

Knucklebones and other animal deposits in the “Cruz del Negro” necropolis: Possible Phoenician funerary rituals in SW Spain?

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Bernaldez-Sánchez E., García-Viñas E., Gamero-Esteban M., Amores-Carredano F. & Ocaña-García De Veas A. — Knucklebones and other animal deposits in the “Cruz del Negro” necropolis: Possible Phoenician funerary rituals in SW Spain? *Anthropozoologica* 48 (2): 323-340. <http://dx.doi.org/10.5252/az2013n2a10>

ABSTRACT

The “Cruz del Negro” necropolis in Carmona (Seville) is part of an archaeological site considered by some authors to be a Phoenician settlement. Findings from the paleobiological and taphonomic study conducted on the grave goods found

KEY WORDS

Necropolis,
Knucklebones,
Phoenicians,
Iberian Peninsula,
Paleobiology,
Taphonomy.

in 38 funerary structures provide possible evidence to support this theory (along with other archaeological objects found there). Analysis of the animal remains found indicates three kinds of grave goods according to the animal species and anatomical parts offered, and points to a series of markers observed in other older sites located in the Mediterranean Basin which indicate the possible eastern origin of the funerary rituals practiced in “Cruz del Negro”. Of the 602 remains analysed, this study highlights the presence of 307 caprine (Caprinae) knucklebones in 15 of the 38 structures studied. Most of them are thermo-altered and highly polished, a practice originally found in Bronze Age sites in the Near East.

RÉSUMÉ

Astragales et autres dépôts animaux dans la nécropole «Cruz del Negro»: serait-on face à des rites funéraires phéniciens dans le Sud-ouest de l'Espagne?

La nécropole de la « Cruz del Negro » de Carmona (Séville) fait partie d'une zone archéologique considérée par quelques auteurs comme une colonie phénicienne. Les résultats de l'étude paléobiologique et taphonomique du mobilier de 38 structures funéraires montrent quelques indices qui pourraient renforcer cette hypothèse. La composition des lots de faune permet de distinguer trois types de mobiliers funéraires en fonction des espèces animales et des parties anatomiques représentées et de sélectionner une série de marques déjà observées sur d'autres sites archéologiques plus anciens du Bassin méditerranéen, laissant supposer une origine orientale des rites funéraires pratiqués dans « la Cruz del Negro ». Sur les 602 restes analysés, nous mettons en relief dans cette étude la présence de 307 astragales de caprinés (Caprinae) provenant de 15 des 38 structures funéraires étudiées. La plupart d'entre eux présentent des traces d'altération thermique et des marques de polissage, modifications qui peuvent être rapprochées de celles observées sur des sites de l'Âge du Bronze du Proche-Orient.

MOTS CLÉS

nécropole,
astragales,
phéniciens,
péninsule ibérique,
paléobiologie,
taphonomie.

INTRODUCTION

During the various archaeological digs carried out in the Iron Age necropolis (8th-4th centuries BC) of “Cruz del Negro” (Carmona, Seville), archaeologists found animal deposits in the excavated tombs (Amores & Fernández 2000; Amores *et al.* 1997, 1999, 2001; Figs 1 & 2; Table 1). This archaeological site is considered by some authors to be a Phoenician settlement (Aubert 2009; Belén *et al.* 1997). Some of these bone offerings have not been recorded in older burials sites in the South of the Iberian Peninsula (Belén *et al.* 2000; Bernáldez 2009; Bernáldez & Bernáldez 2005). Phalanges and carved long bones from horses (*Equus caballus*), red deer (*Cervus elaphus*), boars (*Sus scrofa*) and caprine (*Caprinae*) species have been found in the Copper Age tombs of this region, whereas in Bronze Age graves, the animal bones correspond to anatomical

parts with *low meat yield*¹ such as the mandibles, the distal end of limbs or fragments of other anatomical parts taken from the cutting up of livestock species. At this Iron Age site, as well as finding graves with fragments of bones bearing butchery cuts, there are also structures where the knucklebones of caprine have been deposited, with the exception of one red deer knucklebone, with clear marks of polishing and thermo-alteration which had not been found in other earlier Iberian sites.

Knucklebones have been used as a game, in the divinatory arts and in funerary rituals by different cultures for over 5500 years (Cintas 1947; Holmgren 2002), a custom that, according to Buela (2005), has been practiced by numerous cultures throughout the course of history and up to the present day.

1. Anatomical parts with low meat yield are the parts where the weight of the bones is greater than the weight of meat (Bernáldez 2009).

In Spain and South America, at least, it is still a game that in some places, such as Cuzco (Peru), is played at burials as a way of helping the soul of the deceased to ascend to heaven (Buela 2005).

According to Minniti and Peyronel (2005) deposits of knucklebones in archaeological sites are a marker of Near East cultures. The first accumulations of knucklebones in sacred and funerary contexts are relatively common in sites dating from the Bronze Age up to the Roman period in Sicily, Anatolia, Syria, Palestine, Cyprus and the Aegean (Gilmour 1997; Minniti & Peyronel 2005; Pau 2007; Riedel & Tecchiati, 2001; Russel *et al.* 2009; Sasson 2000), whereas in the western area of the Mediterranean Basin, markers of this ritual are not observed until the 8th Century BC on the Iberian Peninsula, specifically in “Cruz del Negro” (Carmona, Seville), and, a little later, in Algeria and Tunisia (7th Century BC to 2nd Century AD; Belén 1982; Chapa *et al.* 1991; Corzo 1992; Figueras 1952; García *et al.* 1999; Iborra 2004; Izquierdo 1999; Jiménez 2005; Lorrio 1997; Madrigal *et al.* 2010; Morales *et al.* 1983; Oliver 1996; Pajuelo & López 2010; Schattner & San Martin 2006; Torres 1999).

