

# Chicago Radiocarbon Dates V

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THE dates obtained since the publication of our first four date lists (1-5) are presented in this report (6). This list covers the period from 1 Sept. 1953 to 1 Sept. 1954. The dates quoted are based on  $5568 \pm 30$  yr as the half-life of radiocarbon (3). The number of runs is indicated by the number of dates listed, unless they were merely remeasurements of the carbon obtained from an earlier combustion, in which case brackets are placed around the dates involved. Remeasurement always involved rewashing the sample with acid for cleaning; otherwise, separate portions of the original sample were processed and measured. Counting time has been limited to 48 hr in general, except in the case of the samples on the Mayan Calendar problem (C-948 and C-949).

The numbering of samples and the file names we have used are entirely our own and not those of the donors and collaborators. The more descriptive names given by the donors are given first; our file names appear in parentheses. We prefix "C" to our numbers to distinguish them from the sample numbers from other laboratories.

## RADIOCARBON DATES

Our No.	Sample	Age (yr)
I.	<i>Mesopotamia and Western Asia</i> (Principal collaborator: R. J. Braidwood)	
	<i>A. Egypt</i>	
C-811	<i>Nagada (Predynastic Hair II)</i> : Human hair weighing about $\frac{2}{3}$ oz found in a cemetery at Nagada in southern Egypt in 1896. This material belongs to predynastic Egypt and it is older than about 5,000 yr. The British archeologist W. Flinders Petrie constructed a scheme of what he called Sequence Dates on the basis of changing pottery styles, dividing the predynastic period into 80 Sequence Dates. About one-third of this sample consisted of material from Grave 1401 (Sequence Date 42), one-third from Grave 1863 (Sequence Date 46), one-third from Grave 1410 (Sequence Date 36 to 44), and a small amount ( $\frac{1}{2}$ g) from Grave 1729 (Sequence Date 40). These samples as well as C-810, 812, 813, and 814 all came from Petrie's excavations at Nagada.	$5619 \pm 280$

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	They were taken from the Flinders Petrie Collection at University College. Submitted by Margaret Armit, Department of Archaeology and Ethnology, Cambridge University, England.	
C-812	<i>Nagada II (Predynastic Hair III)</i> : Human hair and skin from Grave T.56, dated by Elise Baumgartel generally as "Nagada II." Weight $45\frac{1}{2}$ g including about 20 g of human skin. Submitted by Margaret Armit.	$5020 \pm 290$
C-813	<i>Nagada II (Predynastic Hair IV)</i> : Twenty grams of hair from Grave 733 (Sequence Date 58 to 67) and 5 g of hair from Grave 1349 (Sequence Date 58 to 67). Both portions were used. Submitted by Margaret Armit.	$4720 \pm 310$
	<i>C. Iraq</i>	
C-744	<i>Jarmo (Jarmo Roman IV)</i> : Jarmo is an early village site in the <i>liwa</i> of Kirkuk, Iraq, midway between the towns of Kirkuk and Sulimaniyah. This site is early Neolithic and exhibits the earliest traces of an established food-producing village economy in the "nuclear" Near East. Only the upper third of the site yielded portable pottery, but there was a well-established architectural manifestation throughout the 7.10 m of depth, and there were traces of about a dozen "floors" or building renovations. An excavation labeled I was made clear to virgin soil near one edge of the mound. A second excavation, labeled II, was made from the highest point. This went down 4 m through the sixth floor, which is still 3.2 m above virgin soil. The sixth floor of II is equivalent to the third floor of I, and the second floor of II is equivalent to the first floor of I. The earlier Jarmo sample (C-113), consisting of shell, came from the seventh floor of I. It dated $6707 \pm 320$ yr. The present sam-	$5266 \pm 450$

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	ple, consisting of flecks of charcoal collected by the pickmen as they cleared the levels, came from J-II-2 and J-II-2nd floor. This material was high in the mound and near the surface. Collected and submitted by R. J. Braidwood, Oriental Institute, University of Chicago.	
C-817	<i>Tepe Gawra Ash (Tepe Gawra)</i> : The sample of ash was taken from the trench face of the Tepe Gawra site in the spring of 1951 at a level 2 m above the apparent greatest depth in the low central operation. A fragmentary Ubaid painted jar was in contact with the hearth which yielded this ash. Compare Tobler, <i>Excavations at Tepe Gawra</i> , vol. II, pl. XVII-XIX. Level 19 is the deepest in the area; a point 2.0 m above this would fall above the floor of level 18, but certainly not higher than level 17. It is certain that the sample came from between floors 17 and 18. A date for this level would give the point at which the Ubaid period took on its first flourish in northern Iraq. This is of importance because the change involved was one from peasant villages to market towns with temples; it would lead to new understanding of the general rate of acceleration of cultural growth at a critical point. Collected and submitted by Mr. and Mrs. R. J. Braidwood.	$\begin{bmatrix} 5552 \pm 350 \\ 5100 \pm 800 \\ \text{Average} \\ 5400 \pm 325 \end{bmatrix}$
	<i>F. Palestine</i>	
C-919	<i>Beer-Sheba (Beer-Sheba)</i> : Charcoal from the lowest of three strata of a "chaleolithic" site at Khirbet el-Bitar, near Beer-Sheba, in Israel. The two overlying strata both contained architecture and there is no hint of intrusion. The sample was associated with potsherds, and Ben-Dor writes that "this culture is supposed to be akin to the so-called 'Ghassulian' culture of eastern Palestine." The "Ghassulian" is an assemblage for which dates have been assigned which vary over several thousand years. It would be a useful checkpoint, not only for our understanding of Palestine, but also in terms of the general comparative archeology of the Near East. Submitted by R. J. Braidwood.	$7420 \pm 520$
II.	<i>Western Europe</i> (Principal collaborators: H. L. Movius, E. S. Deevey, Jr., and R. F. Flint).	

