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SMITHSONIAN INSTITUTION RADIOCARBON MEASUREMENTS VI*

ROBERT STUCKENRATH, JR. and JAMES E. MIELKE

Radiation Biology Laboratory
Smithsonian Institution, Washington, D.C. 20560

INTRODUCTION

This list includes those analyses completed December, 1968, with equipment and procedures previously employed here.

All samples were counted at least twice for periods of not less than 1000 minutes each; where necessary, samples were counted for additional periods to obtain the desired consistency of measurements. Errors quoted are derived from measurements of the sample, background, and NBS oxalic acid standard, and have been adjusted where appropriate for small sample dilution. NaOH pretreatments were given all suitable samples for the removal of possible humic contaminants.

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

SAMPLE DESCRIPTIONS

I. ARCHAEOLOGIC SAMPLES

A. Eastern United States

Shepard site series, Maryland

Charcoal samples from Shepard site 18M03 (39° 5′ N Lat, 77° 26′ W Long), Montgomery Co., Maryland, from refuse attributed to early part of Late Woodland period. Coll. 1967 by Slattery and Woodward, Archaeol. Soc. Maryland; subm. by G. E. Phebus (MacCord *et al.*, 1957).

730 ± 60

SI-553. Midden test pit **A.D. 1220**

Charcoal from 14 to 21 in. depth in midden Test Pit 1, assoc. with bones and sherds.

750 ± 50

SI-554. Refuse pit **A.D. 1200**

Charcoal from 14 to 21 in. depth in Refuse Pit 2, assoc. with animal bones, sherds, and stone artifacts.

Lewis Creek Cement Plant series, Virginia

This site (35° 12′ N Lat, 78° 59′ W Long), Augusta Co., Virginia, is believed to be annual hunting camp of people using fabric-marked Albemarle ceramics, large triangular projectile points, and circular houses. Coll. 1966 by C. G. Holland; subm. by Clifford Evans.

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

1100 ± 60

SI-480. Lewis Creek, Pit 1 **A.D. 850**

Charcoal and charred nuts from Pit 1, 12 in. deep, in clay subsoil.

1410 ± 60

SI-481. Lewis Creek, Pit 10 **A.D. 540**

Charcoal and charred nuts from Pit 10, 10 to 20 in. deep, in clay subsoil.

General Comment: by analogy with Lewis Creek mound, this site was expected to date ca. A.D. 1300 (SI-218, 860 ± 240; and SI-219, 580 ± 200; Radiocarbon, 1967, v. 9, p. 368-9).

900 ± 70

SI-535. Kerns site, Virginia **A.D. 1050**

Charcoal from early phase of Late Woodland period at Kerns site (39° 5′ N Lat, 78° W Long), Clarke Co., Virginia. Sample from 14 to 23 in. depth, assoc. with sherds, animal bones, shell, and stone artifacts. Coll. by Slattery and Woodward; subm. by W. R. Wedel (MacCord, *et al.*, 1957).

B. Western United States

Lansing Man series, Kansas

Right femur of adult *Homo sapiens* (id. by W. M. Bass) at Lansing Man site 14LV315 (39° 15′ N Lat, 94° 51′ W Long), Leavenworth Co., Kansas. Coll. 1902 by M. Concannon; subm. by W. R. Wedel.

6970 ± 200

SI-360. Lansing Man femur **5020 B.C.**

Comment: preservative and glue scraped from specimen before pulverizing and rinsing in HCl.

4610 ± 200

SI-360R. Re-run **2660 B.C.**

Comment: plaster and preservative removed before leaching in acetic acid and hydrolysis in HCl.

General Comment (W.R.W.): left femur dated as GX-0586, 5875 ± 105 (unpub.), and another portion dated as M-1890, 4750 ± 250 (unpub.). All these dates suggest that Lansing Man is assignable to Archaic period, for which there is increasing archaeologic evidence in E Kansas. There were no known direct cultural assocs. with Lansing Man at time of discovery.

Red Fox site series, North Dakota

Red Fox site 32B0213 (46° N Lat, 103° 15′ W Long), Bowman Co., North Dakota, is 4-component site. Top component is probably of Coalescent tradition, 2nd and 3rd components are unidentified, while 4th component is affiliated with McKean complex. Coll. 1966 and subm. by O. L. Mallory (Mulloy, 1954; Strong, 1935).