Although the presence of manipulated knucklebones might be sufficient to demonstrate the origin of this Phoenician ritual, a better description of the biometric and taphonomic characteristics of the knucklebones could help to define patterns of funerary ethology with a higher number of markers and ascertain whether this eastern custom was maintained in other parts of the Mediterranean or whether it was subject to change. By finding Phoenician funerary markers and patterns, the aim is to measure the preservation of funerary customs from eastern cultures over the course of their geographic expansion.

METHODOLOGY

The animal bones found in 38 tombs in “Cruz del Negro” were analysed. An initial review revealed the poor state of preservation of most of the remains, almost all of which bore signs of cremation (Denys 2002). To conduct a biological analysis of the bones, they were cleaned with 96% ethanol, avoiding alter-



FIG. 1. — The “Cruz del Negro” necropolis is located in the SW of the Iberian Peninsula (Carmona, Seville). The archaeological site is located within the square: Google-maps, Pérez & Amores (1998).

ing the humidity of the pieces as far as possible. The worst conserved samples were consolidated using a cyanoacrylate adhesive and the most breakable bones were restored using a 20% paraloid solution (Collins 1995; Rosas *et al.* 2005; Fig. 3).

For the purposes of anatomical and species determination, the reference collection from the IAPH Paleobiology Laboratory and specialist bibliographic sources were used (Barone 1999; Boessneck, 1969; Schmidt 1972; Wilkens 2003; Zeder & Pilaar 2010). As accumulation variables, the Number of Elements (NE) and the Minimum Number of Individuals (MNI) were used, both of which were necessary to estimate the level of conservation of the skeletons using the Skeletal Conservation Index or percentage of bones conserved in reference to the total number of bones of the skeleton (SCI)¹ of each species (Bernáldez 2002, 2009, 2011). The age of the sacrificed specimens was estimated using the degree of epi-

Chronology	8th B.C.	7th B.C.	6th B.C.	5th B.C.	4th B.C.	
Structures	148, 179	1, 20, 38, 42, 44, 54, 59, 70, 90, 99, 100, 102, 107, 140		97		
		19, 57, 91, 98, 123, 204				
		60				
		105				

FIG. 2. — Chronology of the 25 structures excavated at the “Cruz del Negro” necropolis. The majority of these structures date between the 8th and 7th Centuries BC, 13 structures could not be dated.

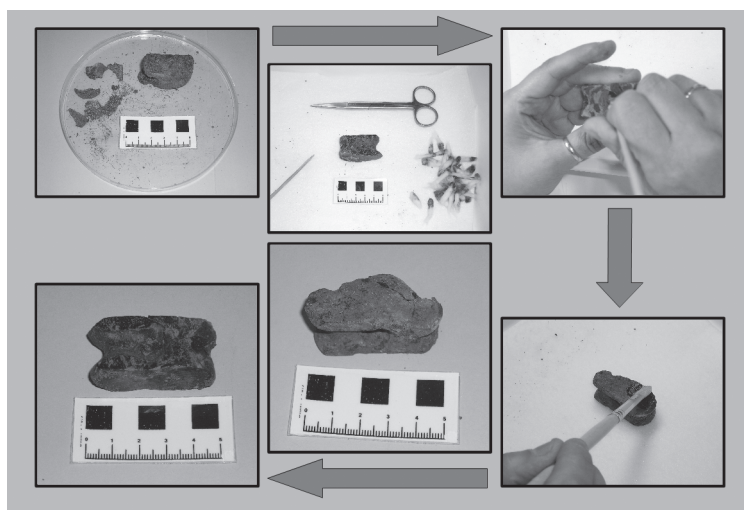


FIG. 3. — Owing to the poor state of conservation of some of the bones, ethanol (96%) was used to clean the samples, and cyanoacrylate adhesive and paraloid to restore and consolidate the most fragile bones. The figure shows the steps taken during the restoration of a polished and thermo-altered red deer knucklebone.

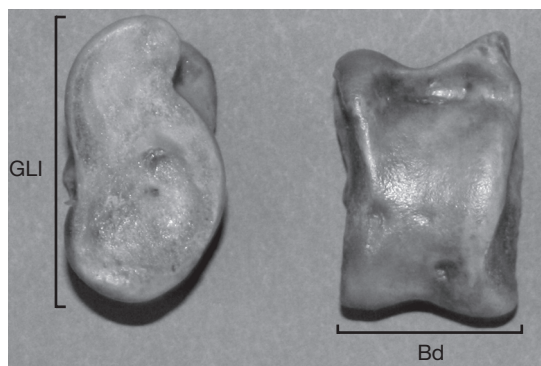


FIG. 4. — Biometry of the knucklebones following von den Driesch (1976). Abbreviations: **Bd**, distal width ; **GLI**, side length.

physeal fusion and dental development (Barone 1999; Schmidt 1972).

As mentioned previously, the aim of this study was to ascertain possible funerary patterns comparable to those observed in sites in the Near East. To do this, the tombs were classified according to the species and anatomical parts offered, taking into account the different levels of preservation. Among the taphonomic aspects, markers of human activity were described, produced by cuts, polishing and thermo-alteration; distinguishing between non-burned, carbonised and calcined bones in accordance with Etxeberria (1994) and Nicholson (1994).

As for the sets of caprine knucklebones, in addition to the taphonomic study of usage markers,

TABLE 1. — General description of the structures studied in the “Cruz del Negro” archaeological site. Abbreviations: Indet., Indeterminate.

