ridge, Isle Royale, Keweenaw Co., Michigan. From fill of Pit 56, a prehistoric copper mine. Fill thought to have accumulated through natural processes after mine was abandoned, so age of mining activity exceeds that of the fill. In order to have an adequate sample of charcoal from as low a level as possible, several samples coll. from various places in the fill in the lower part of the pit were combined. Coll. 1961 and subm. by Tyler Bastian, Univ. of Utah.

M-1275c. Lookout Site, Michigan **2800 ± 120**
850 B.C.

Charcoal from Pit 56, 3.2 to 3.4 ft below highest edge of mine.

M-1275d, e, f, g. Lookout Site, Michigan **4110 ± 130**
2160 B.C.

Charcoal (combined sample) from Pit 56, 3.4 to 5.1 (bottom of mine) ft below highest edge of mine.

General Comment (T.B.): dates similar to those from Pit 25 at the Minong Site on Isle Royale (Michigan I: M-320, M-371e, p. 668-669; USGS III: W-291, p. 447). Mines presumably supplied some of the copper used in the Old Copper complex of the Upper Great Lakes Region. Pit 56 described by Bastian (1963, p. 21-24 & fig. 2, Pl. 1a-c). Pit 25 described by Drier (1961).

Angel Site series, Indiana

Charcoal and shell from the Angel Site (37° 57' N Lat, 87° 28' W Long), Vanderburgh Co., Indiana. Site almost completely homogeneous culturally and chronologically, and may be considered a classic example of Middle Mississippi (Black, 1944). Coll. 1941 and subm. by G. A. Black, Indiana Hist. Soc.

M-2. Angel Site, Mound F, 4 ft below upper surface **1340 ± 120**
A.D. 610

Charcoal (Sample Md. F/408) from depth of 4 ft below upper surface of Mound F, in Block 13-R-4, included in the mound during process of constructing the secondary mantle.

M-4. Angel Site, Mound F, pit in primary mound **530 ± 100**
A.D. 1420

Charcoal (Sample Md. F/4489) from mass of charred organic and vegetable material found in a pit inclusive within the top of the primary mound. Pit inside S room of large building formerly standing on top of primary mound, burned prior to laying down of secondary mantle. Material should date from time of burning of this structure.

M-9. Angel Site, Mound F, primary surface **1980 ± 130**
30 B.C.

Shell (Sample Md. F/1932) removed from primary surface of Mound F, Block 8-R-5.

M-5. Angel Site, village area, house wall trench **580 ± 100**
A.D. 1370

Charcoal (Sample W 10 D/8058) from house wall-trench in village area, Block O-R-1. Trench one of several representing repeated rebuilding of dwellings on approx. the same spot. These could not be separated chronologically, but were all Middle Mississippi.

M-7. Angel Site, village area, house wall trench **760 ± 100**
A.D. 1190

Charcoal (Sample W 11 A/14159) from dwelling wall trench in village proper. Situation similar to that of M-5.

M-10. Angel Site, village area **1850 $\pm$ 120**
A.D. 100

Shell (Sample W 11 A/2738) from Block 9-R-5 within the 0.4 to 0.8 ft cut in the village area.

General Comment (G.A.B.): dates were expected to be approx. the same. M-5 could be from later structure than M-7, but there is no evidence. M-7 looks a bit early compared with M-4 and M-5, but is not too badly out of line. M-4 appears the most realistic, M-2 to be completely unrealistic. Dates for M-9 and M-10 probably reflect the unreliability of shell. *Comment* (J.B.G.): these early Michigan dates run with carbon black were not consistent and were withheld pending clarification. Additional material from the Angel site will be run in the future.

M-467. Canter Caves, Ohio **330 $\pm$ 200**
A.D. 1620

Dessicated (not charred) corn cobs from Canter Caves (39° 8' N Lat, 82° 41' W Long), NW $\frac{1}{4}$ Sec. 36, Jackson Township, Jackson Co., Ohio. Occurrence and stratigraphic position unknown. Corn described by V. H. Jones: 8-, 10-, and 12-row ears, mostly short and thick. Most show elliptical cross section, a characteristic of Basketmaker corn of the Southwest. Some influence of Eastern Complex corn is also evident. Site described in Shetrone (1928). Coll. 1925 by G. N. Miller; subm. by Raymond Baby, Ohio State Mus. *Comment* (V.H.J.): the date and somewhat "primitive" nature of the corn are not consistent and reconcilable. The corn shows only a dilute influence of Eastern Complex, which should be dominant in Ohio by the date derived. Basketmaker influence on corn should be assimilated by this late date into the Eastern Complex, which is closely associated with the Mississippi Pattern.

B. Lower Mississippi Valley and Southeast

M-582. Williams Island, Tennessee **330 $\pm$ 75**
A.D. 1620

Charred ordinary beans (*Phaseolas vulgaris*) contained in the dirt in a shell-tempered plain-surface bowl from a site on Williams Island (35° 5' N Lat, 85° 22' W Long), Hamilton County, Tennessee. Vessel and its contents given by Earl C. Townsend, Jr., to J. B. Griffin in May 1955. Date of collection of vessel not known. Subm. by J. B. Griffin, Univ. of Michigan. *Comment* (J.B.G.): the low bowl has a short, sharply flaring, and almost horizontal rim. It is a late Mississippi vessel and the date is reasonable.

Stanfield-Worley Shelter series, Alabama

Charcoal from the Stanfield-Worley Shelter, Ct^c125 (34° 39' N Lat, 87° 53' W Long), W center of SE $\frac{1}{4}$ Sec. 34, T4S, R13W, Colbert Co., Alabama. Dating of charcoal will give information on the cultural assemblage in the level represented, which includes Dalton projectile points, Big Sandy side-notched #1 points, Cumberland unfluted projectile points, and blade-type tools (DeJarnette, Kurjack, and Cambron, 1962). Coll. 1960 and subm. by D. L. DeJarnette, Univ. of Alabama.

M-1152. Stanfield-Worley Shelter, 55 in. depth **9640 $\pm$ 450**
7690 B.C.

