[RADIOCARBON, VOL. 10, 1968, P. 149-160]

UCLA RADIOCARBON DATES VII*

RAINER BERGER and W. F. LIBBY

Institute of Geophysics, University of California, Los Angeles 90024

The measurements reported have been carried out during the first half of 1967 in the Isotope Laboratory of the Institute of Geophysics and Planetary Physics as a continuation of the UCLA date lists I through VI. Samples were analyzed as CO_2-gas at close to one atm in a 7.5 L proportional counter with 3 energy channels described earlier. Radiocarbon ages have been calculated for uniformity on the basis of a 5568-yr half-life as was recommended by the Sixth International C^{14} and H^3 Dating Conference, June 1965, in Pullman, Washington. The standard for the contemporary biosphere remains as 95% of the count rate of NBS oxalic acid for radiocarbon laboratories. Background determinations have been based on CO_2 obtained from marble. The error listed is always at least a 1σ statistical counting error. In critical cases C^{13}/C^{12} isotope ratio measurements were made to correct the dates for fractionation. All samples were subjected to accepted NaOH and/or HCl pretreatments depending on the individual case as a minimum to exclude contamination. The annual curve for the atmospheric C^{14} content at China Lake, California, will be published in the next date list.

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SAMPLE DESCRIPTIONS

A. United States

UCLA-1221. Painted buffalo shields **Modern**

Leather from 3 large decorated buffalo-hide shields found in a cave near Torrey (Fremont region, Utah) (38° 15′ N Lat, 111° 14′ W Long), now on exhibit at Capital Reef National Monument Mus., Fruita, Utah. Since Fremont culture came to end ca. A.D. 1300, question is if shield design originated with Fremont people or is late introduction from Great Plains. Subm. by C. Grant, Santa Barbara Mus. of Natural Hist., Santa Barbara, Calif. *Comments* (C.G.): D. Gebhard, Univ. of Calif. at Santa Barbara, dates designs stylistically to 17th or 18th century. Shields are discussed in detail in Grant (1967). (R.B.): tree-ring calibrated radiocarbon age is either modern, ca A.D. 1650 or 1750.

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2620 ± 80

UCLA-1222. Rodriguez site, Lassen Co. 670 B.C.

Charcoal sample recovered by J. O'Connell from occupation layer near base of open campsite CA-Las-194 at S end, Surprise Valley California (41° 10′ N Lat, 120° 2′ W Long). Sample from charred limb used as construction element of burnt house. Subm. 1966 by R. F. Heizer, Univ. of Calif. at Berkeley. *Comment* (R.F.H.): dates probable initial occupation of site and pre-dates stratigraphically level containing Elko Eared type projectile points. Earlier date for this site, I-2007 (180 B.C.), 2130 ± 105 yr, is based on charcoal from intruded burial pit and cannot be stratigraphically associated with UCLA-1222.

B. Mexico

La Venta series

Original radiocarbon dates for La Venta ceremonial site in province of Tabasco, Mexico (18° 10′ N Lat, 94° 05′ W Long) were determined about 10 yr ago (M-528 to 536, Michigan II). Through the courtesy of the Michigan lab., portions of original charcoal samples were obtained and age redetermined with statistically smaller errors for reconsideration of age of La Venta site. Samples for original measurements were coll. by P. Drucker and R. F. Heizer during the 1955 National Geographic Society-Smithsonian Institution-Univ. of Calif. excavations. In addition, several samples obtained in 1964 by R. J. Squier, Univ. of Kansas are also included in this list. Subm. and discussed in detail by R. Berger, J. A. Graham, and R. F. Heizer (1967).

3050 ± 90

UCLA-1253. La Venta 1100 B.C.

Charcoal from sherd-bearing refuse deposit exposed in drainage trench NW of Great Pyramid at La Venta. Layer rested on sterile clay and was apparently undisturbed. No structural associations with this sample exist, but since associated pottery is typical of La Venta, date falls in period of La Venta's construction.

2380 ± 60

UCLA-1283. La Venta 430 B.C.