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	<i>D. Ireland</i>	
C-877	<i>Irish Cooking Place (Irish I)</i> : Samples of oak wood ( <i>Quercus</i> ) from an ancient Irish cooking place at Killeens, County Cork. This is site No. 1. Submitted by M. J. O'Kelly, Cork Publick Museum, Fitzgerald Park, Cork, and Eamon de Valera, Dublin.	$3506 \pm 230$
C-878	<i>Irish Cooking Place (Irish II)</i> : Oak wood as from an ancient Irish cooking place at Killeens, site No. 2. Submitted by M. J. O'Kelly and Eamon de Valera.	$3713 \pm 270$
III.	<i>United States</i> (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).	
	<i>A. New England</i>	
C-809	<i>Titicut Site (Titicut)</i> : Charcoal from a hearth from the lowest level at the Titicut site, Bridgewater, Mass. This was a hearth from the lowest level, found 36 in. below the surface of the ground. It is composed of pieces of charcoal, black sandy soil, and pebbles. The hearth was covered by a thin layer of brownish fine sand that was overlain by a layer of gravel and fine white sand about 8 in. thick. Above this there was a layer of yellow soil about 18 in. thick. Humus, the uppermost layer, covered the whole deposit. There was no sign of disturbance or occupation in the layers over the hearth. The distribution of the pebbles and the soil indicated that the layers called "yellow soil" and "gravel and fine white sand" had been deposited upon the hearth by natural movement of materials. The building and use of the hearth antedated this movement. The present hypothesis concerning this situation is that the soil layers were moved over the hearth by congeliturbation during a period when the climate was colder than at present. Continuing geologic investigations may modify this hypothesis. The hearth is covered by a deposit of natural origin. Various similar deposits found on this site and also a number of artifacts excavated from analogous locations are evidence of occupation previous to the movement of the materials. A date on the charcoal will contribute to our knowledge of the	$\begin{bmatrix} 4139 \pm 260 \\ 5750 \pm 720 \\ \text{Average} \\ 4500 \pm 300 \end{bmatrix}$

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	age of the occupation and the time when the geologic event responsible for the movement of the materials took place. It is known that root hairs penetrate the pores of the charcoal. Collected 16 Oct. 1949 by J. Hartshorn, Kirk Bryan and Frederick Johnson. Submitted by Frederick Johnson, R. S. Peabody Foundation, Andover, Mass.	
	B. New York State	
C-943	<i>Sunken Forest in Eastchester, N.Y. (Pelham Bay):</i> At Throggs Neck, Eastchester, submerged tree stumps occur. There is a sea wall on one end behind a beach and a low rocky point terminating in a short pier on the other. A small patch of original <i>Spartina</i> salt-grass association some 30 ft long and 10 ft wide remains margined on one side by fill brought for a road and breaking off on the bayward side with a 2-ft bank of black peaty soil that is eroded by high tides during winter storms. At the foot of this perpendicular bank there are mussels and other maritime denizens. The sunken forest starts from about the mid-tide mark and extends out into 8 or 10 ft of water. The outermost stumps are not exposed even in the lowest tides. This sample came from a stump with cross-section diameters at ground level of about 1½ and 2½ ft. It scarcely protruded above the surface at low tide and its radiating roots had an over-all diameter of about 6 ft. It was about 6 ft below the level of the <i>Spartina</i> flat and about 4½ ft below the high tide mark. Submitted by William J. Robins, New York Botanical Garden.	2830 ± 220
	C. Illinois, Indiana, Iowa, Kentucky, Michigan, Ohio, Pennsylvania, and Kansas.	
C-848	<i>Dune Buried Log, South Haven Mich. (South Haven I):</i> A white pine log taken from a layer of peat on the eastern shore of Lake Michigan at South Haven. The layer is covered by sand dunes. There was a 30-in. layer in which the bits of wood, the pine log constituting this sample, were buried. Collected and submitted by J. H. Zumberge, University of Michigan, and J. Harlen Bretz	$\begin{bmatrix} 6232 \pm 310 \\ 6659 \pm 350 \\ \text{Average} \\ 6440 \pm 230 \end{bmatrix}$