Charcoal from Square 130 R 3, depth 55 in., in enclosed stratum which has been designated as the "Dalton" level.

M-1153. Stanfield-Worley Shelter, 44 in. to 55 in. depth **8920 $\pm$ 400**
6970 B.C.

Charcoal from Squares 130 R 1 through 130 R 7, depth 44 in. to 55 in., which also is designated as the Dalton level.

General Comment (D.L.D.): the lowest occupational layer at the Stanfield-Worley Bluff Shelter, a stratified multicomponent site, was dated by the above. Layer was dark black in color, contrasting with the sterile zone below and a silt-like sterile deposit above. Contained numerous uniface tools, side and end scrapers, graves and spokeshaves, as well as projectile points of two major styles: Meserve-Dalton and the side-notched, basally ground Big Sandy I point. This earliest occupation can be considered a post-fluted-point and pre-shell-mound Archaic manifestation.

M-1215a. Mandeville Site, Georgia **1530 $\pm$ 120**
A.D. 420

Charcoal from the Mandeville Site (31° 40' N Lat, 85° 05' W Long), Clay Co., Georgia. From Feature 5, Mound B. Feature 5, 4.5 ft above mound base and slightly W of final mound (upper area of mound destroyed by bulldozer), was an oval area of charcoal-stained sand with max length of 5.4 ft and width of 3.0 ft. Major association was redeposited human cremation (single individual) with charred wood from crematory fire. Probably incorporated in Phase III (of 4 major additions to mound). Associated artifacts, deposited subsequent to cremation, included 9 ground stone celts; large chipped stone "spade"; 13 bicornal copper spoons, one of which was covered with meteoric iron; 4 to 5 lbs. of galena; and several sherds, 3 check-stamped and 2 plain. Artifacts should relate to Mandeville II as defined in Mound A, regarded as representing Late Hopewell time level as determined for Illinois. Coll. 1960 and subm. by A. R. Kelly, Univ. of Georgia. *Comment* (J. H. Kellar): date received quite consistent with above conclusion. M-1044, Mound A, Layer III, Swift Creek occupation, Mandeville II, gave a date of 1420 $\pm$ 150 B.P. (A.D. 530); M-1045, Mandeville II, Mound A, gave a date of 1460 $\pm$ 150 B.P. (A.D. 510) (Michigan VII, p. 190).

M-1209. Yough Hall Plantation, South Carolina **3770 $\pm$ 130**
1820 B.C.

Oyster shell from Yough Hall Plantation (32° 51' N Lat, 79° 47' 32" W Long), Porcher's Bluff, Charleston Co., South Carolina. Associated with pre-Deptford and post-Fiber-tempered wares, from a late shell ring, the northernmost and probably latest of these structures. Sample should be Terminal Archaic. Shell rings are earliest structures on south Atlantic coast suggesting group ceremonial activity, and probably involved northward movement of a single population from the earliest and southernmost sites on Sapelo Island, Georgia. Site first described by Gregorie (1925). Coll. 1960 and subm. by A. J. Waring, Jr., Savannah, Georgia. *Comment* (A.J.W.): this is my Awendaw Complex and is related to but not identical to the Thoms Creek Ceramic Com-

plex (Griffin, 1945). Either the date is too early, or there is a previously unrecognized focus on the South Atlantic seaboard. Pottery is sand-tempered and coil-made. Coils are narrow fillets laid against each other like clap-boarding. Decoration almost universally by finger—pinching, gouging, and jabbing. Bare minimum of punctuating and incising.

M-1268. Harris Creek Midden, Florida **5450 ± 180**
3500 B.C.

Charcoal (Sample 5) from Harris Creek Midden (29° 7' N Lat, 81° 26' W Long), Tick Island, Volusia Co., Florida. From small pit containing Burial #12, partially charred, 6 ft below present surface and 7¼ ft below datum. This is a deep and presumably relatively early burial. Date needed to determine if burial is of an Archaic (pre-Orange Period) people, or if much later Indians dug into the Archaic midden and used it as a cemetery. Coll. 1961 and subm. by R. P. Bullen, Florida State Mus. *Comment* (R.P.B.): final interpretation of date awaits results of C¹⁴ runs on other samples from same group of burials (see Bullen, 1961).

C. Northeastern United States and Canada

Wapanucket #8 series, Massachusetts

Charcoal from Wapanucket #8 (41° 48' 45" N Lat, 70° 54' 16" W Long), Middleboro, Plymouth Co., Massachusetts. Two components present at site, Paleo-Indian and Archaic. Coll. 1960-1961 and subm. by Maurice Robbins, Massachusetts Archaeol. Soc. Inc.

M-1212. Wapanucket #8, Massachusetts **3550 ± 130**
1600 B.C.

Charcoal from Feature 18, hearth, in subsoil, but excavated into sand layer below. Extends from 45 cm to 72 cm below surface. Archaic Horizon.

M-1213. Wapanucket #8, Massachusetts **3610 ± 130**
1660 B.C.

Charcoal from Feature 21, hearth, in subsoil, bottom extending into underlying sand. Extends from 64 cm to 88 cm below surface. Archaic Horizon.

M-1350. Wapanucket #8, Massachusetts **4720 ± 140**
2770 B.C.

Charcoal found throughout Feature 66, a pit extending from 52 cm to 82 cm below present surface. Believed to be part of earlier component because of association with a Paleo-Indian graver and several flakes of marine chert invariably used for artifacts by Paleo-Indians at this site.

General Comment (M.R.): date of M-1350 too late for Paleo-Indian period; Paleo-Indian graver included in Archaic feature. Range of dates, including date of 3910 ± 100 yr B.P. for Y-1168 (Yale VIII, p. 331), extends over a 1000 yr period, which is in agreement with the range of cultural material being found.

D. United States Great Plains

M-1364. Site 25FT31, Nebraska **5860 ± 160**
3910 B.C.

