Lamont Natural Radiocarbon Measurements IV

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The carbon-14 age determinations made at the Lamont Geological Observatory during the period from October 1955 to March 1957 are reported in this article (*1*). These measurements were all made by the CO_2 gas proportional counting method described in detail elsewhere (*2*). A statement of the method of computing the laboratory error was given in the preceding date list (*3*).

The results are presented in Tables 1 through 4. Table 1 summarizes the measurements of geologic interest. A number of the dates bear on the problem of fluctuations in sea level. Information concerning the more general problem of the duration of the last period of low sea level is provided by the samples from the Mississippi delta, Bermuda, and Santa Rosa Island, while measurements on materials from the Bahamas provide more specific information concerning post-Wisconsin sea levels.

Table 2 contains age data on a wide variety of archeological materials. One of the more interesting measurements of this type has been included in Table 1 because of its importance to the over-all picture of the evolution of the alluvial fans on Santa Rosa Island. This sample (L-290R) also provides evidence about ancient man in America. The date of 29,700 years on burned elephant bone suggests that man occupied the west coast of North America before the major ice advance of the latter part of the Wisconsin glacial period.

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Tables 1 and 2 include a number of samples run by different methods and laboratories. Samples L-190A, L-217A, L-217B, L-335H, and L-335I are in good agreement with results published by the U.S. Geological Survey laboratory on identical samples (*4*). In one case, however (sample L-177), the difference was outside the reported laboratory error. Whereas the majority of rechecks on dates obtained by the black carbon method substantiated the earlier results (see samples L-331A, L-331B, L-331C, L-283G, L-311, and L-336A), a few published ages were found to be too young, presumably because of contamination of the samples by air-borne fission products (see samples L-120G and L-120F). Other checks where both laboratories used a gas-counting technique showed agreement in two cases (samples L-358A, which was also dated by the Humble Oil Company laboratory, and L296A, a tree-ring standard circulated by the Stockholm laboratory).

Tables 3 and 4 include samples from ocean-bottom cores and pluvial lake deposits. Ocean-bottom cores and pluvial lake deposits have been studied intensively at Lamont because of their importance in reconstructing late Pleistocene chronology. The implications of the results on ocean cores in terms of climatic change have been published (*5*) and a summary of the data concerning sedimentation rates is in preparation (*6*). The cores studied were all from the Lamont collection. Maurice Ewing and B. C. Heezen were responsible for the collection of most of these cores, and D. B. Ericson was responsible for the micropaleontologic and lithologic studies (*7*).

Table 4 gives the results obtained from samples selected to provide detailed information concerning the fluctuations in the level of the dry and nearly dry lakes in the Great Basin (*8*). Since these ages were obtained mainly on fresh water carbonates, two criticisms that have been leveled at such materials must be considered. The first is the problem of the initial carbon-14 concentration in the carbonate. As shown by Deevey (*9*), such materials can be low in carbon-14, presumably because of the incorporation of carbonate leached from ancient sedimentary rocks. Measurements on contemporary carbonates and algae from Pyramid Lake indicate that the dissolved carbonate in the lake is only 5 percent lower than the maximum or static equilibrium value. Although it cannot be demonstrated rigorously, there is fairly good evidence to indicate that the variation of the C^{14}/C^{12} ratio during times of high lake level was probably less than 5 percent. The errors introduced by this source are hence probably less than 500 years (*10*).

A second possible source of error in carbonate samples is that of postdepositional exchange of the carbonate ions in the sample with those in its surroundings. In order to make a quantitative estimate of the extent of such contamination, we have studied the problem both by laboratory experiments on natural carbonates and by theoretical calculation, using data on the diffusion rate and surface area. Both methods lead to the conclusion that the amounts of contamination from this source are less than the equivalent of the addition of 2 percent of modern carbon dioxide (*10*). Since the majority of the samples measured are less than 20,000 years in age, the error introduced in most cases is much less than 500 years. If such contamination were present, the ages given in Table 3 would in all cases be minimal.

Table 1. Radiocarbon dates of geologic samples.

Description	Sample No.	Age (yr)
Juneau, Alaska. Muskeg sample of basal sedge peat in the early pine pollen zone at a depth of 3.8 m. The locality is 3 mi from the end of Montana Creek road northwest of Juneau. The age of the peat should reveal the time of earliest pollen sedimentation in the region and should just postdate the recession of the late-Wisconsin ice. Submitted by C. J. Heusser, American Geographical Society.	L-297D	10,300 ± 400
Fletcher's Ice Island, T-3. Samples of organic muck forming layers within the ice. The layers were presumably formed by concentration during melting of the ice. These samples are from the Silk Hill area and were collected during August 1955. Submitted by Norman Goldstein, Air Force Cambridge Research Center.		
Surface dirt.	L-298A	3750 ± 200
Dirt from bottom layer.	L-298B	3400 ± 250

