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SMITHSONIAN INSTITUTION RADIOCARBON MEASUREMENTS VII*

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INTRODUCTION

This list includes those samples dated between December 1968 and July 1971. Samples before SI-617 were completed before the laboratory was dismantled in April 1969 for renovations in the Smithsonian Institution Building. Samples beginning with SI-617 were dated after December 1970, following re-establishment of the laboratory in new quarters.

Two 700 ml counters and one 2 L counter are operated at 2 atmospheres, and a fourth counter of 2 L volume is being installed. In addition to a mercury shroud between guard and sample counter, the counter cavity is surrounded by 3 in. of paraffin, 5 tons of mercury (8 in), and 12 tons (8 in) of pre-1940 battleship armorplate.

Problems inherent in obtaining "dead" hydrogen for CH_4 synthesis have been circumvented by distillation and electrolysis of water from a SE Maryland Pleistocene deposit. Re-investigation of the technique of removing radon from CO_2 in cold charcoal traps indicated some fractionation, and radon removal is now accomplished by passing synthesized CH_4 through charcoal traps held at —30°C. Shell samples are pretreated in 2N HCl to remove outer portion, and CO_2 is evolved using 50% H_3PO_4. Except where noted, all other samples are pretreated with hot 2% NaOH and 2N HCl.

Samples are counted for periods of at least 2500 minutes, and X^2 analyses are made on the 100-minute print-outs. Errors quoted are derived from sample, background, and NBS oxalic acid standard measurements, and have been adjusted where appropriate for small-sample dilution.

SAMPLE DESCRIPTIONS

I. GEOLOGIC AND PALEONTOLOGIC SAMPLES

Barrier island series, North Carolina

Shell samples cored from several localities in coastal Carteret Co., North Carolina, in an attempt to define history of building and abandonment of the barrier islands. Coll. 1968 and subm. by J. W. Pierce, Smithsonian Inst.

SI-578. HR-602-W **>35,500**

White shells from depth 9.8 m to 10.7 m below present surface at HR-602 (34° 54′ 03″ N Lat, 76° 21′ 38″ W Long).

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

32,640 ± 3290

SI-579. HR-602-B **30,690 B.C.**

Discolored black shells from same sampling as SI-578, above.

SI-580. H6-604 **>43,000**

Shells from depth 9.1 m to 10.6 m below present surface at H6-604 (34° 57′ 02″ N Lat, 76° 16′ 50″ W Long).

SI-581. H7-605 **>37,000**

Shells from depth 11.3 m to 12.8 m below present surface at H7-605 (34° 42′ 20″ N Lat, 76° 34′ 51″ W Long).

Contreras Islands series, Panama

Coral from modern reef (7° 49′ N Lat, 81° 46′ W Long), in Contreras Is. off Pacific coast of Panama. Coll. 1970 and subm. by P. W. Glynn, Smithsonian Tropical Res. Inst., to determine rate of net coral accretion.

210 ± 100

SI-679. Modern coral reef, A **A.D. 1740**

Coral conglomerate, 1 m deep in reef.

280 ± 120

SI-680. Modern coral reef, B **A.D. 1670**

Coral conglomerate, 1 m deep in reef. *Comment*: SI-679 and SI-680 were from walls of hole blasted in reef with dynamite.

Holandes Cay series, Panama

Samples from modern coral reef and limestone substrate in Holandes Cay (9° 36′ N Lat, 78° 41′ W Long), off Atlantic coast of Panama. Coll. 1970 and subm. by P. W. Glynn.

2115 ± 125

SI-681. Fossil limestone substrate **165 B.C.**

Montastrea and *Diploria* common, id. Glynn and Stewart, from limestone parapet of fossil-reef substrate under modern living reef.

SI-682. Algal ridge, 4 cm **+1.3% modern**

Crustose coralline algae, 4 cm deep in algal ridge.

SI-683. Algal ridge, 12 cm **<50**

Crustose coralline algae, 12 cm deep in algal ridge.

Volcan Arenal series, Costa Rica

Bark and wood of *Pithecellobium racemiflorium*, id. B. F. Kukachka, from trees felled in prehistoric eruption and ashfall of Volcan Arenal (10° 29′ 12″ N Lat, 84° 33′ 21″ W Long), Costa Rica. Coll. 1968 and subm. by W. G. Melson, Smithsonian Inst. (Melson and Saenz, 1968).

