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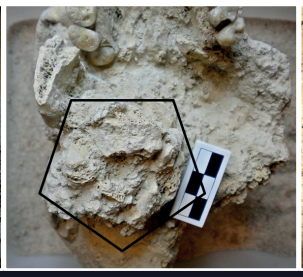


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Anthropomorphic figurine from Marroquíes Bajos (Jaén).
Photo: Miguel A. Blanco de la Rubia.

BIOARCHAEOLOGICAL APPROACHES TO SOCIAL ORGANIZATION AT MARROQUÍES (JAÉN, SPAIN)

Jess L. Beck[1]

Abstract:

Within Iberia increasing attention has been paid to the unprecedented emergence of large-scale villages, or "macro-villages", during the third millennium cal BC. Bioarchaeology has the potential to make significant contributions to our understanding of macro-village organization through a reconstruction of both demography and mortuary treatment. The 113-ha site of Marroquíes in Jaén, Spain, represents one of the largest villages known for the Copper Age. Here, results of the bioarchaeological analyses of three previously unstudied necropolises are presented, representing a minimum number of individuals (MNI) of 280. This sample includes 201 adults and 79 subadults; assessments of sex were possible for 105/201 (52%) adults, producing a count of 46 females or probable females, 28 individuals of indeterminate sex, and 31 males or probable males. Chi-square tests and Fisher's exact tests showed no significant differences in age or sex between the three mortuary populations. Instead, mortuary practices were communal, and individuals of both sexes and almost all ages were interred in primary, secondary, or commingled burials. Limited evidence of age-based or sex-based mortuary differentiation, in tandem with the synchronic maintenance of multiple necropolises, suggests that mortuary decisions were focused on the identities of the social groups responsible for burying the dead.

Keywords: Bioarchaeology, Dental Anthropology, Mortuary Archaeology, Iberia, Copper Age.

APROXIMACIÓN BIOARQUEOLÓGICA A LA ORGANIZACIÓN SOCIAL DE MARROQUÍES (JAÉN, ESPAÑA)

Resumen:

En la península Ibérica ha habido una creciente atención hacia aldeas de gran escala o "macro-aldeas" durante el tercer milenio AC. La bioarqueología tiene el potencial de contribuir de manera significativa a la comprensión de su organización a través de la reconstrucción de la demografía y el estudio de sus prácticas funerarias. Marroquíes, un sitio con una extensión de 113 ha, representa uno de los yacimientos arqueológicos más grandes conocidos de la Edad del Cobre. En este estudio se presentan los resultados del análisis bioarqueológico de tres necrópolis con un NMI (número mínimo de individuos) de 280. Esta muestra incluye 201 adultos y 79 subadultos de los que 46 han sido identificados como individuos femeninos o probablemente femeninos, 28 individuos de sexo indeterminado y 31 masculinos o probablemente masculinos. Las pruebas de chi-cuadrado y el test de Fisher no muestran diferencias significativas en la edad o el sexo entre los tres grupos. El ritual funerario fue comunal con individuos de ambos sexos y casi todas las edades enterrados en posiciones primarias, secundarias o mezclados. La limitada evidencia de diferenciación funeraria basada en la edad o el sexo, junto con el mantenimiento sincrónico de múltiples necrópolis, sugiere que las decisiones funerarias se centraron en las identidades de los grupos sociales responsables de enterrar a los muertos.

Palabras Clave: Bioarqueología, Antropología Dental, Arqueología Funeraria, Iberia, Edad del Cobre.

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1. INTRODUCTION: SOCIAL ORGANIZATION IN COPPER AGE IBERIA (*CA.* 3200-2250 CAL BC)

In southern Iberia, sites of either an unprecedented spatial scale (e.g. Valencina de la Concepción, Marroquíes), or significant investments of communal labor in fortifications and infrastructure (e.g. Los Millares, Perdigões, Vila Nova de São Pedro, Zambujal) began to appear at the end of the 4th millennium BC. An increasing amount of attention is now being paid to such sites (see García Sanjuán *et al*., 2013a; Díaz-del-Río, 2013; Valera *et al*., 2014), and much of this analytical effort has been focused on reconstructing settlement patterns and exchange networks (Nocete Calvo *et al*. 2005; García Sanjuán *et al*. 2013b). Importantly, bioarchaeological analyses can also make key contributions through assessing the degree of inequality apparent in diet, nutritional stress, disease, and mortuary treatment between individuals and between communities.