Description	Sample No.	Age (yr)
St. Pierre les Becquets section, Québec. Wood from a 2-ft layer of compressed peat in nonglacial alluvial sediments that occur 75 ft below the surface in a section comprising 3.5 ft of alluvial sand, 5.0 ft of marine silt, 66.5 ft of proglacial varved silt and clay, 1.5 ft of nonglacial alluvial sand, 2.0 ft of compressed peat and wood, 3.25 ft of silty alluvial sand with some organic matter, 0.5 ft of compressed peat and wood, 1.5 ft of coarse alluvial sand, 1.25 ft of compressed peat with some wood, and 2.0 ft of coarse alluvial sand. The nonglacial sands and peat are underlain in nearby sections by red calcareous till. The proglacial varves are overridden in other sections by gray calcareous till that represents the last ice advance into the area. The section is on the north bank of an intermittent stream, tributary to the St. Lawrence River, that crosses Provincial Highway No. 3 about 1 mi south of the village of St. Pierre les Becquets. It is on the property of Lucien Laroche in lot 4, concession I, parish of St. Pierre les Becquets, Leurard Township, Nicolet County. A similar sample from this section, dated by the U.S. Geological Survey (W-189), also gave an age of > 40,000 yr (*4*). Submitted by N. R. Gadd, Geological Survey of Canada.	L-190A	> 40,000
Port Talbot, Ontario. Gyttja from the base of a wave-cut cliff on the north shore of Lake Erie 2 mi southwest of Port Talbot. Pollen analyses indicate that a cool, hence interstadial, climate must have existed during the period of deposition (*11*). The sample is overlain by 100-ft-thick Wisconsin deposits, including four layers of till. The second till above the gyttja is the same as the till that contains samples L-185B and L-217B at Plum Point, 1 mi southwest of the gyttja exposure. Measurements by the U.S. Geological Survey (*4*) indicate that this material is greater than > 32,000 yr old. Submitted by A. Dreimanis, University of Western Ontario, who considers that the base of the gyttja corresponds to the thermal maximum of the interstadial between the early and the main Wisconsin glaciations (*12*).		
Sample No. 1.	L-185A	> 38,000
Sample No. 2.	L-217A	> 39,000
Plum Point, Ontario. Wood from the "lower till" exposed in a wave-cut cliff on the north shore of Lake Erie. Measurements on a duplicate sample of No. 1 sent to the U.S. Geological Survey gave an age of 27,500 ± 1200 yr (*4*). Submitted by A. Dreimanis, who considers that the lower till was deposited by the main Wisconsin glaciation (*12*).		
Sample No. 1, larch wood (*13*).	L-185B	28,200 ± 1500
Sample No. 2, spruce wood (*13*).	L-217B	24,600 ± 1600
Meaford, Ontario. (All levels are geodetic.) Wood sample of a cedar log from an ancient lake bed, 597.202 ft; imbedded in clay 3.5 in., 596.91 ft; overlay of sand, 605.41 ft; location about 2000 ft from ancient river mouth; taken from public utilities basement excavation on 21 Sept. 1955; lake level then probably about 651 ft; present lake level, 579.8 ft; length of log, 7.25 ft, diameter, 0.75 ft; well-preserved; elevation indicates old Lake Nipissing period (subsequent to Lake Algonquin). Submitted by F. Stanley Knight, Meaford, Ont.	L-312	6300 ± 150
Queen Charlotte Islands, British Columbia. Sample of limnic peat at a depth of 6.6 m in muskeg on Langara Island. Pollen profiles reveal a very early postglacial record. The sample should closely date the retreat of the Cordilleran ice from the ocean border. Submitted by C. J. Heuser.	L-297C	10,850 ± 800
Fraser Lowland, British Columbia. Wood from glacial deposits presumably laid down by advancing Sumas ice, but the possibility that it was laid down by retreating Vashon ice cannot be disregarded. Since the dates obtained agree quite well with those from Two Creeks, it is concluded that these deposits are of Valders age. The dates confirm earlier measurements, by the black carbon method, on samples from this area (L-221D and L-221E) (*14*). Submitted by J. E. Armstrong, Geological Survey of Canada.		
Wood from Whatcom glaciomarine, clayey silt deposits exposed along Norrish Creek.	L-331A	11,450 ± 150
Wood from till-like Whatcom glaciomarine deposits near the mouth of Norrish Creek.	L-331B	11,700 ± 150
Wood from Whatcom glaciomarine, stony, clayey silt along a small creek north of the monastery near Mission, B.C. The deposit is overlain by Sumas till.	L-331C	10,950 ± 200
Lake Washington, Wash. Section of wood from the base of a Douglas Fir tree standing upright on the bottom of the north end of the lake at a depth of 90 ft. The tree, 55 ft in length, including a 10-ft root zone, and 3 ft thick at the base, was pulled out of the bottom intact. The tree was presumably displaced into the lake by an ancient landslide. The purpose of the dating was to establish the date of the landslide. Submitted by H. R. Gould, University of Washington.	L-269E	1160 ± 80
Lake Washington, Wash. Limnic peat material from a core taken in the central part of the lake. The samples are from 40 ft below the lake bottom, just above a thick sequence of blue clays. The water depth is approximately 190 ft. The date should provide a minimum age for the withdrawal of the Vashon ice sheet from the Seattle area. Submitted by H. R. Gould.		
Sample No. 1.	L-330	14,000 ± 900
Sample No. 2.	L-346A	13,650 ± 550
Santa Rosa Island, Calif. These samples were collected from an alluvial fan truncated by wave action. The fan was presumably deposited during times of low sea level, when the streams flowed from the hills out across a wide wave-cut terrace (10 to 25 ft above present sea level) which probably was formed during the last interglacial period. The		

Description	Sample No.	Age (yr)
present-day streams have cut down through the fans, indicating that growth of the fans probably ceased when sea level rose sufficiently to begin the truncation of the alluvial material. The total thickness of the deposits averages about 50 ft. They are capped by fairly mature soils, sand dunes, and, in some areas, by debris from human occupation. Collected by P. C. Orr, Santa Barbara Museum of Natural History, and W. S. Broecker.		
Calcareous sand from a small dune built into the alluvium 40 ft below the surface, which corresponds to a point 80 percent of the way down through the alluvial material.	L-290Z	> 33,000
Thoroughly charred dwarf mammoth bones associated with numerous, large, uncharred pieces of bone from the same animal. The sample was located 36 ft below the top of the alluvium, which corresponds to 50 percent of the way down through the mass.	L-290R	29,700 ± 3000
Charcoal from a burned layer 9 ft below the soil which forms the surface of the alluvial fan.	L-290T	12,500 ± 250
Santa Rosa Island, Calif. Organic muck from the lower layers in a *ciénaga* (pond) deposit which once filled in an old river channel cut into the alluvial fans which were formed in the river systems during times of low sea level. The *ciénaga* itself has been recut by the river. It is now exposed on one side of the rectangular stream channel. The original alluvial material forms the other side. The cause of this filling and recutting of the channel is not clear. Collected by P. C. Orr, G. F. Carter, C. L. Hubbs, and W. S. Broecker.	L-290C	9050 ± 600
La Jolla, Calif. Giant pismo clam shell from beneath an A-B-C soil profile. The size of the clam indicates that the water was then colder than it is at present. Submitted by G. F. Carter, Johns Hopkins University, in connection with an investigation of soils.	L-299A	4400 ± 150
San Diequito River Valley, Calif. Shell from an old midden in the upper part of the fill. The sample should date the lime-pan type of midden and would set a minimum age for the valley fill and the associated developed soil profiles. Submitted by G. F. Carter.	L-299B	6680 ± 170
La Jolla, Calif. Charcoal from a hearth in a midden on top of the sand over a Pleistocene beach. Only a weak soil profile has been developed, but distinct leaching and a beginning of soil development have occurred. Submitted by G. F. Carter.	L-299C	2800 ± 150
Mississippi alluvial valley, La. These samples were taken from cores penetrating the sediments deposited by the Mississippi River during periods of rising sea level following the maximum low of the last glaciation. The trench cut by the river had a maximum depth of about 450 ft and is filled for the most part with gravel and sand below a depth of 100 ft. These deposits grade upward into silts and clays designated as the "topstratum deposits" by Fisk (*15*). A detailed description and interpretation of the deposits has been published by Fisk and McFarlan (*16*). The sample depths quoted do not necessarily correspond to sea level at the time of formation of the sample. The possibility of formation some distance above or below sea level, the possibility of redeposition after formation, and the possibility of postdepositional movement because of subsidence or uplift of the sediments must be considered. The samples were submitted at our request by H. N. Fisk and E. McFarlan, Humble Oil Co., Houston, Tex.		
Marine shells (mostly *Arca, Cardium, Mulinia, Tellina, Chione,* and echinoid fragments) from a core of fine, gray sand, 60 ft below sea level, U.S. Corps of Engineers boring No. 1-U, 300 ft west and 100 ft south of the northeast corner, sec. 2, T13S, R24E, Gretna area, Jefferson Parish, La.	L-291A	4370 ± 220
Marine shells (mostly *Crassostrea, Crepidula, Mytilus,* and *Balanus* fragments) from a core of gray, silty clay, 90 ft below sea level in the same boring as sample L-291A.	L-291B	7870 ± 170
Marine shells (mostly *Arca, Olivella, Crassinella, Anomia,* and *Chione* fragments) from a core of interbedded gray sand and gray, silty clay, 121 ft below sea level, New Orleans expressway boring No. 107, at intersection of S. Roman St. and New Basin Canal, Orleans Parish, La.	L-291C	27,000 ± 1200
Marine shells (mostly *Arca, Olivella, Nuculana,* and *Anomia* fragments) from a core of gray, clayey sand, 147 ft below sea level, New Orleans expressway boring No. 143, at intersection of St. Charles and Calliope Sts., Orleans Parish, La.	L-291D	29,300 ± 2000
Marine shells (mostly *Corbula, Nuculana, Arca, Tellina,* and echinoid fragments) from a core of gray, silty clay, 177 ft below sea level, Humble Oil and Refining Company core test 1, Louisiana state lease 799, lat. 29°09.0′N, long. 89°59.0′W, Grand Isle block 16, offshore from Jefferson Parish, La.	L-291E	7600 ± 350
Wood from a core of gray, silty clay, 218 ft below sea level, Humble Oil and Refining Company core test 1, Louisiana state lease 804, lat. 29°08.5′N, long. 89°58.9′W, Grand Isle block 16, offshore from Jefferson Parish, La.	L-291F	> 37,000
Marine shells (mostly *Chione, Arca, Nuculana, Dosinia,* and *Thais* fragments) from a core of gray, clayey sand, 215 ft below sea level, Humble Oil and Refining Company core test 1, Louisiana state lease 799, lat. 29°09.0′N, long. 89°59.0′W, Grand Isle block 16, offshore from Jefferson Parish, La.	L-291G	11,050 ± 300
Marine shells (mostly *Dosinia, Nuculana, Phacoides, Corbula,* and echinoid fragments), from bit cuttings of gray, silty clay, 233 to 243 ft below sea level, Humble Oil and Refining Company well No. E-6, Louisiana	L-291H	10,530 ± 350