3850 ± 60

SI-478. Third component **1900 B.C.**

Charcoal from rock-filled basin-shaped firepit at bottom of eolian soil zone, 2.4 ft deep, in 3rd component. Assoc. with bone scraps, knives, scrapers, and large side-notched projectile points.

3770 ± 90

SI-479. Fourth component **1820 B.C.**

Charcoal from rock-filled basin-shaped firepit, 3.4 ft deep in 4th component, at top of soil zone below eolian zone of SI-478. Assoc. with projectile points of McKean complex, stone knives and scrapers, fire and storage pits, and possible dwelling foundation.

General Comment (O.L.M.): dates are essentially contemporaneous and within range of dates for late McKean complex sites elsewhere; no substantial stratigraphic gap existed between 2 components dated.

Cattle Oiler site series, South Dakota

Cattle Oiler site 39ST224 (44° 18′ N Lat, 100° 4′ W Long), Stanley Co., South Dakota, represents both Middle Missouri (Initial and Extended horizons) and Coalescent (Extended horizon) traditions. Coll. 1966 and subm. by D. T. Jones.

1140 ± 60

SI-474. House F-124 **A.D. 810**

Juniperus virginiana (id. by W. Weakly) shaved from exterior of W wallpost butt in burned long rectangular House F-124, 4.0 to 4.5 ft deep. Assoc. with materials of Middle Missouri tradition (Initial horizon). *Comment* (D.T.J.): date would seem somewhat early for Initial Middle Missouri horizon component, although there are similar dates for related Breeden site (39ST16) of A.D. 710 ± 150 (M-608, Radiocarbon, 1960, v. 2, p. 39) and A.D. 850 ± 250 (M-839, ibid., p. 40) for Swanson site (39BR16). Main clustering of Initial Middle Missouri horizon sites, however, extends over 200 or 300 yr period beginning ca. A.D. 1000.

860 ± 60

SI-475. House F-130 **A.D. 1090**

Burned grass matting, possibly from house wall, from fill of burned long rectangular House F-130, 4.5 ft deep, 0.5 ft above house floor. Assoc. with materials attributed elsewhere to Middle Missouri tradition (Initial horizon). *Comment* (D.T.J.): date places this sample in mid-range of dated Initial Middle Missouri horizon sites.

General Comment: for other dates from Cattle Oiler site, see SI-314, SI-315, SI-316, SI-317, and SI-318 (Radiocarbon, 1967, v. 9, p. 370-371); also, SI-379 (Radiocarbon, 1969, v. 11, p. 169).

1180 ± 60

SI-476. St. John site, South Dakota **A.D. 770**

Charcoal from loose lens of charcoal and sand at St. John site 39HU213 (44° 8′ N Lat, 99° 37′ W Long), Hughes Co., South Dakota.

Sample from 2.8 to 3.2 ft deep in Test 18; assoc. with Great Oasis Plain and Incised rimsherds, and with smooth and cord-roughened bodysherds. Coll. 1963 and subm. by R. E. Jensen. *Comment* (R.E.J.): this site is northernmost excavated component of Great Oasis materials; greatest similarities lie with Initial Middle Missouri tradition, with minor ties to Late Woodland sites. This first date for Great Oasis complex in Middle Missouri area falls within period suggested by cultural relationships.

810 ± 60

SI-477. John Ketchen site, South Dakota **A.D. 1140**

Charcoal from floor of burned long rectangular House F-17 at John Ketchen site 39ST223 (44° 18′ N Lat, 100° 4′ W Long), Stanley Co., South Dakota. Assoc ceramics are of Middle Missouri tradition (Extended horizon), although there is some evidence of Coalescent tradition (Extended horizon). Coll. 1966 and subm. by D. T. Jones. *Comment* (D.T.J.): date is compatible with SI-378 (A.D. 1260 ± 140) from this site (Radiocarbon, 1969, v. 11, p. 168), as it is more generally with other dated Extended Middle Missouri horizon sites in this district.

13th and Oak Street series, Oregon

This site (45° 42′ N Lat, 121° 30′ W Long), Hood River Co., Oregon, was excavated 1934 without benefit of records. Wide range of projectile point types suggests occupation from unknown time B.C. to as late as A.D. 1700. Unknown amount of upper portion of site has been removed, and original depth of features is now impossible to assess. Coll. 1966 and subm. by G. E. Phebus.