Charcoal from lower margin of Post-Complex A occupation in windblown sands lying on Phase IV surface of W of NE entryway. Previously dated as M-528, 2400 ± 250.

2530 ± 60

UCLA-1284A. La Venta 580 B.C.

Charcoal from bottom of Phase II pit, 68 in. below surface of NW platform. Analogous to M-530, 2760 ± 300. This sample was not pretreated with HCl.

2550 ± 60

UCLA-1284B. La Venta 600 B.C.

Same as UCLA-1284A, but pretreated with HCl. Comparison shows no absorption effects during sample storage due to bomb-C^{14}.

2820 ± 60

UCLA-1285. La Venta **870 B.C.**

Charcoal from phase I platform in Mound A-2. Same as M-532, 2650 ± 300.

3000 ± 60

UCLA-1286. La Venta **1050 B.C.**

Charcoal from artificial fill underlying and contemporaneous with Phase I floor in NW platform. Same as M-534, 2670 ± 300.

2415 ± 60

UCLA-1287. La Venta **465 B.C.**

Charcoal from burnt area on Phase IV surface W of limestone slab paving near NE entryway. Same as M-533, 2130 ± 300; UCLA-903, 2460 ± 80 (UCLA IV) in 1965.

2765 ± 80

UCLA-1276A. La Venta **815 B.C.**

Charcoal from Pit C, 1964 of R. J. Squier at depth 240 to 255 cm in soil moderately rich in sherds.

2830 ± 60

UCLA-1276B. La Venta **880 B.C.**

Charcoal from Pit C, 1964 of R. J. Squier at depth 255 to 270 cm in sherd-rich matrix. A sample from 335 cm was contaminated with asphalt and could not be dated. Presence of asphalt among charcoal in Tabasco-Veracruz area may explain earlier abnormally old dates.

1835 ± 90

UCLA-1280A. La Venta **A.D. 115**

Charcoal from small burnt hearth at depth 114 to 119 cm in Pit B/1, 1964 of R. J. Squier.

1720 ± 180

UCLA-1280B. La Venta **A.D. 230**

Charcoal from depth 153 to 165 cm among many sherds in Pit B/1, 1964 of R. J. Squier.

1760 ± 155

UCLA-1281B. La Venta **A.D. 190**

Charcoal from burnt hearth area at depth 148 to 153 cm in Pit B, 1964 of R. J. Squier.

General Comment: origin and abandonment of La Venta site has been moved ca. 2 centuries back and appears to be contemporary with San Lorenzo (Coe, Diehl, and Stuiver, 1967). Earlier dating of "classic" Olmec makes this culture the more remarkable.

610 ± 80

UCLA-1217. Huistla, Jalisco **A.D. 1340**

Charcoal from fireplace in Pit 5, depth 40 to 48 cm, on alluvial fan SW of Ttzatlan (20° 40′ N Lat, 104° 00′ W Long). Coll., subm., and discussed by M. A. Glassow, UCLA (1967).

605 ± 60

UCLA-1251. Idol **A.D. 1345**

Carved wooden figure of Aztec idol, 54.5 cm tall, one of pair. Other figure was dated as UCLA-1216, 550 ± 60 yr (UCLA-VI) and corrected to 575 ± 60, taking fractionation into account. C^{13}/C^{12} isotope ratio −24.35‰ with respect to PDB standard. Coll. by J. C. Leff, Uniontown, Pennsylvania. Subm. by H. B. Nicholson, UCLA, and R. Berger.

C. Asia

110 ± 300

UCLA-1275. Indian manuscript **A.D. 1840**

Legal manuscript page in Arabic with illustration in Mughal style which may have been pasted on later. Subm. 1967 by J. Katz, Los Angeles . *Comment* (R.B.): based on tree-ring calibrated radiocarbon dating, manuscript page was manufactured during mid-17th to mid-19th century.

D. Europe

European Medieval Architecture series

Dates listed below are a continuation of investigation into Aisled Medieval Timber Hall (UCLA III-VI) and of potential and limitations of radiocarbon dating in the Middle Ages. For maximum precision δC^{13} measurements and sample location in timber are included as well as comparison with secular variations of atmospheric C^{14} levels (Suess, 1965). Samples coll., subm., and commented on by W. Horn, Univ. of Calif., Berkeley, and R. Berger.