Structure	Century (B.C.)	Campaign	Shape	Cardinal direction	Function of the structure	Human remains	
						Gender	Age (years)
1	7 th	1990	Circular hole	-	Tomb	Indet.	20-30 (remains in a container)
19	8 th -7 th	1990	Adobe wall	-	Adobe wall	Indet.	Indet
20	7 th (1 st ½)	1990	Pear-shaped hole	E-W	Tomb	Indet.	20-30
23	-	1990	Rectangular grave with curved head	-	Grave-burned	Indet.	20-30
38	7 th (2 nd ½)	1990	Spindle-shaped/Circular	NE-SW	Bustum	-	-
42	7 th (2 nd ½)	1990	Rectangular/Circular	NE-SW	Bustum	Female	30-40 (remains in a container)
44	7 th (2 nd ½)	1990	Egg-shaped/Circular	NE-SW	Bustum	Indet.	20-30
54	7 th (1 st ½)	1990	Spindle-shaped grave	NE-SW	Grave-burned	Indet.	20-30
57	8 th -7 th	1990	Rectangular grave with curved head	NE-SW	Grave-burned	Male / Indet.	0-6 months / Indet
59	7 th	1990	Rectangular grave	E-W	Grave-burned	Indet.	0-6
60	7 th -6 th	1990	Spindle-shaped/Pear-shaped	NE-SW	Bustum	Indet.	Indet
61	-	1990	Rectangular grave	NE-SW	Ustrinum	Indet.	Indet
68	-	1990	Rectangular grave	NE-SW	Ustrinum	Indet.	Indet
70	7 th (2 nd ½)	1993/95	Rectangular grave	NE-SW	Grave-burned	Indet.	14-20
71	-	1990	Rectangular grave	NE-SW	Grave-burned	Indet.	20-40
72	-	1993	Rectangular grave	NE-SW	Ustrinum	-	-
75-76	-	1993	Egg-shaped grave	NE-SW	Ustrinum	-	-
81-142?	-	1993	Two egg-shaped graves	NE-SW/E-W	-	Male / -	14-30 / -
90	7 th (2 nd ½)	1993	Rectangular grave	E-W	Grave-burned	Indet.	6-14
91	8 th -7 th	1995	Rectangular grave	E-W	Grave-burned	Male?	14-20
97	5 th -4 th	1995	Egg-shaped grave	E-W	Grave-burned	Indet	20-30
98	8 th -7 th	1995	Rectangular grave	-	Grave-burned	Indet	14-30
99	7 th (2 nd ½)	1995	Spindle-shaped grave	NE-SW	Grave-burned	Female	20-30
100	7 th	1995	Rectangular grave	E-W	Grave-burned	Indet	6-14
102	7 th (1 st ½)	1995	Egg-shaped grave	NE-SW	Grave-burned	Female	14-30
105	8 th -6 th	1995	Rectangular grave with curved head	E-W	Grave-burned	Indet	6-30
107	7 th ?	1990	Spindle-shaped grave	NE-SW	Grave-burned	Indet	30-40
116	-	1990	Rectangular grave	NE-SW	Grave-burned	Indet	6-30
123	8 th -7 th	1995	Pear-shaped hole	E-W	Tomb	Male	20-30
138	-	1993	Rectangular grave	E-W	Ustrinum	-	-
140	7 th (1 st ½)	1993	Monument	-	Adobe wall	Indet	Indet
148	8 th (2 nd ½)	1990	Rectangular grave with curved head	NE-SW	Grave-burned	Indet	20-30
164	-	1993	Adobe wall	-	Adobe wall	-	-
179	8 th (2 nd ½)	1990	Rectangular/Circular	E-W	Ustrinum	-	-
195	-	1997	Monument	-	Adobe wall	Indet	12-30
197-3	-	-	Circular hole	-	Tomb	Indet	Indeterminate
202	-	1998	Rectangular grave	NE-SW	Grave-burned	Indet	Indeterminate
204	8 th -7 th	1993	Egg-shaped grave	NE-SW	Grave-burned	Indet	6-14

comparative biometric analysis was conducted of the zoological group² between specimens from the “Caura” Iron Age site (Escacena & Izquierdo

2. We are currently developing the research project to link the morpho-biometrics of goats and sheep with the genetic determination of the species in order to minimise the difficulties differentiating between the two species, using several dozen breeds on the Iberian Peninsula.

1999), one from the “La Gallega” Copper Age site (Martín & Ruiz 1992), and current sheep (*Ovis aries*) (males with six months) from the Sierra de Cádiz mountains, all from the same region of Andalusia. The biometric analysis was completed with the measurements taken from the sheep found in the “Tell Mardikh-Ebla” Bronze Age site in the Middle East (Minniti & Peyronel 2005). The size variables selected for this study were side

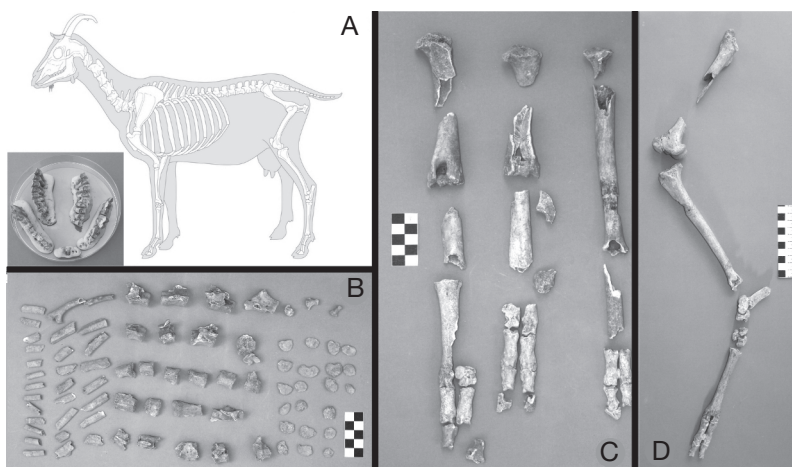


FIG. 5. — Structure 57 contained an almost complete skeleton of a goat: **A**, Image of the dental pieces of the mandible and maxilla; **B**, vertebra and ribs, at least three caudal vertebra; **C**, bones from the forelimbs and from one hind limbs; **D**, bones from the other hind limb, almost complete.

