

# Radiocarbon

1977

## BRITISH MUSEUM NATURAL RADIOCARBON MEASUREMENTS IX

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The following list consists of dates for archaeological samples from countries other than the British Isles measured with a few exceptions over the period of mid-1970 to June 1974.\* The dates were obtained by liquid scintillation counting of benzene using a Model 3315 Packard Tricarb Liquid Scintillation Spectrometer. The laboratory procedures used were those outlined in the previous date list (R, 1976, v 18, p 16). As before, the dates, relative to AD 1950, are based on the Libby half-life for  $^{14}\text{C}$  of 5570 years, are corrected for isotopic fractionation (relative to the PDB standard) and are expressed in radiocarbon years uncorrected for natural  $^{14}\text{C}$  variations. NBS oxalic acid is used as the modern reference standard.

Descriptions, comments, and references to publications are based on information supplied by the persons who submitted the samples.

### ACKNOWLEDGMENTS

We wish to thank H Barker for helpful criticism and advice.

### SAMPLE DESCRIPTIONS

#### ARCHAEOLOGIC SAMPLES

**BM-760. Lake Varna boat, Bulgaria** **559 ± 40**  
**AD 1391**

Wood (*Quercus frainetto* Ten) from structure of boat taken from L Varna, Stalin, Black Sea coast, Bulgaria (43° 20' N, 27° 75' E). Coll 1970 and subm by A Michailov, Natl Inst Cult Properties, Sofia, Bulgaria. *Comment:* when 1st recovered boat considered prehistoric; actual date is clearly much more recent.

**BM-728. Mylodon Cave, Chile** **12,984 ± 76**  
**11,034 BC**

Collagen from femur of mylodon (giant sloth, *Grypotherium listai*) from Cueva del Milodon Grande, Puerto Consuelo, Ultima Esperanza, Chile (51° 36' S, 72° 36' W). Coll ca 1900 from cave floor deposits beneath fallen roof debris (British Mus [Nat Hist] ref M8748; purchased from G A Milward, 1904). Subm by A J Sutcliffe, British Mus (Nat Hist) to

\* Dates obtained over the same period for samples from the British Isles formed the previous list, British Museum VIII.

date these animal remains (Hauthal *et al*, 1899) long the subject of controversy because of surviving flesh and hair. *Comment*: date confirms Pleistocene age of remains and agrees with C-484:  $10,832 \pm 400$ , for giant sloth droppings from same site (Libby, 1952, p 94).

### **Carrizal series, Colombia**

Charcoal from protohist Carrizal phase occupation levels overlying Antigua levels at Carrizal, Municipio Barichava, Santander, Colombia ( $6^{\circ} 40' N$ ,  $73^{\circ} 14' W$ ). Coll 1970 and subm by W Bray, Inst Archaeol, Univ London.

**603  $\pm$  63**

**BM-802. Carrizal** **AD 1347**

Carrizal stratigraphic trench, Levels 4 and 5, 30 to 50 cm below surface. Dates middle part of Carrizal phase occupation.

**682  $\pm$  66**

**BM-803. Carrizal** **AD 1268**

Carrizal stratigraphic trench, Level 7, 60 to 70 cm below surface. *Comment*: samples should date transition from underlying Antigua phase (see BM-804-806, below) but appear contemporaneous with BM-802 from middle of Carrizal phase.

### **Cueva la Antigua series, Colombia**

Charcoal from Antigua phase levels at Cueva la Antigua, Municipio of San Gil, Santander, Colombia ( $6^{\circ} 35' N$ ,  $73^{\circ} 10' W$ ). Coll 1970 and subm by W Bray. Samples date newly defined Antigua phase pottery styles, earliest so far discovered in northern part of highland Colombia.

**1368  $\pm$  103**

**BM-804. Cueva la Antigua** **AD 582**

Trench 1/2, Spit 1 of Antigua phase. Dates transition from Antigua phase to subsequent protohist Carrizal phase.

**1988  $\pm$  98**

**BM-805. Cueva la Antigua** **38 BC**

Trench 1/2, Unit 2, 1.68m below surface. Sample from near base of deposit containing Antigua style pottery.

**1670  $\pm$  44**

**BM-806. Cueva la Antigua** **AD 280**

Trench 1/2, Unit 2, Spit 6. Sample from just above base of deposit containing Antigua style pottery.

**895  $\pm$  59**

**BM-807. Muisca figurine, Colombia** **AD 1055**

Charcoal from clay and charcoal core of copper figurine cast by lost wax process. No exact provenance or archaeol assoc but figurine is in Muisca (Chibcha) style of area around Bogota, Colombia ( $4^{\circ} 40' N$ ,  $74^{\circ} 10' W$ ). Subm by W Bray, from colln of Cambridge Univ Mus Archaeol & Ethnog (ref 46.22). *Comment*: figurine is well-known type assoc with protohist Muisca but not yet found in controlled excavation.