At Valencina de la Concepción, bioarchaeological research has revealed dietary differentiation between mortuary areas and a high proportion of non-local individuals within the sampled mortuary population (Costa Caramé *et al*., 2010; Díaz-Zorita Bonilla, 2017). Archaeological analyses of material culture at Valencina de la Concepción and Los Millares have likewise revealed that certain tombs are characterized by a higher quantity and quality of grave goods than others, providing evidence of wealth differentiation at these settlements (Chapman 1981; García Sanjuán *et al*., 2013b). Determining whether evidence for increasing social differentiation characterizes all mega-sites is an important step in evaluating the degree of inequality in Copper Age Iberian societies.

One impediment to bioarchaeological research on human remains from large-scale villages has been the sheer volume of salvage excavated material, combined with the fragmentary and commingled nature of Copper Age inhumations. However, new approaches dedicated to maximizing the information recovered from commingled and fragmentary remains are becoming increasingly popular within bioarchaeology (e.g. Knüsel and Outram, 2004; Osterholtz *et al*., 2014; Osterholtz, 2016). This study uses standard bioarchaeological techniques and fragmentation-zonation approaches to assess the age and sex of interred individuals, as well as newly developed approaches to dental completion signatures in order to evaluate mortuary treatment at the Chalcolithic site of Marroquíes (Jaén, Spain). The development of these kinds of new methods for analyzing fragmentary and commingled datasets has the potential to greatly expand our understanding of social organization in the Iberian Copper Age.

2. MARROQUÍES[1]

The city of Jaén (Spain) has a multicomponent archaeological record, beginning with the Neolithic period and moving through Iberian, Roman, Medieval, Modern Era, and contemporary occupations (Hornos Mata *et al*., 1998; Sánchez *et al*., 2005). As a result of the northward expansion of the city in the 1990s, hundreds of salvage excavations have also revealed evidence of a massive Copper Age site (Zafra de la Torre *et al*., 1999, 2003) (Fig. 1). At 113 ha, Marroquíes is one of the largest settlements known for the Iberian Copper Age. It is matched in size or importance only by the Chalcolithic holotype of Los Millares in Almería (containing 5 ha of fortified habitation and 13 ha of tombs), and the expansive megasite of Valencina de la Concepción in Seville (400 ha of settlement complex total) (Chapman, 2008; Díaz-del-Río, 2011; García Sanjuán *et al*., 2013a).

Tentative reconstructions suggest that Marroquíes has at least six circular ditches that vary between 1.5 and 5 m in depth, and between 4 and 22 m in width (Zafra de la Torre *et al*. 1999). The series of inter-ditch spaces are interpreted as being organized concentrically and expanding outwards from the center of the settlement, a typical layout for Iberian Chalcolithic enclosure sites (see Díaz-del-Río, 2004b: Fig. 5) (Fig. 2). In some sections, ditches were reinforced with supplementary defensive architecture, including adobe or stone walls, palisades, and bastions. The third ditch was supported by a 375-m long wooden palisade with bastions, and the fifth ditch was partially surrounded by a bastioned adobe wall that was 3 m in height and 2 km in length (Zafra de la Torre *et al*., 1999). Archaeologists have argued that the ditches represent a system of water

[1] In the literature this site is customarily referred to as "Marroquíes Bajos," while Necropolis 4 is referred to as "Marroquíes Altos." Here, to simplify terminology, I use "Marroquíes" to refer to the larger site, and "Necropolis 4" to refer to "Marroquíes Altos."