450 ± 30

SI-576. Tree 111216-1 **A.D. 1500**

400 ± 30

SI-577. Tree 111216-2 **A.D. 1550**

Comment (W.G.M.): low density of wood as indicated by thin-walled fibers suggests fast growth; therefore, possibility of post-sample growth error is considered minimal.

Deep Creek Pit series, Virginia

Samples from Deep Creek Pit (36° 46′ N Lat, 76° 22′ W Long), Norfolk Co., Virginia, near base of Pleistocene stream channel. Coll. 1968 by Paul Drez; subm. by C. E. Ray, Smithsonian Inst.

18,780 ± 630

SI-609. Mammoth tusk **16,830 B.C.**

Fragments of tusk (*Mammut americanum*) id. C. E. Ray, 1.8 m to 2.4 m below surface at base of stream channel. *Comment*: pretreated with diluted CH_3COOH before hydrolysis in HCl.

SI-610. Wood **>38,000**

Elm, id. F. M. Hueber, from position 0.3 m above tusk fragments of SI-609 (above), near base of stream channel. *Comment*: collector states SI-610 is more likely the true age. SI-609 may have received insufficient pretreatment in CH_3COOH.

13,460 ± 420

SI-641. Saltville proboscidean, Virginia **11,510 B.C.**

Tusk of proboscidean (prob. *Mammut americanum*), id. C. E. Ray, from Saltville site (36° 52′ N Lat, 81° 46′ W Long), Smyth Co., Virginia. Coll. 1964 by Gene Booth; subm. by C. E. Ray (Ray *et al.*, 1967). *Comment*: small sample, diluted. Sample pretreated in dilute CH_3COOH before hydrolysis in HCl.

23,235 ± 775

SI-642. Starunia wooly rhinoceros **21,285 B.C.**

Soft tissue of *Coelodonta antiquitatis* (*Blumenbach*), id. J. Stach, from 12.5 m below surface of Starunia Tar Pit (48° 42′ N Lat, 24° 30′ E Long), Ukraine, U.S.S.R. (formerly SE Poland). Coll. 1929 by E. Panow; subm. by C. E. Ray (Nowak *et al.*, 1930). *Comment*: sample fluxed 24 hrs in Soxhlet extractor with thiophene-free benzene, 12 hrs with ethyl alcohol, then washed 24 hrs in 2N HCl to obtain tar-free collagen fraction.

Cave of Muleta series, Mallorca

Bone and charcoal from Cave of Muleta (39° 47′ N Lat, 2° 41′ E Long), Soller, Mallorca. The cave yielded bones of *Myotragus balearicus*, id. W. H. Waldren, an extinct form of antelope, as well as evidence of human occupation of Pre-Talayotic and Talayotic periods. Coll. by W. H. Waldren and J. S. Kopper; subm. by C. E. Ray (Waldren and Kopper, 1968a, b).

2180 ± 115

SI-651A. Sectors C/D, 50 cm, bone **230 B.C.**

Bone of domesticated goat from 50 cm depth, Secs. C and D, assoc. with Pre-Talayotic archaeol. materials. Coll. 1963.

1595 ± 100

SI-651B. Sectors C/D, 50 cm, teeth **A.D. 355**

Teeth of domesticated goat, from same sampling as SI-651A (above). *Comment*: small sample, diluted.

2765 ± 120

SI-652. Sector III **815 B.C.**

Charcoal from Talayotic archaeol. horizon.

15,855 ± 655

SI-646. Sector D, 250 to 300 cm **13,905 B.C.**

Bone (*Myotragus balearicus*) 250 to 300 cm deep, Sec. D. Coll. 1966. *Comment*: small sample, diluted.

23,880 ± 1480

SI-647. Sector E, 400 to 450 cm **21,930 B.C.**

Bone (*Myotragus balearicus*) 400 to 450 cm deep, Sec. E. Coll. 1966. *Comment*: small sample, diluted.

18,100 ± 600

SI-649. Sector F, 300 cm **16,150 B.C.**

Bone (*Myotragus balearicus*) 300 cm deep, Sec. F. Coll. 1966. *Comment*: small sample, diluted.