**Knossos series, Crete**

Charcoal from pre-Palace settlement levels at Knossos, N Central Crete (35° 31' N, 25° 10' E). Coll 1969 and subm by J D Evans, Inst Archaeol, Univ London. Samples date duration of later Neolithic phases (except BM-578, which dates Early Minoan phase; Evans, 1972). Previous dates in BM Knossos series appear in R, 1963, v 5, p 104; R, 1969, v 11, p 279-280 (Evans, 1964; 1968; 1971).

**BM-575. Knossos** **5636 ± 94**  
**3686 BC**

Late/Middle Neolithic transition (W Court of Minoan Palace).

**BM-577. Knossos** **5884 ± 188**  
**3934 BC**

Late Early-Neolithic II (Central Court of Minoan Palace).

**BM-578. Knossos** **3745 ± 137**  
**1795 BC**

Early Minoan II (W Court of Minoan Palace; from Early Minoan II building).

**BM-579. Knossos** **5534 ± 76**  
**3584 BC**

Late Neolithic (W Court of Minoan Palace).

**BM-580. Knossos** **5522 ± 88**  
**3572 BC**

Late Middle-Neolithic (W Court of Minoan Palace).

**BM-581. Knossos** **5588 ± 145**  
**3638 BC**

Late Neolithic (Central Court of Minoan Palace).

*General Comment* (JDE): dates are acceptable (except BM-578, which is much too late) though total duration of later Neolithic appears surprisingly short; Knossos dates so far fall into 2 distinct groups — aceramic and earliest Neolithic in 1st half of 6th millennium BC, later Neolithic phases ca 4400 to 3500 BC — followed by 500 to 700 yr gap before Early Minoan I begins.

**BM-690. Skouriotissa, Cyprus** **2139 ± 51**  
**189 BC**

Wood (*Pinus* sp) from pit prop from 60m below ground level in ancient mine exposed by modern open-cast commercial excavation at Skouriotissa, Morphou, N Cyprus (35° 10' N, 33° 0' E). Coll 1970 and subm by Michael Ayrton. *Comment*: mines in Cyprus have been worked for copper from Bronze age until Roman times (see Forbes, 1950). Sample dates from later part of mining activity; *cf* dates for wood from Apliki Mine, Cyprus, Bonn-677: 2380 ± 60 BP; Bonn-678: 2280 ± 60 BP (R, 1970, v 12, p 37-38); Birm-107: 2330 ± 90 BP (R, 1970, v 12, p 398).

**Ayios Epiktitos Vrysi series, Cyprus**

Charcoal from sealed deposits in a Neolithic settlement at Ayios Epiktitos Vrysi, 10km E Kyrenia, Cyprus (35° 20' N, 33° 26' E). Coll 1973 and subm by E J Peltenburg, Univ Glasgow. Samples date early and middle phases of settlement (Peltenburg, 1972).

<b>BM-843. Vrysi</b> Sample Ref H2A.4	<b>5355 ± 67</b> <b>3405 BC</b>
<b>BM-844. Vrysi</b> Sample Ref H2B.8	<b>5275 ± 47</b> <b>3325 BC</b>
<b>BM-845. Vrysi</b> Sample Ref H4A.5	<b>5360 ± 57</b> <b>3410 BC</b>
<b>BM-846. Vrysi</b> Sample Ref H4B.8	<b>5372 ± 92</b> <b>3422 BC</b>
<b>BM-847. Vrysi</b> Sample Ref H7.4B	<b>5389 ± 53</b> <b>3439 BC</b>
<b>BM-848. Vrysi</b> Sample ref Passage B East. 3, 4	<b>5330 ± 57</b> <b>3380 BC</b>
<b>BM-849. Vrysi</b> Sample ref Area VD.7	<b>5224 ± 78</b> <b>3274 BC</b>

*General Comment* (EJP): dates are consistent with proposed phasing of settlement (Peltenburg, 1974): Early phase, BM-846, 847; transitional, BM-845; Middle phase, BM-843, -844, -848; transitional-Late, BM-849. GU-522: 5420 ± 80, 3470 bc; GU-523: 5340 ± 95, 3390 bc; GU-524: 5255 ± 120 bc (Peltenburg, 1975) are also statistically acceptable within same framework but Birm-182: 5825 ± 145 bc (R, 1971, v 13, p 155) and Birm-337: 5740 ± 140 (R, 1973, v 15, p 468) appear too old for Middle phase. Dates show site flourished for much shorter period than expected and indicate that evolution of Cypriot Neolithic painted pottery styles was rapid and regionally based (GU-dates reported by Peltenburg, 1975, as 453-455 and with slightly different ages; lab nos and dates quoted here are those subsequently amended by issuing lab; Peltenburg, pers commun).