Charcoal from Site 25FT31 (40° 21' 16" N Lat, 100° 40' 12" W Long), NE ¼ SW ¼ Sec. 6, T5N, R30W, Frontier Co., Nebraska. From occupational zone and associated features. Dates Spring Creek Complex component,

a Plains Archaic occupation related to Logan Creek Complex. Estimated date: 5000 to 9000 yr ago (Grange, ms.; Kivett, 1961). Coll. 1961 by R. T. Grange, Jr.; subm. by M. F. Kivett, Nebraska State Hist. Soc. *Comment* (M.F.K. and R.T.G.): this date would appear to be acceptable. The bulk of the projectile points are in the side-notched style of the Logan Creek Complex but the assemblage lacks the side-notched scraper; possibly a chronological or a geographical variation. This is one of the most recent dates for the side-notched tradition in Nebraska which now appears to have lasted for a period of more than 2000 yr.

M-1365. Site 25FT32, Nebraska **565 ± 100**
A.D. 1385

Charcoal from Site 25FT32 (40° 21' 31" N Lat, 100° 40' 39" W Long) NW ¼ Sec. 35, T5N, R30W, Frontier Co., Nebraska. From main house post in NE quadrant of Feature 1, House 1. Should date an Upper Republican Aspect house. Estimated date: A.D. 1200 to 1450 (Grange, ms.; Kivett, 1961). Coll. 1961 by R. T. Grange, Jr.; subm. by M. F. Kivett. *Comment* (M.F.K. and R.T.G.): the date falls within predicted span and was expected to be late within this time range, as it is. This site produces one of two or three ceramic variants in the Red Willow Reservoir.

M-1366. Site 25CC44, Nebraska **585 ± 100**
A.D. 1365

Charcoal from Site 25CC44 (40° 51' 41" N Lat, 96° 9' 38" W Long), NW ¼ NW ¼ Sec. 2, T10N, R11E, Cass Co., Nebraska. From Feature 2. Should add to range of dates for the Nebraska Aspect. May date A.D. 1000 to 1300. Coll. 1962 by M. F. Kivett and J. Garrett; subm. by M. F. Kivett. *Comment* (M.F.K. and R.T.G.): limited sample from this site suggests mixture of Upper Republican and Nebraska Culture pottery. Date is a little more recent than expected, but acceptable.

M-1367. Site 25CC17, Nebraska **705 ± 100**
A.D. 1245

Charcoal from Site 25CC17 (40° 51' 41" N Lat, 96° 6' 48" W Long), NW ¼ SE ¼ Sec. 6, T10N, R12E, Cass Co., Nebraska. From House D. Site is component of Nebraska Aspect. Coll. 1939 by L. N. Kunkel; subm. by M. F. Kivett for David Gradwohl, 1633 Crestline Drive, Lincoln 6, Nebraska. *Comment* (M.F.K. and R.T.G.): date would appear to be acceptable for site of Nebraska Aspect.

M-1246. Hart Site, Kansas **860 ± 100**
A.D. 1090

Charcoal from the Hart Site, 140S305 (38° 39' N Lat, 95° 34' W Long), on 110 Mile Creek, Pomona Reservoir, Osage Co., Kansas. Sample recovered from Feature 3, a subfloor pit in the center of House 1. Site shows affinities with both the Upper Republican Aspect and the Late Woodland of the Mississippi Valley. May represent a preliminary stage in the development of Upper Republican and related complexes. Coll. 1959 and subm. by Roscoe Wilmeth for the Kansas State Hist. Soc. *Comment* (R.W.): date tends to confirm suggestion that Hart Site should be older than Upper Republican sites in Kansas and Nebraska.

M-883. Gypsum Dunes, New Mexico **400 ± 130**
A.D. 1550

Charcoal from an aboriginal hearth in the Gypsum Dunes area (34° 55' N Lat, 107° 22' W Long), Sec. 16, T7N, R5W, Valencia Co., New Mexico. Hearth occurred as a resistant erosional remnant on the compact floor of a deflationary depression (blowout). Sandia or Sandia-like points found on the floor of the blowout, one within 15 in. of the hearth, but not necessarily associated. The hearth was cemented by gypsum and stood as a pedestal above the "hardpan" floor (Agogino, 1957). Note: this was a small sample. Coll. 1958 by George Agogino and Vance Haynes; subm. by George Agogino, Eastern New Mexico Univ. *Comment* (G.A.): either the points are not Sandia points and may or may not be associated with the 400 yr old hearth, or the points are Sandia types but are not directly associated with the hearth. It is my current belief that the projectile points, although typologically similar to Sandia, need not be associated with them either chronologically or typologically.

M-988. Querencia Site, New Mexico **4680 ± 140**
2730 B.C.

Charcoal from the Querencia Site (35° 28' N Lat, 106° 53' W Long), Sandoval Co., New Mexico. Found in hearth exposed by wind in eolian sand deposit resting on Dakota sandstone. Typical San José and Lobo-type artifacts were found on the surface. Hearth cannot be definitely assigned to either phase, but is probably preceramic. Coll. 1958 by George Agogino, G. C. Shelton, and Vance Haynes; subm. by George Agogino. *Comment* (G.A.): date acceptable. Point types found at this locale fit in well with the San José material.

M-992. Santa Ana Site, New Mexico **2460 ± 150**
510 B.C.

Charcoal from the Santa Ana Site (35° 24' 32" N Lat, 106° 38' 16" W Long), Santa Ana Pueblo Grant, New Mexico. From lowest of four superimposed charcoal layers in slope-wash alluvium. Should be same age as other San Pedro sites in the area (Agogino and Hester, 1953). Note: this was a small sample. Coll. 1958 by George Agogino and Vance Haynes; subm. by George Agogino. *Comment* (G.A.): this date fits very well with previous dates that we have found in the Santa Ana area. Apparently the Santa Ana people were of early Pueblo type, living in the central part of New Mexico from about 1300 to 200 B.C.

The Power Pole Site series, New Mexico

Rotted wood from Site LA 4257 (36° 57' 45" N Lat, 107° 36' 00" W Long) NW ¼, NW ¼, Sec. 17, T32N, R7W, left bank of Pine River, San Juan County, New Mexico. Samples date Structures 1 and 3, superimposed cobble ring houses of the Los Pinos Phase, which correlate with the Basket Maker II occupation north of Durango, Colorado. Site described by Eddy (1961). Coll. 1959 by F. W. Eddy; subm. by Fred Wendorf, Mus. of New Mexico.