SI-482. HR3-1, Pit 1 **Modern**

Charcoal from Pit 1, profiled in bank cut, 8 to 13 in. below present surface.

450 ± 70

SI-483. HR3-2 **A.D. 1500**

Charcoal from 4 to 6 in. depth, 6 ft S of SI-482, above.

330 ± 90

SI-484. HR3-3 **A.D. 1620**

Charcoal, 4 to 12 in. below present surface, random sampling of stratum.

C. Mexico

Cueva Blanca series, Mexico

Cueva Blanca (16° 57′ N Lat, 96° 22′ W Long), near Mitla, Oaxaca, Mexico, presents both preceramic and Postclassic horizons. Coll. 1966 and subm. by K. V. Flannery, Univ. of Michigan.

520 ± 50

SI-510. Zone A, Monte Alban V **A.D. 1430**

Charcoal from Zone A, 20 cm deep. Assoc. with corn, squash, zapotes, and ceramics of Monte Alban V period. Sample dates construction of

dry-laid stone-walled agricultural terraces outside cave as well as plants grown there.

9470 ± 190

SI-512. Zone D, Coxcatlán phase **7520 B.C.**

Charcoal from Zone D, 65 cm deep. Assoc. with deer and rabbit bones, projectile points typical of Coxcatlán phase, one-hand manos, scrapers, and crude blades. This is richest Coxcatlán occupation level in cave. *Comment* (K.V.F.): expected date was perhaps 5000 B.C. to 3000 B.C. Prior date for Zone D was 2800 ± 190 B.C. (M-2092, this issue), and date on hearth Feat. 18 was 3295 ± 105 B.C. (GX-0782, unpub.). Sample SI-512 possibly contaminated by charcoal redeposited from Zone E, below.

10,910 ± 80

SI-511. Zone E, preceramic **8960 B.C.**

Charcoal from hearth Feat. 15 in Zone E, 55 cm deep. Assoc. with preceramic artifacts.

10,730 ± 220

SI-511R. Re-run **8780 B.C.**

Re-run of additional material from same sample. *Comment*: average of SI-511 and SI-511R is 10,820 ± 120, 8870 B.C. (K.F.V.): Zone E has also yielded dates of 8100 ± 350 B.C. (M-2093, this issue) and 9050 ± 400 B.C. (M-2094, this issue).

Guila Naquitz Cave series, Mexico

Guila Naquitz Cave (16° 57′ N Lat, 96° 22′ W Long), near Mitla, Oaxaca, Mexico, provides materials of several periods of occupation from preceramic to Postclassic. Coll. 1966 and subm. by K. V. Flannery, Univ. of Michigan.

680 ± 80

SI-513. Monte Alban V **A.D. 1270**

Oak charcoal from Feat. 7, maguey roasting pit 50 cm deep. Assoc. with carbonized maguey, firecracked rock, and Monte Alban V pottery. Pit construction similar to that used by modern Zapotecs in area.

1210 ± 40

SI-514. Monte Alban IIIb or IV **A.D. 740**

Oak charcoal from depth 15 cm in Zone A, assoc. with pottery of Monte Alban IIIb or IV, preserved corn, beans, squash, avocado, zapotes, and cotton. *Comment* (K.V.F.): sample dates beginning of agricultural pattern described by Spanish on their arrival in Mitla area.

8620 ± 160

SI-515. Preceramic **6670 B.C.**

Charcoal from 40 to 45 cm depth in Zone B_2, from preceramic horizon containing preserved wild runner beans, cucurbits, and bottle gourds. These are among oldest preserved beans thus far found in Mesoamerica. *Comment*: other material from this level dated as GX-0784, 6910 ± 180 B.C. (unpub.).

810 ± 170

SI-534. San Geronimo, Venezuela **A.D. 1140**

Charcoal from San Geronimo site (8° 30′ N Lat, 71° W Long), Liberatador, Mérida, Venezuela. Assoc. with sherds and foundation stones, storage pits, metates and manos; believed to be proto-historic site assoc. with later historic Timotes cultures. Coll. 1965 by Mario Sanoja, Univ. de los Andes, Mérida; subm. by Clifford Evans (Iraida Vargas, Investigaciones arquelogicas en el Alto Chima: la Fase San Geronimo: Inst. de Inv. Economicas y Sociales, Ser. Antropol. no. 1, Univ. Central, Caracas, in press). *Comment*: small sample, diluted. (M.S.): typologically dated between A.D. 900 and A.D. 1500.