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	and Lee Horberg, University of Chicago.	
C-846	<i>Dune Buried Peat, South Haven Mich. (South Haven II):</i> The peat layer described in sample C-848 was sampled at the bottom portion. Submitted by J. H. Zumberge, J. Harlen Bretz and Lee Horberg.	6744 ± 530
C-849	<i>Dune Buried Peat, South Haven Mich. (South Haven III):</i> Peat from the uppermost portion of the peat layer described in sample C-848. Submitted by J. H. Zumberge, J. Harlen Bretz, and Lee Horberg.	4816 ± 290
C-871	<i>Glenwood (Glenwood II):</i> Wood from woody layer at the bottom of a sand and gravel deposit at Dyer, Ind., NE¼sec. 30, T35N, R15E, Ill. Taken at a depth of 12 ft below the top of the sand spit from the northernmost of the sand pits now opened. Same deposit as that from which sample C-801 was obtained. Collected 15 Sept. 1953 and submitted by J. Harlen Bretz.	18,500 ± 500
C-872	<i>Dyer, Ind. Deposit (Glenwood III):</i> Peat from lagoon deposit buried beneath the Dyer spit where sample C-871 was obtained. Original depth of burial was about 15 ft. Collected and submitted 15 Sept. 1953, by J. Harlen Bretz.	Older than 21,000
C-893	<i>Tazewell (Tazewell):</i> Log collected near central Ohio in Licking County, 4½ mi southwest of Newark, at a point 300 ft south of Ramp Creek and 500 ft east of the New York Central Railroad. This piece occurred 49 ft below the surface in an excavation for a hydraulic press of the Kaiser Aluminum Plant in 1952. At the surface are 5 to 15 ft of alluvial sand and gravel; below this is somewhat more than 60 ft of homogenous dark gray till. Twigs and a few logs were recovered from a depth of 45 to 60 ft.	16,100 ± 850
	This till fills the mid-Pleistocene (Yarmouth?) buried Newark Valley known from wells 200 to 300 ft to bedrock. It is five mi west of the distinct outer limit of silty Wisconsin drift. On the other hand it lies five mi east of (outside) a clay-rich drift believed to be Cary (Johnstown moraine). All indications are that the logs were	

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
C-899	Barbeau Creek Rock Shelter	
C-900	(Barbeau Creek I-IX): The	
C-903	ancient Indian site located at	
C-904	Modoc near Prairie du Rocher,	
C-904'	Ill., was investigated by a new	
C-905	field methodology. The site it-	
C-907	self has considerable intrinsic	
C-908	interest. It consists of a 25½-	

swept up and deposited by the Tazewell advance and that the surface was covered with thin outwash from the Johnstown moraine in Cary time. Excavated and submitted by Richard P. Goldthwait, Ohio State University.

It consists of a 25½-ft deep midden deposit and is situated at the base of an 82-ft sandstone bluff that projects over and protects the site. It obviously belongs to the Archaic period and from an analysis of the artifacts it is clear that a great deal can be learned from this site about cultural change and development during the Archaic period. In addition, information about its age will be useful in establishing geologic and climatologic conditions in the area.

The samples to be measured were processed in the field by Frederick R. Matson of State College. The method used by Matson was new and was designed to facilitate collection of samples for dating from other sites. Four procedures were used:

- 1) A hand-picked specimen, using a spatula and shielding the palm of the hand with aluminum foil. This concentration of material from charcoal-rich soil is contaminated only with a thin coating of soil and possibly with rootlets that are prevalent throughout the site. There are calcareous deposits throughout the site to a slight extent.
- 2) Material washed in water. The charcoal that floated on top of the bucket of water was collected on a well-washed copper-wire screen (approximately 114-mesh) from a hardware store. After the sample was dried, the charcoal was placed on a piece of aluminum foil and fragments of rock and as many rootlets as possible were removed.
- 3) Material that passed through the copper screen mentioned above, but was retained on a 20-mesh and a 115-mesh sieve. This material was submitted only because of its general interest; it is contaminated with rootlets and rock fragments, and

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	may not be of prime interest for measurement. The samples were saved, however, because at some sites the charcoal fragments may be no larger than these. It would be very tedious to separate all of the rock from the charcoal, but slight agitation in water effectively increases the charcoal content of the sample.	
	4) Samples collected in the field and untouched in the field laboratory. These jars have not been opened since they were taken from the excavation. They were submitted only to round out the possible series. It was not suggested that they be tested. They are charcoal-rich soils, and are similar to the material from which the samples obtained by procedure No. 1 were concentrated.	

The site itself was divided into three stratigraphic zones.

**Series A:** 178 to 186 in. depth. The charcoal occurs in brown sandy soil within a few inches above ash beds and red burned clay areas that may have been hearths. This zone is particularly rich in flints and flint chips. A copper awl and a fragment of a ground and polished bannerstone were found. This is an important and fairly broad occupation zone.

**Series B:** 250 to 262 in. depth. This broad zone of charcoal-flecked soil is again just above ash levels and red clay hearth areas. Several pits and a few post holes reached from this level into the next lower one, which is a charcoal-free band of yellow sandy soil about 2 ft thick; it is practically free of cultural material and was built up in a series of bands which suggest varves. The zone just above this yellow soil from which the charcoal was collected was quite rich in cultural material. Apparently this marks the reoccupation of the site after a considerable period of sandy soil deposition (by water?).

**Series C:** 280 to 307 in. depth. This is the lowest occupation level found at the site. Test drilling at lower levels yielded no cultural debris. It is of course possible that further excavation of more extended areas would uncover occupation levels at greater depths, but at present there is no indication of this. Relatively few flint implements, but many flint chips, some worked, occur in this zone.

