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# BRITISH MUSEUM NATURAL RADIOCARBON MEASUREMENTS XIX

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The following list consists of dates for archaeologic samples mostly measured from June 1984 to June 1985. The dates were obtained by liquid scintillation counting of benzene using the laboratory procedures outlined in previous lists (see, eg, BM-VIII, R, 1976, v 18, p 16). Dates are expressed as suggested by Stuiver and Polach (1977), *ie,* in $^{14}C$ years relative to AD 1950, based on the Libby half-life for $^{14}C$ of 5570 yr, and corrected for isotopic fractionation ($\delta^{13}C$ values are given relative to PDB). No corrections have been made for natural $^{14}C$ variations. The modern reference standards are the NBS oxalic acids (SRM 4990 and RM 49). Errors quoted are the counting error for the sample, combined with an estimate of the errors contributed by the modern and background samples. This estimate includes both counting and non-counting errors, and is computed from differences in the overall count rates observed among the individual backgrounds and moderns. The overall error is given as ±1 standard deviation ($\pm 1\sigma$). Descriptions, comments, and references to publications are based on information supplied by submitters.

## *British Isles*

### *England*

#### Roxby series

Charcoal from three similar and adjoining houses (Inman *et al,* 1985) from site at Roxby, near Whitby, N Yorkshire (54° 30′ N, 0° 50 W, Natl Grid Ref NZ 762143). Coll 1982 and subm by D Spratt, York, to establish chronol for site.

**BM-2207A. Roxby** **1950 ± 150**
$\delta^{13}C = -23.9‰$

Charcoal from post hole in House no. 3, assoc with Iron Age pottery.

**BM-2208A. Roxby** **7090 ± 120**
$\delta^{13}C = -23.9‰$

Charcoal from House no. 2 assoc with metallurgic debris.

*General Comment* (DS): BM-2207A agrees with finds from houses (Stanwick-type pottery, beehive quern and glass). BM-2208A is much earlier than expected but comes from area assoc with metal working and probably reflects age of peat or local coal-like material used for fuel. Sample from House no. 1 proved too small for dating.

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**Down Farm Pond Barrow series**

Samples from pond barrow near Down Farm, Woodcutts, Dorset (50° 55′ N, 2° 00′ W, Natl Grid Ref SU 002137). Coll 1980 and subm by R Bradley, Dept Archaeol, Univ Reading.

**3390 ± 45**

**BM-2189. Down Farm Pond Barrow** $\delta^{13}C = -24.4‰$

Charcoal, ref F2 L4, (*Quercus* sp, heartwood >15 yr old) id. by M Robinson, Univ Mus, Oxford, from base of pit in cluster of burials (Cluster 1) at edge of pond barrow, assoc with bronze awl and human cremation burial.

**3210 ± 45**

**BM-2190. Down Farm Pond Barrow** $\delta^{13}C = -24.1‰$

Charcoal, ref F12 L9, (*Quercus, Prunus, Crataegus* type, *Fraxinus* spp, all from young wood 5–25 yr old) id. by M Robinson, from base of stepped pit in cluster of features (Cluster 1) on edge of pond barrow, assoc with Collared Urn containing human cremation, 2 bone awls, and bronze awl.

**3670 ± 60**

**BM-2191. Down Farm Pond Barrow** $\delta^{13}C = -24.3‰$

Charcoal, ref F28 L2, (*Quercus* sp, >15 yr old) id. by M Robinson, from middle fill of pit in cluster of features (Cluster 2) beside pond barrow, assoc with middle Beaker pottery.

**3110 ± 100**

**BM-2192. Down Farm Pond Barrow** $\delta^{13}C = -26.1‰$

Charcoal, ref PH10, (*Rhamnus* type) id. by M Robinson, from fill of 1 of 4 post holes in center of pond barrow.

**3190 ± 70**

**BM-2324. Down Farm Pond Barrow** $\delta^{13}C = -24.1‰$

Charcoal, ref F30, (*Crataegus* type, 5–25 yr old) id. by M Robinson, from fill of stepped pit containing unaccompanied human cremation at edge of barrow (Cluster 2).

**3870 ± 50**

**BM-2325. Down Farm Pond Barrow** $\delta^{13}C = -25.2‰$

Charcoal, ref F31 L2, (*Quercus* sp, >15 yr old) id. by M Robinson, from middle fill of pit on edge of pond barrow (Cluster 2), assoc with middle Beaker sherds similar to material from upper fill of Dorset Cursus, 40m away.

**3570 ± 40**

**BM-2326. Down Farm Pond Barrow** $\delta^{13}C = -23.5‰$

Charcoal, ref F3 (*Quercus* sp, >15 yr old) id. by M Robinson, from fill of pit on edge of pond barrow, assoc with enlarged Food Vessel containing human cremation.

**3450 ± 50**

**BM-2327. Down Farm Pond Barrow** $\delta^{13}C = -24.3‰$

Charcoal, ref PH8 (*Fraxinus* sp, 5–25 yr old) id. by M Robinson, from fill of 1 of 4 post holes at center of pond barrow, assoc with sherds of plain Food Vessel.

*General Comment* (RB): samples date Beaker settlement cut by features of pond barrow (BM-2191, -2325) and features belonging to pond barrow itself. Two Beaker dates (BM-2191, -2325) are consistent with general sequence of Beaker domestic pottery, whilst 6 dates for elements of pond barrow form consistent series in later part of Wessex Early Bronze Age. Site is first pond barrow to be excavated for >30 years, and these are only dates available for this type of monument.