625 ± 80

UCLA-1260. Leicester Hall **A.D. 1325**

$\delta C^{13} = -25.78‰$

Oakwood from Post F waney edge from very head of tree below arcade plate of Leicester Hall, England (52° 34′ N Lat, 1° 7′ W Long). H/B 38. *Comment:* C^{14} age corresponds to A.D. 1250 to 1400 when considering tree-ring calibrated dating.

415 ± 80

UCLA-1261. Leicester Hall **A.D. 1535**

$\delta C^{13} = -24.39‰$

Wood from Truss F, tie-beam, upper face above Post F next to springing of principal rafter. H/B 39. *Comment:* C^{14} age corresponds to ca. A.D. 1450.

1050 ± 80

UCLA-1262. Leicester Hall **A.D. 900**

$\delta C^{13} = -25.42‰$

Wood from Truss E, Post E′, from inside of mortice of longitudinal arch brace tenon connecting Post E′ with arcade plate between trusses E and D. H/B 35. Tree-ring allowance ca. 150 yr. *Comment:* C^{14} age corresponds to age 950 to 1000 yr. Probable historical age ca. A.D. 1100 to 1150.

UCLA-1263. Leicester Hall **280 ± 80**
A.D. 1670
$\delta C^{13} = -26.26‰$

Wood from Truss E, tie-beam from upper surface, 12 in. from E roof-plate at intersection with roof slope. H/B 37. *Comment:* considering tree-ring calibrated dating, probable historical age is ca. A.D. 1450.

UCLA-1264. Leicester Hall **645 ± 80**
A.D. 1305
$\delta C^{13} = -24.68‰$

Wood from arcade plate between Trusses E and F directly above scarf joint near Post E′. Upper inner edge of beam. H/B 40. *Comment:* probable historical age after calibrated dating ca. A.D. 1250.

UCLA-1265. Leicester Hall **320 ± 80**
A.D. 1630
$\delta C^{13} = -25.12‰$

Wood from Tie-Beam C, lower edge close to Post C′. H/B 41. Tree-ring allowance 10 to 20 yr. *Comment:* C^{14} age corresponds to either A.D. 1600 or 1450.

UCLA-1266. Leicester Hall **630 ± 80**
A.D. 1320
$\delta C^{13} = -24.09‰$

Wood from principal rafter, Truss D, E side immediately above knee-brace. H/B 44. *Comment:* C^{14} age corresponds to ca. A.D. 1275.

UCLA-1267. Leicester Hall **645 ± 80**
A.D. 1305
$\delta C^{13} = -23.37‰$

Wood from upper inner edge of roof-plate, S of Truss E between Post D′ and E′. H/B 36. *Comment:* C^{14} age corresponds to ca A.D. 1250.

UCLA-1268. Leicester Hall **365 ± 80**
A.D. 1585
$\delta C^{13} = -24.75‰$

Wood from upper edge of roof-plate to both sides of Post C. H/B 43. *Comment:* C^{14} age corresponds to ca A.D. 1450.

UCLA-1269. Leicester Hall **700 ± 60**
A.D. 1250
$\delta C^{13} = -25.91‰$

Wood from roof-plate on top of Post C′, lower edge. H/B 42. *Comment:* C^{14} age corresponds to ca. A.D. 1250.
General Comment: it appears that of original Leicester Hall of Norman days, only posts remain. All other timbers appear to be replacements. The building and its dating wil be discussed elsewhere.

UCLA-1097. St. Clere's Hall, St. Osyth **605 ± 60**
A.D. 1345
$\delta C^{13} = -26.4‰$

Sapwood with thin bark layer attached from arch brace of center truss-projecting spur in triangular opening post to side-facing chimney.

Pretreatment included continuous ether extraction for 5 days. Coll. and subm. 1965 by W. Horn, R. Berger, and C. A. Hewett. *Comment:* no change in C^{14} age after secular variations and fractionation. Probable historical age A.D. 1350 ± 60. St. Clere's is discussed in detail in Hewett (1967).