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	The samples were furnished by H. D. Winters of the University of Chicago and Frederick R. Matson of State College, Pennsylvania. The notations in parentheses after each sample number indicate the zone from which, and the procedure by which the sample was taken. For example, the notation A-2 means that the sample was taken from zone A by procedure 2.	
	C-899 (A-1)	5955 ± 235
	C-900 (A-2)	5268 ± 230
	C-903 (B-1)	8546 ± 380
	C-904 (B-2)	10,947 ± 900
	C-904' (B-2)	7800 ± 900
	C-905 (B-3)	11,200 ± 800
	C-907 (C-1)	10,651 ± 650
	C-908 (C-2)	9101 ± 440
C-912	<i>Lizard Creek (Lizard Creek I)</i> : Wood presumably either of early Mankato or early Cary age from a deposit in Webster County, Iowa, 2½ mi northwest of Fort Dodge (SE corner SW¼ sec. 10, T89N, R29W). The stratigraphy is (i) 10 ft 4 in. calcareous Mankato outwash; (ii) 7 ft 4 in. calcareous Mankato till; (iii) 10 ft 0 in. calcareous outwash (early Mankato? or Cary?): wood from <i>oxidized calcareous bedded sand</i> 6½ ft below top of this outwash horizon, same stratigraphic level as sample C-913. (iv) 3 ft 7 in. calcareous till (early Mankato? or Cary?): exposed. Submitted by W. H. Scholtes and R. V. Ruhe, U.S. Department of Agriculture Soil Conservation Service, Iowa State College.	12,120 ± 530
C-913	<i>Lizard Creek (Lizard Creek II)</i> : Wood from the same site as sample C-912 except it came from <i>unoxidized</i> portion of the glacial drift bed. The stratigraphy is (i) 10 ft 4 in. calcareous Mankato outwash; (ii) 7 ft 4 in. calcareous Mankato till; (iii) 10 ft 0 in. calcareous outwash (early Mankato? or Cary?): wood from <i>unoxidized calcareous bedded silt</i> 5 ft 10 in. to 7 ft 0 in. below top of this outwash horizon, same stratigraphic level as sample C-912. (iv) 3 ft 7 in. calcareous till (early Mankato? or Cary?): exposed. Submitted by W. H. Scholtes and R. V. Ruhe.	13,300 ± 900
C-923	<i>Toepfner Mound (Toepfner Mound I)</i> : Charred logs from a tomb in a large Adena mound in Columbus, Ohio, known as	2377 ± 150

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	the Toepfner Mound. These logs occurred 7½ ft above the floor of the mound. The sample was labeled Feature II. Submitted by R. S. Baby, Ohio State Museum, Columbus.	
C-942	<i>Toepfner Mound (Toepfner Mound II)</i> : Charcoal samples from the Toepfner Mound described in sample C-923. This material came from 4.4 ft above the floor of the mound. It was labeled Feature VII. Submitted by R. S. Baby.	2780 ± 410
C-874	<i>Florence Mound (Florence Mound)</i> : Charcoal from an Adena mound known as the Florence Mound in Pickaway County, near Fox, Ohio. This consisted of charcoal from a ceremonial fireplace on the floor of the mound. Collected and submitted by R. S. Baby.	1425 ± 250
C-935	<i>Glacial Wood from Poag, Madison County, Ill. (Edwardsville Well Wood)</i> : Wood from 70-ft depth in Edwardsville city water well at Poag. Location: NE¼NE¼SE¼ sec. 13, T4N, R9W. This well is located on a terrace that is probably late Mankato in age. Submitted by M. M. Leighton, Illinois Geological Survey.	Older than 21,600
C-937	<i>Glacial Wood from Hartford, Ill. (Hartford Well Wood)</i> : Glacial wood thought to belong to the Mankato or to an older ice age found in a well at a depth of 100 to 110 ft, at Hartford, Madison County. Location: NE¼NE¼SW¼ sec. 33, T5N, R9W. The well, known as the Ranney collector well, was dug at the Shell Oil Co. loading dock at Hartford. Submitted by M. M. Leighton.	Older than 24,000
C-928	<i>Kansas Woodland (Kansas Woodland)</i> : Wood charcoal collected from the Missouri basin in the course of the River Basin Survey's archeological excavation at the site near Woodruff, Phillips County, Kan. This site is representative of the sites of one of the early pottery making groups that has been estimated to have occupied the area somewhere between 1000 and 2000 yr ago. No remains belonging to that general period west of the Missouri River have been dated. The charcoal was found in a burial site attributed to the Keith focus of the Woodland pattern. The site has been re-	1343 ± 240