### Badshot series

Bone and antler samples from primary silts in N ditch (Tr B.IV. Layer 3) of Badshot Long Barrow, at Badshot, Runfold, Surrey (51° 10′ N, 0° 50′ W, Natl Grid Ref SU 860480). Coll 1936 to 1937 and subm 1983 by J Cotton, W London Field Unit, Mus London, to date construction of ditch of only known long barrow in Surrey.

**4420 ± 90**

**BM-2272. Badshot** $\delta^{13}C = -22.6‰$

Collagen from bone fragments, ref B.IV.3 (G).

**4480 ± 100**

**BM-2273. Badshot** $\delta^{13}C = -22.9‰$

Collagen from bone fragments, ref B.IV.3 (F).

**4600 ± 120**

**BM-2274. Badshot** $\delta^{13}C = -21.4‰$

Collagen from beam of antler, (red deer) id. by J W Jackson, Univ Manchester, ref B.IV.3.

*General Comment* ( JC): dates constitute useful series for only Neolithic communal monument yet discovered in old Surrey. BM-2273 and-2274, from primary chalk silting of N ditch, indicate that monument lies toward latter end of date range for earthen long barrows. BM-2272 from secondary silt of "red brown loam" at E terminal of N ditch gives date for sherds of simple large Mortlake bowl.

### Maumbury Rings series

Antler picks (red deer) id. by H St George Gray from shafts at Maumbury Rings (Bradley, 1975), Dorchester, Dorset (50° 40′ N, 2° 30′ W, Natl Grid Ref SY 691899). Coll 1908 to 1913 by H St George Gray and subm 1983 by R Bradley, Dept Archaeol, Univ Reading, for Dorchester Mus.

**3650 ± 70**

**BM-2281. Maumbury Rings** $\delta^{13}C = -23.3‰$

Collagen from red deer antler, ref sample 4 (excavator's no. 160), from uppermost fill of Shaft 3.

**3640 ± 70**

**BM-2282. Maumbury Rings** $\delta^{13}C = -22.3‰$

Collagen from red deer antler, ref sample 1 (site no. 60), from bottom of Shaft 1.

*General Comment* (RB): two dates confirm excavator's impression that shafts had filled up rapidly, and suggest that site might be contemporary with stone phase at Mount Pleasant (Wainwright, 1979) nearby, rather than primary earthwork on site. Maumbury Rings now appears to be late satellite of massive post circle recently discovered under modern town of Dorchester (P Woodman, pers commun).

**Wor Barrow series**

Antler (red deer) id. by A Pitt Rivers from lower part of primary silt in ditch of long barrow at Wor Barrow (Pitt Rivers, 1898), Sixpenny Handley, Dorset (51° 00′ N, 2° 00′ W, Natl Grid Ref SU 012173). Coll 1893 to 1894 by A Pitt Rivers and subm 1983 by R Bradley for Salisbury Mus. Barrow is one of distinctive oval type found in Cranborne Chase area. Samples give *terminus ante quem* for barrow construction.

**4350 ± 70**

**BM-2283. Wor Barrow** $\delta^{13}C = -21.9‰$

Collagen from base of red deer antler, ref sample 1, possibly used as pick, marked "Depth 11 ft. Bottom of SE ditch."

**4440 ± 70**

**BM-2284. Wor Barrow** $\delta^{13}C = -21.0‰$

Collagen from fork of red deer antler, ref sample 2, marked "Depth 10.5 ft. On bottom of ditch."

*General Comment* (RB): original site report suggests that BM-2284 dates antler on bottom of long barrow ditch and BM-2283 sample within its lowest silts. Dates agree well with other evidence that oval barrows and related enclosures were being built as late as 5th millennium BP (Bradley *et al,* 1984).

**Oldbury series**

Samples from hillfort (Ward Perkins, 1944) at Oldbury, near Ightham, Kent (51° 10′ N, 0° 10′ E, Natl Grid Ref TQ 590580). Coll 1983 and subm by F H Thompson, Soc Antiquaries, London.

**2310 ± 50**

**BM-2290. Oldbury** $\delta^{13}C = -25.6‰$

Charcoal, (*Quercus* sp) id. by Janet Ambers, from small hearth or fire in old ground surface beneath main rampart.

**BM-2291. Oldbury** **1840 ± 40** $\delta^{13}C = -27.5‰$

Charcoal, (family *Rosaceae,* subfamily *Pomoideae*) id. by Janet Ambers, from small hearth in interior of hillfort near S end.

**BM-2292. Oldbury** **1910 ± 80** $\delta^{13}C = -25.5‰$

Charcoal, (*Corylus* sp) id. by Janet Ambers, from hearth in Tr 9.

*General Comment* (FHT): BM-2290 is somewhat earlier than hoped but can only give *terminus post quem* for rampart construction. Barbed and tanged arrow-head from separate area of old ground surface indicates activity on site earlier than Iron Age. Hearth from which BM-2291 was taken contained no finds; and date, which is later than expected, could conceivably relate to Roman activity. BM-2292 was assoc with trench originally believed to belong to hut, but now known to be part of linear feature containing quantities of late Iron Age pottery with which result agrees.

**Springfield series**

Samples from late Bronze Age enclosure at Springfield Lyons, Springfield, Essex (51° 45′ N, 0° 30′ E, Nat Grid Ref TL 734082). Coll 1983 and subm by D G Buckley, Essex Co Council.

**BM-2313. Springfield** **2780 ± 90** $\delta^{13}C = -26.8‰$

Charcoal, ref RC1, (*Acer* sp) id. by Paula Rudall, Royal Botanic Gardens, Kew, from Context 5532, layer within enclosure ditch, assoc with bronze-casting clay molds.