M-1115D. Power Pole Site, Structure 3 **1740 $\pm$ 150**
A.D. 210

Rotted construction logs obtained by testing under the cobble ring paving of Structure 1. They were located on the SE arch of Structure 3 (Eddy, 1961, Fig. 15) where they had maximum covering from contamination by the overlying paving of Structure 1.

M-1115B. Power Pole Site, Structure 1 **1830 $\pm$ 150**
A.D. 120

M-1115C. Power Pole Site, Structure 1 **1690 $\pm$ 150**
A.D. 260

Rotted logs from different portions of pit (Eddy, 1961, fig. 9). This trench was described with Structure 1 but there is a possibility that it was actually constructed as part of the earlier Structure 3.

General Comment (F.W.E.): regardless of its assignment, this series of three dates is consistent with two C^{14} dates obtained from similar structures at Valentine Village, a second Los Pinos Phase site excavated and reported from the Pine River Canyon (Eddy, 1961, p. 103). The Michigan dates are also consistent with the tree-ring dates obtained on Basket Maker II sites excavated N of Durango, Colorado (Morris and Burgh, 1954).

M-1211. Texas Site, 45A5-9, Texas **2170 $\pm$ 130**
220 B.C.

Human bone from Texas Site (30° 47' N Lat, 104° 46' W Long), Chispa Creek, Jeff Davis Co., Texas. Found eroding from surface of terrace composed of light tan sandy silt, somewhat cemented by disseminated $CaCO_3$. No evidence of intrusive pit. From S edge of locality with four concentrated Folsom sites spread along head of valley of Chispa Creek. Folsom materials found in same deposit as burial, which consists of shafts of several long bones lacking articular processes, and the cranium lacking the lower jaw (see Lehmer, 1958, p. 122). Carbonization of bones suggests cremation or possibly cannibalism. Coll. 1957 and subm. by J. B. Wheat, Univ. of Colorado. *Comment* (J.B.W.): date obviously too late to apply to the Folsom occupation. At the two Folsom localities nearest the find of the human bones there are at least two later occupations, one Archaic and one ceramic. Some Archaic fire pits located only about 20 ft away from the burial find spot. Date would appear to correspond to the Archaic complex.

F. Mexico and South America

M-1118. Oztoyahualco, Teotihuacan, Mexico **1805 $\pm$ 120**
A.D. 145

Charcoal from Mound D (19° 40' N Lat, 98° 50' W Long), found at depth of 1.7 to 1.9 m in SW corner of Pit A2, in sealed deposits between Floors 3 and 2 (Millon and Bennyhoff, 1960, p. 518). Associated with cache of Tzacualli (Teotihuacan I) Phase. Although associated sherds not burned, charcoal was integral part of Cache 3, purposeful offering of major portions of more than eight broken pottery vessels typical of this phase. Charcoal evidently represents burned offering placed with freshly broken vessels on earth floor of a Tzacualli structure prior to second of four known alterations within this first

occupation phase at Teotihuacan. Preliminary ceramic analysis suggests this material represents sub-phase earlier than that encountered within Pyramid of the Sun. Coll. 1959 and subm. by Rene Millon and James A. Bennyhoff, Univ. of California. *Comment* (R.M.): this is approx. 100 yr younger than expected. For previous Tzacualli phase dates at Teotihuacán, see comment on M-1283 (Michigan VIII).

San Juan Teotihuacan series, Mexico

Charred wood from San Juan Teotihuacan (19° 21' 26" N Lat, 98° 22' W Long). Coll. 1960 by R. Gallegos; subm. by J. R. Acosta, Inst. Nac. de Antropol. e Historia, Mexico.

M-1123. San Juan Teotihuacan, Plazoleta of the Moon 2040 ± 150 90 B.C.

Charred wood from floor of a room attached to S side of structure 1, in the NW corner of the Plazoleta of the Moon, about 60 m S of the Pyramid of the Moon. Sample of remains of roof-beam of this room, which represents the last phase of occupation of the site by the Teotihuacanos.

M-1124. San Juan Teotihuacan, Pyramid of the Sun 1640 ± 150 A.D. 310

Charred wood from a hearth found in a newly excavated N-S tunnel in the Pyramid of the Sun. Tunnel crosses old E-W tunnel about 50 m E of entrance of the latter. Represents date of construction of the Great Pyramid and not that of the small interior structure found 3 yr ago (1959).

General Comment (J.R.A.): dates unacceptable, since would suggest that the Pyramid of the Sun was constructed after the city itself had been destroyed.

M-1253. Yayaguala, Teotihuacan, Mexico 1470 ± 120 A.D. 480

Charcoal from Yayaguala (19° 41' 24" N Lat, 96° 51' 06" W Long), Teotihuacan, Mexico. From a large dump, nearly 3 m high, containing about 1/2 million sherds. Structures and pottery are Teotihuacan III-IV (Séjourné, 1963). Coll. 1961 by Eduardo Noguera and Mme. Laurette Séjourné; subm. by Eduardo Noguera, Liverpool 27, Mexico, D. F. *Comment* (E.N.): date, in combination with others from Teotihuacan, indicates occupation much earlier than formerly believed.

M-1125. Tula, Mexico 1460 ± 200 A.D. 490

Charred wood from Tula (20° 3' N Lat, 99° 20' W Long), Hidalgo, Mexico. From a post found in the interior of a pillar in Hall 2 of the Palacio Quemado. Sample carbonized at time city destroyed by the Mexicans. Coll. 1958 and subm. by J. R. Acosta. *Comment* (J.R.A.): date approx. 400 yr early, since all historical sources place conquest and destruction of the city between the 11th and 12th centuries A.D.

M-1151. Yagul, Oaxaca, Mexico 1060 ± 150 A.D. 890

Charcoal from Yagul (16° 58' N Lat, 96° 27' W Long), Oaxaca, Mexico. From beam, not completely charred, 8 to 10 cm in diam, in Mound 5-W.