Description	Sample No.	Age (yr)
state lease 797, lat. 29°10′45″N, long. 89°52′30″W, Grand Isle block 18, offshore from Jefferson Parish, La.		
Wood from bit cuttings of sand and gravel, 313 to 323 ft below sea level, in the same well as sample L-291H.	L-291I	> 40,000
Wood from a core of sand and gravel, 370 ft below sea level, Humble Oil and Refining Company core test 1, hole 2, Louisiana state lease 797, lat. 29°11′25″N, long. 89°53′00″W, Grand Isle block 18, offshore from Jefferson Parish, La.	L-291J	> 31,000
Wood from bit cuttings of gray, silty clay, 260 to 280 ft below sea level, NE¼NE¼ sec. 18, T21S, R31E, Venice area, Plaquemines Parish, La.	L-291K	17,150 ± 500
Marine shells (mostly *Corbula, Pecten, Arca, Nuculana, Anomia,* and echinoid fragments) from bit cuttings of gray, silty clay, 360 to 380 ft below sea level in the same boring as sample L-291K.	L-291L	31,850 ± 3000
Shells of brackish-water and marine fauna (mostly *Crassostrea* with a few *Thais* and *Phos* fragments) from bit cuttings of gray sand, 485 to 490 ft below sea level in the same boring as sample L-291K.	L-291M	> 36,000
Wood from bit cuttings of sand and gravel, 400 to 420 ft below sea level, 2100 ft southeast of the northwest line, 2000 ft southwest of the northeast line, sec. 53, T20S, R29E, Buras area, Plaquemines Parish, La.	L-291N	17,000 ± 500
Marine shells (mostly *Arca, Crassinella,* and *Pecten* fragments) from bit cuttings of sand and gravel, 220 to 240 ft below sea level, 200 ft south and 1000 ft west of the northeast corner, sec. 4, T21S, R22E, Bay Laurier area, Lafourche Parish, La. This sample may have been contaminated by cuttings from a higher elevation in the boring.	L-291O	8350 ± 180
Marine shells (mostly *Arca, Crassinella,* and *Pecten* fragments) from bit cuttings of sand and gravel, 320 to 340 ft below sea level in the same boring as sample L-291O. This sample may have been contaminated by cuttings from a higher elevation in the boring.	L-291P	9100 ± 210
Finely divided wood and plant fragments from bit cuttings of sand and gravel, 210 to 220 ft below sea level, Humble Oil and Refining Company well No. 1, Louisiana state lease 2258, 660 ft north of the south line, 605 ft west of the east line, sec. 35, T12S, R11E, Bayou Pigeon area, Iberia Parish, La. This sample was probably contaminated by cuttings from a higher elevation in the boring.	L-291Q	870 ± 80
Rounded and angular fragments of black wood from bit cuttings of sand and gravel, 240 to 270 ft below sea level, in the same boring as sample L-291Q.	L-291R	> 34,000
Rounded and angular fragments of brown wood from bit cuttings of sand and gravel, 270 to 300 ft below sea level, in the same boring as sample L-291Q.	L-291S	> 33,000
Brown fibrous fragments of wood from bit cuttings of sand and gravel, 260 to 380 ft below sea level, 900 ft south of the north line, 2000 ft west of the east line, sec. 37, T18S, R21E, Larose area, Lafourche Parish, La.	L-291T	25,500 ± 600
Finely divided black wood fragments from bit cuttings of sand and gravel, 200 to 220 ft below sea level, 100 ft south of the north line, 100 ft west of the east line, sec. 84, T21S, R18E, Cocodrie area, Terrebonne Parish, La.	L-291U	16,800 ± 650
Brown, angular fragments of wood from bit cuttings of sand and gravel, 325 to 340 ft below sea level, Humble Oil and Refining Company well No. T-1, Louisiana Land and Exploration Company, NE¼NE¼ sec. 4, T22S, R17E, Bay Saint Elaine area, Terrebonne Parish, La.	L-291W	> 36,000
Black, organic-rich, silty peat from bit cuttings of dark gray, silty clay, 140 to 160 ft below sea level, NW¼-NE¼ sec. 9, T20S, R17E, Dulac area, Terrebonne Parish, La.	L-291X	10,700 ± 150
Large wood fragments from a core of gray, organic-rich, silty clay underlying a natural levee of the Mississippi River, 4 ft above sea level, southwest corner, sec. 47, T11S, R6E, Reserve area, St. John the Baptist Parish, La.	L-291Y	2050 ± 150
Thais shell fragments dredged from the floor of the Gulf of Mexico at depth of about 200 ft, lat 28°12.0′N, long. 92°58.0′W, off Vermilion Parish, La. during cruise of research vessel *Vema* in the spring of 1954. The shells came from an assemblage of marine and brackish-water fauna, including oysters.	L-291Z	7210 ± 200
Marine shells (mostly *Dosinia, Arca, Pecten, Corbula,* and echinoid fragments) from A.P.I. project 51 core No. Pl. 244-52, in 180 ft of water; sample from the interval 8 to 15 ft below floor of the Gulf of Mexico; lat. 29°26.4′N, long. 88°08.0′W, east of the modern Mississippi delta.	L-291AA	7000 ± 200
Marine shells (mostly echinoid fragments) from a core of gray, silty clay, 570 ft below sea level, Gulf Oil Corporation well No. 3, Buras Levee district, state unit, Scott Bay, NW¼-NW¼ sec. 28, T23S, R31E, Plaquemines Parish, La. The age of this sample was previously determined by the Humble Oil Company laboratory as 21,700 ± 800 yr (*16*) and more recently as > 35,000 yr (*17*).	L-358A	> 33,000
Sea Coast, N.C. Sample from peat bed exposed only at low tide. Pollen analysis indicates a climate similar to that of the present time. Since the peat was deposited in a fresh-water swamp, it indicates a rise in sea level in this area from 5 to 10 feet in the past few hundred years. Independent evidence from tide gages and old rice fields supports the idea of a rising sea level. Submitted by S. Taber, University of South Carolina.	L-222B	< 300
Santee River, S.C. Piece of wood from a large log exposed in the excavation for an electric generator below Santee Dam across the Santee	L-222C	800 ± 130