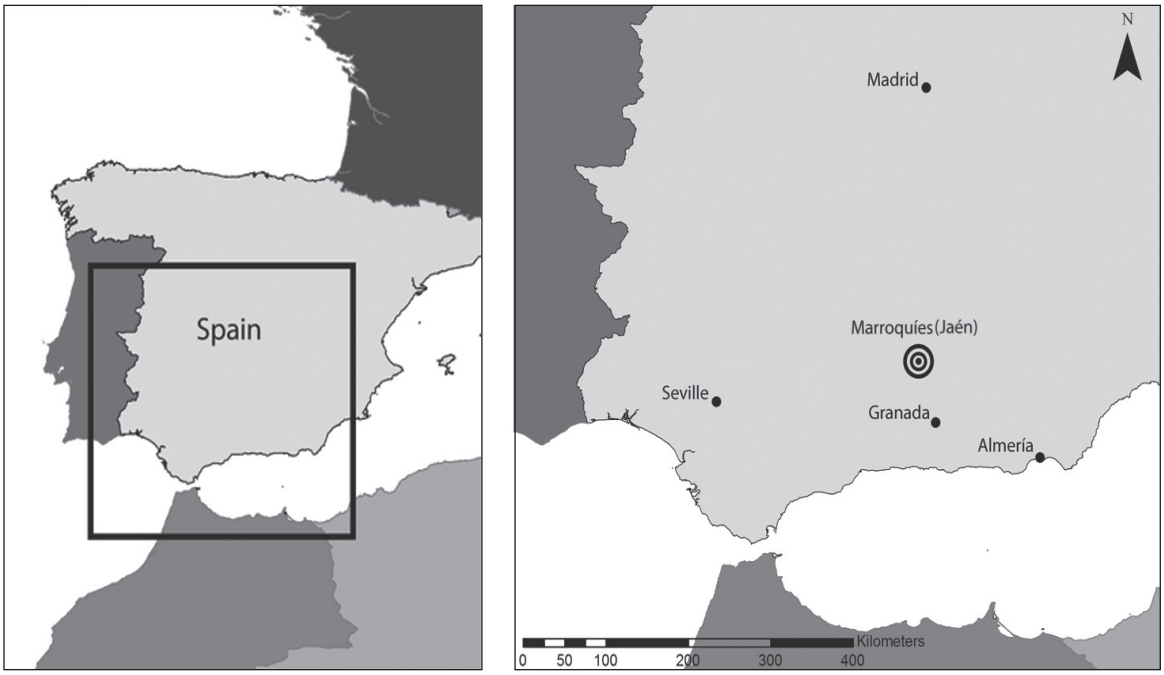

Fig. 1. Location of Marroquíes and major cities in Spain. Original figure from Beck 2016b.

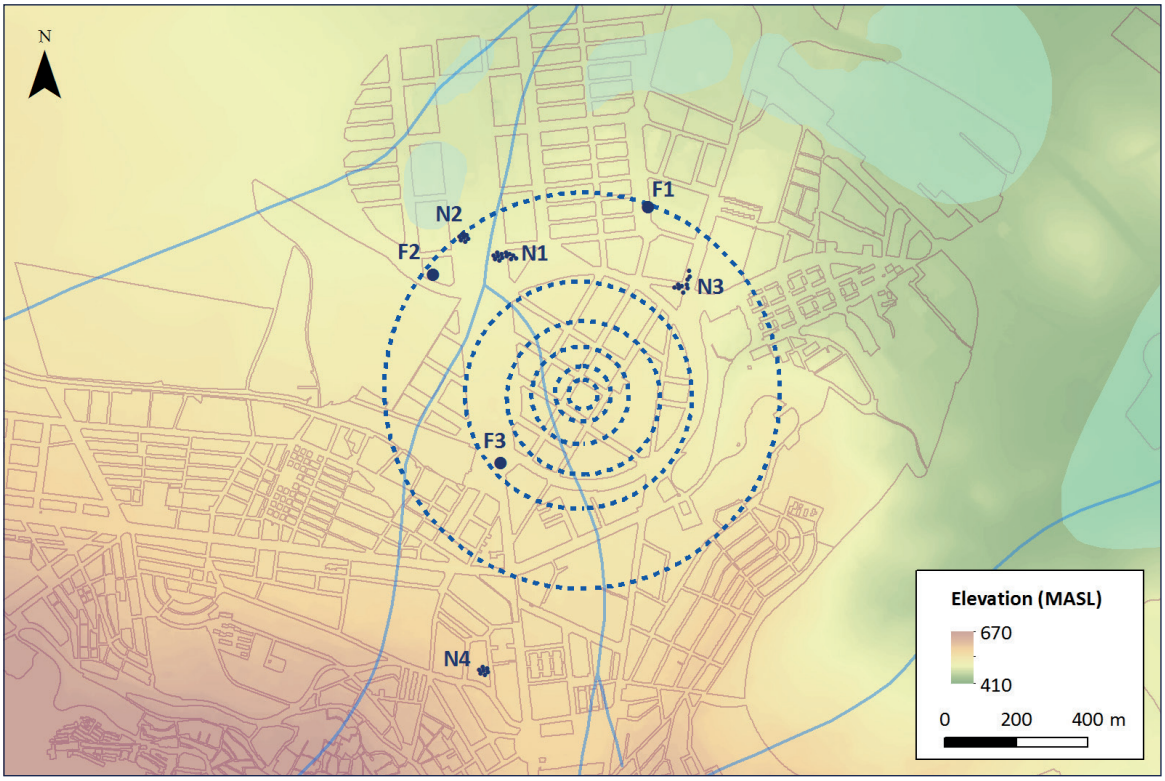

Fig. 2. Location of mortuary areas at Marroquíes (schematic map from Narciso Zafra de la Torre, personal communication). Base cartography: CartoCiudad and Modelo Digital del Terreno MDT05 provided by © Instituto Geográfico Nacional. Courtesy of Antonio Uriarte, Instituto de Historia, CSIC. Figure courtesy of Pedro Díaz-del-Río.