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	ported by M. F. Kivett in a paper entitled "The Woodruff Ossuary, a prehistoric burial site in Phillips County, Kansas" ( <i>U.S. Bur. Am. Ethnol. Bull.</i> 154, River Basin Surveys Paper No. 3, 1953). In Kivett's opinion, "the Keith focus probably represents one of the earliest Woodland variants in this area," perhaps preceding in time the Hopewellian culture of the lower Missouri-Illinois valleys. The Woodland materials of the Central Plains are not yet very well known. They evidently include the earliest pottery yet found in the region, and in part, at least, they may be prehorticultural. Unlike some of the later archeological horizons of the region, none of the Woodland complexes so far investigated have yielded any cross finds of southwestern pottery or other fairly good time indicators. In short, any chronological leads to be gotten from the present charcoal sample will probably throw much-needed light on a prehistoric period for which we have no good leads. Submitted by Frank H. H. Roberts, Jr., and Waldo R. Wedel, Smithsonian Institution.	
	<i>E. Louisiana, Mississippi, Missouri, Nebraska, Georgia, and Texas</i>	
C-824	<i>Medicine Creek Reservoir; Red Smoke Site (Red Smoke Site):</i> Charcoal from the Red Smoke Site (Ft-42) in the Medicine Creek Reservoir Area, Frontier County, Neb. The charcoal was from a hearth in the middle portion of the Terrace-2A fill, located in sec. 15, T5N, R26W. See Schultz, Lueninghoener, and Frankforter, "A Graphic Resume of the Pleistocene of Nebraska," ( <i>Bull. Univ. Neb. State Museum</i> , 3, No. 6, 1951) and Davis, <i>Am. Antiq.</i> , 18, No. 4, (1953). This sample was collected in 1950 by E. Mott Davis and associates. It bears the field No. UNSM 859-50. It would give a date which would be near to what is probably the climax of the Mankato. All of the samples from Terrace-2A which previously have been run are from lower levels. Submitted by C. B. Schultz, University of Nebraska State Museum.	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> <math>8570 \pm 300</math>  <math>9153 \pm 600</math>  Average  <math>8862 \pm 230</math> </div>
C-930	<i>Cedar Canyon Charcoal (Cedar Canyon II):</i> Charcoal from Sx-101, Cedar Canyon, Sioux	$2675 \pm 280$

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	County, Neb. In hearth associated with paleosol at base of Terrace-1 fill (15 ft below top of fill) in bottom of trench dug by University of Nebraska State Museum field party in 1936. This sample (collected in 1951 by Lloyd Tanner, Gilbert C. Lueninghoener, C. B. Schultz, and associates) gives an additional check on the date of the basal part of T-1 fill. The charcoal is from a paleosol below the place where sample C-469, which dated $2147 \pm 150$ yr, was taken in the same terrace fill and exposure. Submitted by C. B. Schultz.	
C-931	<i>Cedar Canyon Charcoal (Cedar Canyon III):</i> Charcoal from Sx-101, Cedar Canyon, Sioux County, Neb. Sample associated with paleosol near top of Terrace-1 fill (25 in. below top of fill). This sample (collected in 1951 by Lloyd Tanner, Gilbert C. Lueninghoener, C. B. Schultz, and associates) is from a paleosol above the place where sample C-469 was taken in the same terrace fill and exposure. Submitted by C. B. Schultz.	$3100 \pm 410$
C-933	<i>Booger Bottom Site (Booger Bottom):</i> A site which is an erosional remnant of an old natural levee in Georgia. Indians had lived on the site, between floods, throughout its life. Site is located in the Buford Reservoir. Cultural material is quite homogenous from bottom to top. It represents a horizon found throughout the southeast. It shows some connections with the Adena culture of Ohio and Kentucky. No dates are available as yet on this horizon. Donor sample No. 53-131. Charcoal, Field Specimen No. 121. Site 9HL64 (Booger Bottom), Hall County, Georgia. Collected 30 Oct. 1953. From postmolds, Feature 16, Section 0-110, surface depth 8.2 to 8.7 ft in old natural levee. Associated with Cartersville Check Stamped pottery. Postholes originated in top of lowest occupation level. Material should date pure Cartersville Check Stamped horizon (Forsythe Period), and Wright Check Stamped horizon, which is present in some Adena mounds. Submitted by Charles H. Fairbanks, Ocmulgee National Monument.	$2104 \pm 140$
	<i>F. Arizona, California, and New Mexico</i>	

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
C-689	<i>Hotchkiss site, Contra Costa County, Calif. (Hotchkiss):</i> Charcoal from the Hotchkiss mound in Contra Costa County, (CCo-138). This was burial 18. This site, which falls in the Late Horizon, is an important prehistoric village and figures prominently in the archeological sequence. Collected and submitted by Robert F. Heizer, University of California.	1229 ± 200
C-894	<i>Searles Lake Mud (Searles Lake III, Searles Lake IV, Searles Lake V, Searles Lake VI):</i> These materials came from Searles Lake, Calif. They consisted of organic extract from the mud which was obtained by extraction with acetone, evaporation to a thick syrup, and the precipitation of the resinous material by the addition of water. The descriptions are as follows:	
C-895	C-894: extract representing the first foot of the parting mud seam between the upper and lower salt deposits of Searles Lake. This was taken at an average depth of 73.7 ft (73.2 to 74.2 ft). This sample should represent material deposited just prior to the last cessation of overflow of waters from the Owens Valley at the close of the last substage of the ice age (Tioga Age). Based on the accumulation of salines in Owens Lake since that time, this was estimated by the late Hoyt S. Gale ( <i>U.S. Geol. Survey Bull.</i> 580-L, 1914) to be about 4000 yr ago.	10,494 ± 560
C-896	C-895: material from the 3.5-ft level of the parting mud seam, 76.2 to 77.2 ft in depth.	15,089 ± 1000
C-897	C-896: material from the 7-ft level of the parting mud seam, 79.7 to 80.7 ft in depth.	18,000 ± 730
	C-897; bottom 1 ft of the parting mud seam. Depth of 82.8 to 83.8 ft. This sample should correspond approximately with the sample C-615, which represented the bottom 2 ft of the parting mud seam in another location, and which gave an age greater than 16,000 yr. Submitted by W. A. Gale, American Potash and Chemical Co., Whittier, Calif.	23,923 ± 1800
C-898	<i>Guano from New Cave, Carlsbad Caverns (Carlsbad):</i> Guano material from the New Cave, Carlsbad Caverns National Park, N.M. It comes from a compacted layer of guano occurring in the silt fill of New	Older than 17,800

