

## UNIVERSITY OF PENNSYLVANIA RADIOCARBON DATES XI

ROBERT STUCKENRATH, JR.\* and BARBARA LAWN

Department of Physics and University Museum,  
University of Pennsylvania,  
Philadelphia, Pennsylvania 19104

### INTRODUCTION

This date list includes those series of samples completed in this laboratory as of August 1968. The B.P. ages are based upon A.D. 1950, and are calculated with a half-life value of 5568 yr. All samples were counted at least twice for periods of not less than 1000 min each. Errors quoted are derived from measurement of sample, background, and modern-age calibration, but do not include any half-life error. All samples were pretreated with 3N HCl, and some, where noted, were given additional pretreatment with 2% NaOH for the removal of possible humic contaminants.

Standard calibration samples are 125-yr-old oak samples which, when corrected for age, have C<sup>14</sup> contents equal to 95% of the NBS oxalic-acid standard. The C<sup>13</sup> relationship between the oak standard and NBS limestone standard #20 is  $-25.7 \pm 1.3\%$  as measured on the University of Pennsylvania mass spectrograph.

### SAMPLE DESCRIPTIONS

#### I. ARCHAEOLOGIC SAMPLES: NEAR EAST

##### *A. Iran*

##### **Yanik Tepe series, Iran**

Yanik Tepe (37° 56' N Lat, 45° 54' E Long), is stratified mound near Khosrowshah village, 25 m SW of Tabriz, Iran. Excavations under C. A. Burney, Univ. of Manchester, revealed levels from Late Neolithic through Chalcolithic to Early Bronze age. Coll. 1961 and 1962: subm. by Burney (1961, 1962, 1964).

<b>P-1244. Late Neolithic, Level P<sup>7</sup></b>	<b>7035 ± 69</b>
Charcoal. <i>Comment:</i> NaOH pretreatment.	<b>5085 B.C.</b>
<b>P-1243. Late Neolithic, Level P<sup>5</sup></b>	<b>6926 ± 80</b>
Charcoal. <i>Comment:</i> NaOH pretreatment.	<b>4976 B.C.</b>
<b>P-1246. Chalcolithic, Level MC<sup>17</sup></b>	<b>5267 ± 73</b>
Charcoal. <i>Comment:</i> NaOH pretreatment.	<b>3317 B.C.</b>
<b>P-1245. Chalcolithic, Level MC<sup>8</sup></b>	<b>5090 ± 56</b>
Charcoal.	<b>3140 B.C.</b>

\* Now at Radiation Biology Laboratory, Smithsonian Institution, Washington, D.C.

- P-1249. Early Bronze age I, Level L<sup>7</sup>** **4437 ± 77**  
**2487 B.C.**  
Charcoal from center posthole of Circle 52. *Comment:* NaOH pretreatment.
- P-1247. Early Bronze age I, Level L<sup>5</sup>** **4204 ± 60**  
**2254 B.C.**  
Charcoal from center posthole of Circle 45. *Comment:* NaOH pretreatment.
- P-1248. Early Bronze age I, Level L<sup>5</sup>** **4149 ± 76**  
**2199 B.C.**  
Charcoal from center posthole of Circle 46. *Comment:* NaOH pretreatment.
- P-1250. Early Bronze age I, Level HX6** **4315 ± 59**  
**2365 B.C.**  
Charcoal. *Comment:* NaOH pretreatment.
- P-1251. Early Bronze age II, Level L<sup>3</sup>** **3918 ± 101**  
**1968 B.C.**  
Charcoal from oven in Room 4. *Comment:* sample counted only once, and date may not be as reliable as others of this series.
- P-1252. Early Bronze age II, Level L<sup>3</sup>** **3656 ± 61**  
**1706 B.C.**  
Charcoal from Room 21 (Phase 4). *Comment:* NaOH pretreatment.