**BM-2314. Springfield** **2370 ± 80** $\delta^{13}C = -23.1‰$

Charcoal sample, ref RC3, (mixed *Quercus* sp, *Acer* sp) id. by Janet Ambers, from Context 5153, secondary fill of enclosure ditch assoc with burned clay and vesiculated pottery.

*General Comment* (DB): BM-2313 provides date for lower fills of enclosure ditch and agrees with postulated date for construction. It also gives date for deposition of bronze casting molds found at bottom of ditch and belonging to Ewart Park traditions. Date is directly comparable with 2 dates from middle silts of outer enclosure ditch at Mucking South Rings (Har-1634, 2770 ± 110 BP and Har-1708, 2810 ± 70 BP (Jones & Bond, 1980, p 475). BM-2314 provides date for large group of pottery derived from higher ditch silts, comprising late Bronze Age/early Iron Age forms.

*Ireland*

**Mount Gabriel series**

Samples from copper mining site at Mount Gabriel, Co Cork, Eire (51° 30′ N, 9° 30′ W). Measured to confirm age of site of presumed early

Bronze Age mining (Jackson, 1968, 1980, 1984a,b; Briggs, 1983). Comment by P T Craddock, Research Lab, British Mus.

**3200 ± 110**

**BM-2271. Mount Gabriel** $\delta^{13}C = -24.9‰$

Peat, ref MG 4, from top of waste heap of mine no. 6. Coll and subm by J Jackson, Dept Geol, Trinity Coll, Dublin.

**3130 ± 80**

**BM-2336. Mount Gabriel** $\delta^{13}C = -26.1‰$

Wood, ref MG-24-01, from sediment in entrance to mine MG-24, sealed under peat deposit and assoc with stone tools. Coll 1984 and subm by W O'Brien, Dept Archaeol, Univ Coll, Cork.

*General Comment* (PTC): dates confirmed existing date of 3450 ± 120 BP (VRI-66; R, 1970, v 12, p 316). This, together with rest of archaeol and environmental evidence, had been called into question by Briggs (1983) who regarded whole operation as 19th century site. These results suggest Briggs' hypothesis to be untenable, and that mines, together with grooved stone hammers found with them, are correctly assigned to Bronze Age, as elsewhere (Craddock, 1986).

*Isle of Man*

**Peel Castle series**

Human bone samples from cemeteries at Peel Castle, Peel (54° 10′ N, 4° 40′ W, Natl Grid Ref SU 242846). Coll 1983 and subm by D Freke, St Patrick's Isle Trust. Comment by A F Roberts, Univ Liverpool.

**170 ± 50**

**BM-2303. Peel Castle** $\delta^{13}C = -20.3‰$

Collagen from human long bone, ref PCB 51.

**150 ± 40**

**BM-2304. Peel Castle** $\delta^{13}C = -21.4‰$

Collagen from human long bone, ref PCB 63.

**630 ± 45**

**BM-2305. Peel Castle** $\delta^{13}C = -19.8‰$

Collagen from human long bone, ref 82-150/A 352.

**730 ± 50**

**BM-2306. Peel Castle** $\delta^{13}C = -20.2‰$

Collagen from human long bone, ref 82-150/A 416.

*General Comment* (AFR): dates are later than expected. BM-2303, -2304 come from area for which there is documentation and oral commun of other use in cal AD 1645 to 1950 (Klein *et al,* 1982). BM-2305, -2306 come from area believed to be pre-Viking, Celtic monastery of 8th century. BM-2305 was overlain by hearth archaeomagnetically dated to ca AD 1150.

*Scotland*

**Strichen series**

Samples from Recumbent Stone Circle at Strichen, Grampian (57° 35′ N, 2° 05′ W, Natl Grid Ref NJ 937545). Coll 1981 and subm by P Abramson, Leeds.

**BM-2315. Strichen** **2150 ± 60** $\delta^{13}C = -27.2‰$

Charcoal, ref 2b/ST81, (*Alnus* sp) id. by Janet Ambers, from bottom of shallow gully inside stone circle, sealed by rubble.

**BM-2316. Strichen** **3090 ± 60** $\delta^{13}C = -25.7‰$

Charcoal, ref 3/ST 81, (*Alnus* sp) id. by Janet Ambers, from bottom of disturbed area containing cremation of adult female, assoc with coarse-fabric sherds.

**BM-2317. Strichen** **2050 ± 80** $\delta^{13}C = -25.5‰$

Charcoal, ref 5 ST/81, (*Alnus* sp) id. by Janet Ambers, from fill of shallow pit regarded as stone hole of prehistoric circle.

*General Comment* (PA): BM-2315 and -2317 are too recent to be regarded as coming from stone circle and must come from later hut circle. BM-2316 is from cremation assoc with stone circle and was probably inserted into bank of circle towards end of period of use.

*Cyprus*

**Lemba Lakkous series**

Samples from occupation site at Lemba Lakkous, 4.5km NNW of Paphos, Paphos dist (34° 50′ N, 32° 20′ E). Coll 1982 and subm by E J Peltenburg, Lemba Archaeol Proj, Cyprus, and Dept Archaeol, Univ Edinburgh, as part of Lemba Archaeol Proj (*cf* Kissonerga Mosphilia, below; Peltenburg, 1985; and BM-1353, -1354, -1473 to -1476, and -1539 to -1543; R, 1982, v 24, p 238–239).

**BM-2278. Lemba Lakkous** **3930 ± 100** $\delta^{13}C = -24.7‰$

Charcoal, from pit M34c.3aF9.

**BM-2280. Lemba Lakkous** **5710 ± 100** $\delta^{13}C = -24.2‰$

Charcoal, from M33d.7–10.

