

UNIVERSITY OF GRANADA RADIOCARBON DATES V

CECILIO GONZALEZ-GOMEZ and PURIFICACION SANCHEZ-SANCHEZ

Laboratorio de Datación por Carbono-14 and Instituto Andaluz de Geología Mediterránea (IAGM) del CSIC, Facultad de Ciencias, Universidad de Granada, E-18071 Granada, Spain

INTRODUCTION

This paper includes some determinations of archaeological, art and palaeobotanical samples from Spain and Portugal, obtained at the University of Granada Radiocarbon Dating Laboratory, mostly from 1986 to 1988. Pretreatment of charcoal and wood samples is a standard acid-basic procedure using 8% HCl and 2% NaOH at boiling temperature. The collagen of bone samples is obtained by the Longin (1971) method.

The method of dating is benzene synthesis and liquid scintillation counting as previously reported (González-Gómez, López-González & Domingo-García 1982; González-Gómez, Sánchez-Sánchez and Domingo-García 1985; González-Gómez, Sánchez-Sánchez and Villafranca-Sánchez 1986, 1987). ^{14}C activity was measured in a Packard Tri-Carb Mod 4640 liquid scintillation spectrometer, using 20 ml low ^{40}K counting vials with 5 ml benzene and 10 ml PPO-toluene as scintillator with a background of *ca.* 9 cpm. Efficiency was approximately 70% using the part of spectrum above the end point of tritium.

Dates reported here are based on 0.95 of the activity of NBS oxalic acid modern standard and the Libby ^{14}C half-life of 5568 years. Samples were measured for 100 minutes repeating 30–40 times, as well as background and standard vials. The standard deviation quoted includes only 1 σ of the counting statistics of background, sample and modern standard counts. Calculations and data are processed by a PC computer, using extended programs made by González-Gómez (Computer-extended programs for radiocarbon dating laboratories, ms. in preparation). Calibrated ages for a 2 σ interval, are obtained by the method of Pearson *et al.* (1986), running the computer programs CALIB (Stuiver & Reimer 1986) and CALI (González-Gómez, CALI, a computer program for calibration of radiocarbon dates, ms. in preparation) using the bidecadal curve for atmospheric origin samples. $\delta^{13}\text{C}$ corrections are based on data reported by Stuiver and Polach (1977).

Sample descriptions are based on information supplied by those who submitted samples.

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ARCHAEOLOGICAL SAMPLES

Spain

El Acequión series

Samples from El Acequión (39°01'N, 2°01'W), Albacete. Coll. 1985–1986 and subm. 1987 by M. D. Fernández-Posse and C. Martín-Morales, Ministry of Cultura, Madrid, to date Bronze Age in E La Mancha.

UGRA-265. AC-786-24a	3770 ± 80
Charcoal from depth 1.86 m; cal. B.C. 2460–1970.	
UGRA-266. AC-786-24b	3680 ± 80
Charcoal from depth 1.86 m; cal. B.C. 2320–1880.	
UGRA-271. AC-786-24c	3730 ± 100
Charcoal from depth 1.86 m; cal. B.C. 2460–1890.	
UGRA-302. AC-285-40	5010 ± 150
Charcoal from depth 1.42 m; cal. B.C. 4224–3386.	
UGRA-304. AC-286-71	3790 ± 120
Charcoal from depth 2.52 m; cal. B.C. 2577–1890.	
UGRA-307. AC-285-4	3020 ± 90
Charcoal from depth 0.80 m; cal. B.C. 1509–1000.	
UGRA-309. AC-785-8	2990 ± 90
Charcoal from depth 0.80 m; cal. B.C. 1440–942.	

General Comment: dates agree with archaeol. expectation, in study of last stage of occupation of site.

Cabezo del Cuervo series

Samples from Cabezo del Cuervo (41°03'N, 0°08'W), Alcañiz, Teruel prov. Coll. 1982 by J. Vicente-Redón and subm. 1984 by P. Atrián-Jordán, Mus. Archaeol. Teruel, to date different cultural levels in middle valley of Ebro River.

UGRA-215. No. 23	3410 ± 90
Wood from depth 1.20 m; cal. B.C. 1950–1520.	
UGRA-216. No. 37	3450 ± 90
Wood from depth 1.50 m; cal. B.C. 2028–1530.	
UGRA-228. No. 15	3320 ± 90
Wood from depth 0.70 m; cal. B.C. 1878–1420.	
UGRA-229. No. 53	3420 ± 90
Wood from depth 2.37 m; cal. B.C. 1960–1520.	

UGRA-230. No. 47 **3220 ± 90**

Wood from depth 1.75 m; cal. B.C. 1734–1310.

UGRA-239. No. 6 **3340 ± 90**

Wood from depth 0.63 m; cal. B.C. 1880–1430.

