

UNIVERSITY OF TOKYO RADIOCARBON MEASUREMENTS V

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Most of the ^{14}C measurements reported here were made between August 1970 and August 1972. Chemical treatment of samples and counting technique remain as described previously (R, 1968, v 10, p 144-148; 1971, v 13, p 97-102). We have added Houtermans-Oeschger type multi-anode anticoincidence gas proportional counter, manufactured by Tokyo Atomic, Japan. The central counter tube, which has several small holes, 5mm diam, is made of aluminized polyethylene foil, 0.06mm thick, with 72mm inside diam and 300mm sensitive length. The external counter tube is made of stainless steel 4mm thick, with 93mm inside diam and 350mm length. The anode wires of both counters are also made of stainless steel 0.05mm diam. The counters are surrounded by a paraffin shield 50mm thick and encased in a 250mm shield of steel on all sides. Acetylene is used as the counting gas at 753.3mm Hg ($22 \pm 1^\circ\text{C}$). Counting rates of background and 95% activity of NBS oxalic acid standard were $1.25 \pm 0.02\text{cpm}$ and $14.39 \pm 0.12\text{cpm}$, respectively.

Ages are calculated using the half-life value 5570 with 1950 as the reference year. The standard deviation quoted includes only 1σ counting statistics of background, sample, and standard counts. Maximum ages are given with a limit of 43,900 years BP, corresponding to sample activity less than 3σ above background.

ACKNOWLEDGMENTS

Descriptions, comments, and references to publications are based on information supplied by the submitters. Thanks are due to Tatsuji Hamada, Institute of Physical and Chemical Research, for water with a low tritium content, and to Kazue Hatakeyama for secretarial assistance. The project was partly supported by a Grant in Aid for Fundamental Scientific Research from the Ministry of Education.

SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. Japan

TK-82. Soda

$15,300 \pm 100$

13,350 BC

Charred wood embedded in pumice flow bed at Soda, Tsuchiya, Hiratsuka city, Kanagawa Pref ($35^\circ 20' 11'' \text{N}$, $139^\circ 16' 4''\text{E}$). Coll 1969 by N Katayama and T Hamada, Univ Tokyo, and subm 1969 by N Katayama. *Comment* (TH): date younger than expected, probably due to state of preservation in porous flow material overlying clay at the site.

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TK-87. Lake Shiobara-ko **24,500 ± 400**
22,550 BC

Driftwood from upper part of lake sediments, Shiobara-machi, Shioga-gun Tochigi Pref (36° 58.7' N, 139° 47.3' E). Coll 1970 by S Yamada and subm 1970 by F Takai, Univ Tokyo. *Comment* (A Iijima, Univ Tokyo): same horizon as TK-66 (R, 1971, v 13, p 98).

Ichihino series

TK-88. **25,800 ± 400**
23,850 BC

Carbonized tree trunk, 15cm diam, from Ito pyroclastic flow, Ichihino, Hiwaki-cho, Kagoshima Pref (31° 47' 42" N, 130° 25' 4" E). Coll by S Yokoyama, Tokyo Univ Educ, and subm 1969 by S Aramaki, Univ Tokyo.

TK-89. **25,200 ± 400**
23,250 BC

Charcoal from Ito pyroclastic flow. Same locality as TK-88. Coll 1969 by S Yokoyama and subm 1969 by S Aramaki.

TK-98. Iwato **23,500 ± 300**
21,550 BC

Carbonized tree trunk, 20cm diam, from Tsumaya pyroclastic flow, Iwato, Fukuyama-cho, Kagoshima Pref (31° 42' 34" N, 130° 53' 27" E). Coll 1970 by S Yokoyama and subm 1970 by S Aramaki.

TK-104. Shinjo-fumoto **26,500 ± 500**
24,550 BC

Carbonized log, ca 5.5cm diam, from Osumi pumice fall, Shinjo-fumoto, Tarumizu city, Kagoshima Pref (31° 25' 27" N, 130° 45' 43" E). Coll 1971 by S Yokoyama and subm 1971 by S Aramaki.

B. Chile

Southern Chile series

TK-70. Puerto Varas 1 **32,000 ± 700**
30,050 BC

Wood from base of uppermost moraines at depth 3.5m, exposed in Pan-American hwy cut at crossroads W of Puerto Varas, Llanquihue Prov, Chile (41° 19' S, 73° 0' 50" W). Coll 1968 by late Shukō Iwatsuka, Univ Tokyo and Atsumasa Okada, Aichi Pref Univ, and subm by Yutaka Sakaguchi, Univ Tokyo. *Comment* (AO): age is stratigraphically incompatible with measured date of TK-71, older than expected, because terminal moraines of innermost and predominant row encircling lake Llanquihue, which included this sample, were estimated to correspond to maximum stage of last glaciation (ca 20,000 yr ago).