Description	Sample No.	Age (yr)
River in Clarendon and Berkeley counties. The sample comes from a series of flood-plain deposits. Submitted by S. Taber.		
Myrtle Beach State Park, S.C. Cedar from a peat bed exposed at low tide. Pollen of spruce and fir has been found in the peat, indicating a colder climate than at present. Stratigraphic evidence indicated that this sample should postdate the last interglacial period. Submitted by S. Taber.	L-222A	> 31,000
Sussex County, N.J. Peat associated with mastodon remains found in a bog located in the Highland Lakes area. Submitted by M. E. Johnson, Department of Conservation, State of New Jersey.	L-231	10,890 ± 200
Bermuda. Sample of Southampton eolianite from Sayles' (*18*) locality No. 4, taken 3 ft 4 in. from the top of the 12-ft formation. Previously dated by the black-carbon method (*14*) as 17,600 ± 800 yr. The new measurement suggests that this earlier date, as well as the date on the underlying Somerset formation (sample L-120F) of 21,000 ± 1600 yr, is too young. Collected by P. Gast, Columbia University.	L-120G	> 30,000
Bermuda. Samples were taken from bore holes located in the vicinity of Longbird Bridge at the western extremity of Kindley Air Force Base, near the north shore of Castle Harbor in eastern Bermuda. Fauna associated with the samples are Pleistocene in age. Sample L-328 appears to have been deposited at a time when sea level was on the order of 60 or more feet higher than it is at present. Samples L-275A and L-275D are reasonably fresh samples of cedar that appear to have been overwhelmed by a rapidly rising sea level. Evidently the deposition of these materials and the eustatic changes in sea level that the materials represent did not occur during the decline of the last Wisconsin glaciation. Submitted by Walter S. Newman, Jackson Heights, N.Y.		
White to buff, angular, silty sand composed of 90 percent or more of debris of *Halimeda* sp. Located 60 ft below present sea level.	L-328	> 33,000
Mixture of charred and uncharred cedar and peaty material. The top of the upper peat is 63 ft below present sea level.	L-275A	> 37,000
Black fossiliferous peat. The lower peat is 72 to 74 ft below present sea level.	L-275B	> 37,000
Bimini, Bahamas. Mangrove peat from 9 ft below low water level. The sample, taken from a core, is overlain by about 9 ft of calcareous sand. The age on this sample is in the same range as the ages obtained on similar deposits that were found in Florida (*14*). Submitted by N. D. Newell, Columbia University.	L-366B	4370 ± 110
Bimini, Bahamas. Oolite sand from the eastern side of Brown Cay from the sediment surface at a depth of 4 to 5 ft of water. Since the C^{14} concentration in the water above the sediments has not been determined, the age was calculated using the average C^{14}/C^{12} ratio for North Atlantic surface water as a control. Submitted by N. D. Newell.	L-366I	740 ± 100
North Bimini, Bahamas. Shell taken from beach rock exposed in a low, wave-cut sea cliff. The sample was located 6 ft above the high-tide level and is thought by the collector to indicate a positive sea stand. Submitted by K. K. Turekian, Yale University.	L-321A	2300 ± 200
North Bimini, Bahamas. Cemented oolite dune sand, presumably deposited subaerially. This sample is probably a composite of older oolite and more recent cement; hence the age must be considered a minimum one. Submitted by K. K. Turekian.	L-321D	13,000 ± 500
South Bimini, Bahamas. Fossil shells separated from the rock which forms the island. Believed to predate the last period of low sea level. Submitted by K. K. Turekian.	L-321B	> 27,000

Table 2. Radiocarbon dates on archeological samples.

Description	Sample No.	Age (yr)
Vancouver, British Columbia. Hearth charcoal from a depth of 9 ft in midden refuse containing clam and mussel shell and artifacts. The site referred to as the Great Fraser midden is located on the southern limits of the city of Vancouver. The sample was associated with the remains of Mongoloid people. Submitted by T. H. Ainsworth, City Museum of Vancouver.	L-337	2100 ± 90
Santa Rosa Island, Calif. Red abalone shell found in association with a large number of human skeletons. This ancient cemetery was covered by a layer of cemented dune sand. Submitted by P. C. Orr.	L-290D	7050 ± 300
San Diego, Calif. Charcoal from the Texas Street site, thought to be a third interglacial alluvial fan and thought to contain evidence for early man. Submitted by G. F. Carter.	L-299D	> 35,000
Lubbock, Tex. Snail shells from the Folsom horizon. The position of the shells is slightly higher than that of the charred bones dated by Libby at 9880 ± 350 yr (*19*). This date, therefore, not only confirms the age assigned to the Folsom culture but also suggests that land snails may be a reliable radiocarbon dating material. Submitted by E. H. Sellards, Texas Memorial Museum.	L-283G	9700 ± 450