*B. Syria***Tell Mureybat series, Syria**

Tell Mureybat (36° 12' N Lat, 38° 7' E Long), is large mound on lower terrace (left bank) of the Middle Euphrates R., 50 mi E of Aleppo, Syria. Excavations of mound in 1965 under direction of Mauritz van Loon, Oriental Inst., Univ. of Chicago, disclosed thick pre-pottery occupation deposit of 16 sub-levels of continuous cultural tradition. Coll. by J. H. Skinner; subm. by van Loon (1966a, b).

- P-1215. Level I** **10,006 ± 96**  
**8056 B.C.**  
Charcoal from open fireplace assoc. with limestone and burned-clay structures resting on river gravels. *Comment:* NaOH pretreatment.
- P-1216. Level I, basal** **10,092 ± 118**  
**8142 B.C.**  
Charcoal from open fireplace at base of culture deposit. *Comment:* NaOH pretreatment.
- P-1217. Level II** **10,215 ± 117**  
**8265 B.C.**  
Charcoal from open fireplace assoc. with ash and bone. Projectile points first appear in this level. *Comment:* NaOH pretreatment.

**P-1220. Level X/XI** **9968 ± 115**  
**8018 B.C.**

Charcoal from area immediately outside firepit, assoc. with rectilinear limestone structures, transition between Levels X and XI.

**P-1222. Level XVI** **9904 ± 114**  
**7954 B.C.**

Soil and charcoal. Level contains remains of 2 successive groups of structures of limestone with wooden beams and posts in clay. *Comment:* NaOH pretreatment.

**P-1224. Level XVI, hearth** **9492 ± 122**  
**7542 B.C.**

Soil and charcoal from open hearth.

*C. Jordan*

**Beidha series, Jordan**

Beidha (30° 30' N Lat, 35° 25' E Long), is large aceramic Neolithic site 4 mi N of Petra, Jordan. Six levels (VI at bottom) provide evidence of 4 architectural periods, all featuring semi-subterranean stone-built houses. Coll. and subm. by D. V. W. Kirkbride, British School of Archaeol. at Jerusalem.

*General Comment:* all samples given NaOH pretreatment.

**P-1378. Level VI, wood** **8175 ± 100**  
**6765 B.C.**

Charred wood from central posthole of burnt segmented house.

**P-1379. Level VI, pistachio** **8546 ± 100**  
**6596 B.C.**

Charred pistachio from same house as P-1378, above.

**P-1380. Level IV, pistachio tree** **9128 ± 103**  
**7178 B.C.**

Charred pistachio tree from central posthole in curvilinear house.

*Comment:* see BM-111 (8790 ± 200, Radiocarbon, 1968, v. 10, no. 1, p. 4) for other date from Level IV of this site.

**P-1381. Level IV, burnt fill** **8765 ± 102**  
**6815 B.C.**

Charcoal from burnt fill believed attributable to Level IV.

**P-1382. Late Level II** **8892 ± 115**  
**6942 B.C.**

Charcoal from stone-lined pit in large single-roomed main house.

*D. Turkey*

**P-1434. Alaça Hüyük, Turkey** **4278 ± 62**  
**2328 B.C.**

Charcoal from 4th level of Chalcolithic occupation (Level 11/12) at Alaça Hüyük (40° 10' N Lat, 34° 52' E Long), near town of Alaça,

25 mi S of Corum in N Turkey. Coll. and subm. by H. Koşay, dir., Ethnogr. Mus., Ankara (Arik, 1937; Radiocarbon, 1965, v. 7, p. 191). *Comment:* for dates from Early Bronze age and Hittite levels of this site, see Pennsylvania VIII (Radiocarbon, 1965, v. 7, p. 191).

**Aşikli Hüyük series, Turkey**

Aşikli Hüyük (38° 22' N Lat, 34° 15' E Long), is proto-Neolithic mound in central Turkey, on right bank of Melendiz Çay, 17 km SE of Aksaray. River erosion has cut into N end of mound; all samples were taken from eroded area. Samples coll. 1964 during preliminary excavations and subm. by I. A. Todd, British Archaeol. Inst., Ankara. *General Comment:* all samples given NaOH pretreatment.