**Khirokitia series, Cyprus**

Charcoal from aceramic levels at settlement of Khirokitia, S Cyprus (34° 48' N, 33° 21' E). Coll 1972 and subm by N P Stanley Price for Dept Antiquities, Cyprus Mus, Nicosia. Samples date aceramic Neolithic phase

in Cyprus and length of occupation of one structure, Tholos XLVI (Dikaios, 1973).

**BM-852. Khirokitia** **7294 ± 78**  
**5344 BC**

Tholos XLVI (I), roof collapse.

**BM-853. Khirokitia** **7451 ± 81**  
**5501 BC**

Tholos XLVI (I), Floors I, II, and III.

**BM-854. Khirokitia** **7442 ± 61**  
**5492 BC**

Tholos XLVI (II), Floors V and VI.

**BM-855. Khirokitia** **7308 ± 74**  
**5358 BC**

Tholos XLVI (II), Floor VII and pre-Floor VII deposit.

*General Comment* (NPSP): samples coll from sounding at site previously excavated by Dikaios (1953) and belong to successive floor levels of a single structure (Stanley Price & Christou, 1973; Stanley Price, 1975). Results compare well with 3 previous dates: St-414-416 (Östlund and Engstrand, 1960).

#### **Bylany series, Czechoslovakia**

Charcoal from levels and pits at site of Bylany, 3 km SW Kutna Hora, Stredocesky region, Bohemia, W Czechoslovakia (49° 55' N, 15° 20' E). Coll ca 1958-1966 by B Soudsky, Archaeol Inst Czechoslovak Acad Sci, Prague; subm by Ruth Tringham, Dept Archaeol, Univ Harvard. Samples date early Neolithic, Linear Pottery culture, and middle Neolithic, Lengyel culture, occupations.

**BM-561. Bylany** **6038 ± 87**  
**4088 BC**

Feature 921 (Level I in oven).

**BM-562. Bylany** **6184 ± 89**  
**4234 BC**

Feature 2214 (Level 0-1 of bldg pit; 3rd phase of Period I).

**BM-563. Bylany** **6686 ± 53**  
**4736 BC**

Feature 378 (bldg pit; "violet" settlement phase pre-optimal part of Period II).

**BM-564. Bylany** **5756 ± 51**  
**3806 BC**

Feature 806 (Level 2 of bldg pit; "dark green" phase post-optimal part of Period II).

**BM-565. Bylany** **6023 ± 77**  
**4073 BC**

Feature 2101 (Level 3 of bldg pit: "red-yellow" phase—end of Period II).

- 6178 ± 134**  
**4228 BC**
- BM-566. Bylany**  
Feature 11 (bldg pit; "yellow" phase—1st part of Period III).
- 4571 ± 75**  
**2621 BC**
- BM-567. Bylany**  
Feature 913 (Level 4 of bldg pit; "blue II" phase—transition Periods III-IV).
- 5635 ± 65**  
**3685 BC**
- BM-568. Bylany**  
Feature 1230 (Level 3 of bldg pit "middle—dark brown" phase—middle of Period IV—Sarka).
- 6754 ± 96**  
**4804 BC**
- BM-569. Bylany**  
Feature 900 (Level 1-6 of bldg pit; "dark brown" phase—end of Period IV—Sarka).
- 4309 ± 108**  
**2359 BC**
- BM-570. Bylany**  
Feature 1728 (Level 1 of bldg pit; early period of stroke-ornamented ware immediately following final Sarka pottery).
- 5789 ± 82**  
**3839 BC**
- BM-571. Bylany**  
Feature 1217 (bldg pit; Lengyel).
- 5729 ± 78**  
**3779 BC**
- BM-572. Bylany**  
Feature 1901 (bldg pit; Lengyel).

*General Comment* (RT): dates fall generally in range of other dates for Linear Pottery culture sites of Central and W Europe, 4500 to 3800 BC, but there are some detailed differences between dates obtained and those expected from archaeol evidence (Soudsky, 1966; Tringham, 1971). Compared with expected dates BM-569, -563, -571 and -572 are too early; -562, -565, -568, -564, -567, and -570 are too late (-567 and -570 appear invalidated by misassoc). Cf GrN-4752 (with BM-563): 6170 ± 45; GrN-4754 (with BM-564); 6270 ± 65; GrN-4755 (with BM-568, -569): 6180 ± 45; GrN-4751 (with BM-570): 5810 ± 65; GrN-4753 which should compare on archaeol evidence with BM-571, -572 gave anomalously high age of 9470 ± 55 (GrN dates: R, 1967, v 9, p 131).

#### **Southern Sierra region series, Ecuador**

Charcoal samples from sites in Southern Sierra region, Ecuador (ca 3° S; 80° W). Coll 1972 and subm by Elizabeth Carmichael, Mus Mankind, London. Sites yielded fine pottery expected earlier than pottery from coastal region, itself among earliest in S America. Dates help determine relationship between coast and Sierra.