270 ± 60

UCLA-1250. Harwell Church **A.D. 1680**

Wood from N transept tie-beam. Coll. and subm. 1962 by J. M. Fletcher, Harwell, England. *Comment* (J.M.F.): if Suess (1965) curve is used, calendar ages derived from UCLA-1250 can be 300, 390, or 430 yr. Since 40 yr have to be allowed for sample location in the beam, this corresponds to A.D. 1690, 1600, or 1560. On stylistic grounds, A.D. 1560 is correct.

E. Africa

2690 ± 80

UCLA-1234. Stone Bowl culture, Kenya **740 B.C.**

Charcoal from Trench 5, 28 in. below surface at Prospect Farm, Elmenteita, Kenya (0° 20′ S Lat, 36° E Long). Coll. 1964 by B. W. Anthony through J. D. Clark, Univ. of California. *Comment* (J.D.C.): result agrees with expected date and with that of Njoro River Cave variant of Stone Bowl culture.

36,000 ± 2400

UCLA-1235. Peers' Cave, South Africa **34,050 B.C.**

Charcoal from 7 ft 9¼ in. to 7 ft 11¼ in. below cave datum (painted white line) of base of Stillbay hearth area in Peers' Cave, Fish Hoek, Cape Province, Republic of South Africa (34° 20′ S Lat, 18° 25′ E Long). Trench II, Grid A-2. Coll. by B. W. Anthony; subm. by B. W. Anthony through J. D. Clark. *Comment* (J.D.C.): date agrees with expected age of beginning of Stillbay industry in S. Africa. Stillbay at Twin Rivers, Zambia is > 33,200 yr (UCLA-707, UCLA V) and 33,750 B.C. at Pomongwe Cave, Rhodesia.

Malawi Later Stone age series

Samples obtained during excavations at NW end of Lake Malawi (Lake Nyasa) (10° S Lat, 34° E Long) which will provide first authentic chronology for prehistoric cultures in Malawi. Coll. 1965 by J. D. Clark and K. R. Robinson, Univ. of California at Berkeley and subm. by J. D. Clark.

3450 ± 80

UCLA-1240. Chaminade, Karonga **1500 B.C.**

Charcoal in yellow sand at 2 ft depth above sealed Later Stone age microlithic occupation floor from Site CH-3, Area C. Should date very shortly after site was abandoned.

3100 ± 80

UCLA-1241. Mbande Court, Karonga **1150 B.C.**

Charcoal from depth 2 ft 3 in. below surface in yellow sand associ-

ated with sealed Later Stone age microlithic occupation layer and underlying Iron age occupation.

North Malawi Iron age series

Following samples date Iron age succession in the N Malawi rift. Coll. and subm. as previous series.

655 ± 80

UCLA-1242. Mwavarambo, Karonga A.D. 1295

Charcoal associated with sherds of Mwavarambo-ware on occupation layer 8 to 12 in. below original surface. No imported trade goods.

760 ± 80

UCLA-1243. Mwamasapa, Karonga A.D. 1190

From charred post of hut in settlement area with Mwamasapa-ware sherds 18 in. below surface. Associated with glass trade beads.

710 ± 80

UCLA-1244. Mwenepera Hill, Karonga A.D. 1240

Charcoal from post in floor of buried settlement area, 8 in. deep. Associated with Mwenepera-ware sherds.

370 ± 80

UCLA-1245. Mbande Court, Karonga A.D. 870

Charcoal from 6 to 12 in. in occupation midden with Mwamasapa derivative-type pottery. Test A.

270 ± 80

UCLA-1246. Mbande Hill, Mpata A.D. 1680

Charcoal from Test A midden at depth 12 to 18 in. from fortified and religious settlement of 1st Kyungus, paramount chiefs of Ngonde people (dominant tribe at NW end of lake). *Comment* (R.B.): with tree-ring calibrated radiocarbon dating, UCLA-1245 may be 500 yr old and UCLA-1246 325 or 450 yr.