El Onio series, Venezuela

El Onio (9° N Lat, 72° W Long), lies in Lake Maracaibo basin, Zulia, Venezuela. Coll. 1965 and 1966 by Mario Sanoja; subm. by Clifford Evans (Sanoja and Vargas, 1968).

320 ± 70

SI-531. Cut 1, Level 1 **A.D. 1630**

Charcoal assoc. with sherds and animal bones 0 to 40 cm deep at bottom of humus layer. *Comment*: many rootlets present. (M.S.): date too recent; site typologically dated between A.D. 800 and A.D. 1000.

900 ± 390

SI-532. Cut 2, Level 2 **A.D. 1050**

Charcoal assoc. with sherds and animal bones from humus layer 40 cm deep. *Comment*: very small sample, diluted. (M.S.): date acceptable.

5740 ± 230

SI-533. Cut 2, Level 3 **3790 B.C.**

Charcoal assoc. with sherds and human skeletal material in sand layer 60 cm deep. *Comment*: very small sample, diluted. (M.S.): date too early.

Rio Grande do Sul, Brazil

Samples of this series represent four sites in the NE Rio Grande do Sul, Brazil, representing Taquara phase (Taquara tradition) and Maquiné phase (Tupiguaraní tradition). Coll. 1965 and 1966 by E. Th. Miller, Brazilian Archaeol. Proj.; subm. by Clifford Evans.

Morro da Formiga

Charcoal from Morro da Formiga Site S-61 (29° 38′ S Lat, 50° 45′ W Long), Taquara Município, type-site for Taquara phase.

1190 ± 100

SI-409. Taquara phase **A.D. 760**

Comment: date acceptable.

Palmeira

Charcoal and sand from Palmeira Site RS-S-282 (29° 40′ S Lat, 50° 55′ W Long), Saparinga, assoc. with pottery of Taquara and Tupiguaraní traditions, immediately above sterile sand.

1380 ± 110

SI-414. Taquara/Tupiguaraní **A.D. 570**

Comment (C.E.): probably dates Taquara tradition.

Paso Fundo

Charcoal samples from Paso Fundo Site RS-M-16 (29° 56′ S Lat, 50° 13′ W Long), Osório Município, assoc. with early Maguiné phase pottery of Tupiguaraní tradition.

520 ± 200

SI-410. Cut 1, 20 to 30 cm **A.D. 1430**

Comment: date too recent.

540 ± 100

SI-411. Cut 1, 30 to 40 cm **A.D. 1410**

Comment: date too recent.

Bassani

Charcoal samples from Bassani Site RS-M-35 (29° 46′ S Lat, 50° 5′ W Long), Osório Município. Assoc. with pottery of middle Maquiné phase. Tupiguaraní tradition.

870 ± 100

SI-412. Cut 2, 23 to 28 cm **A.D. 1080**

Comment: date acceptable.

1070 ± 110

SI-413. Cut 1, 20 to 25 cm **A.D. 880**

Comment: date may be too early.

SI-423. Rio Tibagí, Brazil **Modern**

Charcoal from Site PR-IB-3 (23° 17′ S Lat, 51° W Long), on left bank Tibagí R., Ibiperã Prov., Paraná, Brazil. Sample from 15 to 30 cm depth, assoc. with pottery of Tibagí phase, Tupiguaraní tradition. Coll. 1966 by Igo Chmyz; subm. by Clifford Evans. *Comment*: date acceptable.

Rio Itararé series, Brazil

Charcoal samples from Site SP-BA-7 (23° 35′ S Lat, 49° 36′ W Long), on right bank Rio Itararé, Itaporanga Município, São Paulo, Brazil. Assoc. with pottery of Cambará phase, Tupiguaraní tradition. Coll. 1965 by Igor Chmyz; subm. by Clifford Evans.

850 ± 150

SI-417. Cut A, 0 to 15 cm **A.D. 1100**

1870 ± 100

SI-418. Cut A, 15 to 30 cm **A.D. 80**

Comment (C.E.): date too early.