**P-1238. No. 1, S side**

**8807 ± 128**  
**6857 B.C.**

Charcoal from layer of burnt material 2 to 5 cm thick, 2 m above river level, at center of S side of eroded N end of mound.

**P-1239. No. 2, S face**

**8611 ± 108**  
**6661 B.C.**

Charcoal from layer of burnt material 2 to 3 cm thick, 1½ m above present ground level, 30 m W of P-1238, above.

**P-1240. No. 3, W face**

**8958 ± 130**  
**7008 B.C.**

Charcoal from patches of burnt material 1 m above river level on eroded W face of N end of mound.

**P-1241. No. 4, debris, W face**

**8793 ± 127**  
**6843 B.C.**

Charcoal and burnt plaster from area containing burnt brick, obsidian, and bone of suspected collapsed room fill. Taken from area several cm below P-1240, above.

**P-1242. No. 5, debris, W face**

**8778 ± 128**  
**6828 B.C.**

Charcoal and burnt plaster from area ¾ m above river level, at same location as P-1241, above.

**P-1171. Inandik, Turkey**

**3206 ± 49**  
**1256 B.C.**

Charred wheat grains from level containing broken storage jars and cuneiform tablet in mound near Inandik (40° 30' N Lat, 33° 45' E Long), S of Çankiri on Çankiri-Ankara Rd., Turkey. Coll. 1966 by Raci Temizer, Archaeol. Mus., Ankara; subm. by E. Kohler, Univ. Mus., Univ. of Pennsylvania. *Comment:* NaOH pretreatment. Clay tablet assoc. with this sample is in Hittite script giving name of place and local ruler; definitive date or cross reference to other Hittite tablets not available, and level is believed to date to 16th or 15th century B.C.

**Suberde series, Turkey**

Suberde is a Neolithic site at Görüklük Tepe, 500 m E of Suberde village (37° 21' N Lat, 31° 56' E Long), 11 km SE of Seydişehir in Konya Vilayet, Turkey. All samples are from lower of 2 undisturbed levels, containing a few structural remains with unplastered walls, floors, and hearths. Coll. 1964 and subm. by Jacques Bordaz, Univ. of Montreal (Bordaz, 1965, 1966; Solecki, 1964).

*General Comment:* all samples given NaOH pretreatment.

<b>P-1385. Level II, upper, Area 8</b>	<b>7907 ± 88</b>
Charcoal.	<b>5957 B.C.</b>
<b>P-1386. Level II, upper, mud structure</b>	<b>7995 ± 76</b>
Charcoal assoc. with mud-walled structure.	<b>6045 B.C.</b>
<b>P-1387. Level II, lower, Area 4</b>	<b>8276 ± 300</b>
Charcoal. <i>Comment:</i> large error is due to low-pressure counting of small sample, and date is probably less reliable than others of this series.	<b>6326 B.C.</b>
<b>P-1388. Level II, lower, Area 9</b>	<b>8176 ± 79</b>
Charcoal.	<b>6226 B.C.</b>
<b>P-1389. Level II, lower, Area 42</b>	<b>7584 ± 85</b>
Charcoal.	<b>5634 B.C.</b>
<b>P-1391. Level II, lower, Area 0</b>	<b>8249 ± 91</b>
Charcoal.	<b>6299 B.C.</b>

**Çatal Hüyük series, Turkey**

Çatal Hüyük (37° 06' N Lat, 32° 08' E Long), is large Neolithic mound near Çumra, 50 km SE of Konya, Turkey. Coll. and subm. by James Mellaart, dir. of excavations. Inst. of Archaeol., Univ. of London (1962-1966; Radiocarbon, 1965, v. 7, p. 191-192.)

*General Comment:* all samples were given additional NaOH pretreatment. At this site there is evidence of re-use of construction beams in houses and shrines; therefore, samples from beams and posts, as well as those from fills, may be considered less reliable than those from other contexts.