540 ± 80

UCLA-1236. Mbande Hill, Mpata A.D. 1410

Charcoal from test 1:A, 18 to 24 in. depth. *Comment* (J.D.C.): sample presumably dates beginning of Kyungu occupation of Hill, which, calculated from oral tradition, is from middle to end of 16th century. However, Hill was occupied prior to coming of Kyungu and charcoals may ante-date them.

2100 ± 80

UCLA-1237. Chaminade, Karonga 150 B.C.

Charcoal from location Ch-ID, E wall, 36 in. below surface at Chaminade locality ID (9° 56′ 45″ S Lat, 33° 52′ 50″ E Long). Coll. by V. Haynes, Univ. of Arizona, Tuscon; subm. 1966 by V. Haynes and J. D. Clark.

150 ± 60

UCLA-1238. Chaminade, Karonga A.D. 1800

Charcoal from location Ch-ID, IA level, 19 in. below surface at locality Ch-ID. Coll. by V. Haynes; subm. by V. Haynes and J.D. Clark

Comment (J.D.C.): UCLA-1237 probably comes from below Iron age pottery horizon and UCLA-1238 reflects age of ceramic-ware in general Mbande Hill tradition.

860 ± 80

UCLA-1239. Mwamasapa, Karonga **A.D. 1090**

Charcoal in red-brown sandy clay loam in IA site at 18 to 24 in. depth at Mwm-3 (9° 57′ S Lat, 33° 47′ 55″ E Long). Coll. by K. Robinson; subm. by V. Haynes and J. D. Clark. *Comment* (J.D.C.): dates 2nd oldest pottery ware (Mwamasapa ware) from region. As this ware is associated with imported glass beads and pottery of Kissi type from NW side of lake, it is clear evidence of trade between W side of lake and E coast of Africa at this early time.

Leopard's Hill Cave series

Excavations at Leopard's Hill near Lusaka, Zambia (15° 25′ S Lat, 28° 43′ E Long) have revealed an excellent cave deposit sequence which aids in clarifying the Zambian Later Stone age industrial succession. Subm. by J. D. Clark for Ph.D. thesis of Sheryl F. Miller, 1967.

9700 ± 85

UCLA-1290. Leopard's Hill Cave **7750 B.C.**

Charcoal from bottom level of well-defined industry overlying even earlier Later Stone age deposit. *Comment* (S.F.M.): indicates earlier advent of Later Stone age in Zambia than previously accepted.

16,400 ± 265

UCLA-1291. Leopard's Hill Cave **14,450 B.C.**

Charcoal from base of cave deposit. *Comment* (S.F.M.): GX-0957 from level several ft higher gave 21,550 ± 950 yr. Physical disturbance in antiquity may account for discrepancy. However, both levels are in deep portion of deposit containing distinctive industry and have been separated from overlying strata by stalagmitic brecchia since well before 10,000 yr ago.

4750 ± 80

UCLA-1096. Tessalit, Sahara **2800 B.C.**

Charcoal from 50 cm in tomb in Neolithic cemetery, just E of piste trans saharienne Tessalit-Bidon 5, where it crosses border of Mali (21° 07′ N Lat, 1° 10′ E Long). Tomb contained human skeletal remains and many sheds, 8 celts, 2 bone instruments, and a shell *(Limicolaria)*. Region now entirely desert. Coll. by J. Gaussen, Neuvic-sur-L'Isle, Dordogne; subm. 1967 by J. R. Sackett, UCLA, via R. Mauny, Sorbonne. *Comment* (R.M.): date is important as only second one for S Sahara Neolithic. The other is Adraz Bous 3, Niger, Sa-100 (Saclay I, 1964) 5140 ± 300.

F. Oceanic Measurements

A continuation of seawater radiocarbon determinations from the S California coast (see UCLA IV, V, and VI). Radiocarbon activity ex-

pressed in per cent above level of contemporary biospheric standard, .95 NBS oxalic acid.