Stratigraphically earlier than Tombs 11 and 13, and later than Tomb 10. Tombs 11 and 13 are of Monte Alban V date, have facades with *greca* decoration. Pottery from Tomb 10 examined by Alfonso Caso, indicates this tomb belongs to last days of Monte Alban III-B or the very beginning of IV, marking end of Classic in Oaxaca. Established date is post-A.D. 800 and pre-A.D. 1350, but range should be reduced by continuing work. Coll. 1955 by G. W. Lowe; subm. by John Paddock, Mexico City College. *Comment* (J.P.): date not expected to be so early. However, causes no revision of existing ideas, but serves as confirmation of our ideas of Oaxaca chronology. Increased knowledge of Monte Alban V period would now cause us to say this sample should have dated between A.D. 800 and 1250, not 1350, but date still falls well within that range. Was suspected that pottery of Tomb 10 should come closer to A.D. 1000 than to 900. Since this offering comes from a time of slowly evolving styles, mistake is not upsetting.

Yagul Series, Oaxaca, Mexico

Charcoal from Yagul (16° 57' N Lat, 96° 23' W Long), Oaxaca, Mexico. Should help date Mixtec occupation of the Valley of Oaxaca, archaeologically the same as Period V of Monte Alban, but not previously dated. Coll. 1960 and subm. by Ignacio Bernal, Inst. Nac. de Antropol. e Historia.

M-1248. Yagul, Oaxaca, Mexico **750 ± 100**
A.D. 1200

Charcoal from an offering (?) box found in the N side of Room 13. Corresponds to the latest period of occupation of the building.

M-1249. Yagul, Oaxaca, Mexico **570 ± 100**
A.D. 1380

Charcoal from Room 16, representing latest occupation of building. Associated with polychrome pottery vessel.

M-1250. Yagul, Oaxaca, Mexico **370 ± 100**
A.D. 1580

Charcoal from offering (?) box in N room of Patio A. Also represents latest occupation.

General Comment (I.B.): date of M-1250 seems impossible because no trace of European occupation has been found in excavations at Yagul. All Yagul dates confirm suspicion of rather long period in which Monte Alban V is contemporaneous with Monte Alban IV.

M-1251. Mitla, Oaxaca, Mexico **1110 ± 110**
A.D. 840

Charcoal from Mitla (16° 54' N Lat, 96° 22' W Long), Oaxaca, Mexico. From Tomb C-3 under eastern mound of the Arroyo group. Should help date the Mixtec occupation of the Valley of Oaxaca. *Comment* (I.B.): this is only slightly earlier than the dates on M-1248 and M-1249 from Yagul.

M-1257. Las Charcas, Guatemala **2280 ± 130**
330 B.C.

Charcoal and decomposed plant seeds from Las Charcas (14° 18' N Lat, 90° 16' W Long), NW section of Kaminaljuyu site, Finca las Charcas, Guatemala City, Guatemala. Seeds id. by J. A. Steyermark as *Nectandra* sp., *Persea*

gratissima, and *Palmaceae*. Sample from a jar found imbedded in hard caliche-like clay at the bottom of Pit 2B, a bottle-shaped pit 2 m deep, which also contained sherds, seeds, and refuse (Borhegyi, 1956a, 1956b, 1957). Jar is typical Middle-Pre-Classic Las Charcas Incised pallid red-on-buff ware (cf. Shook, 1951, fig. 1-h). Coll. 1956 and subm. by S. F. de Borhegyi, Milwaukee Pub. Mus. *Comment* (S.F.B.): the Michigan date appears to be later than the generally assumed Early Formative (or Early Pre-Classic) date for Las Charcas (1500 to 1000 B.C., see Shook, 1957; C¹⁴ date 1546 B.C. $\pm$ 800). The new date obtained from Las Charcas sample M-1257 is more in accordance with the Yale date of 382 B.C. $\pm$ 50 (Yale IV, p. 162, Y-384) and seems to confirm Coe's suspicion (Coe, 1961, p. 127-132 & fig. 12), that Las Charcas is a Middle Formative (700 to 300 B.C.) and not an Early Formative cultural manifestation.

M-1308. El Cangrejal (Site SL-1), Panama **930 $\pm$ 100**
A.D. 1020

Charcoal from El Cangrejal (8° 19' N Lat, 82° 13' W Long), Dist. of Lorenzo, Panama. From Pit #3, 60 to 70 cm level, in refuse. Associated with sherd assemblage now under study, which includes Coclé Polychrome. Could range from 500 to 1200 A.D. Coll. 1961 by C. R. McGimsey, Olga Linares, and Freeman Mobley; subm. by Clifford Evans for Inst. of Andean Research. *Comment* (O.L.): within the estimated range.

M-1309. Las Secas Island Site, IS-11, Panama **115 $\pm$ 100**
A.D. 1835

Charcoal from Las Secas Is. Site (8° 0' 30" N Lat, 82° 2' 30" W Long), Bahia de Muertos, Province of Chiriqui, Panama. From 40 to 50 cm level of Pit 1, in refuse material. In association with tripod bowls unlike the usual well-known Chiriqui ceramics, and with some Coclé Polychrome. Analysis has not as yet determined age of Coclé Polychrome as Early or Late. Could range 500 to 1200 A.D. Coll. 1961 by C. R. McGimsey, Olga Linares, and Freeman Mobley; subm. by Clifford Evans for Inst. of Andean Research. *Comment* (O.L.): appears to be too recent, for no Spanish trade goods at site and no mention of living Indians in 16th, 17th and 18th century historical documents on Panama. Discrepancy unexplained.

Loma de Lopez series, Colombia

Shell from Loma de Lopez (10° 48' N Lat, 74° 20' W Long), Cienaga Grande, Dept. de Atlantico, Colombia. From midden refuse. Lower levels of site show clear-cut relationships to Palmira Phase found on Isla de Salamanca. Coll. 1961 by C. Angulo V.; subm. by Clifford Evans for Inst. of Andean Research.

M-1310. Loma de Lopez, Cut 2, 60 to 80 m level **825 $\pm$ 100**
A.D. 1125

Shell (*Protothaca grata* Sby.) from Cut 2, 60 to 80 cm level (Level #4).