UGRA-240. No. 31 **3340 ± 130**

Wood from depth 1.35 m; cal. B.C. 1960–1328.

UGRA-269. No. 44 **3230 ± 80**

Wood from depth 1.72 m; cal. B.C. 1731–1324.

General Comment: dates agree with archaeol. expectation.

El Castillo de Burgos series

Samples from El Castillo de Burgos (Burgos Castle) (42°20'N, 3°43'W). Coll. 1985 by J. M. Martínez-González and subm. 1985 by J. L. de Uribarri-Angulo to date cultural stages at end of Bronze Age and first Iron Age.

UGRA-226. No. 9 Nivel XII **2900 ± 100**

Charcoal from depth 2.08 m; cal. B.C. 1410–840.

UGRA-227. SII-NI-M1 **2710 ± 80**

Seeds from depth 1.52 m; cal. B.C. 1040–790.

General Comment: expected age was *ca.* 2720 ± 250 B.P.

Cerrillo Blanco

Charcoal from Cerrillo Blanco (37°52' N, 4°11'W), Porcuna, Jaén prov. Interlaboratory check sample subm. 1988 by Barcelona Radiocarbon Dating Laboratory.

UGRA-280. MIP IAB-58/59 **2530 ± 80**

Comment: UBAR date was 2650 ± 90; cal. B.C. 830–400.

Cerro de la Mora

Sample from Cerro de la Mora (37°14'N, 3°59'W), Moraleda de Zafayona, Granada prov. Charcoal from depth 4 m coll. and subm. by J. Carrasco-Rús to date end of Bronze Age in an Argaric-type fortification. Other samples from Cerro de la Mora were dated previously by González-Gómez, Sánchez-Sánchez and Domingo-García (1985: 611), González-Gómez, Sánchez-Sánchez and Villafranca-Sánchez (1986: 1201, 1987: 384).

UGRA-283. Cm/87/Fondo **3030 ± 80**

Comment: date agrees with expected age; cal. B.C. 1495–1030.

Dolmen de Azután

Bones from Dolmen de Azután (39°45'N, 5°10'W), Azután, Puente del Arzobispo, Toledo prov. Sample from 1.70 m depth coll. 1983 and subm. 1985 by P. Bueno-Ramírez, Dept. Prehist., Univ. Alcalá de Henares, Madrid prov., to date megalithic chronology in Meseta.

UGRA-288. AZUTAN **5060 ± 90**

Comment: expected age was *ca.* 4800 ± 150 B.P.; cal. B.C. 4038–3690.

Ermita de San Fructuoso

Sample from Ermita de San Fructuoso (43°14'N, 4°17'W), La Miña, Ruate, Cantabria. Charcoal from 0.70 m depth coll. 1985 by E. van den Eynde Ceruti and subm. 1985 by M. A. García-Guinea, Mus. Reg. Prehist. & Archaeol. Santander. This date is important for correct interpretation of site.

UGRA-270. CIT 2 **1090 ± 80**

Comment: expected age was *ca.* 1010 ± 350 B.P.; cal. A.D. 770–1113.

Les Grioterres

Sample from Les Grioterres (41°58'N, 2°23'E), Vilanova de Sau, Barcelona prov. Charcoal from 1.70 m depth coll. 1985 and subm. 1986 by J. Castany-Llussa, Inst. Prehist. & Archaeol. Univ. Barcelona, to date first human occupation of site in Neolithic period.

UGRA-274. G-N 7 **5280 ± 90**

Comment: expected age was *ca.* 5210 ± 250 B.P.; cal. B.C. 4340–3825.

Los Panizales

Sample from Los Panizales (41°02'N, 0°09'W), Alcañiz, Teruel prov. Charcoal from 0.25 m depth coll. and subm. 1987 by J. A. Benavente-Serrano, Taller Arqueol Alcañiz. Sample from inner part of probable tumulus close to surficial lithic bed. Relation between both is doubtful. End of Neolithic period.

UGRA-299. P-1 **2310 ± 90**

Comment: cal. B.C. 763–180.

*Portugal***Alto do Castelo**

Wood from Alto do Castelo (39°15'N, 8°35'W), Alpiarça, Santarém prov. Sample coll. 1982 by P. Kalb and subm. 1987 as interlaboratory comparison sample by the Lisbon Radiocarbon Dating Laboratory.

UGRA-281. AC-466 **2020 ± 80**

Comment: ICEN-122: 2120 ± 70 B.P.; cal. B.C. 340 – cal. A.D. 130.

Barrocal. Alto series

Charcoal from Barrocal Alto (41°16'N, 6°33'W), Peredo da Bemposta, Mogadouro, Tras Os Montes prov. Coll. 1984 by M. de Jesus Sanches, A. Barroso, V. Lopes and A. Gomes-Sebre and subm. 1984 by M. de Jesus Sanches, Porto Archaeol. Study Group, to date prehistoric village.