<b>BM-896.</b>	<b>Cerro Narrio</b>	<b>3928 ± 60</b> <b>1978 BC</b>
Ref 12B1.		
<b>BM-897.</b>	<b>Chauillacamba</b>	<b>2909 ± 55</b> <b>959 BC</b>
Ref 14B1.		
<b>BM-898.</b>	<b>El Carmen</b>	<b>1817 ± 56</b> <b>AD 133</b>
Ref 1B3, 5, 6, 7.		
<b>BM-899.</b>	<b>Uchucay</b>	<b>2242 ± 48</b> <b>292 BC</b>
Ref 2.		
<b>BM-900.</b>	<b>Pirincay</b>	<b>2581 ± 66</b> <b>631 BC</b>
Ref 9E3.		
<b>BM-901.</b>	<b>Pirincay</b>	<b>2697 ± 49</b> <b>747 BC</b>
Ref 9C3.		
<b>BM-902.</b>	<b>Pirincay</b>	<b>1729 ± 49</b> <b>AD 221</b>
Ref 9B6a.		
<b>BM-903.</b>	<b>Pirincay</b>	<b>2635 ± 77</b> <b>685 BC</b>
Ref 9C4.		
<b>BM-904.</b>	<b>El Carmen</b>	<b>2334 ± 61</b> <b>384 BC</b>
Ref 8C3.		
<b>BM-736b.</b>	<b>Asasif, Egypt</b>	<b>3101 ± 52</b> <b>1151 BC</b>
<p>Small tree roots from tree pits of Tuthmosis III causeway at Asasif, Luxor, Egypt (25° 41' N, 32° 24' E). Coll 1970 and subm by M Bietak, Vienna. <i>Comment</i>: date corrected for natural <sup>14</sup>C variations (Damon <i>et al</i>, 1972; Ralph <i>et al</i>, 1973) is ca 1450 BC. This agrees with archaeol evidence that causeway dates to last year of reign of Tuthmosis III, 1504-1450 BC.</p>		
<b>Sakkara series</b>		
<p>Charcoal and reed samples from Sacred Animal Necropolis at Sakkara, Egypt (29° 51' N, 31° 14' E). Coll 1971-1973 and subm by G T Martin, Dept Egyptol, Univ College, London.</p>		
<b>BM-967.</b>	<b>Sakkara</b>	<b>2136 ± 54</b> <b>186 BC</b>
Charcoal from Block 5 (9), Sec 7, floor, occupation level (Sample 16).		

<b>BM-968. Sakkara</b>	<b>2117 ± 53</b> <b>167 BC</b>
Charcoal from Block 5 (9), Sec 7, fuel bin on N side, occupation level (Sample 17).	
<b>BM-969. Sakkara</b>	<b>2290 ± 43</b> <b>340 BC</b>
Reeds used as bonding between mud-brick courses, Block 1, Sec 7, N wall (Sample 80). Reign of Nectanebo II.	
<b>BM-1098. Sakkara</b>	<b>2212 ± 47</b> <b>262 BC</b>
Charcoal from Block 5 (D), Sec 7, hearth (Sample 60).	
<b>BM-1099. Sakkara</b>	<b>2477 ± 42</b> <b>527 BC</b>
Reeds used as bonding between mud-brick courses, Sec 3 (Nectanebo II temple), E wall (Sample 135).	
<b>BM-1100. Sakkara</b>	<b>2205 ± 42</b> <b>255 BC</b>
Reeds used as bonding between mud-brick courses, main N-S cross wall (S end), Block 7, Sec 7.	
<i>General Comment:</i> dates accord well with archaeol evidence (Martin, 1973; 1974), particularly in light of further excavations since these samples were coll (H S Smith, in press) and agree with hist evidence when allowance is made for natural <sup>14</sup> C variations.	
<b>Sitagroi series, Greece</b>	
Charcoal from prehistoric settlement mound at Sitagroi, Plain of Drama, Macedonia, Greece (41° 05' N, 24° 01' E). Coll 1968 to 1969 and subm by A C Renfrew, Dept Archaeol, Univ Southampton. Samples date occupation phases revealed by stratigraphy of mound (Renfrew, 1970; 1971).	
<b>BM-648. Sitagroi</b>	<b>6265 ± 75</b> <b>4315 BC</b>
Wood charcoal, Phase I, Level ZA67.	
<b>BM-649. Sitagroi</b>	<b>5904 ± 66</b> <b>3954 BC</b>
Wood charcoal from flotation, Phase II, Level ZA50.	
<b>BM-650a. Sitagroi</b>	<b>4363 ± 56</b> <b>2413 BC</b>
Wood charcoal from flotation, Phase IV, Level ZB112.	
<b>BM-650b. Sitagroi</b>	<b>5367 ± 85</b> <b>3417 BC</b>
Wood charcoal, Phase III, Level ML118.	
<b>BM-651. Sitagroi</b>	<b>4332 ± 79</b> <b>2382 BC</b>
Acorns from flotation, Phase IV, Level ZB108.	