M-1311. Loma de Lopez, Cut 2, 2.20 to 2.40 m level **905 $\pm$ 100**
A.D. 1045

Shell (*Protothaca grata* Sby.) from Cut 2, 2.20 to 2.40 m level (Level #12).

M-1312. Loma de Lopez, Cut 2, 2.80 to 3.00 m level **945 ± 100**
A.D. 1005

Shell (*Protothaca grata* Sby.) from Cut 2, 2.80 to 3.00 m level (Level #15).

General Comment (C.A.V.) the chronology from the dates agrees with the archaeology, for the dates are consistent within the strata of Cut 2 and the cultural materials correlate closely with the Palmira site of Salamanca Island.

M-1313. Cupica Mound (Site CHP-38), Colombia **735 ± 100**
A.D. 1215

Charcoal from Cupica Mound (6° 40' 22" N Lat, 77° 30' 10" W Long), on coast S of Rio Jurado, near Punta Cruces, Dept. de Chocó, Colombia. From 76 cm below surface in refuse, and in first artificial fill in mound. Site has five cultural complexes, Cupica I through V. Sample should date Cupica II level. Coll. 1961 by G. Reichel-Dolmatoff; subm. by Clifford Evans for Inst. of Andean Research. *Comment* (G.R.-D.): date later than expected, because, although it is associated with materials underlying Coclé-style pottery in Cupica, it corresponds essentially to Late Coclé in Panama. This suggests that time-span of Cupica sequence is shorter than was thought, and that Late Coclé pottery spread S only after ca. 1000 A.D. Similarities between the cultural material from Cupica, dated by this sample, and certain Panamanian materials thought to be "formative", might indicate that latter are much later than has been supposed. However, the Cupica date fits the upper part of the Sinú sequence, as had been postulated, and also establishes the first clear link between Coclé and Colombia.

M-1314. Rio Anjiá Site (CHP-41), Colombia **335 ± 100**
A.D. 1615

Charcoal from Rio Anjiá Site (6° 0' 10" N Lat, 77° 20' 22" W Long), in Bahía de Salano area, Pacific Coast, Dept. de Chocó, Colombia. From 1.05 m below surface in trench in refuse. Horizon agricultural with metates and grinding stones. Pottery distinct. Study of ceramics will cross-seriate this site with Cupica complexes. Coll. 1961 by G. Reichel-Dolmatoff; subm. by Clifford Evans for Inst. of Andean Research. *Comment* (G.R.-D.): date coincides with the historical date of 1632-1646 when a Mission was founded among the little-known Idabaez Indians of the Bahía de Solano area. The incised pottery dated by this sample appears to be derived from the prehistoric complexes to the N and SE which, however, do not seem to be ancestral to the pottery of the modern Chocó Indians. According to early sources on the Idabaez, their culture seems to have differed from the neighboring tribes and, in the light of this C¹⁴ date, the Idabaez appear to have been a remnant group, surrounded by recent invaders whose prehistoric roots lie outside the Chocó area.

Site M-7 series, Ecuador

Site N of Manta along the coast (0° 57' S Lat, 80° 39' W Long), Esteros, Manabí Prov., Ecuador. Charcoal from Cut A in village refuse. Bahia Culture Complex, about 500 B.C. to A.D. 500. Coll. 1961 by E. Estrada, Clifford Evans, and Betty Meggers; subm. by Clifford Evans for Inst. of Andean Research.

M-1315. Site M-7, 3.20 to 3.40 m level **2050 $\pm$ 120**
100 B.C.

Charcoal from 3.20 to 3.40 m level.

M-1316. Site M-7, 4.00 to 4.20 m level **2120 $\pm$ 120**
170 B.C.

Charcoal from 4.00 to 4.20 m level. Bahia I Culture Complex. Should date ca. 500 B.C. to beginning of present era.

M-1319. Site M-7, 4.00 to 4.20 m level **2110 $\pm$ 120**
160 B.C.

Charcoal from 4.00 to 4.20 m level.

General Comment (C.E.): these dates agree well with the estimates made on pottery analysis and with previous dates; see M-734 (Michigan IV, p. 192) and W-833 and W-834 (USGS V, p. 181).

Valdivia Site (G-31) series, Ecuador

Charcoal and shell from Valdivia Site (1° 56' S Lat, 80° 45' W Long) Guayas Prov., Ecuador. From Cut J in village refuse. Valdivia Culture (Evans, Meggers, and Estrada, 1959). Coll. 1961 by E. Estrada, Clifford Evans, and Betty Meggers; subm. by Clifford Evans for Inst. of Andean Research.

M-1317. Valdivia Site, Zone D, 2.70 to 3.00 m level **4480 $\pm$ 140**
2530 B.C.

Charcoal from 2.70 to 3.00 m level. Should fall within range of dates for samples W-631, W-632, and W-630, or earlier (USGS V, p. 181).

M-1318. Valdivia Site, Zone D, 3.00 to 3.30 m level **4170 $\pm$ 140**
2220 B.C.

Charcoal from 3.00 to 3.30 m level. Period A by ceramic analysis.

M-1320. Valdivia Site, Zone E, 3.60 to 3.90 m level **5150 $\pm$ 150**
3200 B.C.

Charcoal from 3.60 to 3.90 m level. Period A by ceramic analysis.

M-1321. Valdivia Site, Zone E, 3.90 to 4.20 m level **4100 $\pm$ 140**
2150 B.C.

Shell (*Anomalocardia subrugosa* Sby.) with all surfaces in excellent condition showing no powdering, from 3.90 to 4.20 m level. Period A.

M-1322. Valdivia Site, Zone E, 4.00 m level **4620 $\pm$ 140**
2670 B.C.

Charcoal from Hearth B, at 4.00 m level. Period A.