<b>P-1374. Level XII, Room E.XII.29, fill</b>	<b>7757 ± 92</b>
Charcoal from fill. <i>Comment:</i> although this is stratigraphically earliest room yet excavated, sample from fill may derive from some other context.	<b>5807 B.C.</b>

- P-1369. Level X, Courtyard E.X.29, fill** **7937 ± 109**  
**5987 B.C.**  
Charcoal from lower fill in courtyard.
- P-1371. Level X, Courtyard E.X.29, fill** **7844 ± 102**  
**5894 B.C.**  
Charcoal from lower fill in courtyard, stratigraphically above P-1369, above.
- P-1372. Level X, Courtyard E.X.29, fill** **7915 ± 85**  
**5965 B.C.**  
Charcoal from upper fill in courtyard, stratigraphically above P-1371, above.
- P-1370. Level X, Room E.X.28, hearth** **8036 ± 104**  
**6086 B.C.**  
Ash from lowest floor deposit. *Comment:* for additional date from Level X, see P-782, 8092 ± 98; for date from Level IX, above Level X, see P-779, 8190 ± 99 (Radiocarbon, 1965, v. 7, p. 191).
- P-1367. Level VIII, Shrine E.VIII.45, hearth** **7853 ± 97**  
**5903 B.C.**  
Charcoal from hearth in floor.
- P-1366. Level VIII, Shrine E.VIII.45, fill** **7684 ± 90**  
**5734 B.C.**  
Charcoal. *Comment:* for date from Level VII, above Level VIII, see P-778, 7538 ± 89 (Radiocarbon, 1965, v. 7, p. 191).
- P-1362. Level VIB, Room E.VIB.27, post** **7904 ± 111**  
**5954 B.C.**  
Charcoal from burnt post. *Comment* (J.M.): question here arises of re-use of wood from unburnt buildings of Level VII. Plaster counts would place construction of Level VII some 120 yr before that of Level VIB, and therefore in range of P-1362 here, P-1363 below and P-770, 7912 ± 94 (Radiocarbon, 1965, v. 7, p. 192). These may date cutting of timber for construction of Level VII, but those timbers were found as re-used in Level VIB buildings.
- P-1364. Level VIB, Shrine E.VIB.70, post** **7936 ± 98**  
**5986 B.C.**  
Charcoal from burnt post. *Comment:* see P-1362, above and P-1365, below. For additional dates from Level VIB, see: P-777, 7704 ± 91; P-797, 7629 ± 90; P-781, 7524 ± 90; and P-770, 7912 ± 94 (Radiocarbon, 1965, v. 7, p. 191-192).
- P-1365. Level VIA, Shrine E.VIA.70, ladder** **7729 ± 80**  
**5779 B.C.**  
Charred fragments of ladder.
- P-1375. Level VI, Shrine E.VI.25, post** **7661 ± 99**  
**5711 B.C.**  
Charcoal from burnt post.

**P-1363. Level VI, Room E.V.49, beam** **7911 ± 103**  
**5961 B.C.**

Charcoal from burnt beam in storeroom attributed to either Level VI or VIA. *Comment:* age would suggest that this beam was used originally in Level VII, and re-used here in Level VI. For additional dates from Level VIA, see: P-827, 7579 ± 86; P-769, 7505 ± 93; and P-772, 7572 ± 91 (Radiocarbon, 1965, v. 7, p. 192.)

**P-1361. Level V, Shrine, F.V.1, hearth** **7499 ± 93**  
**5549 B.C.**

Charcoal from hearth and storeroom of richly decorated shrine. *Comment:* for additional date from Level V, see P-776, 7640 ± 91 (Radiocarbon, 1965, v. 7, p. 192). For dates from levels stratigraphically above those of this date list, see: Level IV, P-775, 8037 ± 96; and Level II, P. 796, 7521 ± 77 (Radiocarbon, 1965, v. 7, p. 192.)

II. ARCHAEOLOGIC SAMPLES: MEDITERRANEAN

*A. Cyclades, Greece*

**P-1280. Kephala, Keos** **4826 ± 56**  
**2876 B.C.**

Carbonized beans from single-occupation rock shelter on promontory on N coast of Keos (37° 42' N Lat, 24° 18' E Long), in Cyclades, Greece. Coll. 1964 and subm. by J. L. Caskey, Univ. of Cincinnati (1964). Site at Kephala appears to have been occupied during transition from late Neolithic to Early Bronze age cultures. *Comment:* NaOH pretreatment.