**BM-652. Sitagroi** **3803 ± 59**  
**1853 BC**  
Wood charcoal from post-hole, Phase Va, Level PO162.

**BM-653. Sitagroi** **3790 ± 78**  
**1840 BC**  
Vetch seeds, Phase Vb, Level QO8.

*General Comment:* sequence of dates for Sitagroi fits well with stratigraphy and harmonizes adequately with Bln series for the site; BM-648 and Bln-779: 6625 ± 170 BP, 4675 BC, and BM-650a and Bln-880: 4510 ± 100 BP, 2560 BC date same samples (Renfrew 1970; 1971).

#### **Baba Jan series, Iran**

Charcoal from stratigraphic series from Baba Jan, between Kermanshah and Khorramabad, Luristan, Iran (34° 24' N, 46° 59' E). Coll 1966 to 1969 and subm by Clare Goff, Inst Archaeol, Univ London. Samples were intended to date 4 major building levels and assoc pottery styles, and to provide dates for major phase of Luristan bronze industry (Goff, 1969; 1970; Goff-Meade, 1968).

**BM-586. Baba Jan** **2205 ± 58**  
**255 BC**  
Burnt roof beam, lowest floor (Stratum 8a, Level III), Central Hall (Rm 4) of Fort on E Mound (Sample 1).

**BM-587. Baba Jan** **2176 ± 55**  
**226 BC**  
Burnt roof beam, lowest floor (Stratum 9, Level III), Rm 5 of Fort on E Mound (Sample 2).

**BM-589. Baba Jan** **2096 ± 50**  
**146 BC**  
Burnt material from floor of Groom's Kitchen, reoccupation level of Fort (Stratum 6, Level II); assoc with imported pottery and elbow fibulae (Sample 4).

**BM-597. Baba Jan** **2144 ± 52**  
**194 BC**  
Burnt beam on floor, Level III, Painted Chamber (Sample 12).

*General Comment:* dates are very much later than those expected (1500 to 600 BC) and cannot be reconciled with archaeol evidence.

**BM-483. Choga Mami, Iraq** **6846 ± 182**  
**4896 BC**  
Charcoal (Sample 6) from prehistoric site of Choga Mami, nr Mandali, Diyala Liwa, Iraq (33° 45' N, 45° 33' E). Coll 1967 to 1968 and subm by Joan Oates, British School Archaeol in Iraq. Sample dates transitional Samarra/Hajji Muhammad level (Oates, 1969; see Oates, 1972 for discussion of this and related dates).

- 10,046 ± 318**  
**8096 BC**
- BM-764. Nahal Oren, Israel**  
Animal bone (collagen) from Upper Natufian level at Nahal Oren, ca 15km S of Haifa, Israel (32° 40' N, 35° E). Coll 1971 and subm by A J Legge, Univ London for British Acad proj for early hist of agric (Noy *et al*, 1973).
- 2043 ± 78**  
**93 BC**
- BM-1073. Punic ship, Italy**  
Small branches of wood from dunnage in wreck of Punic ship, 200m off N shore of Isola Lunga, Marsala, W Sicily (37° 48' N, 12° 27' E). Coll 1973 and subm by Honor Frost, Punic Ship Excavation, British School in Rome. Sample dates closed group of Punic Greek and Roman pottery carried on ship (Frost, 1972-1974; Culican & Curtis, 1974). *Comment*: chemically separated cellulose fraction only used for dating; *cf* HAR-499: 2050 ± 60 BP, 100 BC, date for portion of same sample pretreated with acid and alkali only.
- Jericho series, Jordan**  
Charcoal from Early Bronze age levels at Jericho, Jordan (31° 53' N, 35° 27' E). Coll ca 1960 and subm by Kathleen Kenyon.
- 4175 ± 48**  
**2225 BC**
- BM-548. Jericho**  
Phase XADii, Stage XIV—xliva. First appearance of structures in area of Trench III.
- 4204 ± 49**  
**2254 BC**
- BM-549. Jericho**  
Phase XAJ—XAK, Stage XV. li to lii. Major destruction of fire within Stage XV.
- 4126 ± 50**  
**2176 BC**
- BM-550. Jericho**  
Phase XAQ—XAR, Stage lxi—lxii. Major destruction, probably following collapse of town wall.
- 4080 ± 42**  
**2130 BC**
- BM-551. Jericho**  
Phase XAS—XAT, Stage lxxv—lxxvi. Destruction involving collapse of timber roofs.
- 4115 ± 39**  
**2165 BC**
- BM-552. Jericho**  
Phase XAVi, Stage XVII. lxxviii.
- 3922 ± 78**  
**1972 BC**
- BM-553. Jericho**  
Phase XAY, Stage XVIII. lxxii. Assoc with earliest surviving town wall in area of Trench II.