General Comment (C.E.): these new dates must be considered in comparison with the three dates W-630, W-631, and W-632 of 4050 $\pm$ 200, 4190 $\pm$ 200, and 4450 $\pm$ 200 (USGS V, p. 181) from Period B and Period A of the Valdivia culture, based on shell samples. Those wanting to discount the early dates of this Formative period culture objected to the use of shell; with the new dates based on four charcoal and one shell samples and all as early or earlier than the shell dates, we can conclude that the Valdivia Culture dates within the range of the total series of Michigan and USGS dates. The main discrepancy

between shell dates and charcoal is that the charcoal gives the older dates, and in the case of M-1321 and M-1322, the charcoal date is actually 500 yr earlier than the shell date. Thus the evidence shows that the Valdivia Culture is as early as estimated and the pottery sequences in the stratigraphic excavations bear out the dating. Certain dates do not fall in line with their stratigraphic position in the ground, but this is not too disturbing, for in deep midden deposits there is always some slight migration of specimens from people continuing to live on the site. The pottery studies bear this out.

Sambaquí do Forte Marechal Luz series, Brazil

Charcoal, carbonized seeds, and bone from Sambaquí do Forte Marechal Luz (27° 50' S Lat, 48° 50' W Long), Ilha do Sao Francisco, Santa Catarina, Brazil. Coll. 1960 and subm. by A. L. Bryan, Univ. of Alberta.

M-1200. Sambaquí do Forte Marechal Luz, 640 ± 100
Stratum 1 A.D. 1310

Charcoal from Stratum 1 within Test Pit No. 1, 2 m N of main trench, and from 10 to 30 cm below the surface. Presumably dates last occupation of site (Zone VIII).

M-1203. Sambaquí do Forte Marechal Luz, 620 ± 100
Stratum 5 A.D. 1330

Charcoal from fireplace in Stratum 5. Dates end of Occupation Zone V immediately before introduction of pottery.

M-1204. Sambaquí do Forte Marechal Luz, 1100 ± 100
Stratum 6a A.D. 850

Carbonized seeds found in a large lens in Stratum 6a. Dates Occupation Zone IV.

M-1205. Sambaquí do Forte Marechal Luz, 850 ± 100
Stratum 6b A.D. 1100

Charcoal from fireplace associated with several burials intruded from Stratum 5b into Stratum 6b. Dates Occupation Zone V.

M-1206. Sambaquí do Forte Marechal Luz, 1440 ± 110
Stratum 7 A.D. 510

Charcoal found adjacent to unfired modeled clay cooking-bowl features in Stratum 7. Dates Occupation Zone IV.

M-1207. Sambaquí do Forte Marechal Luz, 2060 ± 120
Stratum 10 110 B.C.

Burned whale vertebra used as charcoal brazier, Stratum 10. Dates end of Occupation Zone II.

M-1208. Sambaquí do Forte Marechal Luz, 3660 ± 130
Stratum 21 1710 B.C.

Charcoal from Stratum 21 (lowest shell stratum, just above Occupation Zone I in basal clay). Dates beginning of Occupation Zone II.

General Comment (A.L.B.): the 23 major physical strata have been divided into seven "occupation zones." Because this large shell mound lies on a steep hillside protected from wave erosion and higher sea levels, it was occupied longer than most and has yielded good evidence for cultural change. Absence of intentional bifacial percussion flaking has been noted before from some Brazilian sambaquís, but this one presents a stratified sequence which lacks any evidence for a bifacial percussion flaking industry until Occupation Zone IV, where three examples were recovered. Detritus flakes, some showing evidence of use for working in a suddenly expanded bone industry, and bifacially-flaked leaf-shaped "blanks," were found only in Zones V, VI, and VIII (from the surface through Stratum 5). This and the fact that raw material for flaking the diabase axes came from a dike on the beach near the sambaquí indicates that the three axes from Occupation Zone IV were probably traded in and not made by the occupants of the site. From the dates we can conclude that the people who lived on this sambaquí remained ignorant of the technique of bifacial percussion flaking until about A.D. 1000 and of pottery-making until after A.D. 1300. As only plain pottery (usually black but sometimes oxidized to an orange ware) was found, there is no evidence for contact with Tupí-Guaraní groups who occupied the island of Santa Catarina to the S at least by A.D. 1550.

G. Far East and Pacific

Soksil Site series, Korea

Charred wood, id. by R. Yarnell as oak (Black Forest variety) from the Soksil Site (37° 35' 30" N Lat, 127° 11' 30" E Long), ½ mi SW of Soksil-li and about 13 mi E of Seoul, on the N bank of the Han River, Kyongge-do Province, Korea (Chase, 1961). Coll. 1960 and subm. by D. W. Chase, Montgomery Mus. of Fine Arts, Montgomery, Alabama.

M-1258. Soksil Site, Test 6, Korea

**2230 ± 120
280 B.C.**

Charred wood from hearth in Test 6, at a depth of 4 ft, in an occupational lens 7 in. thick, below loose clay talus. Pottery in this lens is Han River types A, B, and C. Should date late Neolithic in Han River Valley, estimated at 2000 yr ago. *Comment* (D.W.C.): date matches original round-number guess date fairly well. Should pretty nearly date latest occupation of site. Sites of Okkok and Tokso-ri, although featuring Han River Plain types, may be later, however. MacCord (1958) obtained a date from Kapyong Site on Pukhan River of not quite 2000 yr ago (Michigan II, p. 1104-1105, M-303). Site had Han River Plain types plus check- and simple-stamped types found at Tokso-ri. This helps to bear out the late position of terminal Neolithic occupation at Soksil.

M-1259. Soksil Site, Test 8, Korea

**2340 ± 120
390 B.C.**

Charred wood from Test 8, 1 ft below occupation zone yielding M-1258. Located on W slopes of site between Tests 2 and 6. Zone is a 6 in. layer of dark brown clay overlain by a loose silt bed 5 ft thick. Yangju Plain vessel recovered, as well as a pottery disc with Han River paste and sherds of Han River types A and B. Should date Middle Neolithic in central Korea, estimated

at 2500 yr ago. *Comment* (D.W.C.): date could give absolute terminus of Yangju Plain. I do not believe it dates any part of what might in time be defined as Middle Neolithic in central Korea. Probably dates climactic occupation of the site and is Late Neolithic but not in its terminal phase.

M-1430. Komoro Dam Site, Japan **11,300 $\pm$ 400**
9350 B.C.