Description	Sample No.	Age (yr)
Plainview, Tex. Snail shells from the bone beds that contain the Plainview cultural materials. The accumulation of the bone bed came about from the stampede of a herd of bison, which resulted in the death or crippling of about 100 bison that were crossing Running Water Creek within the limits of the present city of Plainview. On the basis of field studies, the age of the sample had been estimated to be close to that of the Folsom culture. Submitted by E. H. Sellards.	L-303	9800 ± 500
Midland, Tex. Pond snail shells from the white sand which forms the base of the deposit. The Midland skeletal remains and artifacts were found in the gray sand that rests disconformably above the white sand. Collected by E. H. Sellards, Texas Memorial Museum, and F. Wendorf, Museum of New Mexico; submitted by E. H. Sellards.	L-304C	13,400 ± 1200
Jackson County, Ala. Charcoal from the 13-ft level in Russel Cave (*20*); estimated to be about 9000 yr old. This sample represents the oldest C^{14}-dated material directly associated with human remains in the eastern United States. Submitted by C. F. Miller, Smithsonian Institution.	L-344	7950 ± 200
New York, N.Y. Timber from remains of a ship found in a New York subway excavation. Thought to be Adrien Block's ship, the *Tiger,* which burned in New York (New Amsterdam) harbor in 1613. When found, the ship timbers were covered with layers of sand and silt totaling 11 ft in thickness. The shoreline of Manhattan Island in 1625 was at Dey and Greenwich Sts., where the timbers were unearthed. Submitted by W. M. Williamson, Marine Museum of New York City.	L-262	420 ± 80
Chiapas, Mexico. Charcoal associated with pre-Classic ceramics. The site had been estimated to be between 1600 and 2100 yr old on the basis of historical research. Submitted by T. S. Ferguson, New World Archeological Foundation, Oakland, Calif.	L-286A	1550 ± 100
Chiapas, Mexico. Charcoal from a depth of 2 m in mound A near the town of Santa Rosa. Submitted by T. S. Ferguson.	L-357	2170 ± 80
Paracas, Peru. Cotton cloth, Paracas Necropolis period; mummy 49, part of the same undyed cotton fabric dated by Libby, by the black carbon method (sample C-271), as 2257 ± 200 yr (*19*). The present result, although it is in good agreement, supports the general belief that the C-271 mean was too large. Cloth of identical type from Paracas Necropolis period, mummy 114, sample L-115, was also dated by both the black carbon and CO_2 methods as 1700 ± 200 and 1750 ± 90. These four tests suggest that, within the group burial of more than 400 Necropolis mummies, there are measurable age differences. Corroboration calls for further study of existing collections and field work concentrated on cultural horizons antedating this time bracket, and within it. Submitted by Junius Bird, American Museum of Natural History.	L-311	2050 ± 100
Viru Valley, Peru. Samples from burials at site V-162 (Huaca de la Cruz), late Mochica phase. A sample from a burial at the same site and from the same phase was dated by the University of Chicago (C-619) at 1833 ± 119 yr (*20*). The ages reported here agree better with archeological evidence for the north coast of Peru, according to W. D. Strong, Columbia University, who submitted the samples.		
Burial 3, textile fabrics, No. 500.	L-335A	1300 ± 80
Burial 10, basketry, No. 559.	L-335B	1300 ± 80
Nazca, Peru. Second series of ages relating to materials collected by the Columbia University Ica-Nazca expedition, 1952–53 (*21*). The first series was included in a previously published Lamont date list (*3*). The two series are generally remarkably consistent with each other and with the stratigraphic and stylistic evidence available for the south coast of Peru. Submitted by W. D. Strong.		
Site N-4 (Cahuachi): burial 32, human hair, No. 352. Huaca del Loro phase, Fusional epoch.	L-335F	1200 ± 90
Site N-4 (Cahuachi): burial 4, textile fragments, No. 225. Late Nazca phase, Florescent epoch. (Nazca B).	L-335E	1430 ± 90
Site N-4 (Cahuachi): burial 39, human hair and textile fragments, No. 356. Middle Nazca phase, Florescent epoch. (Nazca A).	L-335G	1620 ± 100
Site I-27 (Ocucaje II): burial 3, reeds strung with cord, No. 414. Late Paracas phase, Formative epoch.	L-335C	1840 ± 100
Site I-27 (Ocucaje II): burial 4, human hair and scalp, No. 415. Late Paracas phase, Formative epoch.	L-335D	1940 ± 100
Catamarca Province, Argentina. Charcoal from dwelling place at Site No. 10, Hualfin Valley, near the juncture of the Rio Guiyischi (Huiliche). The sample was associated with pottery types "Ciénaga polychrome" and "Huiliche monochrome" of the Barreales culture. Collected by Rex Gonzalez, Universidad Nacional de La Ciudad La Plata. Submitted by Junius Bird.	L-307	1130 ± 90
Tarascon, France. Charcoal from a depth of 10 to 20 cm in the late Magdalenian horizon of the Grotte de la Vache. Estimated age, 10,000 to 12,000 yr. Collected by R. Robert, Tarascon (Ariége), France, and H. Gross, Bamberg, Germany, and submitted by H. L. Movius, Jr., Peabody Museum, Harvard University.	L-336C	11,650 ± 200
Chambéry, France. Lignite from the Voglans-Sonnaz locality. The horizon from which the sample was taken is believed to be of third interglacial (Riss-Würm) age. A sample from the nearby Lake Bourget locality was dated by the Chicago laboratory as > 21,000 years (sample C-588) (*19*). Collected by L. Moret, University of Grenoble, France, and submitted by H. L. Movius, Jr.	L-336A	> 39,000
La Colombiére, France. This is a large rock shelter, near Poncin (Ain). The sample consisted of ashy material	L-177	14,150 ± 450

Description	Sample No.	Age (yr)
from a hearth in a Gravettian (or Upper Perigordian) occupation layer resting immediately upon and interdigitated with the last depositional stages of the 20- to 23-m terrace of the Ain River. It has been thought that this site should be quite a bit older than the Lascaux site dated by Libby (*19*) at 15,500 ± 900 yr. A sample from this same hearth, measured at the U.S. Geological Survey C^{14} laboratory (sample W-150) (*4*) gave an age of 11,650 ± 600 yr. Collected and submitted by H. L. Movius, Jr.		
Tarragona, Spain. Sample of ashes from a prehistoric level under the city of Tarragona. Submitted by W. L. Bryant Foundation, Springfield, Vt.	L-280	2050 ± 130
Angelsta, Sweden. Tree rings (No. 101 to 150, counting from the center) from a Neolithic fir tree found at a depth of 3.5 m in Rya Moor. This sample has been circulated as a radiocarbon standard. A similar sample was dated by the Stockholm Radioactive Dating Laboratory as 2470 ± 65 yr old (St-156) (*22*). Submitted by G. Ostlund, Stockholm, Sweden.	L-296	2600 ± 80
Shanidar Cave, Kurdistan, Iraq. Samples from layer C, the second oldest of four cultural layers ranging from modern back to Mousterian of the middle Paleolithic period (*23*). Duplicates of these samples were run by the U.S. Geological Survey laboratory (*4*), ages of 29,500 ± 1500 (W-178) and > 34,000 yr (W-180) being obtained. The agreement is satisfactory. Collected by R. Solecki, Smithsonian Institution, and submitted by W. D. Strong.		
Impure charcoal from the upper part of layer C, the Baradost culture (related to the Aurignacian in Western Europe). Field catalog No. 338, square S3W1, 10.0 ft below the datum plane.	L-335H	26,500 ± 1500
Charcoal from 2 ft above the base of layer C. Field catalog No. 401, square S2W4, 15.0 ft below the datum plane.	L-335I	32,300 ± 3000
Dothan, Jordan. Charcoal from cooking areas and what appears to be burned roof beams from the Biblical site of Dothan, located 60 mi. north of Jerusalem. The age assigned from pottery remains and other archeological data is 900 to 800 B.C. Submitted by J. P. Free, Wheaton College.	L-365	2760 ± 80
Mount Carmel Range, Israel. Charcoal from the Upper Levalloiso-Mousterian level of the Mugharet-el-Kebara, a site located south of Haifa. This level is correlated with level B at the nearby Mugharet-et-Tabum, where several Neanderthal burials were discovered. The age calculated is 33,000 yr, but because of the small size of the sample, the error slightly overlaps the sensitivity limit, and hence a minimum age is quoted. Collected by M. Stekeles, Hebrew University, Jerusalem, and submitted by H. L. Movius, Jr.	L-336D	> 30,000
Bortal Fakher, Tunisia. Charcoal from a lower Capsian archeological site in southern Tunisia. Compared with the age of 7300 yr obtained on an Upper Capsian sample (L-240B) (*3*) from Khanquet-el-Mouhaad, the age on sample No. 1 appears to be too young. Remeasurement of this sample gave the same age. A second sample from the same locality gave a slightly greater but still somewhat younger age than expected. Collected by E. G. Gobert, Tunis, Tunisia. Submitted by H. L. Movius, Jr.		
Sample No. 1.	L-240A	6900 ± 150
Sample No. 2.	L-366I	7700 ± 200

Table 3. Radiocarbon dates on samples of ocean sediment.