16,335 ± 415

SI-648. Sector X, 300 cm **14,385 B.C.**

Bone (*Myotragus balearicus*) 300 cm deep, Sec. X. Coll. 1967. *Comment*: small sample, diluted.

18,735 ± 555

SI-650. Sector X, 350 to 400 cm **16,785 B.C.**

Bone (*Myotragus balearicus*) 350 to 400 cm deep, Sec. X. Coll. 1967. *Comment*: small sample, diluted.

14,465 ± 315

SI-645. Sector Z, 350 cm **12,515 B.C.**

Bone (*Myotragus balearicus*) 350 cm deep, Sec. Z. Coll. 1966. *Comment*: small sample, diluted.

General Comment: SI-645 was pretreated by cold hydrolysis in 0.5N HCl under aspirator vacuum for 48 hrs to extract collagen as the datable fraction. Other samples of bone and teeth were pretreated following Haynes (written commun., 1968) by cold hydrolysis in 50% CH_3COOH, with final CO_2 evolution in 1.ON HCl. For other dates from this cave, see: Y-2359, 2910 ± 120 (R., 1969, v. 11, p. 638); KN-640-3a, 7134 ± 80, Sec. O, 175 cm; KN-640-3b, 5934 ± 109, Sec. O, 150 cm (Waldren, written commun., 1971). See also age determinations by racemization of amino acids: RAA-SC-1, 34,000 yr, Sec. Z, 450 cm; and RAA-SC-2, 107,000 yr, Sec. Z, 650 cm (Waldren, written commun., 1971).

Difference between dates of SI-651A and SI-651B for Pre-Talayotic occupation, and earlier date of SI-652 for later Talayotic horizon does not engender confidence in the situation.

II. ARCHAEOLOGIC SAMPLES

A. United States

SI-530. Rabbit Bone Cave, Wyoming — **1670 ± 100 A.D. 280**

Charcoal from basin-shaped firepit lined with fire-reddened sandstone in Rabbit Bone Cave, 48PA202 (44° 30′ N Lat, 109° W Long), Park Co., Wyoming. Assoc. with wide corner-notched projectile points, scrapers, knives, bone awl and beads, manos and metates, and many rabbit bones. Coll. 1964 by R. W. Edgar; subm. by R. W. Neuman, RBS, Smithsonian Inst.

Nebraska culture series, Nebraska

Charcoal samples from 11 sites representative of the Nebraska culture along W bank of Missouri R. Subm. by W. R. Wedel, Smithsonian Inst. (Cooper, 1939; Hill and Wedel, 1936; Hill and Cooper, 1938).

SI-617. Leary site, house post — **620 ± 100 A.D. 1330**

Charred fragments of house post from Leary site, 25RH1 (40° 01′ N Lat, 95° 23′ W Long), Richardson Co. Assoc. with Nebraska and Oneota components. Coll. 1965 by Wendell Frantz.

SI-618. Leary site, Feature 14 — **1170 ± 60 A.D. 780**

Charred fragments or house post in Feature 14 of Leary site (see SI-617, above). *Comment*: see also WIS-151, 740 ± 55; and WIS-155, 540 ± 55 (R., 1967, v. 9, p. 534).

SI-619. Majors site — **910 ± 140 A.D. 1040**

Charcoal from Majors site, 25NH2 (40° 29′ N Lat, 95° 46′ W Long), Nemaha Co. Assoc. with shell-tempered, shoulder-incised ceramics as well as Nebraska culture artifacts. Coll. 1937 by Paul Cooper.

SI-620. Cass site, Pit F-7 — **540 ± 110 A.D. 1410**

Charcoal from Pit F-7 in Cass site, 25CC96 (41° 01′ N Lat, 96° 16′ W Long), Cass Co. Coll. 1966 by Wendell Frantz.

SI-621. Cass site, Feature 1 — **615 ± 115 A.D. 1335**

Charcoal from Feature 1 in earth lodge floor of Cass site (see SI-620, above).

550 ± 100

SI-622. Cornish Meadows site **A.D. 1400**

Charred fragments of post in House 1 of Cornish Meadows site, 25SY2 (41° 02′ N Lat, 96° 09′ W Long), Sarpy Co. Coll. 1937 by Paul Cooper.

1040 ± 100

SI-623. Ashland site **A.D. 910**

Charcoal from Cache 3 in House 1 of Ashland site, 25CC1 (41° 03′ N Lat, 96° 18′ W Long), Cass Co. Coll. 1937 by Paul Cooper.