*General Comment* (EJP): by comparison with other late Neolithic dates from Cyprus, BM-2280, which comes from Period 1 context, is too early and may

derive from land clearance. BM-2278 is only date from Period 2 context and cannot be differentiated from late Chalcolithic Period 3 dates.

**4030 ± 110**

**BM-2279. Kissonerga Mosphilia** $\delta^{13}C = -23.0‰$

Charcoal, ref 82.11–12, from destruction debris of Bldg 3.2, Kissonerga Mosphilia, Paphos dist (34° 50′ N, 32° 25′ E). Coll 1982 and subm by E J Peltenburg as part of Lemba Archaeol Proj (*cf* Lemba Lakkous, above, Peltenburg, 1985; and BM-1353, -1354, -1473 to -1476, and -1539 to 1543; R, 1982, v 24, p 238–239). *Comment* (EJP): date confirms comtemporaneity of major occupation with that at nearby Lemba.

**2090 ± 50**

**BM-2294. Kyrenia Ship** $\delta^{13}C = -24.8‰$

Pitch, ref Sample KS A, (probably from Aleppo pine, *Pinus halepensis*), from waterproof lining of late 4th century BC Rhodian amphora from cargo of submerged wreck of Greek merchant ship sunk ca 300 BC 1.6km NE of Kyrenia (35° 20′ N, 33° 20′ E). Coll 1969 (sampled 1982) and subm 1984 by M L Katsev, Inst Nautical Archaeol, Am School Classical Studies, Athens. Date of manufacture and filling of amphora expected to be closely contemporaneous with sinking of ship (see BM-1588, -1588A, -1639, R, 1982, v 24, p 239–240). *Comment* (RB): result agrees statistically with previous dates BM-1588, -1588A (R, 1982, v 24, p 239–240) and P-1621, -1622 (R, 1971, v 13, p 363–364) for wood from ship and almonds from cargo, suggesting pitch sample does not show initial age effect. Calibrated mean date range of 375 BC to AD 25 (Klein *et al,* 1982) agrees broadly with expected historic date of wreck (ca 310 to 300 BC).

*France*

**Les Eyzies series**

Collagen from fragmentary animal bone (probably bison and horse) excavated by R Chappell, Dept Conservation, British Mus, from opposite sides (upper and lower surface) of mass of breccia 30cm thick from floor of Grotte des Eyzies, Les Eyzies, Dordogne (44° 35′ N, 1° 0′ E), representing late Magdalenian occupation debris. Coll ca 1860 by E Lartet and H Christy and subm 1984 by G de G Sieveking, Dept Prehist and Romano-British Antiquities, British Mus, from specimen in British Mus colln since ca 1865 (Lartet & Christy, 1875). Recently, complete separation of components of breccia has revealed engraved bone pieces, antler biserial points, bone needles, and flint artifacts, and faunal analysis, in particular of reindeer bone, has provided detailed evidence of hunting and butchery practices. Samples dated to provide chronol basis for this investigation (Ambers, J & Burleigh, R, Radiocarbon dating of the Magdalenian habitation refuse, *in* Sieveking, G de G, ed, Les Eyzies mon, ms in preparation).

**11,600 ± 380**

**BM-2285. Les Eyzies** $\delta^{13}C = -20.4‰$

Collagen, ref Sample 1(A).

**12,590 ± 980**

**BM-2286. Les Eyzies** $\delta^{13}C = -20.2‰$

Collagen, ref Sample 2(B).

*General Comment* (RB & JA): difference between dates is not statistically significant (large error of BM-2286 arose from small amount of sample available). Mean age of 11,730 ± 350 BP agrees well with other dates for late Magdalenian in Périgord region (*cf* BM-302, 11,750 ± 300 BP, BM-304, 12,070 ± 180 BP, R, 1969, v 11, p 283).

## Montgaudier series

Samples from Palaeolithic occupation of cave complex at Montgaudier (Duport, 1976; 1983), Commune Montbron, near Angoulême, Charente (45° 40′ N, 0° 30′ E). Coll by L Duport, Dept Archaeol, Angoulême and subm by G de G Sieveking, to date assoc works of art, hearths, and habitation levels.

**18,090 ± 650**

**BM-2307. Montgaudier** $\delta^{13}C = -19.6‰$

Collagen from bone fragments, ref Sample 1, from Magdalenian level above Hearth H27/I17 (Duport, 1983). Coll 1980 to 1981.

**11,930 ± 190**

**BM-2308. Montgaudier** $\delta^{13}C = -19.8‰$

Collagen from bone fragments, ref Sample 3, from Loc 12, Layer 2, Sq E′2. Coll 1983.

**14,770 ± 270**

**BM-2309. Montgaudier** $\delta^{13}C = -19.8‰$

Collagen from bone fragments, ref Sample 4, from Loc 12, Layer 2, Sq G2. Coll 1983.

**11,690 ± 170**

**BM-2310. Montgaudier** $\delta^{13}C = -19.4‰$

Collagen from bone fragments, ref Sample 5, from Loc 12, Layer 3, Sounding. Coll 1983.

**20,870 ± 370**

**BM-2311. Montgaudier** $\delta^{13}C = -18.9‰$

Collagen from bone fragments, ref Sample 6, from Loc 12, Level 4, Sq F′2. Coll 1983.