Description	Sample No.	Age (yr)
Core A179-15. Taken at 3110-m depth at lat. 24°48′N, long. 75°55′W off Eleuthera Island, Bahamas, from a steep slope. The core consists mainly of calcilutite with a layer of calcareous silt near the base of the section. A description of the lithology and the climatic implications of the core has been published (*5*). Collected by M. Ewing.		
Depth 0 to 1 cm.	L-332A	1000 ± 230
Depth 0 to 3 cm (from trigger weight core).	L-332B	1300 ± 225
Depth 49 to 50.5 cm.	L-332C	4530 ± 300
Depth 129 to 132 cm.	L-332D	15,900 ± 600
Core V3-126. Taken at a depth of 3485 m in the Gulf of Mexico at lat. 23°45′N, long. 92°28′W. The sample taken at 23- to 27-cm depth was taken close to the end of the period of increase in surface water temperature. The details of the lithology and the significance of the age measurement are given by Ewing, Ericson, and Heezen (*24*). Collected by M. Ewing.	L-332O	7900 ± 450
Core V3-127. Samples from a core taken in the Gulf of Mexico on a topographic high in the Sigsbee Deep at lat. 23°38′N, long. 92°40′W, water depth 3540 m. A complete description of this core and the significance of these measurements is given by Ewing, Ericson, and Heezen (*24*). Bulk carbonate material was run in each case. Collected by M. Ewing; submitted by D. B. Ericson, Lamont Geological Observatory.		
Depth 35 to 45 cm.	L-343C	12,870 ± 400
Depth 68 to 95 cm.	L-343D	19,650 ± 1200
Depth 134 to 144 cm.	L-343E	23,830 ± 1500
Depth 185 to 192 cm.	L-343A	25,850 ± 2000
Core A185-35. Samples from a core taken in the Gulf of Mexico at a depth of 3630 m, lat. 24°34′N, long. 92°37′W. The measurements were on bulk core		

Description	Sample No.	Age (yr)
material in each case. A complete description of the core and the significance of these measurements has been published (*24*). Collected by M. Ewing; submitted by D. B. Ericson.		
Depth 103 to 109 cm.	L-343B	10,900 ± 1000
Depth 650 to 670 cm.	L-343F	20,000 ± 2000
Core A172-2. Taken at 3070-m depth in the Caribbean Sea at lat. 16°12′N, long. 72°19′W. The comparison between the coarse and the fine fractions substantiates Suess' data indicating that the fine fraction from cores taken in regions of rather steep topography may contain reworked carbonate. C^{14} measurements on such material would give maximum ages. Collected by M. Ewing.		
Depth 14 to 29 cm; > 74 μ fraction.	L-332P	11,050 ± 200
Depth 14 to 29 cm; < 74 μ fraction.	L-332R	13,500 ± 400
Core A179-8. Taken at 4060-m depth at lat. 20°28′N, long. 72°49′W, northwest of the island of Hispaniola on the Caicos-Hispaniola abyssal plain. The core contains numerous layers of calcareous sand, probably because of slumping or turbidity currents. The normal sediment from which the samples were taken consists of lutite. The details of the lithology and the climatic implications of the core have been published (*5*). Collected by M. Ewing.		
Depth 0 to 2 cm.	L-332G	9900 ± 700
Depth 268 to 275 cm.	L-332H	13,750 ± 300
Core A180-74. Samples of bulk carbonate from a core taken from a depth of 3320 m at lat. 00°03′S, long. 24°10′W in the Atlantic Ocean. The core consists of uniform foraminiferal lutite with no obvious evidence of turbidity currents, erosion, slumping, or reworked sediments. The excellent agreement in lithology between this core and three others taken on a 400-km traverse across the mid-Atlantic ridge in the equatorial region indicates that this core represents an undisturbed record of sedimentation. The details of the lithology and climatic implications of this core have been published (*5, 25*). Collected by B. C. Heezen.		
Depth 9 to 12 cm.	L-332K	8000 ± 500
Depth 26 to 33 cm.	L-332J	13,250 ± 600
Depth 175 to 186 cm.	L-332I	> 40,000
Core A180-76. Taken at 3510-m depth at lat. 00°46′S, long. 26°02′W. This core is similar in almost every respect to core A180-74. The purpose of the two measurements was to determine whether the coarse and fine fractions of the carbonate material would give the same age. Measurements by Suess (*4*) in other areas suggest that the fine material contains reworked carbonate and hence gives an anomalously old age. This does not seem to be the case in these cores. Collected by B. C. Heezen.		
Depth 10 to 22 cm; < 74 μ fraction.	L-332E	9500 ± 180
Depth 10 to 22 cm; > 74 μ fraction.	L-332F	10,500 ± 250
Core A180-93. Taken at a depth of 4114 m at lat. 13°04′S, long. 36°26′W. The sample consisted of bulk carbonate material taken at the mid-point of the temperature change (20- to 30-cm depth). The same comments as those made for core A180-100 apply to this one. Collected by B. C. Heezen.	L-332N	15,000 ± 550
Core A180-100. Taken at a depth of 4260 m at lat. 17°28′S, long. 34°58′W. This core was chosen in order to determine whether the temperature change in the surface waters of the South Atlantic Ocean correlated in age with that in the north Atlantic (*5*). Although this core is the best available, it is from an area where slumping may have brought in reworked material. Since the amount of coarse fraction was exceedingly small, the bulk material was measured. The ages quoted are maximum owing to the possibility of the presence of reworked carbonates. The mid-point of the temperature change falls at 30 cm, indicating that the change occurred less than 20,000 yr ago. Collected by B. C. Heezen.		
Depth 0 to 8 cm.	L-310A	5000 ± 250
Depth 25 to 35 cm.	L-310B	20,000 ± 900
Depth 60 to 80 cm.	L-310C	35,000 ± 4000

Table 4. Radiocarbon dates on Pluvial Lake samples.

Description	Sample No.	Age (yr)
Lake Lahontan area, Nev. The following measurements were made as part of a program designed to reconstruct the pattern of the climatic variations in the western part of the Great Basin (*26*). Since a large majority of the measurements were made on carbonate materials, a study has been made of the validity of such materials as indicators of radiocarbon age (*10*). The samples were collected as part of a joint project by P. C. Orr and W. S. Broecker.		
Large oolites from a beach about 60 ft above the present lake level in the Pinnacles area at the north end of Pyramid Lake. Elevation is about 3870 ft.	L-288F	1100 ± 200
Shells from an extensive shell beach on Anaho Island about 50 ft above the present level of Pyramid Lake. Elevation about 3860 ft.	L-288H	2100 ± 200
Basketry from the upper portion of the deposits in Crypt Cave. This wave-cut cave is located on the east side of dry Lake Winnemucca at an elevation of about 370 ft above the present level of Pyramid Lake. Elevation about 4170 ft.	L-289II	2400 ± 200
Wood fragments from a habitation level 32 in. below the surface of the deposits in Hidden Cave, a wave-cut	L-289BB	3050 ± 200