capture and distribution for agricultural irrigation and water supply (Hornos Mata *et al.*, 1998; Zafra de la Torre *et al.*, 2003), both an irrigation canal and a defensive structure[2], or a primarily defensive structure related to the rise of social conflict in the region (Sánchez *et al.*, 2005; Cámara Serrano *et al.*, 2012b; Cámara Serrano and Molina González, 2016). However, as recent research by Aranda Jiménez *et al.* (2016) has shown, the chronology of the ditch system and settlement is so complex that interpretations of the nature and function of the site will doubtless continue to evolve in tandem with finer-grained analyses of specific structures and areas.

Regardless of the function of the ditches at Marroquíes, the available archaeological evidence suggests that the enclosure system was maintained, re-excavated, and modified over time (Sánchez *et al.*, 2005; Aranda Jiménez *et al.*, 2016). Certain elements of its construction, such as the adobe wall, bastions, and access points, were likely defensive in nature. However, modifications to the ditches themselves, such as the deliberate increase in the slope of Ditch 4 (Hornos Mata *et al.*, 1998) and the deviation in the trajectory of Ditch 5 to reach the Magdalena stream (Pérez Martínez, 2005), would have increased water capture efficiency. Sedimentary evidence, specifically the thick levels of silt and lacustrine sediments concentrated along some of the ditch bottoms, likewise attests to the prehistoric flow of water through the ditches (Pérez Martínez, 2005; Sánchez *et al.*, 2005). In addition to its postulated functions of irrigation and defense, Zafra de la Torre *et al.* (1999) have argued that the enclosure system may have divided the occupational area of the site from outlying storage and fields. Site reports attest to the scarcity of ceramics, chipped stone, ground stone, and architectural features outside of the fifth ditch, suggesting that this area was most likely used as agricultural land (Pérez Martínez, 2005).

Within the interior of the enclosure system there appears to be a gradual change in the organization of domestic architecture over time, with a transition from functionally differentiated dwellings grouped around central plazas after 2450 cal BC to multiple domestic complexes bordered by stone walls after 2200 cal BC (Zafra de la Torre *et al.*, 1999; Díaz-del-Río, 2004a; Cámara Serrano *et al.*, 2012a, 2012b). Importantly however, as Cámara Serrano and Molina González (2016) have indicated, this process is not unilineal, and there is variability across different areas of the site. Overall, this architectural trend likely reflects changes in the social organization of the village. During the early phases at the site when the ditch and wall enclosure system was constructed, there is less variability in the size and contents of dwellings and features. When variability does occur, larger roundhouses are clustered with smaller structures, suggesting functional links rather than social differentiation. Sometime after the enclosure system was constructed, the site became marked by a pattern of increasing architectural differentiation. The rise of walled extended domestic complexes occurs after the conclusion of communal labor investment in the enclosure system. This architectural shift suggests the institutionalization of family households, and may reflect the increasing power of lineage groups relative to individual leaders. The growing tension between the leader(s) who initially organized the investment of communal labor in the ditch and wall system and the lineage groups themselves may have led to the steep drop-off in activity at the site and subsequent dispersal of the Marroquíes population at the turn of the 2nd millennium BC (Díaz-del-Río, 2004a).

3. THE MORTUARY AREAS

Seven areas of mortuary activity containing more than 450 individuals have been identified at Marroquíes (Sánchez *et al.*, 2005; Cámara Serrano *et al.*, 2012a; Beck, 2016a)[3]. While these areas also include evidence of other non-mortuary structures and/or activities, they represent marked concentrations of funerary activity within the archaeological backdrop of the site. These funerary locales have been divided into two main categories. A *necropolis* is an area of organized mortuary activity with clearly defined mortuary structures, while a *fosa común*, or "mass burial," is an area where multiple commingled individuals are interred in a pit or ditch (Narciso Zafra de la Torre,

2 PÉREZ MARTÍNEZ, M. (2005): *Memoria Final de la Intervención Arqueológica Preventiva en Bulevar II Fase. Sector SUNP 1*, Excmo. Ayuntamiento de Jaén, Jaén.