*General Comment* (GdeGS): BM-2307 gives date for level overlying Hearth 27/127, which is regarded as belonging to same strat level as hearth in Sq J.20, although this is some meters away and deposit is not continuous. Thus, date relates to BM-1913 (18,050 ± 230 BP; R, 1983, v 25, p 47) and confirms unexpectedly early date for Sq J.20 hearth and suggests that this and layer dated by BM-2207 antedate classic Magdalenian III-IV occupa-

tion at Montgaudier. Late Magdalenian finds for these deposits can be regarded as intrusive. BM-2208 to -2311 come from Loc 12, strat deposit on terrace outside cave entrance, close to sounding from which BM-1913 was obtained. BM-2308, -2309 and -2311 are in strat order. BM-2308 dates upper part of Layer 2, BM-2309, lower part and BM-2311, Layer 4, lowest part of strat. Determinations confirm strat sequence and suggest cave was used for long period. BM-2310 was from separate sounding in same area. BM-2308 and -2310 can be regarded as late Magdalenian dates and BM-2309 as classic Magdalenian. BM-2311 confirms evidence of BM-1913 that lower part of deposit antedated classic Magdalenian III-IV cultural succession in Charente. Site is in hard water area but pretreatment in acid to extract collagen should have removed any possibility of contamination from dissolved carbonate.

*Iraq*

**2310 ± 80**

**BM-2293. Khirbet Khatuniyeh** $\delta^{13}C = -23.5‰$

Charcoal, ref KK A1, from Tr D1, Level 4, destruction level at Khirbet Khatuniyeh, near Eski Mosul (36° 40′ N, 42° 50′ E). Coll 1984 and subm by J E Curtis, Dept W Asiatic Antiquities, British Mus. *Comment* (JEC): it is clear from assoc material that destruction level at site should be dated either to end of Late Assyrian period (612 BC) or later (550 to 500 BC).

**Abu Salabikh series**

Samples from Early Dynastic tell of Abu Salabikh, Qadisiyyah Governorate (35° 15′ N, 45° 05′ E). Coll 1983 and subm by J N Postgate, Fac Oriental Studies, Univ Cambridge, to supplement dating sequence already established for site (R, 1982, v 24, p 163–164).

**3700 ± 60**

**BM-2328. Abu Salabikh** $\delta^{13}C = -25.4‰$

Charcoal, ref 4J87:108, from burned floor, Phase ½, Rm 28 (see Postgate, 1984, p 98–99 for provenience).

**4090 ± 60**

**BM-2329. Abu Salabikh** $\delta^{13}C = -27.5‰$

Charcoal, ref 6G75:525, from fire installation in W side of Gr 162, Rm 58 (see Postgate, 1984, p 97 for provenience).

**4210 ± 70**

**BM-2330. Abu Salabikh** $\delta^{13}C = -26.6‰$

Charcoal, ref 5I88:11, from remains of roof beam from Rm 192, Sq 5I88 (see Postgate, 1984, p 101–103 for provenience).

*General Comment* (JNP): results conform with chronol order expected on archaeol grounds, also with earlier series: BM-2328 is from context close to BM-1366 (3869 ± 56 BP; R, 1982, p 163), suggesting that beam from which

earlier sample was taken had been in use for some time. Both these contexts should be late Early Dynastic III. BM-2329 should be earlier than BM-1365A to -1365D (R, 1982, p 163) on strat grounds and is therefore satisfactory (ca transition from ED II to ED III). BM-2330 is from ED II house and cal 2650 to 3030 BC (Klein *et al,* 1982) is acceptable.

*Israel*

**Nahal Hemar series**

Samples from early Neolithic levels in cave deposit (Bar-Yosef, 1985, p 8) at Nahal Hemar, ca 10km W of Sodom, Judean Desert (31° 10′ N, 35° 10′ E). Coll 1983 by D Alon and O Bar-Yosef and subm by O Bar-Yosef, Inst Archaeol, Hebrew Univ, Jerusalem, to provide date for very rare occurrence of site with numerous organic remains (wooden beads, baskets, linen textiles, human skulls, animal remains) of Neolithic period of Levant (*cf* Jericho), from which sample of flints recovered was insufficient to establish correlation with Jericho sequence.

**BM-2298. Nahal Hemar** **8250 ± 70**
$\delta^{13}C = -20.9‰$

Charcoal from hearth in Sq F3, Layer 3A.

**BM-2299. Nahal Hemar** **9110 ± 300**
$\delta^{13}C = -23.0‰$

Strings from basketry, from Sq H4C, Layer 4.

**BM-2300. Nahal Hemar** **8690 ± 90**
$\delta^{13}C = -20.4‰$

Strings from Layers 3 and 4.

*General Comment* (OB-Y & RB): results confirm that site is in same range as PPNB of Jericho (9160 to 8450 BP; Burleigh, 1984). BM-2298 agrees with dates of 8100 ± 100 BP (RT-650, unpub) and 8270 ± 80 BP (Pta-3650, unpub) for charcoal from same context (hearth in Layer 3A); BM-2299 agrees with Pta-3625 (unpub), 8850 ± 90 BP for strings from same context (Layer 4).

*Italy*

**Italian prehistory series**

Samples from SE and central Italy subm by R Whitehouse, Univ Lancaster, to establish $^{14}C$ chronology for prehist of area, for which few dates are available.

**Marcianese series**

Samples from early to middle Neolithic village site (Geniola, 1980, 1982) at Marcianese, comune Lanciano, Chieti prov, S Abruzzo (42° 12′ N, 1° 55′ E). Coll 1969 by A Geniola, Inst Civilta Preclassiche, Univ Bari.

**6290 ± 60**

**BM-2250. Marcianese** $\delta^{13}C = -24.7‰$

Charcoal, ref sample 1, from lower levels of main hut excavated.

**6250 ± 90**

**BM-2251. Marcianese** $\delta^{13}C = -24.1‰$

Charcoal, sample 2, from upper levels of main hut.

**6000 ± 110**

**BM-2252. Marcianese** $\delta^{13}C = -19.9‰$

Collagen from human and animal bone, ref sample 3.