1130 ± 150

SI-422. Rio Paranapanema, Brazil **A.D. 820**

Charcoal from Site SP-AS-14 on right bank Rio Paranapanema (22° 46′ S Lat, 51° 3′ W Long), Municipio of Iepê, São Paulo, Brazil. Assoc. with pottery of Cambará phase, Tupiguaraní tradition, 0 to 15 cm deep. Coll. 1966 by Igor Chmyz; subm. by Clifford Evans.

E. Africa

Samatite series, West Africa

Samatite (12° 32′ N Lat, 16° 38′ E Long), Pte. St. George in Casamanca region of Senegal, West Africa, is stratified site with pottery and bog-iron. Present occupation is by Diola in nearby villages. Samples are from Cut 2 in Mound C. Levels 0 to 140 cm belong to more recent cultural period with punctate, red-slipped, and shell-tempered pottery; levels 140 to 200 cm are older cultural period with wavy-line, basket-impressed, braid-impressed, and sherd-tempered pottery. These are 1st C^{14} dates for sub-tropical Senegal. Coll. 1966 by O. Linares de Sapir; subm. by Clifford Evans.

380 ± 70

SI-489. 30 to 40 cm **A.D. 1570**

Charcoal from hearth, assoc. with mollusks, mammal bones, and pottery of pre-European Diola occupation.

920 ± 50

SI-490. 50 to 60 cm **A.D. 1030**

Charcoal from hearth, assoc. with mollusks, bones, and pottery of recent ceramic phase of pre-European Diola occupation. *Comment* (O.L. de S.): date too early.

320 ± 100

SI-491. 100 to 110 cm **A.D. 1630**

Charcoal from cooking area, assoc. with pottery of recent ceramic phase of pre-Diola occupations. Very little shellfish assoc. with sample.

490 ± 80

SI-492. 120 to 130 cm **A.D. 1460**

Charcoal from cooking area, assoc. with bones and pottery of recent ceramic phase of pre-Diola occupation. *Comment*: small sample, diluted.

590 ± 140

SI-493. 140 to 150 cm **A.D. 1360**

Charcoal from cache of shell and pottery which represents end of older period characterized by wavy-line, braid- and basket-impressed ceramics. *Comment*: small sample, diluted.

390 ± 70

SI-495. 170 to 180 cm **A.D. 1560**

Charcoal from hearth, assoc. with older ceramic phase. *Comment*: small sample, diluted. (O.L.de S.): sample apparently contaminated with more modern material.

2150 ± 80

SI-496. 180 to 190 cm **200 B.C.**

Charcoal from hearth, assoc. with older ceramic phase. *Comment*: small sample, diluted.

Niomoune series, West Africa

Niomoune (12° 38′ N Lat, 16° 39′ E Long), Dioloulou in Casamanca region of Senegal, West Africa, is 2-period site extending from Late Neolithic/Early Iron age through Late Iron age. Samples from 0 to 60 cm are of more recent period with punctate ceramics, spouts, and red slip in upper levels, but lacking braid- or basket-impressed or wavy-line ware. Levels 60 to 120 cm are of older period with crushed-shell temper, braid- and basket-impressed wares, but lacking red slip. Coll. 1966 by O. Linares de Sapir; subm. by Clifford Evans.

330 ± 50

SI-497. 20 to 40 cm **A.D. 1620**

Charcoal assoc. with bone fragments, iron, and ceramics of more recent phase.

1680 ± 80

SI-499. 100 to 120 cm **A.D. 270**

Charcoal assoc. with older ceramic component and with rice agriculture.

F. Far East

Iwashita Cave series, Japan

Iwashita Cave (33° 14′ N Lat, 129° 45′ E Long), Sasebo City, Nagasaki Pref., Kyushu, Japan, is one of several cave sites yielding Jomon pottery of apparently older age than that provided by open sites. Coll. 1964 by Masuru Aso; subm. by Clifford Evans (Aso, 1968).

9010 ± 120

SI-501. Layer V, 92 cm **7060 B.C.**

Charcoal from 92 cm below cave floor, B-4, Layer V, assoc. with roulette pottery of Earliest Jomon period.