735 ± 115

SI-624. Farnsworth site, House 1 **A.D. 1215**

Charcoal from Cache 1 in House 1 of Farnsworth site, 25SY1 (41° 12′ N Lat, 96° 17′ W Long), Sarpy Co. Coll. 1935 by Paul Cooper.

610 ± 140

SI-625. Farnsworth site, House 2 **A.D. 1340**

Charcoal from floor of House 2 of Farnsworth site (see SI-624, above). Coll. 1935 by Paul Cooper.

360 ± 50

SI-626. Frank Parker site, House 1 **A.D. 1590**

Charcoal from entrance to House 1 of Frank Parker site, 25WN1 (41° 23′ N Lat, 95° 56′ W Long), Washington Co. Coll. 1938 by Paul Cooper.

515 ± 115

SI-627. Frank Parker site, House 2 **A.D. 1435**

Charcoal from Cache 3 of House 2 of Frank Parker site (see SI-626, above). Coll. 1938 by Paul Cooper.

555 ± 65

SI-628. Parker site, House 1 **A.D. 1395**

Charcoal from floor of House 1 of Parker site, 25D02 (41° 44′ N Lat, 96° 30′ W Long), Douglas Co. Coll. 1938 by Paul Cooper.

775 ± 175

SI-629. Parker site, House 4 **A.D. 1175**

Charcoal from floor of House 4 of Parker site (see SI-628, above). Coll. 1938 by Paul Cooper.

290 ± 120

SI-630. Parker site, midden **A.D. 1660**

Charcoal from Midden 3 of Parker site (see SI-628, above). Coll. 1938 by Paul Cooper.

850 ± 140

SI-631. Houston site, House 1 **A.D. 1100**

Charcoal from Cache 2 in House 1 of Houston site, 25BT1 (41° 50′ N Lat, 96° 18′ W Long), Burt Co. Coll. 1938 by Paul Cooper.

680 ± 140

SI-632. Houston site, House 2 **A.D. 1270**

Charcoal from floor of House 2 of Houston site (see SI-631, above). Coll. 1938 by Paul Cooper.

720 ± 140

SI-633. Ross site, House 1 **A.D. 1230**

Charcoal from floor of House 1 in Ross site, 25TS2 (42° 12′ N Lat, 96° 24′ W Long), Thurston Co. Coll. 1938 by Paul Cooper.

750 ± 120

SI-634. Ross site, House 2 **A.D. 1200**

Charcoal from floor of House 2 of Ross site (see SI-633, above). Coll. 1938 by Paul Cooper.

585 ± 115

SI-635. Ross site, House 3 **A.D. 1365**

Charcoal from Cache 6 of House 3 of Ross site (see SI-633, above). Coll. 1938 by Paul Cooper.

535 ± 115

SI-636. Schrader site **A.D. 1415**

Charcoal from floor of House 1 of Schrader site, 25LC1 (40° 40′ N Lat, 96° 41′ W Long), Lancaster Co. Assoc. with artifacts suggestive of Nebraska culture influenced by Upper Republican component. Coll. 1935 by Paul Cooper.

B. Peru

2600 ± 110

SI-485. El Tanque, Peru **650 B.C.**

Cotton threads from burial offering at El Tanque (11° 55′ S Lat, 77° 10′ W Long), Ancón, Peru. Assoc. with bichrome ceramics of type unusual on Peruvian central coast. Coll. 1961 by R. M. Mendieta; subm. by Clifford Evans, Smithsonian Inst. *Comment*: for primary occupation of this area, see UCLA-967, 4720 ± 80 (R., 1966, v. 8, p. 476).

3570 ± 80

SI-486. Ondores, Peru **1620 B.C.**

Charcoal from Ondores (11° S Lat, 76° 11′ W Long), Junin, Peru. This is a large site, occupied from Pre-ceramic through Formative periods. Sample from Pit 2, Level F, in black earth with ashes and shell. Assoc. with incised ceramics of possible Kotosh-Sajara-Pata affiliations. Coll. 1965 by R. M. Mendieta; subm. by Clifford Evans.