*General Comment* (RW): samples were assoc with Impressed Ware, including some with elaborate decoration but no painted pottery was present. Thus, date was tentatively postulated to be in early 7th millennium BP. Instead, dates form very coherent group falling late in range of dates for Impressed Ware generally. They nonetheless fit into range of dates available for earliest Neolithic sites in central E Italy (Pi-101, 6578 ± 135 BP, from Villaggio Leopardi, Pi-46, 6247 ± 130 BP, from Grotta dei Piccioni, R, 1961, v 3, p 100; R-634a, 6580 ± 75 BP, from Maddalena, and R-598, 6210 ± 75 BP, -598a, 6140 ± 70 BP, -599a, 6260 ± 85 BP, from Ripabianca, R, 1970, v 12, p 603).

### Grotta di Cala Scizzo series

Samples from small natural cave (Geniola & Tunzi, 1980) used during late to final Neolithic at Grotta di Cala Scizzo, near Punta della Penna, comune Torre a Mare, Bari prov (41° 5′ N, 4° 30′ E), assoc with cult objects. Coll 1977 by A Geniola.

**4880 ± 210**

**BM-2253. Grotta di Cala Scizzo** *Est* $\delta^{13}C = -19.5‰$

Collagen from animal bone, ref sample 1, from Level I, assoc with late Serra d'Alto and Diana Wares.

**4230 ± 100**

**BM-2254. Grotta di Cala Scizzo** $\delta^{13}C = -18.6‰$

Collagen from animal bone, ref sample 2, from Level II, assoc with Diana and Bellavista wares.

**3190 ± 80**

**BM-2255. Grotta di Cala Scizzo** $\delta^{13}C = -20.6‰$

Collagen from animal bone, ref sample 3, from Level III, assoc with Diana and Bellavista wares.

*General Comment* (RW): of 3 dates from site, only BM-2253 seems acceptable. For further discussion of implications of results, see comment on dates for Grotta 1 di Cala Colombo, BM-2259, -2260, -2301, -2302, below.

**Santa Barbara series**

Samples from artificial rock-cut structure, cut in late Neolithic into side of ditch of earlier Neolithic settlement (Geniola, 1979) at Santa Barbara, comune Polignano a Mare, Bari prov, C Apulia (41° 0′ N, 4° 50′ E). Coll 1975 & 1978 by A Geniola.

**BM-2256. Santa Barbara** **5800 ± 120** $\delta^{13}C = -18.1‰$

Collagen from animal bone, ref sample 1, from Level I.

**BM-2257. Santa Barbara** **5620 ± 130** $\delta^{13}C = -20.9‰$

Collagen from animal bone, ref sample 2, from Level II.

**BM-2258. Santa Barbara** **5720 ± 120** $\delta^{13}C = -20.8‰$

Collagen from animal bone, ref sample 3, from Level III.

*General Comment* (RW): site is clearly of cult significance and contains deer skulls and number of highly decorated painted vessels of Serra d'Alto Ware, which should, on typologic grounds be assigned to early phase of ware, characterized by cups with bold painted designs on belly (Whitehouse, 1969, p 290–292). Dates form tight cluster which seems early for traditional placing of Serra d'Alto Ware in Neolithic sequence, but is in agreement with earlier suggestion (Whitehouse, 1969, p 290–292; 1978, p 81) that first phase of Serra d'Alto Ware was contemporary with Trichrome Wares. Other dates available for Serra d'Alto Ware are R-284, 5555 ± 75 BP, from Grotta della Madonna (R, 1967, v 9, p 355) and Pi-49, 4770 ± 110 BP, from Grotta dei Piccioni (R, 1961, v 3, p 100). R-284 has been regarded as anomalous but in view of new dates it now seems acceptable and that Serra d'Alto painted ware tradition began early in 6th millennium BP. For further discussion of dating of Serra d'Alto Ware, see comment on dates for Grotta 1 di Cala Colombo, BM-2259, -2260, -2301, -2302, below.

**Grotta 1 di Cala Colombo**

Samples from small natural cave used for burials and cult purposes in late to final Neolithic in Grotta 1 di Cala Colombo (Geniola, 1976; De Lucia *et al,* 1977) comune Torre a Mare, Bari prov, C Puglia (41° 5′ N, 4° 30′ E). Coll 1973 by A Geniola.

**BM-2259. Grotta 1 di Cala Colombo** **4070 ± 60** $\delta^{13}C = -19.7‰$

Collagen from animal bone, ref sample 2, from Level I, assoc with 1st use of cave, and with pottery of late Serra d'Alto type and Diana Ware.

**BM-2260. Grotta 1 di Cala Colombo** **4870 ± 90** $\delta^{13}C = -19.6‰$

Collagen from animal bone, ref sample 3, from Levels II to IV, period when cave not in use but assoc with some material from Level 1.

**1180 ± 50**

**BM-2301. Grotta 1 di Cala Colombo** $\delta^{13}C = -18.8‰$

Collagen from animal bone, ref sample 4, from Levels V to VII, assoc with fire in cave and re-use for collective burial of ca 15 individuals with mainly Bellavista type pottery together with some Diana and late Serra d'Alto wares.

**4810 ± 180**

**BM-2302. Grotta 1 di Cala Colombo** $\delta^{13}C = -19.7‰$

Collagen from animal bone, ref sample 5, from Level VII, assoc with collective burial, Bellavista, Diana and Serra d'Alto pottery.