Description	Sample No.	Age (yr)
cave in the Fallon area. Elevation 4104 ft.		
Twigs from a habitation level composed mainly of guano and dust 22 to 28 in. below the surface of the deposits in Guano Cave, which is located about 270 ft above the present level of Pyramid Lake on the east side of dry Lake Winnemucca. These deposits are covered by a 6-in. layer of silt which was probably washed in from another part of the cave. Elevation about 4050 ft.	L-356B	3200 ± 130
Shell from a remnant of lake sediments in the floor of wave-cut Diaphragm Cave, which is located at the water level on the east side of Pyramid Lake just north of the Pyramid. Elevation 3820 ft.	L-289R	3200 ± 250
Black pitchlike material found on the ceilings and walls of most of the caves in the area. P. C. Orr, who has studied these deposits, is convinced that they are not from smoke. One theory is that they consist of organic material leached from the tufa which covers the inside of all the caves. The young age seems to rule out this possibility.	L-364BI	4150 ± 150
Matting associated with a human burial in Cow Bone Cave, which is located on the east side of dry Lake Winnemucca. Elevation 4020 ft.	L-289FF	5970 ± 150
Fragments of netting from the topmost portion of the lowest habitation level in Fishbone Cave, which is located on the east side of dry Lake Winnemucca at an elevation of about 250 ft above the present level of Pyramid Lake. Elevation about 4050 ft.	L-289KK	7830 ± 350
Tufa from a large mushroom-shaped carbonate mound located about 100 ft above the present lake level in the Pinnacles area at the north end of Pyramid Lake. The sample was the outermost of a series of concentric layers of various varieties of tufa. Elevation about 3900 ft.	L-364CE	8500 ± 200
Lithoid tufa from about 165 ft above Crypt Cave. This sample is from about 100 ft below the highest known level of the lake. Elevation about 4330 ft.	L-289G	9700 ± 200
Duplicate of sample L-289G, collected 9 mo later. Elevation about 4300 ft.	L-356G	10,000 ± 220
Lithoid tufa from about 110 ft above Crypt Cave. Elevation 4280 ft.	L-356H	9700 ± 200
A second sample taken from the same place as L-356H. Elevation 4280 ft.	L-364DA	10,700 ± 240
Lithoid tufa from the Lahontan beach level in the Winnemucca Cave area. This sample was the highest tufa observed in the area and came from within 50 ft of the maximum recognized Lahontan level. Elevation about 4380 ft.	L-364AA	9500 ± 200
Lithoid tufa from crevices in the rocks at the top of Anaho Island, which nearly coincides with the maximum lake level. Elevation about 4380 ft.	L-289N	11,800 ± 200
Lithoid tufa from the Mullen Pass area on the west side of Pyramid Lake. The elevation of the sample was nearly the same as that of L-289N. Elevation about 4360 ft.	L-289I	11,250 ± 350

Description	Sample No.	Age (yr)
Tufa from the lithoid terrace located 50 ft below the maximum level attained by Lake Lahontan. The sample was collected on Anaho Island. Elevation about 4330 ft.	L-289M	11,700 ± 200
Lithoid tufa from an elevation of about 400 ft above the present level of Pyramid Lake, on Anaho Island. Elevation about 4200 ft.	L-289L	11,570 ± 250
Lithoid tufa from the entrance of Fishbone Cave. Elevation about 4050 ft.	L-289C	11,700 ± 500
Tufa from a thick multilayer plate which divides Diaphragm Cave into an upper and a lower room. The sample itself was layered. Individual measurements on the upper and lower portions showed no significant difference in age. Elevation 3820 ft.	L-289H	12,700 ± 300
Radiating mushroom-shaped tufa masses forming a pavement within the upper clay members of the sediments exposed in the canyon of the Truckee River just south of the Agency Bridge in Nixon. The sample elevation is about 200 ft above the level of Pyramid Lake. Elevation 4002 ft.	L-289S	12,900 ± 350
Sample from radiating tufa from the same pavement as sample L-289S but 1 mi further south along the river. Elevation about 4020 ft.	L-364AM	12,700 ± 300
Mammillary material forming the base of sample L-364AM. Elevation about 4010 ft.	L-364AN	13,700 ± 300
Dendritic tufa forming one of the concentric layers in the mushroom described for sample L-364CE. The sample comes from a distance of 1.5 ft from the surface of the 16-ft diameter mushroom. Elevation about 3900 ft.	L-364CI	14,500 ± 400
Shell from sand found immediately below the terrestrial or habitation deposits in Fishbone Cave. Elevation about 4050 ft.	L-289P	15,130 ± 550
Tufa from a broken piece of a diaphragm which once divided Fishbone Cave. The piece was found resting on the mud-cracked surface of the lake sediments that fill the bottom of the cave. Elevation about 4050 ft.	L-289D	14,800 ± 500
Piece of a tufa diaphragm found in place buried in the sediments at a depth of 72 in. in Hidden Cave. Elevation about 4100 ft.	L-289AA	15,130 ± 400
Shells from near the top of a sequence of lake sediments found under the habitation layers in Fishbone Cave. Elevation about 4050 ft.	L-289O	15,670 ± 700
Dendritic tufa from the base of the large deposits associated with the Dendritic terrace on Anaho Island. The sample elevation is about 300 ft above the present level of Pyramid Lake. Elevation about 4100 ft.	L-289K	16,130 ± 750
Shell from near the top of the sequence of lake deposits in Crypt Cave. Elevation about 4170 ft.	L-364BR	18,700 ± 700
Marl from near the base of the lake sediments deposited in Crypt Cave. Elevation about 4170 ft.	L-364BS	19,750 ± 650
Impure marl from a thin layer located 4 ft below the tufa pavement in the sediment sequence cut by the Truckee River. Elevation about 4005 ft.	L-364AL	17,600 ± 650

Description	Sample No.	Age (yr)
Marl deposited at the Dendritic terrace level at the heads of valleys in the Astor Pass region north of Pyramid Lake. Elevation about 4150 ft.	L-364CR	16,800 ± 600
Shell taken from sample L-364 CR.	L-364CS	17,500 ± 600
Thinolite tufa associated with the Thinolite terrace on Anaho Island. The sample elevation is about 180 ft above the present level of Pyramid Lake. Elevation about 3980 ft.	L-289J	28,900 ± 1400
Shell taken from the base sandy member of the sediments exposed in the canyon of the Truckee River. This sandy layer lies immediately below the clay member from which samples L-364AM, L-364AL, and L-289S were taken. Elevation about 3990 ft.	L-364AK	> 34,000
Salt Lake City, Utah. Tufa from the three major Lake Bonneville terraces taken in a vertical sequence at the southern tip of the Oquirrh Mountains just west of Salt Lake City. Collected by R. Davis and O. A. Schaeffer, Brookhaven National Laboratory; A. J. Eardley, University of Utah; P. C. Orr and W. S. Broecker.		
Massive tufa from a gravel bed at the Stansbury level.	L-363B	13,200 ± 300
Tufa forming a 4-in. thick coating on the surface of a wave-cut Paleozoic limestone outcrop on the Stansbury terrace.	L-363C	12,900 ± 180
Tufa forming a 4-in. thick coating on a horizontal surface of a Paleozoic limestone outcrop exposed on the Provo terrace.	L-363D	10,900 ± 400
Tufa forming a coating on a vertical face of limestone just below the Provo terrace. Although this sample was taken within 500 ft. of sample L-363D, it was a completely different structure.	L-363E	15,530 ± 280
Fine grain massive white tufa deposited as a cement between stream cobbles located close to the Bonneville level. The sample consisted of several plates of tufa about 1 in. thick and quite free of any inclusions of detrital material.	L-363G	16,100 ± 350
Tufa forming a thin coating on a large boulder located near the level of the Bonneville terrace.	L-363H	23,150 ± 1000
Dugway Proving Ground, Utah. Samples from the white marl layer exposed in the "Old River" bed just south of the limits of Dugway Proving Ground limits. According to Gilbert (*27*), who described this sedimentary sequence, the deposition of the marl occurred while the lake stood at the Bonneville level. Collected by R. Davis, O. A. Schaeffer, and P. C. Orr.		
Poorly laminated marl from approximately the middle of the bed.	L-363I	23,300 ± 800
Finely laminated marl from somewhat above L-363I.	L-363J	21,200 ± 450
Great Salt Lake, Utah. Samples from a core taken near the southern end of the lake west of Salt Lake City at a water depth of about 28 ft. The samples are from immediately above and below a layer rich in organic material and H_2S. This layer was presumably deposited during a major continuous high-water stage of the lake. Submitted by A. J. Eardley, University of Utah, and J. F. Schreiber.		
Limey silt and clay from a depth of 14 to 16 ft in the core.	L-376C	12,500 ± 250
Organic fraction. Limey silty clay from a depth of 30 to 32 ft in the core.	L-376D	26,300 ± 1100
Inorganic or carbonate fraction from the same sample.	L-376D	25,300 ± 1000
Provo, Utah. Samples of tufa collected from the shorelines of pluvial Lake Bonneville in the West Mountain region. The dates on these samples should indicate times at which the water level of the lake was at or possibly above the height of the tufa deposit. Collected by H. J. Bissell, Brigham Young University, upon the request of B. C. Heezen and W. S. Broecker.		
Tufa from the Stansbury level (about 330 ft above the present level of Great Salt Lake) at Lincoln on the north end of West Mountain. Elevation is 4520 ft.	L-333A	25,500 ± 1300
Tufa from the Provo level (about 580 ft above the present level of Great Salt Lake) on the north end of West Mountain. Elevation 4780 ft. Since this sample consisted of a limestone conglomerate cemented with tufa, even careful separation does not assure freedom from contamination with Paleozoic limestone. The age calculated is hence a maximum.	L-333B	33,200 ± 4000
Tufa from a level intermediate between the Provo and Stansbury levels from the west side of West Mountain. Elevation 4690 ft.	L-333C	15,200 ± 400