TK-71. Puerto Varas 2 **23,300 ± 300**
21,350 BC

Wood from ca 4.5m below surface in silt underlying moraines which included TK-70 at almost same locality as Puerto Varas 1. The silt, ex-

posed in the EW-running hwy cut, consists mostly of water-laid volcanic ash. Coll 1968 by S Iwatsuka and A Okada and subm by Y Sakaguchi.

TK-72. SW of Puerto Montt

26,000 ± 400

24,050 BC

Wood from ca 15m below original surface at large exposure facing SW corner of Tenglo I, SW of Puerto Montt, Llanquihue Prov, Chile (41° 31' 13" S, 73° 0' 11" W). Sample was embedded in terminal moraines around Seno (Bay) Reloncavi. Coll 1968 by S Iwatsuka and A Okada and subm by Y Sakaguchi. *Comment* (AO): date suggests earlier age at maximum stage of last glacial invasion into Seno Reloncavi.

TK-74. SE of Puerto Montt

13,900 ± 120

11,950 BC

Wood from fluvio-glacial silt exposed in a hwy cut, ca 3km SE of Puerto Montt, Llanquihue Prov, Chile (41° 29' S, 72° 55' W). Site is on inner side of predominant moraines along N coast of Seno Reloncavi. Strata are slightly deformed by push of glacier ice, and are locally overlain by gravel. Probably same sample was dated at 15,400 ± 400 yr (K Segerstrom, 1964). Coll 1968 by S Iwatsuka and A Okada and subm by Y Sakaguchi. *Comment* (AO): dates suggest advanced stage of piedmont glacier after maximum phase of last glaciation.

C. Bolivia

TK-73. Potosi

8960 ± 180

7010 BC

Peat from middle horizon, 1 to 3m thick, ca 10m below surface at ca 65km SW of Potosi city, Quijarro, Potosi, Bolivia (19° 52' S, 66° 06' W). The peat, probably deposited in warm climate after retreat of valley glacier, is overlain by fluvio-glacial lacustrine sediments. Original surface constitutes wide valley floor, and is dissected, 13m deep, by Rio Visicia, upper stream of Rio Yura flowing into the Pilaya, a tributary of Rio La Plata. The site, +3640m alt, is in the Cordillera Real, Cordillera Los Frailes in subdivision, a W branch of E Andean range. Coll 1968 by S Iwatsuka and A Okada and subm by Y Sakaguchi.

D. Barbados

TK-116. St Michael, Barbados

18,400 ± 200

16,450 BC

Coral (*Montastrea annularis*) id by P Enos from Black Rock, N suburb of Bridgetown, Parish of St Michael, Barbados, West Indies (13° 07' N, 59° 38' W). Sample from terrace sediment younger than youngest terrace, 82,000 BP reported by Broecker *et al* (1968). Coll 1971 by A Sugimura and subm 1972 by A Iijima, Univ Tokyo. *Comment* (AS): same specimen dates 26,600 ± 1400 BP (Gak-3547); the difference is unexplained.

II. ARCHAEOLOGIC SAMPLES

A. Japan

TK-99. Minatogawa **18,250 ± 650**
16,300 BC

Charcoal from clayey soil layer 15 to 16m below surface in fissure at limestone quarry, Minatogawa, Gushikami-son, Shimajiri-gun, Okinawa Pref (26° 8' N, 127° 46' E). Excavated 1969-1971 by Research Group for Pleistocene Man in Okinawa. The layer yielded human skeletons including crania. Coll and subm 1970 by N Watanabe.

TK-100. Takahashi village site **1770 ± 140**
AD 180

Charred wood from floor of dwelling pit No. 12 of late Yayoi period at Takahashi village site, Toyota city, Aichi Pref (35° 6' N, 137° 11' E). Pottery was of Kakeyama type. Coll 1967 and subm 1970 by N Watanabe.

TK-97. Toro site **2100 ± 70**
150 BC

Cryptomeria palisade board of dike from 50cm below surface of swampy ground at Toro site, Ishida, Shizuoka city, Shizuoka Pref (34° 57' N, 138° 33' E). Pottery is of late Yayoi type. Coll 1947 and subm 1970 by T Sekino, Univ Tokyo. *Comment* (TS): date is older than supposed archaeol age. Cf 1950 ± 130 (N-70), 1940 ± 120 (N-71), 1940 ± 100 (N-73): R, 1964, v 6, p 113; 2010 ± 120 (N-74a): R, 1966, v 8, p 335; and 1960 ± 80 (Gak-793), 2060 ± 90 (Gak-794), 2300 ± 120 (Gak-795), 1720 ± 90 (Gak-796), 2590 ± 100 (Gak-797), 2240 ± 90 (Gak-798): R, 1967, v 9, p 55.

*B. Iran***Dailaman series**

A group of ancient tombs from many sites in valley of Dailaman (ca 36° 54' N, 49° 55' E) in Elburz Mts. Tokyo Univ Iraq-Iran Archaeol Expedition, led by N Egami, excavated some of them in 1960 and 1964. Reports already pub (Egami, Fukai, and Masuda, 1965; 1966; Sono and Fukai, 1968; Fukai and Ikeda, 1971).