*General Comment* (RW): BM-2301 is clearly anomalous and BM-2259 seems too young. Remaining 2 results, 4870 ± 90 BP (BM-2260) for late Serra d'Alto and Diana Ware and 4810 ± 180 BP (BM-2302) for Bellavista Ware are consistent with other dates for these pottery types. Other dates for Diana Ware come from Grotta della Madonna (R-283, 5110 ± 70 BP; R, 1967, v 9, p 355), Lipari acropolis (R-180, 5000 ± 200 BP; R, 1969, v 11, p 488) and Contrada Diana (R-182, 4885 ± 55 BP; R, 1969, v 11, p 489). Earlier dates for Cala Colombo and Cala Scizzo (*cf* BM-2253, above) are almost identical to date from Contrada Diana. Later date for Bellavista Ware is in accordance with strat and with pottery typology. Most interesting feature of results is indication of long duration of Serra d'Alto Ware, which seems to have lasted from early 6th to early 5th millennium BP, confirming previously doubted evidence from Grotta dei Piccioni (*cf* comment on dates for Santa Barbara, BM-2256 to -2258, above).

*Portugal*

**Segovia series**

Samples from Iron Age hillfort ( Júdice Gamito, 1979, 1981, 1982) at Segovia, near Elvas, Alentejo (40° 0′ N, 7° 0′ W). Coll 1972 and 1982 and subm by Teresa Júdice Gamito, Inst Archaeol, Univ Lisbon.

**2280 ± 45**

**BM-2159. Segovia** $\delta^{13}C = -21.4‰$

Collagen from bone from Layer 5, Sq A1 (corresponding to Layers 6–7 of Sq B), close to interface of N defensive wall of main settlement.

**2410 ± 50**

**BM-2160. Segovia** $\delta^{13}C = -19.0‰$

Collagen from bone from Layer 8, Sq A1, close to interface of N defensive wall of main settlement.

**2140 ± 130**

**BM-2287. Segovia** $\delta^{13}C = -23.7‰$

Charcoal from Area B-111b, Layer 6, Spit 1 underneath large bldg, assoc with pottery.

**BM-2288. Segovia** **1220 ± 110**
$\delta^{13}C = -19.9‰$

Collagen from bone from Sq A1, Layer 4, Spit 1.

**BM-2289. Segovia** **890 ± 60**
$\delta^{13}C = -20.5‰$

Collagen from bone from Sq A1, Layer 5–6, close to N wall.

*General Comment* (TJG): BM-2159 = cal 540–180 BC (Klein *et al;* R, 1982, v 24, p 103–150) which agrees with expected date of 600–400 BC. BM-2160 = cal 700–395 BC which overlaps with expected late Bronze Age/early Iron Age date, 750–700 BC by analogy with Medillin, site close to Segovia in Extremadura, (Almagro Gorbea, 1977), and with similar layers at El Carambolo, Cerro Macareno and Colina de los Quemados in Andalucia (Pellicer Catalan, 1976–78). BM-2287 = cal 530 BC–AD 205 and was assoc with pottery of ca 600–500 BC. Date is acceptable but large error term due to small size of sample limits usefulness. BM-2288 came from Iberian horizon with expected date between 200–400 BC. Cal AD 605–1010 does not agree with expectations but is acceptable for known later use of site and probably reflects later intrusion into Iron Age layers. BM-2289, which was expected to give early Iberian date, probably reflects same re-use of site.

*Spain*

**Ferrandell-Oleza series**

Samples from Beaker settlement site of Ferrandell-Oleza Old Settlement, Valldemosa, Mallorca, Baleares (39° 40′ N, 2° 30′ E). Coll 1984 and subm by W H Waldren, Donald Baden-Powell Quaternary Research Centre, Pitt Rivers Mus, Univ Oxford, and Dir, Deya Archaeol Mus and Research Center, Deya de Mallorca.

**BM-2297. Ferrandell Oleza** **2140 ± 80**
$\delta^{13}C = -24.2‰$

Charcoal from Sec EXW, Quad Q15–16 alongside Water Channel, from level of early Bell Beaker pottery.

**BM-2312. Ferrandell Oleza** **3210 ± 80**
$\delta^{13}C = -19.2‰$

Collagen from fragmentary animal bone, most unid., but including small cow and goat, from beneath Water Channel.

*General Comment* (RB): dates are later than expected (>4000 BP); charcoal probably misassoc.

**BM-2337. Rio Tinto** **2330 ± 80**
$\delta^{13}C = -24.3‰$

Charcoal, ref CL 79 Layer 15, Sample 39, from early mining levels in area T1, at base of Corto Largo sec, Rio Tinto (37° 40′ N, 6° 30′ W), assoc with evidence of metal extraction. Coll 1979 and subm by B Rothenburg, Inst Archaeo-Metallurg Studies, Univ London. Comment by P T Craddock.

*Comment* (PTC); sample is from base of massive continuous layers of slag in central area of ancient smelting, thus dating commencement of large-scale operations at Rio Tinto that were to last for next 6 centuries or so.

## References


Almagro Gorbea, M, 1977, Appendix on C14 date, *in* El Bronce Final y el Periodo Orientalizante en Extremadura: Madrid, Ministeris Culture.

Ambers, J and Burleigh, R, in prep, Radiocarbon dating of the Magdalenian habitation refuse, *in* Sieveking, G de G, Les Eyzies mon, in prep.

Bar-Yosef, O, 1985, A cave in the desert: Nahal Hemar, 9,000-year-old-finds: Jerusalem, Israel Mus.

Bradley, R, 1975, Maumbury Rings, Dorchester: the excavations of 1908–13: Archaeologia, v 105, p 1–97.

Bradley, R, Cleal, J, Gardiner, J, Green, M and Bowden, M, 1984, The Neolithic sequence in Cranborne Chase, *in* Bradley, R and Gardiner, J, eds, Neolithic studies: Oxford, Br Archaeol Repts 133, p 87–105.

