Radiocarbon Dates, II[1]

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The dates obtained since the publication of the first date list (*1*) are presented below. This list covers the period September 1, 1950, to September 1, 1951. The dates quoted are based on 5568 ± 30 years as the half-life of radiocarbon (*2–5*). The number of runs is indicated by the number of dates listed. When the later runs were merely remeasurements of the carbon obtained from a single combustion, brackets are placed around the set of dates; otherwise separate portions of the original sample were processed and measured. The counting time has been limited to 48 hr in most cases.

RADIOCARBON DATES

I. *Mesopotamia and Western Asia*

(Principal collaborators: R. J. Braidwood, T. Jacobson, Richard A. Parker, and Saul Weinberg.)

A. Egypt

Our No.	Sample	Age (years)
550 and 551	*Upper K*: wheat and barley grain from Upper K Pit No. 59, Jar 3, and another of the Upper K Pits (No. lost), of the Fayum A material, as described in *The Desert Fayum*. Submitted by Gertrude Caton-Thompson, Cambridge, and Elise Baumgartel, Museum of The University of Manchester.	6391 ± 180

E. Iran

525 and 574	*Belt Cave* (Ghar-i-Kamarband): Five miles west of Behshahr at the southeast corner of the Caspian Sea; stratified cultural deposit 4.05 m thick containing from bottom to top Mesolithic, late Mesolithic, Neolithic, late Neolithic, and Bronze Age materials. Burned bone which was treated by dissolving in hydrochloric acid to separate the charred carbon, which was measured. Collected and submitted by Carleton S. Coon, University of Pennsylvania Museum.	

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RADIOCARBON DATES—(*Continued*)

Our No.	Sample	Age (years)
525	Supposedly from same levels as 574. Comment: Looks intrusive or altered.	{ 1130 ± 300 { 1260 ± 430
574	Zone containing upper Mesolithic artifacts, 1.25–2.15 m deep (Layers 15 and 16).	8545 ± 500

F. Palestine

576	*Bible*: Dead Sea scrolls. Book of Isaiah; linen wrappings used. Found in cave near Ain Fashkha in Palestine by Pere de Vaux (OP) under supervision by G. Lankester Harding, curator, Department of Antiquities of the Jordan government. Thought to be first or second century B.C. Brought for test by James L. Kelso at suggestion of Ovid R. Sellers and with permission of Mr. Harding. Submitted directly by C. H. Kraeling, Oriental Institute, University of Chicago.	1917 ± 200

II. *Western Europe*

(Principal collaborators: H. L. Movius, E. S. Deevey, Jr., and R. F. Flint.)

A. France

577	*France I*: Material from a late upper Paleolithic (Magdalenian) occupation layer overlain by 1.5–2 m of rock fall. Collected in and around a hearth which measured 60 cm in diameter and 10 cm in thickness at the center. Found at La Garenne, St. Marcel (Indre), France. Consisted of 1,500 g burned bone from which sufficient organic material was obtained by acid dissolution of the bone. Submitted by J. Allain, 34 Ave. Thabaud-Boislareine, Neuvy St. Sepulchre (Indre), France, via H. L. Movius, Harvard.	11,109 ± 480
578	*France II*: Same as 577, except that it consisted of an ashy material with sand, charcoal, and burned bones.	15,847 ± 1200

Our No.	Sample	Age (years)
579	*France III*: Same as 577 and 578, except found outside the hearth but in same horizon. Burned bone.	12,986 ± 560
588	*Lake Bourget*: Lake Bourget wood and peat samples taken along road between Chambéry and Grenoble in southeastern France. Should be interglacial or interstadial. This sample was wood from 2″ above base of level 3d, the lowest lignite bed in the exposure between La Flachère and La Brussère (Isère). Donor's sample No. 1. Submitted by H. L. Movius.	At least 21,000
595	*Geneva*: Wood from peat bed in Dranse Valley east of Geneva and south of Lake Geneva in France rather than Switzerland. Submitted by H. L. Movius.	At least 19,000
	B. Germany	
449	*Overbeck Top*: Peat from 0 to 2 cm above the dry horizon described in Sample 450 (*1*). Submitted by F. Overbeck.	1129 ± 115
	C. Denmark	
435	*Danish House*: Birchwood from the same area as samples 433 and 434 (*1*). From House 2. Probably a few years younger than House 1. Submitted by J. Troels-Smith, National Museum, Copenhagen. Comment: Seems to agree with 433 and possibly 434, giving a general mean of 9479 ± 280 years.	9425 ± 470
	D. Ireland	
356	*Irish Post-Glacial*: Lake mud, Lagore, County Meath. Early Post-Glacial, Zone IV. Submitted by G. F. Mitchell (his sample No. I-B).	11,787 ± 700
	E. England	
602	*Stonehenge*: Charcoal sample from Stonehenge, Wiltshire, Eng. Taken from hole No. 32 of a series of holes that are believed to have been used for some sort of ritual. These holes belong to the first phase of the monument and are considered to be late Neolithic. Submitted by Stuart Piggott, University, Edinburgh.	3798 ± 275