**Ayia Irini series, Keos**

Ayia Irini (37° 42' N Lat, 24° 18' E Long), lies on promontory in main harbor of Keos. Coll. 1964 and subm. by J. L. Caskey (1964).

**P-1281. Early Helladic II** **3388 ± 62**  
**1438 B.C.**

Charcoal from Trench 6, 3 m below modern surface, 0.8 to 0.9 m above present sea level, in deposit containing pottery of Early Helladic II types. *Comment:* NaOH pretreatment.

**P-1282. Late Minoan IB/Late Helladic IIA** **3126 ± 48**  
**1176 B.C.**

Charcoal from Room XV, Area A, 2 m below modern surface. Room XV is 1 of many basement rooms containing destruction debris with imported pottery of Late Minoan IB/Late Helladic IIA types. *Comment:* NaOH pretreatment.

**P-1283. Temple, Room IV** **3061 ± 54**  
**1111 B.C.**

Charcoal from Room IV of Temple, 29 cm above present sea level. *Comment:* NaOH pretreatment.

**P-1284. House F, Room I****3250 ± 66****1300 B.C.**

Charcoal from Room I of House F, 0.7 to 2 m below modern surface. Basement room probably destroyed by earthquake during time of Late Minoan IB pottery.

**Saliago series, Cyclades**

Saliagos (37° 03' N Lat, 25° 05' E Long), is Neolithic settlement on Saliagos, small island between Paros and Antiparos in Cyclades group, Greece. Coll. 1965 and subm. by J. D. Evans, Univ. of London, and A. C. Renfrew, Univ. of Sheffield (1968, p. 144).

**P-1311. No. 15, hearth****6172 ± 74****4222 B.C.**

Dark soil from hearth area, Level 11, Area VI. *Comment:* NaOH pretreatment.

**P-1396. No. 21, shell****6074 ± 79****4124 B.C.**

*Spondylus* shell from Pit B, 2.75 m below surface, and below present high tide mark, Phase 1 of occupation.

**P-1333. No. 11, shell****5775 ± 84****3825 B.C.**

*Spondylus* shell, 0.75 m below surface.

**P-1368. No. 2, shell****5909 ± 87****3959 B.C.**

*Spondylus* shells from Level 5.

**P-1393. No. 4, shell****5716 ± 85****3766 B.C.**

*Spondylus* shells from same level as stones of Phase 3 occupation. *General Comment:* CO<sub>2</sub> released from shells by treatment with acetic acid. Dates calculated with reference to *Spondylus* shell from same area A.D. 1880 to 1890. C<sup>13</sup>/<sup>12</sup> analysis indicated no need for correction of dates for fractionation effects.

*B. Crete, Greece***Knossos series, Crete**

Bronze Age town of Knossos (35° 12' N Lat, 25° 42' E Long), has been undergoing excavations since 1957 by M. S. F. Hood for British School of Archaeol. at Athens. Samples of this series represent Middle and Late Minoan periods, and were coll. during excavations on N and S sides of Royal Rd. leading W from Theatral Area, 150 m W of Bronze Age Palace (Hood, 1961, 1962, 1967; Radiocarbon, 1965, v. 7, p. 286.)

**P-1351. Middle Minoan IB****3320 ± 51****1370 B.C.**

Charred wood from Level 23, Area CE, with pottery of Middle Minoan IB type. *Comment:* NaOH pretreatment. (M. S. F. H.): some possibility of contamination with later or earlier material.