**4170 ± 42**  
**2220 BC**

**BM-554. Jericho**

Phase XBB, Stage XIX. lxxvi. Penultimate Early Bronze age phase.

*General Comment:* samples were from levels belonging to later part of Early Bronze age and probably mostly to EB II; main stages represent complete changes in plan, subsidiary divisions represent important structural changes. Expected calendar dates ca 2700 to 2350 BC; when corrected for natural <sup>14</sup>C variations these dates appear too old. (See R, 1963, v 5, p 106 and R, 1969, v 11, p 290 for other BM dates for earlier levels at Jericho.)

**2627 ± 99**  
**677 BC**

**BM-946. Gua Cha, Malaysia**

Human bone (collagen) from Burial 2 at Gua Cha, Kelantan, W Malaysia (5° N, 101° 45' E). Coll 1954 and subm by G de G Sieveking, British Mus. Deposits at site contain extended burials assoc with Cord-Imprinted Neolithic pottery and polished stone axes, and contracted burials in levels containing an earlier Hoabinhian industry (Sieveking, 1956a). *Comment* (GdeGS): dates Neolithic burial; other burials contained insufficient collagen for dating purposes and date is surprisingly late compared to that of BM-43: 3450 ± 150 BP, 1500 BC (Am Jour Sci R Supp, 1960, v 2, p 29) found with fully comparable pottery types.

**1657 ± 60**  
**AD 293**

**BM-958. Pontian boat**

Wood from ancient boat found ca 1925 at Pontian, Pahang, W Malaysia (3° 30' N, 102° 30' E). Subm by G de G Sieveking. Sample dates characteristic style of assoc earthenware storage vessel termed Pontian jar (Sieveking, 1956c) also found as sherds at Tanjong Rawa (see BM-959, below).

**1767 ± 50**  
**AD 183**

**BM-959. Selinsing boat**

Wood from boat (canoe burial) at Tanjong Rawa, Selinsing estuary, Perak, W Malaysia (4° 30' N, 100° 30' E). Coll 1955 and subm by G de G Sieveking. Sample dates primary burial and Kalumpang ware (Sieveking, 1956b, c); Pontian ware found in later levels on this site (see BM-958, above).

**Tarxien series, Malta**

Carbonized seeds, id by J M Renfrew (1972) from Tarxien Cemetery, Valletta, Malta (35° 52' N, 14° 32' E). Subm by A C Renfrew from colln of Natl Mus, Valletta for comparison with BM-101: 4485 ± 150 BP, 2535 BC (R, 1963, v 5, p 107) and BM-141: 3880 ± 150 BP, 1930 BC (R, 1968, v 10, p 5) both unexpectedly early dates.

**BM-710. Tarxien** **3286 ± 72**  
**1336 BC**

Carbonized 6-row barley (*Hordeum vulgare* L) and horse beans (*Vicia faba* L) from Glass Jar 1 in Natl Mus colln, originally from cinerary urn from Tarxien Cemetery and belonging to Cemetery phase.

**BM-711. Tarxien** **3354 ± 76**  
**1404 BC**

Carbonized horse beans (*Vicia faba* L) from Glass Jar 5 in Natl Mus colln. Same provenance as BM-710 above.

*General Comment:* BM-710 and -711 fit much more satisfactorily with emerging radiocarbon chronology for Malta and confirm that BM-101 does not date Cemetery phase (see Renfrew, C, 1972 for full interpretation and discussion of dates).

**BM-712. Skorba** **4478 ± 56**  
**2528 BC**

Charcoal (*Phillyrea* sp) from floor of Hut of the Querns at Skorba Temple, NW Malta (35° 55' N, 14° 23' E). Coll 1962 by D H Trump and subm 1971 by A C Renfrew from coll of Natl Mus, Valletta for comparison with BM-142: 5240 ± 150 BP, 3290 BC (R, 1968, v 10, p 5). *Comment:* sample is from Ggantija phase and confirms BM-142 too early for that phase: BM-712 also harmonizes well with dates for succeeding and preceding phases, BM-143: 4380 ± 150 BP, 2430 BC and BM-147: 5000 ± 150 BP, 3050 BC (R, 1968, v 10, p 5). See also general comment to BM-710 and -711 above and Renfrew, C, 1972.

**BM-808. Qala Pellegrin** **3912 ± 64**  
**1962 BC**

Animal bone (collagen) from Neolithic site at Qala Pellegrin, Ras il-Pellegrin, between Gnejna Bay and Fomm ir-Rih Bay, NW coast Malta (35° 56' N, 14° 23' E). Coll 1970 by R Virzi and subm by E Coleiro, Royal Univ, Msida, Malta.

**Taruga series, Nigeria**

Charcoal from iron smelting furnaces at Taruga, Nigeria (ca 7° N, 10° E). Coll 1968-1972; subm by B Fagg, Pitt Rivers Mus, Univ Oxford.