RADIOCARBON DATES—(*Continued*)

Our No.	Sample	Age (years)
	III. United States (Principal collaborators: E. S. Deevey, Jr., R. F. Flint, J. B. Griffin, R. F. Heizer, F. Johnson, F. H. H. Roberts, and W. S. Webb.)	
	A. New England	
478	*Linsley V*: Peat from Upper Linsley Pond, Conn. Taken at 10.55 m with large sampler. Pollen date is early to middle C-1. Pine zone is at 11.90 m. Collected and submitted by E. S. Deevey, Jr.	8794 ± 550
	C. Iowa, Illinois, Kentucky, Pennsylvania, Ohio, and Indiana	
575	*Wedron*: Wood from Lake Kickapoo deposits at Wedron, Ill. From dark peaty silt occurring in a bedrock valley in St. Peter sandstone in the same quarry and position as sample No. 535 (*1*). Wood horizon is overlain by periglacially deformed sand and dark silt, which in turn underlie laminated clay (Lake Kickapoo deposits). These lie under a series of tills which have been regionally correlated by L. Horberg and others. The lowest of these is Bloomington, so the sediments must be early Tazewell (either Bloomington or Shelbyville). Collected by H. Bretz and transmitted by Jerry Olson. It was taken as a check on Sample 535.	Older than 17,000
526	*Lake Lundy*: Wood from Bellevue, Ohio, ¾ mile northwest of Castalia on the 620 contour near the first "r" in Margaretta. This falls within the higher limit of Lake Lundy (Grassmere) but above the Elkston limit. Lake Warren beaches are 50′–60′ higher. Submitted by R. P. Goldthwait, Ohio State University.	8513 ± 500
508	*Camden*: Wood from Camden moraine, south of Dayton, Ohio. Sample 465 (*1*) was from the outer limit of the drift of which the Camden moraine is a recessional moraine. This may be Cary. Submitted by R. P. Goldthwait.	Older than 17,000
509	*Farmdale II*: Wood found 0′–1′ below surface of the Farmdale	Older than 19,000

Our No.	Sample	Age (years)
	loess at Farm Creek, Ill. Same site as Sample 510 (*1*). Submitted by Guy D. Smith.	
500	*Lake Cicott*: Peat from Lake Cicott bog, Ind. Collected from 22′–23′-depth, combined Samples G, H, I, L, M, B. Thought to be Zone C-1, Zone B boundary. Collected by J. E. Potzger, Butler University, Indianapolis, Ind., and submitted by E. S. Deevey, Jr.	5625 ± 310
	D. West Virginia, North Carolina, and South Carolina	
474	*Singletary Optimum*: Peat from highest of the three organic horizons at Singletary Lake, N. C. Same site as Sample 475 (*1*). Submitted by David G. Frey.	10,224 ± 510
	E. Louisiana, Missouri, Mississippi, Nebraska, and Texas	
558	*Folsom Bone*: Burned bison bone from Lubbock, Texas, from the Folsom horizon. Submitted by E. H. Sellards, Texas Memorial Museum, Austin. Mr. Sellards' description: ''This burned bone has been collected by Glen Evans and Grayson Meade of our staff. We are entirely satisfied that the horizon is Folsom. This conclusion that it is Folsom is based on two principal observations. We have, as you know, a thoroughly proven section at Clovis, New Mexico, the succession being a gray sand containing elephant, other fossils, and artifacts as the basal stratum of the section, followed by a deposit containing a large percentage of diatomaceous earth as the second stratum. The elephant is absent from this second stratum, and instead we have an abundance of bison. At the Lubbock locality exactly these conditions are repeated, gray sand as the basal stratum with elephant as the most common fossil, followed by the diatomaceous material with the extinct bison as the abundant fossil. Later units are present at both localities. At the Clovis locality the Folsom culture is contained in and confined to this second horizon. At the Lubbock locality Folsom culture is present as shown by the fact that we have found Folsom points thrown out in the course of dredging. We have not yet found them in place in the diatomaceous deposit, but are fully convinced that they will be found in place as excavating proceeds.''	9883 ± 350
469	*Cedar Canyon*: Charcoal from Cedar Canyon, Neb., locality Sx-101. Found in buried hearth (*cf. Am. Naturalist*, **70**, 359 [1936]). Submitted by C. B. Schultz.	1993 ± 190 2379 ± 430 Av. 2147 ± 150
153	*Davis*: Corncobs from Davis site, in eastern Texas. Nos. 5888, Jones 3497. Submitted by Alex Krieger, University of Texas, via James Griffin.	1553 ± 175
	F. Arizona, California, and New Mexico	
567–573	*Bat Cave*: Charcoal all from one area in Bat Cave. From levels from which there has been no vandalism and little opportunity for mixture by rodent activity. Submitted by Paul C. Mangelsdorf, Harvard. The development of the corn culture presumably is correlatable with the charcoal dates.	
	Sample No. — *Location*	
	567 Area III, Section Ic, Front, 11″–15″ depth	1610 ± 200
	569 Area III, Section Ic, Rear, 24″–36″ depth	2816 ± 200
	570 Area III, Section Ic, Front, 36″–48″ depth	2048 ± 170
	571 Area III, Section Ic, Front, 48″–60″ depth	5605 ± 290
	572 Area III, Section Ic, Front, 54″–66″ depth	5000 to 7500 (poor run)
	573 Area III, Section Ic, Front, 60″–66″ depth	5931 ± 310
584	*Tularosa Cave I*: Corncobs from Tularosa Cave in west central New Mexico, in which a stratified refuse deposit with 38,000 cobs of a primitive type, together with other cultivated plant material, was found. This sample of cobs was from Square 2R2, Level 14, the lowest occupation level resting on sandstone bedrock 9′ 4″ from the surface of the dry midden. Submitted by Paul S. Martin, Chicago Natural History Museum.	2223 ± 200