- P-1352. Middle Minoan IIA** **3208 ± 63**  
**1258 B.C.**  
Charred wood from Level 32, Area B, with pottery of Middle Minoan IIA type. *Comment:* NaOH pretreatment. (M. S. F. H.): some possibility of contamination with later or earlier materials.
- P-1353. Middle Minoan IIIB** **3029 ± 83**  
**1079 B.C.**  
Charred wood from Level 116, Area H, with pottery of Middle Minoan IIIB type.
- P-1354. Late Minoan IA** **3565 ± 72**  
**1615 B.C.**  
Charred wood from Level 113, Area H, Late Minoan IA. *Comment:* NaOH pretreatment. (M. S. R. H.): this occupation level is probably Late Minoan IA, although scraps of pottery found in it seem to be earlier, perhaps Middle Minoan IIIA.
- P-1355. Late Minoan IA** **3125 ± 64**  
**1175 B.C.**  
Charred wood from Level 98, Pit G, Area IA, Late Minoan IA. *Comment:* NaOH pretreatment. (M. S. F. H.): this seems to be relatively pure and well-dated context. It is small shallow pit, stratified below, and sealed by floor of next period, Late Minoan IB.
- P-1356. Late Minoan IB** **2964 ± 74**  
**1014 B.C.**  
Charred wood from Level 65, Area JK, debris above floor of building destroyed by fire, 3 m below modern surface. *Comment:* NaOH pretreatment. For additional dates from Late Minoan IB destruction level at Palaikastro, Crete, see St-1263, 3535 ± 70, and St-1264, 3510 ± 120 (Radiocarbon, 1965, v. 7, p. 286). (M. S. F. H.): destruction levels represented by 2 series of deposits (Late Minoan IA, P-1355, and Late Minoan IB, P-1356) may not be very far separated in time, say 10 to 20 yr rather than 50 yr allowed by conventional dates. Late Minoan IA destruction level at Knossos may reflect earthquake disaster connected with or contemporary with 1st eruption on island of Thera (modern Santorini), which overwhelmed Bronze Age settlements there. Late Minoan IB horizon of destruction at Knossos appears to be result of final explosion of island of Thera which caused similar and contemporary destructions at other major sites in central and E Crete.
- P-1357. Late Minoan II** **3096 ± 69**  
**1146 B.C.**  
Charred wood from Level 17A, Area HA, Late Minoan II. *Comment:* NaOH pretreatment.
- P-1358. Late Minoan IIIA, Level 63** **3033 ± 68**  
**1083 B.C.**  
Charred wood from Area H. *Comment:* NaOH pretreatment. (M. S. F. H.): much of pottery of this level is of earlier date, and some of charred wood may derive from Late Minoan IB destruction.

**P-1359. Late Minoan IIIA, Level 64****3226 ± 43****1276 B.C.**

Charred wood from Area H. *Comment*: NaOH pretreatment. (M. S. F. H.): fragments of inscribed clay tablets (Linear B) were found in this deposit, and are like those in Palace of Minos at Knossos. Sample may derive from destruction level contemporary with destruction of Palace.

*C. Spain***P-1404. Son Servera, Mallorca****3260 ± 59****1310 B.C.**

Charcoal from lowest deposit, with remains of wooden dwelling, atop Megalithic tower at Son Servera (39° 42' N Lat, 03° 16' E Long), 2 km from town of Son Servera, 64 km E of Palma, on Mallorca in Balearic Is. Sample is believed to provide beginning date for Talayotic occupation in Balearics. Coll. 1967 and subm. by G. R. Borday, Mus. of Mallorca.

## III. ARCHAEOLOGIC SAMPLES: SOUTH AMERICA

*A. Venezuela***P-1211. El Tiestal, Venezuela****454 ± 45****A.D. 1496**

Charred corn cobs and seeds (*Caesalpinia corriraria* Wild) assoc. with animal bones (birds, deer, rabbits, and colubridae) in Level 6 (100 to 120 cm) at Mound E-1, El Tiestal (10° 00' N Lat, 69° 49' W Long), in Quibor Valley, State of Lara, Venezuela. Coll. 1963 and subm. by Mario Sanoja, Univ. Los Andes, Merida, Venezuela. *Comment*: compare with other dates from this site: Level 1, SI-121, 380 ± 50; and Level 6, SI-120, 380 ± 50 (Radiocarbon, 1965, v. 7, p. 252). See also Level 4 from nearby Mound 2, SI-149, 160 ± 90 (Radiocarbon, 1966, v. 8, p. 418).