8710 ± 100

SI-502. Layer V, 1.20 m **6760 B.C.**

Charcoal from 1.20 m below cave floor, A-4, Layer V, assoc. with zigzag roulette pottery of Earliest Jomon period. *Comment*: small sample, diluted. (M.A.): depth of A trench est. since original surface was disturbed in construction of bomb shelter during World War II.

11,300 ± 130

SI-503. Layer IX, 1.84 m **9250 B.C.**

Charcoal from 1.84 m below cave floor, C-1, Layer IX, assoc. with plain and nail-marked pottery of Earliest Jomon period. *Comment*: small sample, diluted.

650 ± 70

SI-545. Black Beach, Massachusetts **A.D. 1300**

Peaty marsh material from Black Beach, fronting Sippewissett Marsh (41° 35′ N Lat, 70° 39′ W Long), near West Falmouth, Massachusetts. Sample from 0.6 m depth exposed along shore by migration of sand dunes shoreward from Black Beach toward Sippewissett Marsh. Coll. 1967 and subm. by D. J. Stanley (Stanley and Rhoads, 1967).

Atlantic Shell Bed series, North Carolina

Shells from several localities along coast of North Carolina, id. and coll. by O. H. Pilkey, Duke Univ.; subm. by J. W. Pierce.

9060 ± 100

SI-518. Shell bed, 19.3 m **7110 B.C.**

Ostrea virginia from oyster bank at 19.3 m water depth (34° 51′ N Lat, 70° 12′ W Long).

10,820 ± 200

SI-519. Shell bed, 25.9 m **8870 B.C.**

Ostrea virginia from oyster bank at 25.9 m water depth (33° 52′ N Lat, 77° 13′ W Long).

26,440 ± 1170

SI-521. Shell bed, 100 m **24,490 B.C.**

Spisula solidisima, Mulina lateralis, and *Polynices duplicatus* from 100 m water depth (34° 12′ N Lat, 76° 6′ W Long).

7880 ± 80

SI-520. Beach surface **5930 B.C.**

Ostrea virginia from surface of present beach (34° 36′ N Lat, 76° 32′ W Long). Discolored shells of same species are found at depths 26 m to 91 m. Age of this sample suggests shoreward transport of shells from deep water to beach by storm waves.

25,780 ± 1340

SI-539. Barnegat Light Walrus **23,830 B.C.**

Sample of bone from mexilla adjacent to right tusk alveolus of *Odobenus rosmarus* (id. by C. E. Ray) from Specimen U.S.N.M. 23784 dredged from water depth 18 to 24 m ca. 17 km off Barnegat Light (39° 46′ N Lat, 73° 56′ W Long), New Jersey. Coll. 1966 by scallop dredger (received through Bur. Comml. Fisheries); subm. by C. E. Ray (Ray *et al.,* 1968). *Comment*: small sample, diluted. Sample very hard, leached in warm acetic acid 12 to 14 days before hydrolysis. It has been assumed that walrus shifted its range southward in response to glacial cooling, but assumption has yet to be corroborated by dating of southerly specimens such as this.

33,660 ± 3980

SI-459. Saltpeter Cave bear **31,710 B.C.**

Rib fragments of *Tremarctos floridanus (Gidley)*, id. by J. E. Guilday, from Saltpeter Cave, Grassy Cove (35° 50′ N Lat, 84° 57′ W Long),

Cumberland Co., Tennessee. Northernmost recorded find of extinct Florida Spectacled bear, found as single individual on cave floor beneath flowstone, in narrow side passage 4000 ft from cave entrance. Coll. 1965 by D. C. Irving; subm. by J. E. Guilday and C. E. Ray (Guilday and Irving, 1967). *Comment*: very small sample, diluted. Sample leached in acetic acid before hydrolysis.

Ladds series, Georgia

Carbonate land snails from Ladds site (34° 9′ N Lat, 84° 50′ W Long), Bartow Co., Georgia. Shells assoc. with remains of Late Pleistocene vertebrates. Coll. 1966 by Lewis Lipps; subm. by C. E. Ray (Lipps and Ray, 1967).

SI-458. Shell with fauna — **17,520 ± 630 / 15,570 B.C.**

SI-459. Modern control shell — **148% Modern**

Comment: post-modern C^{14} activity of modern control lends confidence to date for shells assoc. with fauna.