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	Cave, sec. 23T25S, R23E, New Mexico Bureau of Mines. The layer is about 2 ft below the flowstone cap forming the present floor of the cave about 100 yd within and 50 ft below the cave entrance. The associated silt contains numerous skeletal remains of an extinct species of three-tailed bat, <i>Tadarida</i> . Dating affords a maximum age for the beginning of the maximum dripstone and flowstone development in New Cave. This is believed to have been contemporaneous with the same stage in adjacent Carlsbad Caverns 5 mi east. Submitted by Lloyd C. Pray, California Institute of Technology.	
	<i>G. Nevada, Oregon, Utah, and Washington</i>	
C-844	<i>Indian House Pit in Oregon (Klamath House):</i> Indian house pit on the Klamath Reservation, 18 m long on the north-south axis, 16 m wide on the east-west axis, and 2 m in depth. A dead ponderosa pine in the house pit, which started its growth sometime after the abandonment of the house, seems to have lived about 250 yr. Samples were wood taken from the house pit. Collected and submitted by L. S. Cressman, University of Oregon.	430 ± 165
C-728	<i>Lovelock Cave Basketry (Lovelock V):</i> Samples of basketry to check the cultural type found in the Lovelock Cave. Furnished by E. K. Burnett, Heye Foundation. Samples collected by Loud and Harrington and described in "Lovelock Cave" [ <i>Univ. Calif. Publ. Archeol. Ethnol.</i> 25, No. 1 (1929)]. Submitted by L. S. Cressman.	1686 ± 220
C-729	C-728: matting fragment, 18 to 48 in. below the surface; C-729, Bulrush cud ( <i>Scirpus validus</i> ), 18 to 48 in. below the surface; C-730, basketry fragments, 18 to 48 in. below the surface. These three samples were combined.	
C-730		
C-735	<i>Lovelock Cave Basketry (Lovelock II):</i> Basketry fragments from a depth of 96 to 126 in. below the surface in the same cave as described in samples C-728, C-729, and C-730. Submitted by L. S. Cressman.	3172 ± 260
C-827	<i>Lind Coulee, Wash. (Lind Coulee):</i> Charcoal from an ancient occupation site in the Lind Coulee. In this site stone artifacts	$\begin{bmatrix} 9400 \pm 940 \\ 8518 \pm 460 \\ \text{Average} \\ 8700 \pm 400 \end{bmatrix}$

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	are found in association with animal bones in deposits that have been identified by geologists as Late Pleistocene in age. Among the bones from the site are those of bison. Because of the scrappy nature of the bones it has not been possible to identify the particular species of bison. The bones in general exhibit a fair degree of mineralization. Submitted by Richard Daugherty, State College of Washington.	
C-914	<i>Tule Springs Site, Tule Springs, Nev. (Tule Springs)</i> : Ancient occupation site at Tule Springs. Excavated by Fenley Hunter and M. R. Harrington, Southwest Museum, Los Angeles. The sample consisted of charcoal taken from beneath one of the ash beds about 2 ft below the present surface and about 14 ft below the surface of the lake bed deposit which at one time covered it. It is thought that the charcoal is of human origin. Submitted by M. R. Harrington.	Older than 23,800
	H. Minnesota, Wisconsin, and Wyoming	
C-836	<i>Old Copper, Oconto, Wis. (Old Copper I)</i> : Charred wood from the Old Copper culture site near Oconto. The samples were directly associated with Archaic burials. The Old Copper culture has never been accurately dated. Charred wood from crematorium Feature 1, Area II. Submitted by Robert E. Ritzenthaler, Milwaukee Public Museum.	5600 $\pm$ 600
C-837 C-839	<i>Old Copper, Oconto, Wis. (Old Copper II)</i> : Charred wood from Feature 3, Area I constitutes samples C-837, and charcoal from Feature 11, Area I, constitutes sample C-839. Twelve grams of C-837 and 8 g of C-839 were mixed and measured. Submitted by Robert E. Ritzenthaler.	7510 $\pm$ 600
IV.	<i>Mexico and Central America</i>	
C-884	<i>Pre-Classic Miraflores, Kaminaljuyu, Guatemala (Guatemala I)</i> : Charcoal from Str. 4, Md. E-III-3, Kaminaljuyu. This belongs to the pre-Classic Miraflores phase in this area. Collected and submitted by Edwin M. Shook, Carnegie Institution of Washington.	3142 $\pm$ 240