3820 ± 60

SI-487. San Blas, Peru **1870 B.C.**

Charcoal from San Blas (11° S Lat, 76° 11′ W Long), Junin, Peru. From Pit 1, Level L, assoc. with chipped stone artifacts and plainware ceramics. Coll. 1965 by R. M. Mendieta; subm. by Clifford Evans.

1690 ± 50

SI-488. Wari-Wilka, Peru **A.D. 260**

Wood from temple at Wari-Wilka (12° 12′ S Lat, 75° 10′ W Long), Junin, Peru. Site occupied during Regional Florescent period; temple constructed during Tiahuanaco expansion, and used through Wanca and Inca periods until Spanish conquest. Sample probably represents remodelling of temple, and is part of 3 rotting trusses of central lintel. Coll. 1965 by R. M. Mendieta; subm. by Clifford Evans.

C. Brazil

590 ± 50

SI-541. Beliscao, Brazil **A.D. 1360**

Charcoal from Cut A, Level 45 to 55, 50 cm below surface at Beliscao, BA-LN-12 (12° 04′ S Lat, 37° 44′ W Long), Dist. Palame, Mun. Rio Real, Bahia, Brazil. Sample assoc. with ceramics and lithic artifacts of Aratu phase. Coll. 1966 by Valentin Calderon; subm. by Clifford Evans.

1080 ± 90

SI-542. Guipe, Brazil **A.D. 870**

Charcoal from Cut A, Level 45 to 60, 45 cm below surface at Guipe, BA-LN-13 (12° 47′ S Lat, 38° 27′ W Long), Mun. Aratu, Bahia, Brazil. Assoc. with ceramics and lithic artifacts of Aratu phase. Coll. 1966 by Valentin Calderon; subm. by Clifford Evans.

Gruta do Padre series, Brazil

Charcoal from Gruta do Padre, PE-16 (9° 05′ S Lat, 38° 19′ W Long), Petrolandia, Pernambuco, Brazil. Assoc. with lithic artifacts. Coll. 1967 by Valentin Calderon; subm. by Clifford Evans.

2720 ± 110

SI-637. Quadrant B, 0 to 30 cm **770 B.C.**

Charcoal assoc. with cremated burials, fragments of matting, polished grooved ax, and a few plain potsherds. A sterile windblown layer appears below this level, separating it from other levels below (see SI-544, below).

7580 ± 410

SI-544. Quadrant A, 90 cm **5630 B.C.**

Comment: small sample, diluted.

Sambaqui Pôrto Maurico series, Brazil

Sambaqui Pôrto Maurico is a preceramic shell midden on the coast of Brazil (30° 26′ S Lat, 49° 30′ W Long), 5 km from Bay of Paranguá, Paraná, Brazil. Samples were dated to determine rate of deposition of shells as indicative of food supply. Coll. 1966 by J. W. Rauth; subm. by Clifford Evans.

SI-504. .25 m — **4640 ± 80** / **2690 B.C.**

Anomalocardia brasiliana Gmelin, assoc. with bones and lithic artifacts, .25 m below surface.

SI-505. .50 m — **4620 ± 100** / **2670 B.C.**

Oyster shells from .5 m below surface.

SI-506. 1 m — **4740 ± 90** / **2790 B.C.**

Oyster shells from 1 m below surface.

SI-507. 1.5 m — **4540 ± 90** / **2590 B.C.**

Oyster shells from 1.5 m below surface.

SI-508. 2 m — **4760 ± 80** / **2810 B.C.**

Oyster shells near base of sandy clay deposit, 2.0 m below surface.

SI-509. 1 m — **6030 ± 130** / **4080 B.C.**

Ostrea arborea, 1 m below surface. No artifacts assoc. with sample. This would appear to date a brief early occupation when *Ostrea arborea* was the only species exploited.

General Comment: this site is 10 to 15 km S of shell mounds of Saquarema and Gomes, and similarity of artifact content of this site to Gomes suggests similar date of occupation. See Sambaqui de Saquarema (R., 1965, v. 7, p. 198); and Sambaqui do Gomes (R., 1963, v. 5, p. 97 and R., 1969, v. 11, p. 159-160).

Rio Krauel series, Brazil

Charcoal samples from Rio Krauel, SC-VI-10 (27° 03′ S Lat, 49° 38′ W Long), Santa Catarina, Brazil. Coll. 1966 by W. F. Piazza; subm. by Clifford Evans.