SI-456. Ester Creek, Alaska — **22,680 ± 300 / 20,730 B.C.**

Tendon and organic fraction of left tibia of *Felis atrox* (id. T. Galusha) from Ester Creek area frozen-muck (65° N Lat, 147° 30′ W Long). Coll. 1938 by Otto Geist; subm. by C. E. Ray.

Fairbanks Creek series, Alaska

Organic samples from mummified fauna found in frozen muck at Fairbanks Creek (65° N Lat, 147° W Long). Subm. by C. E. Ray.

SI-453. Mammuthus primigenius — **15,380 ± 300 / 13,430 B.C.**

Flesh from lower leg found 85 ft deep, at floor of snow gulch. Coll. 1940 by R. H. Osborne. *Comment* (C.E.R.): sample believed assoc. with artifact now under study by Osborne.

SI-454. Musk-ox hair — **17,210 ± 500 / 15,260 B.C.**

Hair from hind limb of single mummified musk-ox. Coll. 1940 by Otto Geist. *Comment*: see SI-455, below.

SI-455. Musk-ox muscle — **24,140 ± 2200 / 22,190 B.C.**

Muscle from beneath scalp on skull roof of same musk-ox as SI-454, above. *Comment*: very small sample, diluted.

Rio de la Plata series, Argentina

Oyster shells from 2 extensive shell beds off mouth of Rio de la Plata, Argentina. Coll. 1966 and id. by C. M. Urien; subm. by J. W. Pierce.

580 ± 90

SI-516. 18 m water depth **A.D. 1370**

Oyster shell from bed (37° 5′ S Lat, 56° 28′ W Long), 18 m water depth.

420 ± 60

SI-517. 31 m water depth **A.D. 1530**

Ostrea puelchana from shell bed (35° 40′ S Lat, 54° 45′ W Long).

REFERENCES

Date lists:

Michigan V	Crane and Griffin, 1960
Michigan XIII	Crane and Griffin, 1969
Smithsonian IV	Long and Mielke, 1967
Smithsonian V	Mielke and Long, 1969

Aso, Masaru, 1968, Excavation report of the Iwashita Cave: Chuo-Koron Bijutsu Shuppan, Tokyo.

Crane, H. R. and Griffin, J. B., 1960, University of Michigan radiocarbon dates V: Am. Jour. Sci. Radiocarbon Supp., v. 2, p. 31-48.

———— 1970, University of Michigan radiocarbon dates XIII: Radiocarbon, v. 12, p. 161-180.

Guilday, J. E. and Irving, D. C., 1967, Extinct Florida Spectacled Bear, *Tremarctos floridanus* (Gidley) from central Tennessee: Natl. Speleological Soc. Bull., v. 29, no. 4, p. 149-162.

Lipps, Lewis and Ray, C. E., 1967, The Pleistocene fossiliferous deposit at Ladds, Bartow County, Georgia: Georgia Acad. Sci. Bull., v. 25, no. 3, p. 113-119.

Long, Austin and Mielke, J. E., 1967, Smithsonian Institution radiocarbon measurements IV: Radiocarbon, v. 9, p. 368-381.

MacCord, H. A., Slattery, Gates, and Woodward, D. R., 1957, The Shepard site: Archaeol. Soc. Maryland Bull., v. 1.

Mielke, J. E. and Long, Austin, 1969, Smithsonian Institution radiocarbon measurements V: Radiocarbon, v. 11, p. 163-182.

Mulloy, William, 1954, The McKean site in northeastern Wyoming: Southwestern Jour. Anthropol., v. 10, no. 4, p. 432-460 .

Ray, C. E., Wetmore, Alexander, Dunkle, D. H., and Drez, Pauil, 1968, Fossil vertebrates from the marine Pleistocene of southeastern Virginia: Smithsonian Misc. Colln., v. 153, no. 3.

Sanoja, Mario and Vargas, Iraida, 1968, Proyecto 72: arqueologia del occidente de Venezuela: 2° Informe General, 38th Internatl. Cong. Americanists, Stuttgart.

Stanley, D. J. and Rhoads, D. C., 1967, Dune sands examined by infrared photography: Amer. Assoc. Petroleum Geol. Bull., v. 51, no. 3, p. 424-430.

Strong, W. D., 1935, An introduction to Nebraska archaeology: Smithsonian Misc. Colln., v. 43, no. 10.