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
C-884	<i>Pre-Classic Majadas, Kaminaljuyu, Guatemala (Guatemala IV)</i> : Charcoal from an intrusive cache of jades, pottery, and sculpture in Md. C-III-6, Kaminaljuyu. This belongs to the pre-Classic Majadas phase. Collected by Edwin M. Shook.	2970 $\pm$ 200
C-887	<i>Pre-Classic Miraflores, Kaminaljuyu, Guatemala (Guatemala III)</i> : Charcoal from Str. 5, Md. E-III-3, Kaminaljuyu. Sample from the fill of Str. 5, stratigraphically slightly postdating C-884. Miraflores phase (formerly Verbena) of the pre-Classic. Collected by Edwin M. Shook.	2490 $\pm$ 300
C-891	<i>Pre-Classic Eruption in El Salvador (El Salvador)</i> : Charcoal from San Salvador. Charcoal which serves to date the last pumice explosions of El Bqueron volcano and the pre-Classic artifacts (compare C-884, C-886, and C-887) found in abundance in the same stratum at many localities in and near San Salvador. This charcoal comes from a well $\frac{1}{4}$ mi north of the Inter-American highway bridge over Rio Acelhuate, approximately 1 mi east of San Salvador. It occurs in a layer of humus-bearing weathered pumice and is overlain by 31 m of fluvialite pumice. Collected and submitted by Howel Williams, University of California.	2993 $\pm$ 360
C-948 C-949	<i>Mayan (Mayan I, II)</i> : In the case of these samples a second attempt to test the limit of sensitivity of the radiocarbon dating method was made. The first, published in the last date list (5), concerned samples from Nippur fixing the Babylonian calendar. The choice between the Spinden and Goodman-Thompson correlations for the Mayan calendar is the point at issue. In Nov. 1951 Kulp ( <i>Science</i> 114, 565) published a single result on wood taken from a carved Mayan lintel from structure 10, Tikal. The carved date on the lintel was 9.15.10.00 in the Mayan calendar, which, according to the Goodman-Thompson correlation, would be 30 June A.D. 741, and according to the Spinden correlation would be 30 Oct. A.D. 481. Kulp's result was A.D. 481 $\pm$ 120.	
	The present samples from carved lintels from Tikal, Guatemala, were furnished from the Ethnographical Museum at Basel, Switzerland. Sample C-	



## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	948 was taken from the famous lintel shown on Plate 42 of Morley's <i>The Ancient Mayan</i> . It consisted of sapodilla wood and bore the Mayan date 9.15.10.00, the same as the sample tested at Columbia University. Sample C-949 was taken from the glyphic of the lintel shown on Plate 72 (Maudslay). It bore the same date and also was sapodilla wood.	
	The samples were measured separately over a period of about 6 wk in each case, and the mean results calculated. Within the experimental error of about 1 percent the net count rate for both samples agreed. Combining these data with the half life of radiocarbon, which is estimated to involve an error of 0.54 percent, and the assay for modern wood, which we take to have an error of 0.67 percent, we obtain the results given. The samples were submitted by Hans Dietschy of the Ethnographical Museum, Basel. Most of the measurements were taken by Delia Gonzalez Tudge.	
	C-948: date, A.D. 469 $\pm$ 120.	1485 $\pm$ 120
	C-949: date, A.D. 435 $\pm$ 170	1521 $\pm$ 170
	Weighted average: date, A.D. 451 $\pm$ 110.	1503 $\pm$ 110
VII.	<i>Other Areas</i>	
C-829	<i>Situmpa Forest Station (Barotseland)</i> : Check pit excavated in 1952 by J. Desmond Clark of the Rhodes-Livingstone Museum, Livingstone, Northern Rhodesia. Charcoal from depth of 2 ft 10 in. to 3 ft 4 in. in redeposited Kalahari sands. Associated industry includes shards of Stamped Ware pottery (Bambata variant), which is not believed to be as old as would be indicated by the 4078 $\pm$ 300 yr (2126 B.C. $\pm$ 300 yr) obtained for sample C-662. This pit was dug at some 5 yd distance from the first excavation to check the earlier date. Submitted by H. L. Movius, Jr. on behalf of J. D. Clark.	1854 $\pm$ 220
C-830	<i>Lusu Village, Zambezi River (Lusu Village)</i> : Charcoal collected in what appeared to be a large hearth in Lusu Village, Zambezi River, Sesheke District Barotseland. Sample taken just above spot where shards of Stamped Ware pottery of a believed Rhodesian Wilton occupation were found. This is overlain by 2 ft 7 in. of redeposited Kalahari sands. The	[ 2025 $\pm$ 230 2353 $\pm$ 180 Average 2139 $\pm$ 150 ]

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	section is very clear; the charcoal layer averages just over 1 in. thick and extends for 8 ft along the face of the section. Age believed to be approximately the same as that of the 4 to 5 ft horizon at the Situmpa Forest Station Pit, Machili (sample C-829). Submitted by H. L. Movius, Jr. on behalf of J. D. Clark.	
C-850	<i>Fossil Skull, Florisbad, South Africa (Florisbad I)</i> : Peat I from Florisbad site. The site lies approximately 25 mi due north of Bloemfontein, Orange Free State, Union of South Africa. The geologic stratification of this site is very marked. At a depth of 19 ft in the lowest peat layer, from which sample C-850 was taken, the Florisbad Skull, <i>Homo (Africanthropus) helmeri</i> , was discovered <i>in situ</i> and in association with many stone implements and numerous extinct species of animals, for example, horse, hippopotamus, pig, and antelope. Above the lower-lying layer are three other layers of peat dated in later samples. Submitted by H. L. Movius, Jr. on behalf of A. C. Hoffman, National Museum, Bloemfontein, Union of South Africa.	Older than 41,000
C-851	<i>Florisbad Peat (Florisbad II)</i> : Peat II, lying 47 in. above the lowest lying peat (C-850), and itself 13 in. thick at the Florisbad site. Submitted by H. L. Movius, Jr. on behalf of A. C. Hoffman.	9104 $\pm$ 420
C-852	<i>Florisbad Peat (Florisbad III)</i> : Peat III, lying 52 in. above Peat II, which in turn lies 47 in. above the lowest lying Peat I at the Florisbad site. Submitted by H. L. Movius, Jr. on behalf of A. C. Hoffman.	6700 $\pm$ 500
C-924	<i>Cave of the Hearths, Potgietersrus, South Africa (South Africa I, South Africa II, South Africa III, South Africa IV)</i> : Organic material from the ashy substance constituting the deposit in the Cave of the Hearths, South Africa. Collected by R. J. Mason, submitted by K. P. Oakley, British Museum, London.	
	C-924: Middle Stone Age III; 130 in. in column "A"	11,600 $\pm$ 700
	C-925: Middle Stone Age IV; 180 in. in column "B"	15,100 $\pm$ 730
	C-926: Middle Stone Age II; 156 in. in column "A"	16,811 $\pm$ 960
	C-927: Middle Stone Age I; 288 in. in column "C"	11,700 $\pm$ 610