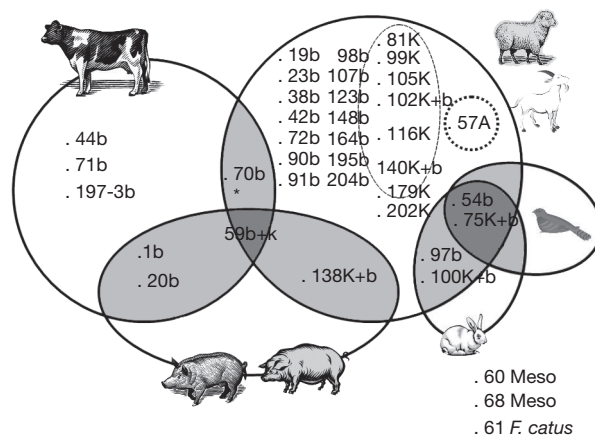


FIG. 6. — Animal associations studied in the structures of the “Cruz del Negro” archaeological site. The bones are shown to belong to the Caprinae Subfamily. Three types of offerings have been defined on the basis of the paleobiological study: series of remains from human consumption (**b**), set of offerings with a recreational or magical function (**K**) and mixed offerings (**K + b**). Abbreviations: **A**, complete goat; **b**, bones; **K**, knuckle-bones. *In this structure, the remains of an indeterminate micro-vertebrate were also found.

length (GLI) and distal width (Bd) following von den Driesch (1976; Fig. 4). Comparative analysis was conducted using ANOVA³ and Scheffé tests (software SPSS 14.0).

3. Previously, Normality was confirmed (Kolmogorov-Smirnof and Shapiro-Wilk tests) along with Homoscedasticity (Levene test),

RESULTS AND DISCUSSION

In the 38 structures studied, 602 bone elements were recorded from a minimum of 169 specimens

two essential conditions required when carrying out the ANOVA test (Milton 2007)

TABLE 2. — Animal remains studied in the "Cruz del Negro" necropolis. The Caprinae Subfamily is the most strongly represented in NE and MNI. Notice the abundance of caprine knucklebones, 307, in addition to the knucklebone of a red deer. Legend: NE = Number of Elements; MNI = Minimal Number of Individuals Table 3. — Knucklebones located in the structures of "Cruz del Negro". Most of them are thermo-altered. Abbreviations: CARB, carbonised; CAL, calcined; N, not polished; NO, unburned; Y, polished.

Structure	Century (B.C.)	Ovis or Capra		Bos taurus		Sus scrofa		Cervus elaphus		Felis catus		Birds		Orycto. cuniculus		micro		meso		Summatory		
		Knuckle-bones	NE	MNI	NE	MNI	NE	MNI	Knuckle-bones	MNI	NE	MNI	NE	MNI	NE	MNI	NE	MNI	NE	MNI	NE	MNI
1	7th				6	1	5	1											1		12	2
19	8th-7th	6	2																		6	2
20	7th (1st ½)				1	1	1	1										1			3	2
23	-	8	1																		8	1
38	7th (2nd ½)	7	1																		7	1
42	7th (2nd ½)	4	1																		4	1
44	7th (2nd ½)				1	1															1	1
54	7th (1st ½)	4	2									3	1	2	1			5			14	4
57	8th-7th	133	1																		133	1
59	7th	1	1	1	2	1	1	1													5	3
60	7th-6th																	6	1		6	1
61	-									1	1										1	1
68	-																			2	1	2
70	7th (2nd ½)	12	1		1	1										17	1	3	1		33	4
71	-				2	1															2	1
72	-	3	1																		3	1
75-76	-	1	1									1	1	14	1						16	3
81-142?	-	2	1																		2	1
90	7th (2nd ½)	2	1																		2	1
91	8th-7th	6	1																		6	1
97	5th-4th	5	1											1	1						6	2
98	8th-7th	1	1																		1	1
99	7th (2nd ½)	1	1																		1	1
100	7th	210	2	67											2	1			1		215	68
102	7th (1st ½)	1	1	2																	2	2
105	8th-6th	1	1																		1	1
107	7th ?	1	1																		1	1
116	-	22	15																		22	15
123	8th-7th	1	1																		1	1
138	-	1	1				1	1													2	2
140	7th (1st ½)	4	1	4															1		6	4
148	8th (2nd ½)	1	1																		1	1
164	-	3	1																		3	1
179	8th (2nd ½)	1	1																		1	1
195	-	2	1																2		4	1
197-3	-				1	1															1	1
202	-	62	31						1	1											63	32
204	8th-7th	5	1																		5	1
Total		307	209	146	14	7	8	4	1	1	1	1	4	2	19	4	17	1	22	3	602	169

belonging to 10 species: seven cows (*Bos taurus*), one red deer (*Cervus elaphus*), four pigs/boars (*Sus scrofa*), 146 goats/sheep (*Capra hircus/Ovis aries*), one cat (*Felis catus*), four rabbits (*Oryctolagus cuniculus*), two undetermined species of bird, 3 meso-

ungulates and one micro-vertebrate (Table 2). The 21 fragments of meso-ungulates and the 17 from microfauna could not be determined owing to their poor state of preservation (thermo-alterations). 90% of the bones and 95.71% of the specimens



FIG. 7. — One type of offering was made up of remains from human consumption. They were mainly bones that yielded little meat. For example, this image shows a *Sus scrofa* mandible, a fragment of a *Bos taurus* radius and three phalanges from the same leg of a caprine. Most of the cattle and pig remains did not present thermo-alterations.

conserved belonged to cows, red deer, pigs/boars, goats and sheep.

The caprine group is the most strongly represented animal group, accounting for 86.14% of the specimens (146) and 89% of the remains (516 bones) found in 32 of the 38 structures analysed. Bovine remains were recorded in 7 structures, suidae in 4 tombs, rabbits and birds in two, and a red deer knucklebone was found in just one grave.

Although the skeletal representation of the 169 specimens is minimal, with an SCI of less than 2% of the total bones of the skeletons of the each species (the average number of bones registered per specimen was between 1 and 4), structure 57 contained an almost complete skeleton of a goat (SCI = 64%, Fig. 5) together with two humans: a child under 6 months and an individual of indeterminate gender and age.