**BM-532. Taruga** **2042 ± 126**  
**92 BC**

Furnace 4, charcoal from within and below slag horizon (TA3, Sample 3).

**BM-533. Taruga** **2269 ± 143**  
**319 BC**

Sq 015a3, Layer 3, NW quarter, -55 to -90cm (TA2, Sample 8).

**BM-534. Taruga** **2121 ± 116**  
**171 BC**

Sq 015a3, Layer 3, NW quarter, -90 to -107cm (TA2, Sample 9).

<b>BM-938. Taruga</b>	<b>2541 ± 74</b> <b>591 BC</b>
Furnace 1 (Sample J13d1).	
<b>BM-939. Taruga</b>	<b>222 ± 40</b> <b>AD 1728</b>
Furnace 12 (Sample K14a2, K14a3).	
<b>BM-940. Taruga</b>	<b>2488 ± 84</b> <b>538 BC</b>
Furnace 7 (Sample K13a1).	
<b>BM-941. Taruga</b>	<b>2541 ± 104</b> <b>591 BC</b>
Loto D (Sample N15d4).	
<b>BM-942. Taruga</b>	<b>2291 ± 133</b> <b>341 BC</b>
Furnace 4 ( <i>cf</i> BM-532, above).	

*General Comment:* except for BM-939 which appears to be intrusive, samples provide dates for early iron smelting in W Africa and indirectly for terra-cotta sculpture of Nok (Fagg & Fleming, in press); *cf* I-1459: 2230 ± 120 BP, 280 BC (Taruga Lf, layer 3); I-2960: 2390 ± 140 BP, 440 BC (TA2, 015a3); I-3400: 2250 ± 100 BP, 300 BC (TA3, Furnace 2).

<b>BM-535. Katsina Ala</b>	<b>384 ± 45</b> <b>AD 1566</b>
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Charcoal from Katsina Ala, Nigeria (7° 10' N, 9° 30' E) from an occupation site comparable with Taruga, Nigeria (BM-532-534, BM-938, BM-940-942, this list above). Coll 1968; subm by B Fagg, Pitt Rivers Mus, Univ Oxford. Sample from large mass of charcoal in Nok culture occupation layer. *Comment:* date expected to compare with those for furnaces at Taruga, above.

#### **Inca sites, Peru**

Samples from Inca buildings in Cuzco region of Peru (ca 13° 30' S, 72° W). Coll 1970 and subm by Ann Kendall, Inst Archaeol, Univ London.

<b>BM-924. Choqepuqio</b>	<b>674 ± 58</b> <b>AD 1276</b>
Wood.	
<b>BM-925. Canarraccay</b>	<b>413 ± 59</b> <b>AD 1537</b>
<b>BM-926. Cuzco</b>	<b>231 ± 71</b> <b>AD 1721</b>
Charred bone (collagen), Sample Q11AC3.	
<b>BM-927. Keannbamba</b>	<b>217 ± 67</b> <b>AD 1733</b>
Grass and wood.	

**BM-928. Urco** **203 ± 63**  
 Grass and wood, Sample I. **AD 1747**

**BM-929. Urco** **298 ± 40**  
 Wood, Sample J. **AD 1652**

**BM-930. Cuzco** **460 ± 89**  
 Charcoal, Sample 1676L. **AD 1490**

**BM-931. Cuzco** **286 ± 52**  
 Wood, Sample 1676P. **AD 1664**

*Comment:* dates agree reasonably well with those expected when allowance is made for secular <sup>14</sup>C variations.

**BM-936. Castelo do Giraldo, Portugal** **2685 ± 65**  
**735 BC**

Charcoal from Late Neolithic settlement at Castelo do Giraldo nr Valverde, Evora, Portugal (38° 32' N, 8° 00' W). Coll 1972 and subm by J M Arnaud, Nat Mus Archaeol & Ethnol, Lisbon. Sample intended to date Neolithic settlement related to megaliths of Alentejo. *Comment* (JMA): sample coll from supposed undisturbed Neolithic or Chalcolithic level but date indicates area, like other parts of same site, was occupied during transition Bronze—Iron age, attested by stroke—burnished ware and bronze tools. TL dates for sherds from same layer were ca 3000 BC and ca 1150 BC, confirming disturbance.

#### **Parpalló series, Spain**

Bone and antler (collagen) from stratified early Upper Palaeolithic levels in cave of Parpalló, Valencia Prov, Spain (38° 55' N, 0° 20' W). Coll 1930 by L Pericot Garcia; subm by I Davidson, Dept Archaeol, Univ Cambridge.

**BM-858. Parpalló** **>40,000**  
 Pre-Solutrean level, depth ca 7.5m; vertebrae of *Cervus ibex* and *C elaphus*.

**+900**  
**20,490**  
**—800**  
**BM-859. Parpalló** **18,540 BC**

Lower Solutrean level, depth 6.5 to 7m; bone and antler fragments (*C elaphus*).