RADIOCARBON DATES—(*Continued*)

Our No.	Sample	Age (years)
585	*Tularosa Cave II*: Cobs and tree bark from Tularosa Cave in west central New Mexico. This sample was taken from Square 2R2, Level 10, 6′ 8″ below the surface. This layer is the Pine Lawn phase, the first pottery-making period of the area. Submitted by Paul S. Martin via Donald Collier.	2112 ± 230 2177 ± 225 Av. 2145 ± 160
612	*Tularosa Cave III*: Corn and vegetable material from Tularosa Cave (*cf.* 584 and 585), Square 2R2, Level 13. Pre-pottery and associated with Chiricahua-type implements. Submitted by Paul S. Martin.	2300 ± 200
518	*San Pedro II*: Charcoal from Pearce 8: 9, Cochise Site #3, San Pedro stage. Sulphur Spring Valley, Ariz. Submitted by E. B. Sayles.	1762 ± 430
615	*Searles Lake*: Searles Lake, Calif., organic matter from mud seam separating upper and lower salt deposits of Searles Lake, believed to have been deposited by flood waters during last glaciation. Organic matter was extracted with acetone, evaporated to a thick syrup, and the resinous material precipitated by adding water. Donor's sample No. 2. Submitted by W. A. Gale, American Potash and Chemical Corp., Trona, Calif.	At least 16,000
628	*Big Sur*: Charcoal from shell midden on California coast at mouth of Willow Creek about 30 miles south of Big Sur on coast of Monterey County. Midden overlain by 10′ of gravels. Present beach gravels submerge 4.5′ of midden, indicating shore subsidence. Submitted by R. F. Heizer, University of California, Berkeley.	1879 ± 250
	G. Nevada, Oregon, and Utah	
599	*Leonard Rock Guano*: Bat guano taken from immediately next the Pleistocene gravels in the Leonard Rock Shelter, Nev. Submitted by R. F. Heizer.	11,199 ± 570
276	*Lovelock III*: Vegetal material, earliest occupation level, Lovelock Cave (LCB). Submitted by R. F. Heizer.	2452 ± 280 2517 ± 320 Av. 2482 ± 260
587	*Humboldt*: Basketry from Humboldt Cave in Nevada, excavated in 1936. This cave is some 10 or 12 miles west of Lovelock Cave. Submitted by R. F. Heizer.	1953 ± 175
609	*Danger Cave I*: Charcoal, wood, and sheep dung from Danger Cave, near Wendover, Utah. Found on old beach of Lake Stansbury, consisting of 2′ of sand deposited on cemented gravels. Both sheep dung and wood were found in the sand layer. Above this several feet of later deposits lie. This sample was sheep dung from donor's F #18 FS #535. Submitted by Jesse D. Jennings, University of Utah.	11,453 ± 600
610	*Danger Cave II*: Same as 609, except wood.	11,151 ± 570
	I. South Dakota	
604	*Long Site*: Charcoal from the Long Site (39FA65) in the Angostura area of southwestern South Dakota. The charcoal was taken from an oval-shaped unprepared hearth (Feature 14) 2.1′ long and 1.5′ wide in the west center of Square N3E3. Part also was taken from a small surrounding area. Donor's sample No. 39FA65-417. Collected by Richard P. Wheeler in the summer of 1950 in the field party of Paul L. Cooper, River Basin Surveys, University of Nebraska. Submitted by Paul L. Cooper.	7073 ± 300
	J. Alaska	
563	*Denbigh Log*: Base log from Paleo-Eskimo house 7-IYH7; Cape Denbigh, Iyatayet site. Submitted by F. Rainey.	2016 ± 250
505	*Alaska I*: Spruce wood from Hillside (Okvik House), Gambell, St. Lawrence Island, Alaska. Excavated by Giddings in 1939. Submitted by F. Rainey.	2258 ± 230
560	*Trail Creek*: Willows and charcoal from 80-cm depth in Cave 9 at Trail Creek, Alaska. Submitted by F. Rainey.	5993 ± 280
301	*Fairbanks Creek*: Wood from 30′–60′ depth on Fairbanks Creek, Fairbanks, Alaska. Associated with extinct mammal bones. Submitted by Wendell Oswalt, Uni-	12,622 ± 750