Almost all the offered bones came from the distal parts of the limbs (from tarsals/carpals to phalanges), joints (epiphysis of the femur, humerus,

scapula and radius) and the skull, which in current slaughterhouses are classified as *low meat-yield* parts (Bernáldez 2009).

TYPES OF ANIMAL DEPOSITS

Based on the variety of species and anatomical parts represented in the bone records, three types of funerary deposits can be determined (Fig. 6):

Remains from human consumption

These kinds of deposit were registered in 22 funerary structures, where anatomical parts with low meat yield are in the greatest abundance. Within this group, 15 tombs contained distal bones from limbs (chiefly phalanges and metapodial bones) of caprines and a further 7 contained cattle and pig remains (epiphysis of the humerus, tibia, radius and femur bones, and skull fragments, Fig. 7). The remains of human and caprine bones were in the same state of preservation in 13 of the 15 structures. However, few of the cow and pig bones presented thermo-alterations.

Manipulated knucklebones.

These knucklebones presented marks of thermo-alteration and polishing (Gilmour, 1997) are not related with human consumption (Fig. 8). They were found in six tombs in varying amounts.

Remains of consumption and knucklebones.

Of the six tombs found with these kinds of deposits, two contained pigs and cattle remains, a further two had caprine bones and the last two structures contained the bones of rabbits and birds (these latter showing no signs of thermo-alteration), together with one or several knucklebones. Once again, most of the anatomical parts represented were *low meat yield*.

There were four structures that could not be classified into any of these three groups. Two of them might belong to the type 1 offerings, since they contained a few splinters of ungulates, a third contained an almost complete goat skeleton (structure 57; species determined according to Zeder & Pilaar 2010) together with the remains of a child and an adult; and in the fourth there was the pelvis of a cat which was similar in size to a current domes-

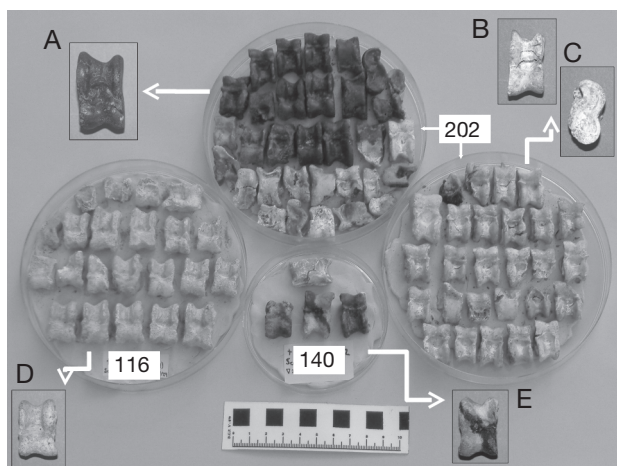


FIG. 8. — Knucklebones located in structures 116, 140 and 202. They are in different states of conservation: **A**, carbonised; **B**, calcined; **C**, polished; **D**, without thermo-alteration; **E**, thermo-altered with patches. Of particular note is the use of fresh bones owing to the presence of characteristic fissures produced when burning (see image B).

tic cat (structure 61). This latter tomb, although it lacked elements that would permit absolute or relative dating, is located in the oldest part of the necropolis (8th Century BC). If the date could be corroborated, it could be one of the oldest examples of the domestic cat brought to the Iberian Peninsula by Eastern cultures (Driscoll et al 2009; Lipinski *et al.* 2008).

In addition to these three types of deposits described by their content, a distinction can also be made in terms of two different times at which the deposits were made, according to the preservation of the remains:

- a. Offerings deposited before the cremation of the deceased and, consequently, burned at the same time.
- b. Offerings deposited after the cremation of the deceased, which present no thermo-alterations.

These two depositing times seem to be related with the species offered. The first group corresponds to the remains of caprine specimens which were burned, with the exceptions of structure 16 where the knucklebones were not burned or polished (type 1 according to Minnitti & Peyronel 2005) and tomb 57 with almost a complete goat, equally without alterations. The second group corresponds to cattle and pig remains, which do not usually present burns, with the exception of structures 20 and

59. Although the sample is small, it appears that there is a certain relationship between the species offered and the time of the offering, with caprine remains being the offerings that would accompany the deceased during the cremation, and cattle and pigs deposited after the cremation of the deceased which on occasions might be accompanied by small animals such as birds and rabbits.

Knucklebones

The 308 knucklebones (307 from caprines and one from a red deer, *Cervus elaphus*) were found among the 602 bone remains recorded, with 236 in an acceptable state of preservation to analyse usage markers. Of these, 145 knucklebones were measured for a comparative biometric study.

Below is an analysis of the knucklebones found, in accordance with the characteristics that could be taken as markers according to the considerations of this group and other authors regarding possible markers of the orientalisation of funerary ritual:

Species. In sites in the Mediterranean Basin, offerings of knucklebones are largely from caprines. In places such as “Tell Mardikh-Ebla” the majority are from sheep, and to a lesser extent from other ungulates such as cattle, red deer or gazelle (*Gazella*

TABLE 4. — Statistical values of the biometric data for the different groups of knucklebones. Legend: **Bd**, distal width; **GLI**, side length.