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
C-911	<i>Bushman Paintings, South Africa (Bushman Paintings)</i> : A very good sample of charcoal from South West Africa. It bears on a very important dating problem, namely, the question of the age of certain styles of the so-called Bushman paintings. The charcoal was found stratified in a cave deposit in direct association with ochre for making the frescos which fill the cave walls. H. Breuil is convinced that a measurement of these charcoals will provide a first direct indication of when the main group of these paintings was executed. The sample was collected at a locality known as the <i>Phillip Cave</i> which is near Ameib, southeast of the Erongo Mountains in the Windhoek region of South West Africa. Submitted by H. L. Movius, Jr., on behalf of H. Breuil, Paris.	3368 ± 200
C-917	<i>Zimbabwe, South Africa (Zimbabwe II)</i> : Wood from an excavation in the "Temple" at Zimbabwe by K. R. Robinson in 1951 (See plan opposite p. 23 in Zimbabwe Guide). The specimen is cut from a second lintel, the first having already been dated at 1361 ± 120 yr (sample C-613). Sample submitted by Hallam L. Movius, Jr. on behalf of Roger Summers, National Museum, Bulawayo, Southern Rhodesia. This date was averaged with the date for sample C-613 of 1361 ± 120 to give a date of A.D. 574 ± 107	1506 ± 305

## RADIOCARBON DATES (Continued)

Our No.	Sample	Age (yr)
	for the Zimbabwe city on the Christian calendar.	
C-831	<i>Hawaii (Hawaii I and Hawaii II)</i> : Charcoal and wood from Bowl Cave on uninhabited Necker Island, northwest Hawaiian Islands. Found in 1923 reportedly under 14 in. of sterile dust in association with stone artifacts of ancient Hawaiian type and thought to be contemporaneous with the ancient stone ruins on the island (see <i>Archeology of Nihoa and Necker</i> , Bishop Museum Bulletin 53, p. 90).	
C-832	C-831: 1 $\frac{1}{8}$ oz charcoal stored in museum in tin can 1923-51, in glass jar, 1951-53. Collected by W. Anderson and submitted by Kenneth P. Emory, Bernice P. Bishop Museum, Honolulu.	166 ± 200
	C-832: 2 $\frac{1}{8}$ oz. piece of <i>wiliwili</i> (cork) wood, kept in cardboard box in museum.	0 ± 250

## References and Notes

1. J. R. Arnold and W. F. Libby, *Science* **113**, 111 (1951).
2. W. F. Libby, *ibid.* **114**, 291 (1951).
3. ———, *Radiocarbon Dating* (Univ. of Chicago Press, Chicago, 1952).
4. ———, *Science* **116**, 673 (1952).
5. ———, *ibid.* **119**, 135 (1954).
6. I gratefully acknowledge the generous financial support of the John Simon Guggenheim Memorial Foundation, the Geological Society of America, and the Wenner-Gren Foundation for Anthropological Research. I also wish to thank the members of the Committee on Carbon 14 and the several other archeologists and geologists who have given advice about selection and identification of samples from time to time. Samuel Thomas, Augusto Moreno, and Delia Gonzalez Tudge burned and reduced the samples this year. Their meticulous care contributed immeasurably to the program.



## News and Notes

### Advances in International Conservation

The highly successful 4th general assembly of the International Union for the Protection of Nature was held in Copenhagen from 25 Aug. to 3 Sept. at the invitation of the Danish Government, which is a member of the union. Some 150 delegates and observers from 125 organizations and 25 countries participated; these representatives included zoologists, botanists, geographers, and soil specialists with a special interest in ecology as well as educators and officials from government departments concerned with conservation. Problems were presented in papers that were discussed in technical sessions or by special committees,

the resulting recommendations were then reviewed by the executive board of the union, and final action was taken at the closing plenary session. The size of the assembly and the program arrangement made the meeting an effective working conference.

A technical meeting on the subject of the protection of arctic animals, presided over by Spärck, revealed an alarming decline in the numbers of many arctic species in recent years. Although some of this decline is due to natural conditions, such as climatic changes, there was clear evidence that man is also responsible because Indians and Eskimos have been furnished with modern rifles and motor boats. Modern transportation, especially the airplane, has made remote areas