Our No.	Sample	Age (years)
	versity of Alaska Museum, College.	
V.	*South America* (Principal collaborator: J. B. Bird.)	
323	*Peruvian Rope*: Rope in excellent condition from cache in lowest layer (D) of Huaca Prieta Mound No. 1. Associated with early Negative (Gallinazo) pottery. Submitted by J. B. Bird.	2632 ± 300
362	*Chicama VII*: Sample of cattail roots from Layer K-2 of Huaca Prieta Mound No. 3. Should be between samples 316 and 318 (*1*). Submitted by J. B. Bird via H. C. Cutler, Chicago Natural History Museum.	4044 ± 300
598	*Huaca Prieta*: Charcoal from the lowest occupation level of Huaca Prieta No. 2, found directly on bedrock by Constante Larco, under the direction of J. B. Bird. Submitted by J. B. Bird.	4298 ± 230
619	*Mochica Rope*: Rope from a late Mochica burial at Huaca de la Cruz in the Virú Valley. Associated pottery indicates it dates from the latter part of the Mochica period as recorded in the Virú, the first valley south of Moche. Submitted by W. D. Strong, Department of Anthropology, Columbia University, via J. B. Bird.	1838 ± 190
VII.	*Other Areas*	
548	*Japanese*: Charcoal from Ubayama shell mound, about 10 miles west of Tokyo, Japan. Charcoal was part of structural remains in a house area in the bottom levels of the mound. Found in fall of 1948. Thought to be oldest house site in Japan. Submitted by Ralph D. Brown, 26 W. Rustic Lodge Ave., Minneapolis, Minn. Similar sample submitted by Lt. Col. H. G. Schenck. This sample was not measured.	4850 ± 270 3938 ± 500 Av. 4546 ± 220
603	*Late Jomon*: Charcoal collected by Father Groot from the early Late Jomon (Horinouchi Stage) horizon at the Ubayama shell mound (*cf.* 548) in Japan. Submitted via H. L. Movius.	4513 ± 300

RADIOCARBON DATES—(*Continued*)

Our No.	Sample	Age (years)
580	*West Africa*: Late Stone Age Lupembian stone blade associated with carbonized wood from a late Upper Pleistocene deposit at Mufo, Angola, Portuguese West Africa. Found on the eastern bank of the Luembe River (7° 38′ S, 21° 24′ E). Stratigraphy was gray-white sand at surface 2.50 m thick. At the base of this the Lupembian (late Stone Age) backed blade was found in mint condition, unworn, and associated with the carbonized wood measured. Next below the sand was a gravel layer 65 cm thick, next a ferritized gravel layer 5 cm thick, then a gravel layer identical with the second layer from the surface. This was 10 cm thick and rested on the bedrock of mica schist. Submitted by J. Janmart, Museo do Dundo, Comparrhia de Diamantes de Angola, Dundo-Lunda, Angola, via H. L. Movius.	11,189 ± 490
581	*West Africa*: Carbonized wood found 15 cm down in the gravel layer underlying sample 580. Submitted by J. Janmart via H. L. Movius.	14,503 ± 560
540	*Hawaii*: Charcoal from earliest Polynesian culture in Hawaii. Found in Kiliouou Bluff Shelter, Kuliauaw, Oahu Island, by Kenneth P. Emory, Bernice P. Bishop Museum, Honolulu. Submitted by K. P. Emory.	946 ± 180
600	*Australia A*: Aboriginal kitchen midden charcoal from Australia, taken from Goose Lagoon, Western Victoria, on property called "Leura" east of Goose Lagoon. The midden was on the north side of the aeolianite region and toward its east end, about 15′ above the alluvium flat. Collected by Edmund D. Gill, National Museum of Victoria, Melbourne. Submitted by H. L. Movius.	1177 ± 175
601	*Australia B*: Aboriginal kitchen midden charcoal from Australia, taken from Koroit Beach at Armstrong's Bay, northwest of Warrnambool, Victoria. Collected by Edmund D. Gill. Submitted by H. L. Movius.	538 ± 200