Archaeological site	Statistical parameters	GLI (mm)		Bd (mm)	
		Results	Typ. error	Results	Typ. error
La Gallega N = 14	Mean	29,21	0,39	18,27	0,31
	Variance	2,16		1,35	
	Minimum	27,02		16,22	
	Maximum	32,63		19,93	
Caura N = 8	Mean	25,06	0,47	15,70	0,45
	Variance	1,75		1,63	
	Minimum	22,52		13,57	
	Maximum	25,89		16,95	
Cruz del Negro N = 145	Mean	25,08	0,18	15,39	0,13
	Variance	4,86		2,47	
	Minimum	20,60		10,30	
	Maximum	31,16		19,67	
Current samples N = 7	Mean	29,65	0,72	18,55	0,43
	Variance	3,58		1,30	
	Minimum	27,27		17,28	
	Maximum	32,77		20,04	
Tel Mardikh-Ebla N = 98	Mean	30,17	0,15	19,01	0,13
	Variance	2,19		1,61	
	Minimum	27,10		14,90	
	Maximum	33,80		21,40	

TABLE 5. — Results of the ANOVA test (p-value = 0.05). There are significant differences depending on the two measures; however, only the results for Bd- distal width- were considered because it is the only dataset that fulfils the criterion of Homoscedasticity.

ANOVA						
Parameter		Sum of square	gl	Quadratic mean	F	Sig.
GLI	Inter-groups	1653,501	4	413,375	113,301	0,000
	Intra-groups	974,135	267	3,648		
	Total	2627,637	271			
Bd	Inter-groups	820,405	4	205,101	99,790	0,000
	Intra-groups	548,769	267	2,055		
	Total	1369,175	271			

Corporal laterality. Leviticus (7:32) tells us that Jews prefer to offer the right side of the animal. Focusing not on this custom in particular but on the fact that there might be a preference to consume or offer a certain side of the animal, it was observed that of the 307 caprine knucklebones there were 107 from the left side, 91 from the right and 38 indeterminate owing to their poor state of preservation (Table 3). There does not appear to be a preference for offering certain parts of the animal and this could be a marker of their Near East origin. Although this information is lacking in relation to other sites, this marker should be maintained until

more information is available that would determine whether laterality is irrelevant or not.

Biometrics. Biometric analysis was conducted on the measurements of the caprine (sheep and goats) knucklebones in “Cruz del Negro” together with other sites in the South of the Iberian Peninsula dating from between the Copper Age and the Iron Age (“La Gallega” -Valencina de la Concepción, Seville-; “Caura” -Coria del Río, Seville-). In addition to these sites, data were added from sheep found in the site of “Tell Mardikh-Ebla” and a small group of current lambs from the Sierra de

TABLE 6. — Results of the Scheffé test (p -value = 0.05). This test classifies data sets into two groups using the harmonic mean (= 14.030) because the size of the samples is heterogeneous. Type 1 error levels are not guaranteed.

	Archaeological site	N	Subset for alpha = 0.05	
			2	1
Scheffé	Cruz del Negro	145	15,393	
	Caura	8	15,700	
	La Gallega	14		18,272
	Current samples	7		18,547
	Tell Mardikh-Ebla	98		19,000
	Sig.		0,988	0,765

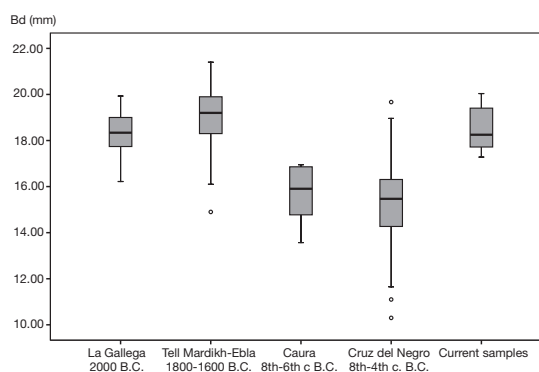


Fig. 9. — Biometric data of the caprine knucklebones. The measurements of 265 bones from four archaeological sites were compared along with seven bones from current specimens. The image reflects the differences between the samples from the Iron Age (“Caura” and “Cruz del Negro”) and the other samples.

Cádiz mountains. Having confirmed Normality and Homoscedasticity in the data sets (only found for the measure Bd; sig. = 0.192; Levene Statistic = 1.537) the ANOVA test was applied, and the results of this test showed that at least one of the groups presented significant differences from the rest (Tables 4-5); using the Scheffé test, two significantly similar groups were seen to form (Table 6):

- Group 1: Composed of samples from “Tell Mardikh-Ebla”, the current samples from lambs in Andalusia and “La Gallega” (where the caprine remains dating back to the Copper Age are ancient genetic analysis to determine the species).
- Group 2: Comprising the Iron Age knucklebones found at “Cruz del Negro” and “Caura”. Both sites

were contemporaneous and close to one another geographically (around 20 km as the crow flies), and the remains could belong to a single population of these caprine species.

The significantly smaller specimens are in the second group (Fig 9), in which it is unknown as to whether the specimens are sheep or goats or whether both species are present (as observed in the sample of 97 knucklebones where 47.42% were from sheep and 34.02% from goats). Until the ancient genetic and morpho-biometric study of domesticated caprine species in the South of the Iberian Peninsula is complete, this will remain an open issue. It can be stated, however, that the specimens offered were more than six months old.

Humans and animal deposits

In addition to analysing the characteristics of the different remains found, an attempt was made to link these animal offerings with the biological characteristics of the humans buried with them. Anthropologists have determined 33 individuals, but have only been able to define the gender of 7 of them: three females (two aged over 20 and one between 14 and 30 years of age) and four males (a baby under one year, one individual aged over 20, and a further two aged between 14 and 30 years of age). Really, there is little data available to define the relationships between the characteristics of the human and the type of deposits, but looking purely at the age of the individual, the number stands at 25 individuals: 5 children under the age of 14, 12 over the age of 20 and 8 estimated at being aged somewhere between 6 and 30 years of age.

Although the results are not conclusive, owing to the small amount of data, certain trends are detected which should be studied further in future research:

- 1. The bones of caprines are offered most often, regardless of the gender and age of the humans. Most of them are thermo-altered.
- 2. Cattle and pigs remains are only found in the tombs of adult individuals and the majority of the remains do not present thermo-alterations.
- 3. Caprine knucklebones are found in the tombs of children and one young woman. Anthropologists were able to determine the age of 7 individuals related

TABLE 7. — (Part 1) Chronology of the archaeological sites with associations of knucklebones. The first datum for the Iberian Peninsula dates from the 8th Century BC in the "Cruz del Negro" site.