**+850**  
**18,080**  
**—770**  
**BM-861. Parpalló** **16,130 BC**

Upper Solutrean level, depth 4.75 to 5m; antler fragments (*C elaphus*).

*General Comment:* date of > 40,000 is older than expected for Parpalló sequence where earliest remains were described as Gravettian (Pericot Garcia, 1942) but BM-859 agrees well with date for Lower Solutrean of Laugerie-Haute Est, France, GrN-1888: 20,890 ± 300 BP, 18,940 BC (R, 1963, v 5, p 167); although BM-861 suggests Solutrean lasted longer in Valencia than in Dordogne, dates for Parpalló appear to show remarkable similarity in age with Solutrean industries of SW France (Davidson, 1974).

### Spirit Cave series, Thailand

Charcoal from Hoabinhian levels (Gorman, 1969) at Spirit Cave, Mae Hongson, Thailand (19° 40' N, 98° E). Coll 1966 by C F Gorman, Dept Anthropol, Univ Hawaii; subm by G de G Sieveking.

**BM-501. Spirit Cave** **7907 ± 198**  
**5957 BC**  
Site 19, A2-B2 (2); Sample 1.

**BM-502. Spirit Cave** **9073 ± 112**  
**7123 BC**  
Site 19, C2-N wall (3); Sample 2.

**BM-503. Spirit Cave** **9510 ± 160**  
**7560 BC**  
Site 19, B2-NW corner (5); Sample 3.

**BM-504. Spirit Cave** **9202 ± 106**  
**7252 BC**  
Fire pit, B2-C2 (5); Sample 4.

### Amerindian palaeopathology series, United States

Five bone (collagen) samples from skeletons showing evidence of pathologic lesions. Samples came from various mus collns and form part of program for study of early history of disease in the New World (Brothwell & Burleigh, 1975). Subm by D R Brothwell, Inst of Archaeol, Univ London.

**BM-462. Californian Amerindian** **857 ± 52**  
**AD 1093**  
Californian Amerindian (ca 35° N, 120° W) of Late Horizon period from Berkeley colln (Ref Scr. I. 83. 4434) showing evidence of treponemal infection.

**BM-463. Californian Amerindian** **622 ± 63**  
**AD 1328**  
Californian Amerindian (ca 35° N, 120° W) of Late Horizon period from Berkeley colln (Ref Cco. 138. 6091) showing evidence of spinal osteitis probably indicating tuberculosis.

**BM-464. "Prehistoric" Amerindian** **563 ± 104**  
**AD 1387**

Amerindian from May's Lick, Kentucky (ca 37° N, 85° W). From Am Mus Nat Hist colln, New York (Ref 20/915). One of nine individuals showing vault changes suggestive of treponematoses.

**BM-465. Horr's Island Amerindian** **735 ± 83**  
**AD 1215**

"Late prehistoric" Amerindian from Horr's Is, Florida (ca 28° N, 82° W). From Smithsonian colln, Washington, DC (Ref 352156). Assoc with individuals showing osteitic changes suggestive of treponematoses.

**BM-466. Horr's Island Amerindian** **852 ± 120**  
**AD 1098**

"Late prehistoric" Amerindian from Horr's Is, Florida (ca 28° N, 82° W). From Smithsonian colln, Washington, DC (Ref 352162). Assoc with individuals showing osteitic changes suggestive of treponematoses.

*General Comment:* dates support view that treponemal diseases were established in the New World before Columbian contact (see Brothwell and Burleigh, 1975 for a fuller discussion of dates).

**Divostin series, Yugoslavia**

Charcoal from storage pits in Neolithic settlement site at Divostin, Kragujevac, E Yugoslavia (44° 02' N, 20° 50' E). Coll 1969 and subm by A McPherron, Dept Anthropol, Univ Pittsburgh and Ruth Tringham, Univ Harvard (McPherron & Srejović, 1971).

**BM-573. Divostin** **6935 ± 98**  
**4985 BC**

Feature 120 E, 105cm below surface; Starcevo level.

**BM-574. Divostin** **5247 ± 144**  
**3297 BC**

Feature 121 (sample from various depths in undisturbed storage pit below floor of Vinca Plocnik "D" house).

*General Comment* (AMcP and RT): BM-573 agrees with Bln-896: 6945 ± 100 BP, 4985 BC, date for portion of same sample; dates for Starcevo occupation at Divostin fall within range of dates for other early Neolithic settlements of SE and Central Europe (Azmak, Gornja Tuzla, Vrsnik); similarities suggest Starcevo layers at Lepenski Vir (undated) and Divostin were contemporaneous. BM-574 is considerably later than expected and differs from Bln-898, 5860 ± 100 BP, 3910 BC for same sample but agrees with Bln-867, 5250 ± 100 BP, 3300 BC and fits with ceramic chronology of Divostin and with dates for Eneolithic (Bodrogkeresztur culture) settlements of SE Europe.

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