Carbonic anhydrase series

Seawater was obtained from Bioscience Facility, U.S. Naval Station, Pt. Mugu, California, through cooperation of Dr. S. Ridgeway. Water originates from well 200 ft below beach level and is filtered through beach sand to exclude plants, etc. pH = 7.6. It was transported in plastic-lined, 55 gal drums to U.S. Naval Ordnance Test Station, China Lake, Calif., and exposed to air bubbling at ca. 200 L/hr and the action of various quantities of carbonic anhydrase for different times.

UCLA-1162. Seawater **−6.1%**

Exposed 12 hr to air bubbling plus 100 mg enzyme per 50 gal seawater.

UCLA-1160. Seawater **+4.9%**

Exposed 86 hr to air bubbling plus 100 mg enzyme.

UCLA-1161. Seawater **+9.5%**

Exposed 119 hr to air bubbling and 100 mg enzyme.

UCLA-1165. Seawater **−4.5%**

Exposed 12 hr to air and 10 mg enzyme.

UCLA-1164. Seawater **+12.4%**

Exposed 86 hr to air and 10 mg enzyme.

UCLA-1163. Seawater **+14.8%**

Exposed 119 hr to air and 10 mg enzyme.

UCLA-1166. Seawater **+18.2%**

Exposed 170 hr to air and no enzyme. *Comment:* the barrels containing 10 mg enzyme were exposed to direct winter sun whereas the 100 mg barrels were not. This series was run to check on earlier similar measurements (UCLA VI), except that the seawater in this series originated from below the ocean surface.

Control series

Since Pt. Mugu seawater from 200 ft without artificial addition of enzyme exchanged CO_2 relatively rapidly with air contrary to expectations (UCLA VI), seawater from surface and subsurface was compared for its exchange qualities without enzyme addition.

UCLA-1169. Seawater **−4.7%**

Coll. 9 March 1967 from 200 ft well at Pt. Mugu. Measured C^{14} content directly without exposure to air.

UCLA-1170. Seawater **+23.89%**

Same as UCLA-1169 but exposed to air at ca. 200 L/hr for 182 hr.

UCLA-1171. Seawater **+8.6%**

Coll. 20 March 1967 from surface water off Sunset Blvd., Santa Monica and measured directly without exposure to air.

UCLA-1172. Seawater **+7.4%**

Same as UCLA-1171 but exposed without enzyme for 120 hr to air at 200 L/hr.

UCLA-1173. Seawater **+15.6%**

Coll. 27 March 1967 at Pt. Mugu from 200 ft well and exposed without enzyme addition for 120 hr to air at 200 L/hr. *Comment:* from these measurements it is apparent that subsurface water tends to exchange CO_2 with air more quickly than surface water observed previously (UCLA VI).

Subsurface water series

The question may be raised if subsurface water from 200 ft which has passed through beach sand and other strata is really representative of −200 ft ocean water. Therefore, with the cooperation of Lt. J. C. Fritz, UCLA-NROTC and Capt. C. Bassett, USN, seawater was obtained from 33° 20.5′ N Lat, 118° 17.5′ W Long at 200 ft depth off S California coast by submarine *USS BAYA*. Water was taken, as previously, to NOTS China Lake and exposed to air bubbling at 200 L/hr without enzyme addition.

UCLA-1176. Seawater **+6.7%**

Coll. 26 May 1967. Not exposed to air.

UCLA-1177. Seawater **+34.2%**

Same as UCLA-1176. Exposed to air for 72 hr.

UCLA-1173. Seawater **+15.6%**

Same as UCLA-1176. Exposed to air for 212 hr. *Comment:* apparently, seawater from below surface does exchange CO_2 more readily than surface water. If this is true, then the upwelling regions and oceans in tropical latitudes may remove bomb-C^{14} much faster from the air than previously thought.

Central and South American Marine Shells series

Application of the following measurements of modern but pre-bomb marine shells to shell-based archaeological dates will be discussed elsewhere. Radiocarbon measurements are corrected for C^{13} and are numerically equal to Δ but are expressed as per cent deviation from the count rate of 0.95 NBS oxalic acid, rather than as per mill. The δC^{13} (‰) measurements with reference to the Chicago PDB standard were carried out by M. Yzuel in the Inst. of Geophysics, UCLA. Shells coll. and subm. by R.E. Taylor and R. Berger (1967), UCLA.