Area	Archaeological sites -Necropolis-	Location	Knuckle bones	Bronze Age	8th B.C.	7th B.C.	6th B.C.	5th B.C.	4th B.C.	3th B.C.	2th B.C.	1th B.C.	1th A.C.	2nd A.C.	References
Levant	Megiddo	Israel	70	1800-1600											Gilmour, 1997
Cyprus	Hama	Siria	45	2000-1900											Minniti & Peyronel 2005
	Lapithos	Cyprus	6	1300-1200											Minniti & Peyronel 2005
	Ayia Paraskevi	Cyprus	2	1300-1200											Minniti & Peyronel 2005
	Tamassos	Cyprus	10	1200-1100											Minniti & Peyronel 2005
	Hala Sultan Tekké	Cyprus	1	1220-1190											Minniti & Peyronel 2005
	Palaepaphos	Cyprus	3	1300-1200											Minniti & Peyronel 2005
	Salamis	Cyprus	1	1050-1000											Minniti & Peyronel 2005
Grece	Amathonte	Cyprus	6	1050-1000											Minniti & Peyronel 2005
	Jalisso	Rhodes	indet												Minniti & Peyronel 2005
	Macri Langoni	Rhodes	indet												Minniti & Peyronel 2005
	Papatishires	Rhodes	11												Minniti & Peyronel 2005
	Marmaro	Rhodes	18												Minniti & Peyronel 2005
Sicilia	Olynthus	Chalcidice	100												Minniti & Peyronel 2005
	Torrebigni	Partanna	indet												Minniti & Peyronel 2005
	San Pantaleo	Motya	indet												Pau, 2007
Italic Peninsula	Vadena	Bolzano (Italy)	46	2000-1800?											Riedel & Tecchiati, 2005
	Colombara	Veronese (Italy)	25	2000-1800?											Riedel & Tecchiati, 2001
	Laives-Via Galizia	Bolzano (Italy)	indet	900											Riedel & Tecchiati, 2005
Argelia	Rachgoun	Argelia	indet												Belén, 1982

TABLE 7. — (Part 2) Chronology of the archaeological sites with associations of knucklebones. The first datum for the Iberian Peninsula dates from the 8th Century BC in the “Cruz del Negro” site.

Area	Archaeological sites -Necropolis-	Location	Knuckle bones	Bronze Age	References
Tunisia	Utica	Túnez	indet	8th B.C.	Belén, 1982
Iberian Peninsula	Cruz del Negro	Sevilla	308	8th B.C.	Belén, 1982
	Angorrilla	Sevilla	indet	7th B.C.	Pajuelo & Aldana, 2010
	Los Villares	Albacete	3	6th B.C.	Oliver, 1996
	Villaricos	Almería	indet	16/10/13	Madrigal et al., 2010
	Medelín	Badajoz	>5	6th B.C.	Madrigal et al., 2010
	Ampurias	Alicante	>100	5th B.C.	Torres, 1999
	Puig dels Molins	Ibiza	indet	4th B.C.	Figueras, 1952.
	La Bobadilla	Jaén	23	3rd B.C.	Iborra, 2004
	Era Alta	Granada	8	2nd B.C.	Jiménez, 2005
	Cabecico del Tesoro	Murcia	47	1st B.C.	Oliver, 1996
	Plaza de Asdrúbal	Cádiz	14	1st A.C.	Oliver, 1996
	Estacar de Robarinas	Jaén	indet	1st A.C.	Corzo, 1992
	Serrá de Daró	Gerona	2	1st A.C.	Jiménez Higuera, 2005
	Madrigueras	Cuenca	>2	1st A.C.	Oliver, 1996
	Orieyl	Castellón	46	1st A.C.	Belén, 1982
	Coimbra del Barranco Ancho	Murcia	230	1st A.C.	Oliver, 1996
	La Albufereta	Alicante	194	1st A.C.	García et al., 1999
	El Cigarralejo	Murcia	>300	1st A.C.	Oliver, 1996
	Los Nietos	Murcia	7	1st A.C.	Morales et al., 1983
	Castellones de Ceal	Jaén	indet	1st A.C.	Oliver, 1996
	La Guardia	Jaén	indet	1st A.C.	Chapa et al., 1991
	Carmona	Sevilla	2	1st A.C.	Oliver, 1996
	La Osera	Ávila	indet	1st A.C.	Belén 1982
	La Serreta	Alicante	indet	1st A.C.	Belén 1982
	La Yunta	Guadalajara	>100	1st A.C.	Jiménez, 2005
	El Amarejo	Albacete	1	1st A.C.	Iborra, 2004
	Turo dels Dos Pins	Barcelona	4	1st A.C.	Llorio, 1997
	Mas del Barberán	Teruel	13	1st A.C.	Oliver, 1996
	Cerro de la Cabeza del Obispo	Jaén	13	1st A.C.	Izquierdo, 1999
	Munigua	Sevilla	>35	1st A.C.	Jiménez, 2005
				1st A.C.	Schattner & San Martín, 2006