TK-95. Charcoal **3090 ± 50**
1140 BC

Charcoal from filling of No. 7 tomb in D area on Ghalekuti hill No. II (GHA II-T.7) just above stone lid covering chamber. Coll 1964 by S Miyake and subm 1970 by S Fukai, Univ Tokyo.

TK-96. Wood of coffin **1040 ± 70**
AD 910

A piece of coffin wood belonging to Islamic period recovered from GHA II-T.4. Coll 1964 by S Miyake and subm 1970 by S Fukai.

*C. Syria***Douara Cave I series**

Charcoal and black humic soil from deposits of Douara Cave I, ca 18km NE of Palmyra, Syria (34° 40' N, 38° 35' E). Coll 1970 by K Endo

and subm 1971 by H Suzuki. Report was already pub (Suzuki and Takai, 1973).

TK-111a. >43,900

TK-111b. >43,900

Sample TK-111 was charcoal from hearth of Layer E assoc with Levallois-Mousterian industries according to sample submitter, but it resembled black humic soil. TK-111a was not pretreated. TK-111b was pretreated with cold 2N HCl by putting it into a beaker and pouring the acid over it to remove inorganic carbon contaminants. *Comment* (KE): same sample gave 30,600 $\begin{smallmatrix} +2800 \\ -2100 \end{smallmatrix}$ (Gak-3537; Suzuki and Takai, 1973, p 143-144).

TK-112. >43,900

Black humic soil from Layer K, ca 2.5m lower than comparable horizon of TK-111. Sample was pretreated by acid and alkali. *Comment* (KE): sample of same layer gave 29,600 \pm 1600 (Gak-3535; Suzuki and Takai, 1973).

D. Lebanon

TK-113. Tripoli 2940 \pm 100
990 BC

Snail shells from reddish soil in coastal sand dunes, El-Mina, Tripoli, Lebanon (34° 26' N, 35° 49' E). Coll 1970 by K Endo and subm 1971 by H Suzuki. *Comment* (KE): date of palaeosol intercalated in eolian sands suggests age of sand dune formation in Holocene.

E. Peru

TK-93. Ancón 530 \pm 80
AD 1420

Textile and gourd from Tomb 16, 175cm below surface, near Bahía de Ancón, Lima, Peru (11° 44' S, 77° 10' W). Coll 1969 by H Vidal, Mus Ancón, and subm 1972 by K Terada, Univ Tokyo. *Comment* (KT): probably Inca period.

Sechín series

Archaeol sites at Sechín, central coast, Peru (9° 30' S, 78° 29' W). Coll 1971 by L Samaniego, Case Cultura, and subm 1972 by K Terada.

TK-105. Sechín 3rd layer 1100 \pm 70
AD 850
Charcoal from fireplace of dwelling site No. 1.

TK-106. Sechín 4th layer 2720 \pm 60
770 BC
Charcoal from fireplace below floor of dwelling site No. 1.

2940 ± 120
990 BC

TK-107. Sechín 5th layer

Charcoal from layer below 4th layer.

General Comment (KT): dates indicate 2 or 3 periods, including Chavín.

Kotosh series

Coll 1969 by Univ Tokyo Sci Expedition to the Andes, Kotosh, Peru (9° 56' S, 76° 16' W) and subm 1972 by K Terada, Univ Tokyo. See Izumi and Terada (1972).

3000 ± 80
1050 BC

TK-108. Kotosh, KM 03-101

Charcoal from Waira-jirca period at KM mound. *Comment* (KT): 3800 ± 110 (Gak-262), 3780 ± 90 (Gak-765), 3200 ± 80 (TK-43; R, 1969, v 11, p 514), and 3100 ± 130 (N-69-2; R, 1966, v 8, p 336).

3360 ± 160
1410 BC

TK-109. Kotosh, KM 03-102

3470 ± 80
1520 BC

TK-110. Kotosh, KM 03-103

Both were dated with charcoal from Mito period at KT mound. *Comment* (KT): 3620 ± 100 (Gak-766a), 3900 ± 100 (Gak-766b) and 3900 ± 900 (TK-42; R, 1969, v 11, p 514).

F. Chile

Cañamo series

Archaeol sites at Cañamo, Iquique, Chile (20° 48' S, 70° 12' W). Coll 1967 by L Núñez, Univ Chile and subm 1970 by K Terada. See Núñez, (1965).

1190 ± 60
AD 760

TK-101. Cañamo-3

Plant fiber of basket, offering to the dead, from tomb No. 15 containing Tiahuanacoid elements.

3960 ± 80
2010 BC

TK-102. Cañamo-2

Charcoal from lowermost layer of shell mound, preceramic, Stratum 4.

2810 ± 90
860 BC

TK-103. Cañamo-1

Charcoal from uppermost layer of shell mound, agricultural and ceramic, Stratum 1.

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