*B. Brazil***Sambaqui de Gomes series, Brazil**

Sambaqui de Gomes (25° 20' S Lat, 84° 45' W Long), is shellmound site lying off Bay of Antonina, 1000 m NE of Saquerama R. R. Sta., Municipio of Morretes, Parana, Brazil. Samples are from occupational and hearth levels within shellmound. Coll. by J. W. Rauth; subm. by W. R. Hurt, Univ. of Indiana (1962, 1964, 1966; Radiocarbon, 1963, v. 5, p. 97).

**P-915. Sambaqui de Gomes, 200 to 250 cm****4885 ± 65****2935 B.C.**

Charcoal, shell, and dried sponge from 200 to 250 cm.

**P-916. Sambaqui de Gomes, 250 to 300 cm****4859 ± 64****2909 B.C.**

Charcoal and shell from 250 to 300 cm.

*General Comment*: for additional dates from levels stratigraphically above those of this list, see: P-540, 25 to 75 cm, 4490 ± 136; and P-541,

150 cm 4487  $\pm$  76 (Radiocarbon, 1963, v. 5, p. 97). (W. R. H.): dates correlate well with previous samples from Sambaqui de Gomes. If dates are correlated with Fairbridge's chart, it would appear that initial layers of shell were deposited on ancient beach formed during last phase of Older Peron High (ca. 3000 to 2800 B.C.) and that remaining deposits were accumulated during 1st half of Bahama Low (ca. 2800 to 2500 B.C.).

**4218  $\pm$  63**

**P-914. Sambaqui de Saquarema, Brazil**

**2268 B.C.**

Charcoal, shell, and dried mud from 7 to 7.5 m at shellmound of Sambaqui de Saquerema (25° 20' S Lat, 84° 45' W Long), near Sambaqui de Gomes, 3 km S of Rio Nundiaquara and 650 m N of Saquerema Sta. near NW shore of Bay of Antonina, Parana, Brazil. Mound measures 90 m long by 40 m wide, with original height estimated at 10.5 m; base of mound rests on old mangrove swamp 2 m below present water level. Coll. by J. W. Rauth; subm. by W. R. Hurt (Rauth and Hurt, 1960; Hurt, 1962, 1964, 1966; Radiocarbon, 1965, v. 7, p. 198). *Comment:* stratigraphically, this sample lies below P-587, 6.8 m, 4307  $\pm$  69; and above P-538, 8 m, 4071  $\pm$  73, in series of dates from this site (Radiocarbon, 1965, v. 7, p. 198). (W. R. H.): dates support conclusion that this shellmound accumulated during last phase of Bahama Low (ca. 2500 to 2100 B.C.) when level of ocean was theoretically lower than at present.

*C. Peru*

**El Paraiso series, Peru**

This series of samples is from El Paraiso complex (11° 57' S Lat, 77° 05' W Long), in Chillan R. drainage on central coast of Peru. Coll. 1966 and subm. by Frederic Engel, Univ. Nacional Agrária, Peru.

**3444  $\pm$  59**

**P-1214. Middle occupation, Unit I**

**1494 B.C.**

Charcoal and ashes from refuse and ash deposit on mud floor around building, Unit I, early phase of middle occupational period. *Comment:* NaOH pretreatment.

**3065  $\pm$  61**

**P-1209. Unit I, early phase**

**1115 B.C.**

Dried grasses extracted from mortar which cemented stones of N main wall of Unit I. *Comment:* sample undersized, counted at reduced pressure, and may be less reliable than others of this series.

**3366  $\pm$  59**

**P-1210. Unit I, late phase**

**1416 B.C.**

Cane basketry from rubble fill of room of Unit I. Fill was used to create building platform for addition of new upper rooms.

## REFERENCES

## Date lists:

BM V	Barker and Mackey, 1968
P VI	Stuckenrath, Jr., 1963
P VIII	Stuckenrath, Jr., 1965
SI II	Long, 1965
SI III	Long and Mielke, 1966
St VI	Engstrand, 1965

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