References and Notes

1. This research was supported in part by a grant from the National Science Foundation. The techniques now in use were developed under contract AF19(604)-851 with the Air Force Cambridge Research Center. An advisory committee composed of W. D. Strong, chairman, H. L. Movius, Jr., and J. Bird provided guidance in the selection of the archeological samples. E. McFarlan, P. C. Orr, E. H. Sellards, D. B. Ericson, A. J. Eardley, V. K. Prest, N. D. Newell, and H. R. Gould were particularly helpful in supplying worth-while samples and in the evaluation of the results. E. A. Olson, J. Hubbard, M. Zickl, and R. Lupton aided in various phases of the technical operations. This article is Lamont Geological Observatory contribution No. 262.
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7. The credit for the collection of and for the micropaleontologic work on the core samples for which ages were given in a previous date list (*3*) was omitted by mistake during the final revision of the paper. M. Ewing and B. C. Heezen were responsible for the collection of the samples, and D. B. Ericson was responsible for the micropaleontologic work.
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News of Science

Soviet Satellite Carrier Rocket

On 8 December 1957 the president and the chief scientific secretary of the U.S.S.R. Academy of Sciences addressed a cable to the president of the U.S. National Academy of Sciences regarding the rocket carrier body of the first artificial earth satellite, which was launched on 4 October 1957. A similar cable was addressed on 9 December to Joseph Kaplan, chairman of the U.S. National Committee for the International Geophysical Year, by Academician I. P. Bardin, president of the Soviet IGY Committee. Because the substance of these two cables is identical, only the first is quoted:

Detlev Bronk, *President*
National Academy of Sciences

According to available data some not entirely burnt remnants of the first earth satellite rocket have been scattered along a line including Alaska and the west coast of North America. A thorough investigation of the not entirely burnt rocket remnants and the knowledge of the exact places of their fall are of great scientific significance as they provide valuable data concerning phenomena occurring when satellites enter the denser atmospheric layers. The USSR Academy of Sciences asks all the USA scientists to communicate the data concerning the fall of the rocket remnants and to send the remnants which were found to the Academy of Sciences Moscow USSR.

President of USSR Academy of Sciences
Academician A. N. Nesmeyanov
Chief Scientific Secretary of USSR Academy of Sciences
Academician Topchiev

Although no evidence had come to light indicating that the rocket body of the first satellite had fallen in North America, a review of all available data and reports was initiated on 6 December when press dispatches from Moscow indicated that the U.S.S.R. believed the carrier body may have fallen on this continent. The results of this review, as of 11 December, were negative, and, on the same day, the president of the National Academy of Sciences accordingly addressed the following reply to the U.S.S.R. Academy:

President A. N. Nesmeyanov
Academy of Sciences of U.S.S.R.
Moscow

Reference your message and message Bardin to Kaplan our review thus far of sightings and trackings of satellite and investigation of reports of objects sighted do not indicate rocket or remnants fell in United States or its territories. We have no reports of finding of any such bodies. Your request being transmitted to trackers and others. It will be helpful if you can provide data you mention as available to guide our further search.

Detlev W. Bronk, *President*
National Academy of Sciences
U.S.A.

Several observation programs are under way in the United States as part of the IGY effort in the tracking of all satellites. Photographic and visual tracking responsibilities have been assigned to the Smithsonian Astrophysical Observatory, 60 Garden St., Cambridge 38, Mass. Radio tracking responsibilities have been assigned to the Naval Research Laboratory, Washington 25, D.C. Reliable information on satellite sightings would be welcome. Photographic and visual data should be addressed to the Smithsonian Astrophysical Observatory and, similarly, radio data to the Naval Research Laboratory.

Hugh Odishaw
U.S. National Committee for the International Geophysical Year, National Academy of Sciences, Washington, D.C.

AAAS Theobald Smith Award

Paul Talalay, associate professor, Ben May Laboratory for Cancer Research, University of Chicago, is the winner of the 1957 AAAS Theobald Smith award in the medical sciences. This annual award, which was established by Ely Lilly and Company in 1936, consists of $1000, a bronze medal, travel expenses to the annual AAAS meeting, and expenses at the meeting. This year's award will be made on 29 December during the Association's annual meeting in Indianapolis by William B. Bean, vice president and chairman of the AAAS section on medical sciences.

The award is given for "demonstrated research in the field of the medical sciences, taking into consideration independence of thought and originality." The recipient must be a U.S. citizen less than 35 years old on 1 January of the year in which the award is made.

Talalay's main interest has been in the enzymatic mechanisms controlling steroid metabolism. Realizing the advantages that bacteria would have for such studies, he isolated soil bacteria that could satisfy their organic nutritional requirements from a single steroid such as testosterone or progesterone. Talalay was the first to isolate and purify the water-soluble enzymes responsible for the interconversions of hydroxy- and ketosteroids. He also demonstrated that these enzymes, which he named hydroxysteroid dehydrogenases, functioned in association with the coenzyme, diphosphopyridine nucleotide.

Talalay concentrated especially upon study of the kinetics of the reactions of the hydroxysteroid dehydrogenases with a variety of steroids. He was able to demonstrate the high affinity between the enzymes and certain steroid molecules and to elucidate the molecular features of the steroid molecules that are essential for binding the steroid enzyme complex together.

Recently, Talalay has studied the mechanism of double bond introduction into steroids. These reactions are of interest in connection with the aromatization involved in the biosynthesis of phenolic estrogens, and in the formation of the highly physiologically active *l*-dehydrosteroids. He has succeeded in obtaining soluble enzyme preparations which introduce double bonds into positions 1 and 4 of ring A of steroids and convert 19-nor-testosterone to estrone and estradiol. He has demonstrated that these reactions require certain oxidation-reduction dyes and has obtained insight into the enzymatic mechanisms by which these reactions are carried out.