UGRA-223. 1/BA-84/S-II/T.26-L **3230 ± 100**

Comment: expected age was *ca.* 3200 ± 250 B.P.; cal. B.C. 1740–1310.

UGRA-272. 2/BA-84/S-II/U.26 **2050 ± 100**

Cal. B.C. 370 – cal. AD 130.

Comment: age is younger than expected – 3200 ± 250 B.P.

UGRA-273. 3/BA-84/S-II/X.22 **6950 ± 90**

Sample from depth 0.65 m; cal. B.C. 6034–5630.

Comment: age is older than expected – 3450 ± 300 B.P.

Castro do Coto da Pena series

Seeds from Castro do Coto da Pena (41°52'N, 8°50'W), Vilarelho, Caminha, Viana do Castelo prov. Samples coll. 1983 and subm. 1984 by A. Coelho Ferreira da Silva, Univ. do Porto, to date last occupation of site at end of Bronze Age.

UGRA-200. No. 5 **2950 ± 100**

Cal. B.C. 1430–900.

UGRA-220. No. 2 **2920 ± 110**

Sample from depth 1.80 m; cal. B.C. 1420–840.

General Comment: dates agree with archaeol. expectation that confirm age of occupation of bottom stratum of site.

Mamoá do Monte da Olheira

Charcoal from Mamoá do Monte da Olheira (41°12'N, 8°02'W), Serra da Aboboreira, Baião, Dist. do Porto, Douro Litoral prov. Sample from depth 0.53 m, coll. 1981 and subm. 1987 by D. de Jesus da Cruz, to date megalithic necropolis with 40 tombs in region.

UGRA-287. Amostra no. 1 **5630 ± 90**

Comment: expected age was *ca.* 4960 ± 500 B.P.; cal. B.C. 4720–4340.

Povoado Pre-Historico da Lavra

Samples from Povoado Pre-Historico da Lavra (41°10'N, 8°04'W), Lavra, Marco de Cavanese, Soalhaês prov. Coll. 1982 and subm. 1984 by M. de Jesus Sanches to date village.

UGRA-267. 1-LA.82/E.C.3 **5830 ± 90**

Charcoal to date village; cal. B.C. 4936–4490.

UGRA-268. 2-LA.82/F.4 **7500 ± 100**

Charcoal to date silo or cave; cal. B.C. 6558–6110.

General Comment: expected ages were 3700 ± 250 B.P. for both samples.

ART SAMPLES

Spain

UGRA-67. **480 ± 90**

Wood from statue of St. Anthony the Abbot; expected age was *ca.* 15th century A.D. Sample subm. by P. Gómez-Acha, Granada.

UGRA-141. **290 ± 90**

Wood from rear side of picture on plank; expected age was *ca.* 17th century A.D. Sample subm. 1983 by J. J. Pons-Marco, Castellón de la Plana.

UGRA-219. **410 ± 90**

Wood from rear side of St. Andrew picture on plank; expected age was *ca.* 14th century A.D. Sample subm. 1985 by J. L. Vílchez-Quero and J. Torres-Garzón, Granada.

PALAEOBOTANICAL SAMPLES

Spain

Barrio de San Miguel series

Samples from Cerro de San Miguel (43°21'N, 1°48'W), Anzarán, Irún, Guipúzcoa prov. Coll. and subm. 1987 by J. M. Edeso-Fito and F. M. Ugarte-Elorza, Soc. Ciencias Aranzadi, Mus. S Telmo, San Sebastián, to date Quaternary littoral paleogeographic evolution on coast of Gulf of Vizcaya (Quipuzcoan sector).

UGRA-294. A3. 0.85m. (C1) **>45,000**

Charcoal from depth 4.05 m.

UGRA-301. Ao. 0.30m. (C4) **38,300 ± 2100**

Charcoal from depth 3.20 m.

Maxalen Berri

Sample from Maxalen Berri (43°08'N, 1°51'W), Oyarzum, Guipuzcoa prov. Coll. and subm. 1987 by J. M. Edeso-Fito and F. M. Ugarte-Elorza, Soc. Ciencias Aranzadi, Mus. S Telmo, San

Sebastián, to date Quaternary evolution in Oyarzum River valley.

UGRA-300. OYA-1 **2550 ± 90**

Wood from depth 2.00 m; cal. B.C. 900–400.

Sopelana

Sample from Sopelana (43°23'N, 3°00'W), Sopela, Vizcaya prov. Coll. and subm. 1987 by F. M. Ugarte-Elorza to date Würm and Holocene evolution of paleolandscape on Vizcaya coast.

UGRA-293. Sop-1 **41,400 ± 2500**

Wood from depth 3.00 m.

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