UCLA-1249A. Shell **+ 2.18%**
$\delta C^{13} = -5.72‰$

Cerithidea valida (Adams) from Guayaquil, Ecuador. Coll. 1927 by J. M. Reed; subm. by E. P. Chace, Nat. Hist. Mus., San Diego, California. Uncorrected $\delta C^{14} = +1.01 \pm .45$.

UCLA-1249B. Shell **− 1.51%**
$\delta C^{13} = +1.84‰$

Thais biserialis (Blainville) from Guayaquil, Ecuador. Coll. 1927 by J. M. Reed; subm. by E. P. Chace. Uncorrected $\delta C^{14} = -1.15 \pm .53$.

UCLA-1254. Shell **− 3.45%**
$\delta C^{13} = +1.74‰$

Strombus granulatus (Swainson) from Port Parker, Costa Rica. Coll. 1935 and subm. by J. Garth, Allan Hancock Fdn., Univ. of S California, Los Angeles. Uncorrected $\delta C^{14} = -3.11 \pm .43$.

UCLA-1255A. Shell **− 1.55%**
$\delta C^{13} = +0.35‰$

Kelletia kelleti (Forbes) from Santiago Is., Galapagos Is. Coll. 1934; subm. by J. Garth. Uncorrected $\delta C^{14} = -1.48 \pm .62$.

UCLA-1255B. Shell **− 4.04%**
$\delta C^{13} = +1.88‰$

Astraea (Uvanilla) undosa (Wood) from Santiago Is., Galapagos Is. Coll. 1934 and subm. by J. Garth. Uncorrected $\delta C^{14} = -3.68 \pm .94$.

UCLA-1255C. Shell **− 0.68%**
$\delta C^{13} = +1.33‰$

Fasciolaria (Pleuroploca) princeps (Sowerby) from Espanola Is., Galapagos Is. Coll. 1934 and subm. by Garth. Uncorrected $\delta C^{14} = -0.42 \pm .51$.

UCLA-1255D. Shell **− 0.35%**
$\delta C^{13} = +2.88‰$

Nerita (Ritena) scabricosta (Lamarck) from Santa Cruz Is., Galapagos Is. Coll. 1932 and subm. by J. Garth. Uncorrected $\delta C^{14} = -0.22 \pm .48$.

UCLA-1256A. Shell **+ 0.12%**
$\delta C^{13} = +1.48‰$

Vasum caestus (Broderip) from Secas Is., Panama. Coll. 1935 and subm. by J. Garth. Uncorrected $\delta C^{14} = +0.42 \pm .61$.

UCLA-1256B. Shell **− 1.16%**
$\delta C^{13} = +1.30‰$

Strombus galeatus (Swainson) from Secas Is., Panama. Coll. 1935 and subm. by J. Garth. Uncorrected $\delta C^{14} = -0.90 \pm .58$.

UCLA-1277. Shell **− 2.63%**

$\delta C^{13} = +0.09‰$

Concholepas concholepas (Bruguière) from Antofagasta, Chile. Coll. 1925 by F. W. Pennell; subm. by R. T. Abbott, Acad. of Nat. Sciences of Philadelphia. Uncorrected $\delta C^{14} = -2.61 \pm .40$.

UCLA-1278. Shell **− 4.34%**

$\delta C^{13} = +1.32‰$

Tequla aler (Lesson) from Valparaiso, Chile. Coll. before 1940; subm. by L. R. Saul, Dept. of Geol. UCLA. Uncorrected $\delta C^{14} = -4.09 \pm .87$.

UCLA-1279. Shell **− 8.50%**

$\delta C^{13} = +1.15‰$

Oliva peruviana (Lamarck) from Peru. Coll. before 1940; subm. by L. R. Saul. Uncorrected $\delta C^{14} = -8.29 \pm .48$.

UCLA-1282. Shell **− 3.52%**

$\delta C^{13} = -0.22‰$

Strombus peruvianus (Swainson) from N Peru. Coll. before 1940; subm. by L. R. Saul. Uncorrected $\delta C^{14} = -3.56 \pm .57$.

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