RADIOCARBON DATES—(*Continued*)

Our No.	Sample	Age (years)
606	*Waterton*: Western Alberta, Canada, glacial forest bed in northwest quarter, Sec. 8, T. 2R. 29 at Waterton (*cf.* Waterton Lakes topographic map). Stratigraphy: Topsoil, 1′; gravel, 12′; lacustrine clay, 6″; gravel, 2′; sandy silt with invertebrate fossils, 2′; forest bed, 2′; dark-brown Keewatin drift, 9′. This sample was wood. L. R. Wilson, University of Massachusetts, says it is black-and-white spruce. The ecology is similar to that at edge of tundra now. Submitted by Leland Horberg, University of Chicago.	3261 ± 250
607	*Waterton Peat*: Same as 606, except peat instead of spruce wood.	3327 ± 320
629	*Seeds*: Ancient Manchurian lotus seeds, still fertile. Collected by Ichiro Ohga in the Pulantien Basin of South Manchuria in a peat layer presumably of Pleistocene age; uplift and erosion had exposed the layer on the walls of the Pulantien River valley. Ohga germinated several hundred seeds, either filing the thick outer shell or soaking seeds in concentrated sulfuric acid for 1–5 hr. Genus *Nelumbo*, similar to the Indian lotus *N. nucifera*. Submitted by R. W. Chaney, University of California, Berkeley.	1040 ± 210

RADIOCARBON DATES—(*Continued*)

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Technical Papers

Some Properties of an Ascorbic Acid Oxidation Inhibitor in Vegetables[1]

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During the course of previous work in this laboratory, it was observed that the ascorbic acid content of frozen spinach decreased more rapidly during freezer storage than did the ascorbic acid content of frozen snap beans (*1*). Variations in the processing method (scalding, cooling, or type of package) did not appreciably affect this rate of loss. However, several workers (*2–8*) have shown that some vegetables have an inhibiting effect on the oxidation of ascorbic acid. Spinach has some inhibitory effect (*3, 7*) but its action is very slight as compared to the effect of vegetables such as snap beans, cauliflower, and cabbage. The purpose of this study was to investigate some of the chemical and physical properties of the inhibitor of ascorbic acid autoxidation in frozen snap beans.

In order to eliminate as many variables as possible, and also to accelerate the rate of autoxidation, a method was devised in which the ascorbic acid solutions were maintained under constant oxygen pressure and at a constant temperature. Gas bottles holding the samples were kept in a water bath at 35° C. Oxygen was supplied to the samples from an oxygen tank through a glass manifold with 12 side outlets to which the gas bottles were attached. In order to facilitate keeping the pressure constant from experiment to experiment, a mercury manometer (15-in. CODC Standard Cleanout Manometer) was connected to the other end of the manifold.

Solutions of snap-bean extract to be tested for their effect on ascorbic acid autoxidation were pipetted into duplicate gas bottles. Fifty ml of ascorbic acid solution, containing 2 mg ascorbic acid, was added to each gas bottle, the mixture shaken, and a 5-ml aliquot removed and combined with an equal amount of 2% *m*-phosphoric acid solution preparatory to reduced ascorbic acid determinations.

When the 12 gas bottles were thus set up, they were placed in the water bath and attached to the manifold. In order to saturate the solutions with oxygen, the pure gas was bubbled through them for 6 min at a rate of 8 liters/min, as determined by an oxygen flow meter (Linde Oxygen Therapy Flow Meter Type L-14). The system was then closed, and, on the basis of the barometric reading, the oxygen pressure was increased until equivalent to 69.86 cm Hg and was

[1] Scientific Paper No. 1017, Washington Agricultural Experiment Stations, Institute of Agricultural Sciences, State College of Washington, Pullman.

[2] Present address: Department of Foods and Nutrition, University of Hawaii, Honolulu. This paper represents a portion of a thesis submitted in partial fulfillment of the M.Sc. degree in Home Economics.