Carbonized tree trunk from Komoro Dam Hydroelectric Power Plant (36° 19' N Lat, 138° 25.4' E Long), at the S bank of the dam, SE of Komoro City, Nagano Prefecture, Japan. Found close to bottom of Pumice Flow 2 deposit, from Asama volcano. Directly underlain disconformably by Pumice Flow 1. Pumice Flow 2 correlated with Itahana Yellow Pumice Bed, North Kanto. Maebashi peat bed immediately below the Itahana Brown Pumice has been dated at 13,130 $\pm$ 230 yr ago (Gakushuin I, p. 89, GaK-159). Many non-ceramic remains placed below Itahana Yellow Pumice and above Itahana Brown Pumice. Itahana Yellow Pumice is below horizon of earliest Jomon Culture (Saishikada) yielding earliest Jomon pottery of the Tsumegatamon style. This predates the Early Jomon Culture of the Natsushima shell mound, which has yielded dates of 9240 $\pm$ 500 and 9450 $\pm$ 400 yr ago (Michigan V, p. 45, M-769, 770, and 771). Coll. 1960 by Dr. Aramaki; subm. by Kunio Kobayashi, Shinshu Univ. *Comment* (K.K.): confirms estimates as to the rough date of the borderline between ceramic and non-ceramic cultures in Japan, and also agrees with our conceptions of Japanese Late Quaternary chronology (see Kobayashi, 1957, 1962).

Iyatayet Ceramic series, Alaska

Carbonized material from pottery sherds from the Iyatayet Site (64° 13' N Lat, 160° 47' W Long), Cape Denbigh, Alaska. Pottery coll. by J. L. Giddings, samples scraped from interior and exterior of sherds while collection under analysis at Mus. of Anthropol., Univ. of Michigan (Giddings, 1951, 1960; Griffin, 1953). Subm. by J. B. Griffin, Univ. of Michigan and J. L. Giddings, Brown Univ.

M-1260a. Iyatayet Site, Alaska, Barrow Plain **960 $\pm$ 100**
A.D. 990

Carbonized material from sherds of Barrow Plain. Type associated with Birnirk and Western Thule cultures and persists from time of Birnirk, probably A.D. 600, to time of Ekseavik, A.D. 1400.

M-1260b. Iyatayet Site, Alaska, Barrow **1050 $\pm$ 110**
Curvilinear **A.D. 900**

Carbonized material from sherds of Barrow Curvilinear. Same associations as Barrow Plain.

M-1260c. Iyatayet Site, Alaska, Norton Ware **2720 $\pm$ 130**
770 B.C.

Carbonized material from sherds of Norton ware, assigned to the Norton Complex. Dates available indicate Norton lasted from 500 to 100 B.C., or, in the Near Ipiutak Phase, to about the beginning of our era. There is a previous C¹⁴ date of 255 B.C. (Pennsylvania IV, p. 11).

General Comment (J.L.G.): dates of carbonized material from Barrow Ware

coincide very nicely with Western Thule sites at Cape Krusenstern. Since there is no firm trace of Birnirk at Iyatayet Site, but an abundance of cross-typing with the Western Thule houses, I assume that my early Nukleet is the source of these sherds. Date for Norton sample is earlier than other Norton dates, coinciding with two dates from the Choris Culture (Pennsylvania IV, p. 10). Since sample undoubtedly relates to Norton culture rather than Choris, this suggests Choris Culture at Choris Peninsula is some centuries earlier than previously published C^{14} dates would indicate.

H. Africa, Europe, and Siberia

Lochinvar Hot-Spring Mound Site series, Northern Rhodesia

Charcoal from Lochinvar Hot-Spring Mound Site ($15^{\circ} 55' S$ Lat, $27^{\circ} 16' E$ Long), Kafue Basin, Southern Province of Northern Rhodesia, Africa. Associated with faunal debris and percussion flaked tools and chipping debris relating to the Later Stone Age (Northern Rhodesian Wilton, Gabel, 1962, 1963). Samples are from lower levels of the site and probably pertain to a relatively early phase of this culture. There is no way of estimating the age of the cultural material associated with these samples, but a maximum age of 5000 to 7000 yr is suggested by C^{14} dates for comparable finds elsewhere in southern and central Africa. Coll. 1961 and subm. by Creighton Gabel, Northwestern Univ.

M-1323. Lochinvar Hot-Spring Mound Site, 4450 $\pm$ 150
No. Rhodesia 2500 B.C.

Charcoal from grid square 6L17, 96 in. depth.

M-1324. Lochinvar Hot-Spring Mound Site, 4650 $\pm$ 150
No. Rhodesia 2700 B.C.

Charcoal from grid square 6L24, 96 in. depth.

General Comment (C.G.): UCLA obtained dates of 4300 yr ago at the 96 in. depth and 4700 yr ago at the 60 in. depth (UCLA II, p. 18). Univ. of Michigan dates are probably essentially correct.

M-1345. Kosinj, Yugoslavia 2590 $\pm$ 200
640 B.C.

Charcoal from Kosinj ($44^{\circ} 44' N$ Lat, $15^{\circ} 14' E$ Long), Croatia, Yugoslavia, found in fireplace associated with clay ring believed to be support for smelting pot. Site thought to be remnant of first Croatian printing house, dated A.D. 1483 to 1491. Fireplace and clay ring would be for melting lead for type. Alternative hypothesis places site in pre-Roman times, at about 2500 yr ago. Coll. 1961 and subm. by Zvonimir Kulundžić, Zagreb II, Buconjiceva 19, Yugoslavia.

M-1330. Atalunga Site, Siberia 1750 $\pm$ 150
A.D. 200

Charcoal from the Atalunga Site ($56^{\circ} 20' N$ Lat, $104^{\circ} E$ Long), Atalunga, Irkutsk Oblast, Siberia, on the Ilim River. Pure Serovo site, according to interpretation of A. P. Okladnikov. Coll. 1929 by G. Debets; subm. by J. B. Griffin, Univ. of Michigan, from the Hermitage collection in Leningrad. *Comment* (J.B.G.): date appears to be too late for Serovo Complex, which probably should be in the 2nd millenium B.C.

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