Briggs, C S, 1983, Copper mining at Mount Gabriel, Co Cork: Bronze age bonanza or post-famine fiasco?: Prehist Soc Proc, v 49, p 317–334.

Burleigh, R, 1984, Additional radiocarbon dates for Jericho (with an assessment of all the dates obtained), *in* Kenyon, K M and Holland T A, eds, Excavations at Jericho, v 5: London, Br School Archaeol Jerusalem, p 760–765.

Craddock, P T, 1986, Bronze age metallurgy in Britain: Current Archaeol, v 99, p 106–109.

De Lucia, A, Ferri, D, Geniola, A, Giove, C, Maggiore, M, Melone, N, Pesce Delfino, V, Pieri, P and Scattarella, V, 1977, La comunità neolitica di cala Colombo presso Torre a Mare (Bari), *in* Documenti e Monografie 42: Soc Storia Patria Puglia, Bari.

Duport, L, 1976, La grotta de Montgaudier *in* Union Internatl Sci Prehist et Protohist (UISPP) cong, 9th Proc: Livret guide de l'excursion A4 Sud-Ouest (Aquitaine et Charente), p 151–158.

———— 1983, Gravures Magdaleniennes de Montgaudier Commune de Montbron (Charente): Poitiers.

Geniola, A, 1976, La comunità neolitica di Cala Colombo presso Torre a Mare (Bari): Riv Antropol, v 59, p 189–275.

———— 1979, Il neolitico della Puglia settentrionale e centrale, *in* La Publia dal Paleolitico al Tardoromano: Electa, Milano, p 52–93.

———— 1980, Considerazioni conclusive sullo scavo archeologico dell' insediamento neolitici di Marcianese, *in* Convegno sulla Preistoria-Protostoria della Daunia, 2nd, Proc: San Severo, Civica Amministrazione, p 59–67.

———— 1982, Marcianese: Itinerari, Lanciano.

Geniola, A and Tunzi, A M, 1980, Espressioni cultuali e d'arte nella Grotta di cala Scizzo presso Torre a Mare (Bari): Riv Sci Preistoriche, v 35, pt 1–2, p 125–146.

Inman, R, Brown, D R, Goddard, R E and Spratt, D A, 1985, Roxby Iron age settlement and the Iron age in north-east Yorkshire: Prehist Soc Proc, v 51, p 181–214.

Jackson, J S, 1968, Bronze age copper mines on Mount Gabriel, W County Cork, Ireland: Archaeol Austriaca, v 43, p 92–103.

———— 1980, Bronze age copper mining in Counties Cork and Kerry, Ireland, *in* Craddock, P T, ed, Scientific studies in early mining and extractive metallurgy: British Mus Occ paper 20, London, p 9–30.

———— 1984a, Copper mining at Mount Gabriel, Co Cork: Bronze age bonanza or post-famine fiasco? a reply: Prehist Soc Proc, v 50, p 375–377.

———— 1984b, The age of primitive copper mines on Mt Gabriel, West County Cork: Irish Jour Archaeol, v 2, p 41–50.

Jones, M V and Bond, D, 1980, Later Bronze age settlement at Mucking, Essex, *in* Barrett, J and Bradley, R, eds, Settlement and society in the British Later Bronze age: Oxford, Br Archaeol Repts 83.

Júdice Gamito, T, (ms) 1979, Aspects of settlement, economy and society in southern Portugal from 600 BC till the Roman conquest: M Phil dissert, Univ Cambridge.

———— 1981, Resistencia a Roma no Sudoeste Peninsular: Lisbon, Historia.

———— 1982, A Idade do Ferro no sul de Portugal—problemas e prespectivas: Arqueologia, v 6, p 3–16.

Klein, J, Lerman, J C, Damon, P E and Ralph, E K, 1982, Calibration of radiocarbon dates: Tables based on the consensus data of the Workshop on Calibrating the Radiocarbon Time Scale: Radiocarbon, v 24, no. 2, p 103–150.

Lartet, E and Christy, H, 1875, Reliquiae Aquitanicae, being contributions to the archaeology

and palaeontology of Périgord and the adjoining provinces of southern France (1865–1875): London, Williams & Norgate.
Pellicer Catalan, M, 1976–78, Problematica general de los inicios de la iberizacion en Andalucia Occidental: Barcelona, Inst Prehist Arqueol, Mono XLIX.
Peltenburg, E J, 1985, Lemba archaeological project Cyprus 1983: Preliminary report: Levant, v XVII, p 53–64.
Pitt Rivers, A, 1898, Excavations in Cranborne Chase, v 4: London, privately printed.
Postgate, J N, 1984, Excavations at Abu Salabikh, 1983: Iraq, v 46, 95–113.
Stuiver, M and Polach, H A, 1977, Discussion: Reporting of $^{14}C$ data: Radiocarbon, v 19, no. 3, p 355–363.
Wainwright, G, 1979, Mount Pleasant, Dorset: Excavations 1970–71: London, Soc Antiquaries.
Ward Perkins, J B, 1944, Excavations on the Iron age hillfort of Oldbury, near Ightham, Kent: Archaeologia, v 49, p 127–176.
Whitehouse, R, 1969, The Neolithic pottery sequence in southern Italy: Prehist Soc Proc, v 35, p 267–310.
———— 1978, Italian prehistory, carbon 14 and the tree-ring calibration, *in* Blake, H McK, Potter, T W and Whitehouse, D B, eds, Papers in Italian archaeology I: Oxford, Br Archaeol Repts, S 41, p 71–91.