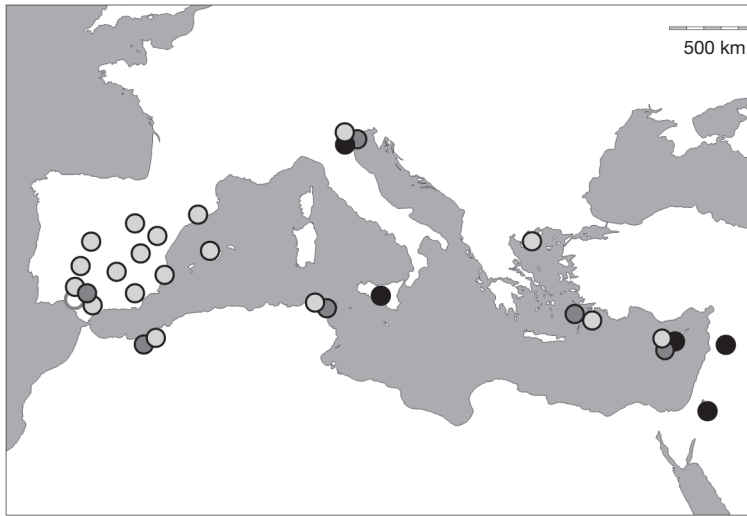


FIG. 10. — Location of the archaeological sites with accumulations of knucklebones in the Mediterranean Basin. The oldest are located in the Near East (2000 – 1600 BC), and the oldest necropolis in the Iberian Peninsula where these kinds of offerings have been found is “Cruz del Negro” (8th Century BC). The latest record located dates from the 2nd Century AD in the “Munigua” archaeological site in southern Spain. Symbols : black circles : Bronze Age; dark grey circles: 8th-7th B.C.; light grey circles: 6th-1st B.C.; white circles: 1st-2nd A.C. Maps from d-maps.com (copyright Daniel Daley).

with the deposits of knucklebones: 2 were children aged under 14, 4 were over the age of 6 and in one tomb there were the remains of a woman aged over 20 (structure 99). In this case, there are insufficient data to assure that the offerings of knucklebones are related with the gender and age of the deceased, but it notable that none of the tombs where adults are buried presented knucklebones in among their funerary grave goods.

Centuries later, this custom of offering knucklebones to the dead continued in the Iberian Culture (approximately between the 5th and 4th Centuries BC) which, according to Chapa (2003), is not related exclusively with the burial of children; whereas in the Roman period, according to de Nardi (1991), the offering of knucklebones was related with the activities of adults (men and women) and children. Given these variations, it is yet to be ascertained whether in the Near East this ritual was related with children, young adults or women, as appears to be the case in the “Cruz del Negro” necropolis (Holmgren 2002).

Findings of knucklebones from the Levante to the Iberian Peninsula

The “Cruz del Negro” necropolis offers possibly the earliest evidence in the Iberian Peninsula of the pres-

ence of knucklebones in tombs (8th Century BC). Prior to this date, the animal offerings found in the Copper Age were usually carved bones, such as the phalanges of horses, red deer, cattle and caprines, but no knucklebones were found (Belén *et al.* 2000; Bernáldez & Bernáldez 2005). A review has revealed 52 archaeological sites in the Mediterranean Basin (Israel, Syria, Palestine, Cyprus, Greece, Italy, Sicily, Algeria, Tunisia and the Iberian Peninsula) where knucklebones were used as an offering (Fig. 10; Table 7). Within this area, the earliest findings were located in the archaeological sites of “Hama” in Syria and “Megiddo” in Israel (2000-1600 BC.; Gilmour 1997; Minniti & Peyronel 2005), with the latest sites dating from the 4th Century BC in the “Olynthus” necropolis of Greece (Minniti & Peyronel 2005) and from the 2nd Century AD from the “Munigua” archaeological site in Southern Spain (Schattner & San Martín 2006).

Moving away from the Western Mediterranean, older evidence can be found of these kinds of grave goods in two archaeological sites in Sicily dating from the Copper Age (Pau 2007) and in the Italian site of Vádena dating from the end of the Bronze Age (Riedel & Tecchiati 2005), together with the

site in Cyprus (1300-1000 BC), a custom that survived in this place until the 5th Century BC in the archaeological site of "Amathonte". Elsewhere in the Mediterranean Basin (Greece, Tunisia, Algeria and Spain), the first evidence of this kind of deposit, excluding the "Cruz del Negro" site, dates from the 7th Century BC. According to these findings, it would appear that the transmission of this custom follows an expansion process from East to West (Gilmour 1997).

CONCLUSIONS

The aim of this paper is to describe the funerary practices observed in the "Cruz del Negro" necropolis (Carmona, Southern Spain) from the 8th to the 7th Centuries BC, relating them with those seen in other similar sites located in the Mediterranean Basin, and verifying their links with cultures from the Near East.

In "Cruz del Negro", the remains of cattle, red deer, pigs, goats, sheep, rabbits and birds have been determined, with the majority belong to sheep/goats, indicating that these species, both domesticated and wild, which were closest to the everyday lives of these settlers, were given as offerings. The paleobiological study conducted not only determined three types of animal origin offerings and noted two different times for depositing these offerings; it also found markers that might link this site to Eastern cultures. The presence of offerings related with waste from human consumption, including bones from anatomical parts that *low meat yield*, might correspond to the remains of the funerary banquet (Delgado 2008; Niveau de Villedary & Castro 2008) after the cremation of the deceased; this kind of deposit is similar to that described in some Phoenician necropolis. The finding of sets of manipulated knucklebones is the marker that is most closely linked with the Phoenicians in this study. Owing to the characteristic of depositing knucklebones observed in the oldest sites in the Mediterranean Basin, it can be deduced that this ritual expanded westwards until it reached the Iberian Peninsula in around the 8th Century BC. According to our analyses, these knucklebones, which are

usually burned⁴ and many of which are polished, might be related with the tombs of children and young women (this finding must be approached with caution as the sample is very small). In addition, the presence of the remains of a domestic cat could be another marker of the Phoenician origin of "Cruz del Negro".

The importance of this work lies not only in deducing the Ancient Levant nature of the animal deposits found in "Cruz del Negro" on the basis of the groups of knucklebones with certain taphonomic conditions found in the tombs, but in demonstrating that the presence of animals in tombs should be subjected to standardised analysis in order to design a model of cultural behaviour which would help to pinpoint the expansion of the Phoenicians or other Eastern cultures towards the West of the Mediterranean Basin.

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4. They might possibly have been burned at the same time as the deceased individual.

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Submitted the 13 September 2011;
accepted the 8 February 2012