SI-536. Rio Krauel, Cut 2 — **290 ± 80** / **A.D. 1660**

Charcoal, .1 to .15 m below surface, assoc. with lithic artifacts.

SI-537. Rio Krauel, Cut 4 — **660 ± 80** / **A.D. 1290**

Charcoal, .15 to .2 m below surface, assoc. with lithic artifacts.

Mondai phase series, Brazil

Charcoal from 4 sites, all representative of the Mondai phase, a corrugated subtradition of the Tupiguarani ceramic complex. Coll. 1967 in Santa Catarina by W. F. Piazza; subm. by Clifford Evans.

250 ± 90

SI-546. Passo do Uraguai **A.D. 1700**

Charcoal from Cut 1, .2 to .3 m below surface at Passo do Uraguai, SC-U-54 (27° 05′ S Lat, 53° 02′ W Long). *Comment*: small sample, diluted.

510 ± 70

SI-547. Barra Grande, Cut 1 **A.D. 1440**

Charcoal from Cut 1, .2 to .3 m below surface at Barra Grande, SC-U-55 (27° 07′ S Lat, 53° 05′ W Long). *Comment*: small sample, diluted.

620 ± 80

SI-550. Barra Grande, Cut 2 **A.D. 1330**

Charcoal from Cut 2, .2 to .3 m below surface at Barra Grande (see SI-547, above).

490 ± 70

SI-548. Sao Carlos **A.D. 1460**

Charcoal from Cut 1, .2 to .3 m below surface at Sao Carlosm SC-VX-5 (27° 06′ N Lat, 53° 01′ W Long). *Comment*: small sample, diluted.

1070 ± 100

SI-549. Barra Escondida I **A.D. 880**

Charcoal from Cut 1, .1 to .25 m below surface at Barra Escondida I, SC-U-69 (27° 08′ S Lat, 53° 26′ W Long).

D. Argentina

Salto Grande series, Argentina

Shell samples from 2 adjacent sites (31° 13′ S Lat, 57° 15′ W Long). Grande, Entre Rios, Argentina. The sites are shell mounds with Salto Grande (Serrano terminology) ceramics on surface, but these samples are assoc. with a non-decorated Pre-Guarani ceramic style. Coll. 1967 by E. M. Cigliano; subm. by Clifford Evans.

770 ± 70

SI-555. Cerro Chico **A.D. 1180**

Felipponea iheringi (Pilsbry), 40 to 50 cm below surface of shell midden 80 cm deep.

1090 ± 40

SI-556. Los Sauces **A.D. 860**

Felipponea iheringi (Pilsbry), 40 to 45 cm below surface of shell midden 250 m S of Cerro Chico (see SI-555, above).

SI-557. Modern shell **+4.3% modern**

Asolene megastoma subm. as modern control for this area. While

modern examples of *Felipponea* are no longer found in Argentina, *A. megastoma* was found in the middens. *Comment*: no problem of contamination by older dissolved carbonates.

E. Far East

I.C.U. series, Japan

Charcoal samples from various locations in the Internatl. Christian Univ. (I.C.U.) site (35° 41′ N Lat, 139° 32′ E Long), Mitaka, Tokyo, Japan. Samples attributed to Middle Jomon period. Coll. 1967 by J. E. Kidder; subm. by Clifford Evans.

SI-551. Early Middle Jomon, I.C.U. **4960 ± 100 3010 B.C.**

Charcoal from Loc. 19, Pat 2; from bottom of pit, covered by layer of black humus to depth of 20 cm, and overlain with stones. Assoc. with Atamadi ceramics of Early Middle Jomon period. *Comment*: small sample, diluted.

SI-552. Late Middle Jomon, I.C.U. **4310 ± 120 2360 B.C.**

Charcoal from Loc. 28C, Pit 2, from pit in floor of pit-house, directly under stone pile. Assoc. with shell-scraped pottery (Nojima type) and small amounts of Middle Jomon pottery. *Comment*: small sample, diluted.

General Comments: for other Middle Jomon dates from this site, see UCLA-279, 4570 ± 150 (R., 1964, v. 6, p. 337), and SI-125, 5090 ± 65 (R., 1965, v. 7, p. 253). (C.E.K.): both dates may be accepted as valid for Middle Jomon, but time difference seems too great for I.C.U. site; unexplainable at present.

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