3 CRESPO KAYSER, A., ALHAMBRA GALLOWAY, C., ESPINAR KAYSER, C., PÉREZ VALLEJO, T., LISALDE MARTÍNEZ, R. and GORBEA PÉREZ, M. (2009): *Memoria Final de la Intervención Arqueológica Preventiva en el Solar Situado en la Parcela D-PAD (Antiguo T3) del SUNP 1. Zona Arqueológica de Marroquíes Bajos (Jaén)*, (Expediente 173/07).

personal communication). With the exception of Necrópolis 4 (also known as "Marroquíes Altos"), which is found to the southwest of the settlement on the upward slope of Jaén, all of these mortuary areas are located in between Ditch 4 and Ditch 5 (Fig. 2)".

The human skeletal remains from *Necrópolis 1*, *Necrópolis 2*, and *Necrópolis 4* have never previously been investigated, and were recently subject to full bioarchaeological study (Beck, 2016a, 2016b). This paper presents the results of analyses of minimum number of individuals (MNI), age, sex, and mortuary treatment at these three mortuary areas, and explores the implications of these results for the reconstruction of social organization at this site.

3.1. PREVIOUSLY STUDIED MORTUARY AREAS

Fosa Común 1 (F1) and *Necrópolis 3* (N3) have been analyzed and published previously. F1 was a pit dug into the fifth ditch with an estimated MNI of 5. Two well-preserved long bones from this mortuary area were radiocarbon dated to the mid- and late-third millennium BC (Sánchez *et al.*, 2005). N3 was much larger, with an estimated MNI of 173 individuals from eight different mortuary structures. Here, radiocarbon dates suggest four broad periods of use, stretching from the mid-third to early-second millennium BC (Cámara Serrano *et al.*, 2012a; 2012b). Mortuary structures at N3 contained a mixture of human and animal burials, and show episodes of reuse or construction activity, including the construction of walls around some of the structures. Finally, Fosa Común 2 (F2) is a burial of multiple individuals interred in a pit. F2 has never been subject to bioarchaeological analysis, but archaeologists estimated an MNI of 11 based on skull counts during excavation (Crespo Kayser *et al.*, 2009).

3.2. NEWLY STUDIED MORTUARY AREAS

Necrópolis 1 (N1) was excavated in 1998-1999, and the typology of associated artifacts suggested an area of Copper Age funerary activity[4]. Here, 28 kg of human remains were recovered from seven mortuary structures, arranged in a circular fashion around the central burial of a single individual in Structure 22 (Fig. 3). The structures can be divided into two categories: Type 1 tombs comprise a series of bell-shaped pits clustered in a circular arrangement around a central tomb, with multiple individuals interred in each structure. Dug into the marl, these structures are 6 m in diameter and range from 1.5-2 m in depth. Type 2 tombs are small pits dug into bedrock that are 0.5 m in depth and 2-3 m in diameter. Both types of tombs have limited grave goods, with the exception of large ceramic sherds and burials of whole animals. All Type 1 tombs witnessed re-use and domestic or utilitarian activity during the Late Copper Age or Early Bronze Age, and some structures are also overlapped by tombs from the later Emiral Necropolis (8th-9th C. AD). AMS radiocarbon dates taken from human collagen suggest that these structures were in use during the early- to mid-third millennium (Beck 2016a).

Necrópolis 2 (N2) was discovered in 2006, and comprises seven mortuary structures containing human remains which are distributed in a linear fashion along the internal edge of Ditch 5 (Fig. 4). A single cranium was also recovered from within the ditch itself, from an archaeological unit named "Unit 47" (Pérez Martínez, 2005). In total, 15 kg of human remains were from five mortuary structures were available for bioarchaeological analysis.

Archaeologists described three types of mortuary structure at this necropolis. The first is a series of shallow graves of 30-40 cm in depth that are oval or irregular in shape, with variable dimensions of 0.9-1.6 m in length and 1-2.7 m in width. The second type of mortuary structure contains burials interred directly on the clay substrate; these are only 10 cm in depth, but have larger surface dimensions, ranging from 3-5 m in length and 2-5 m in width. Finally, the third type of structure is approximately 1.7 m in diameter, and comprises a circular, stone-covered grave containing burials interred directly on the clay substrate. An additional two empty structures (Structure 48 and Structure 49) were documented in close proximity to the other mortuary spaces. Due to their formal similarities with the structures described above, archaeologists posited that these also had likely funerary functions.

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[4] SERRANO PEÑA, J., CANO CARILLO, J., JIMENEZ MORILLAS, Y. and ALCALA LIRIO, F. (2000): *Urbanizacion SUNP-1 (1a Fase) de Jaén. Intervención Arqueológica de Urgencia Informe de los Tramos Afectatdos en: Distribuidor Sur, Calle A y Calle 1*, EPSA, Jaén.

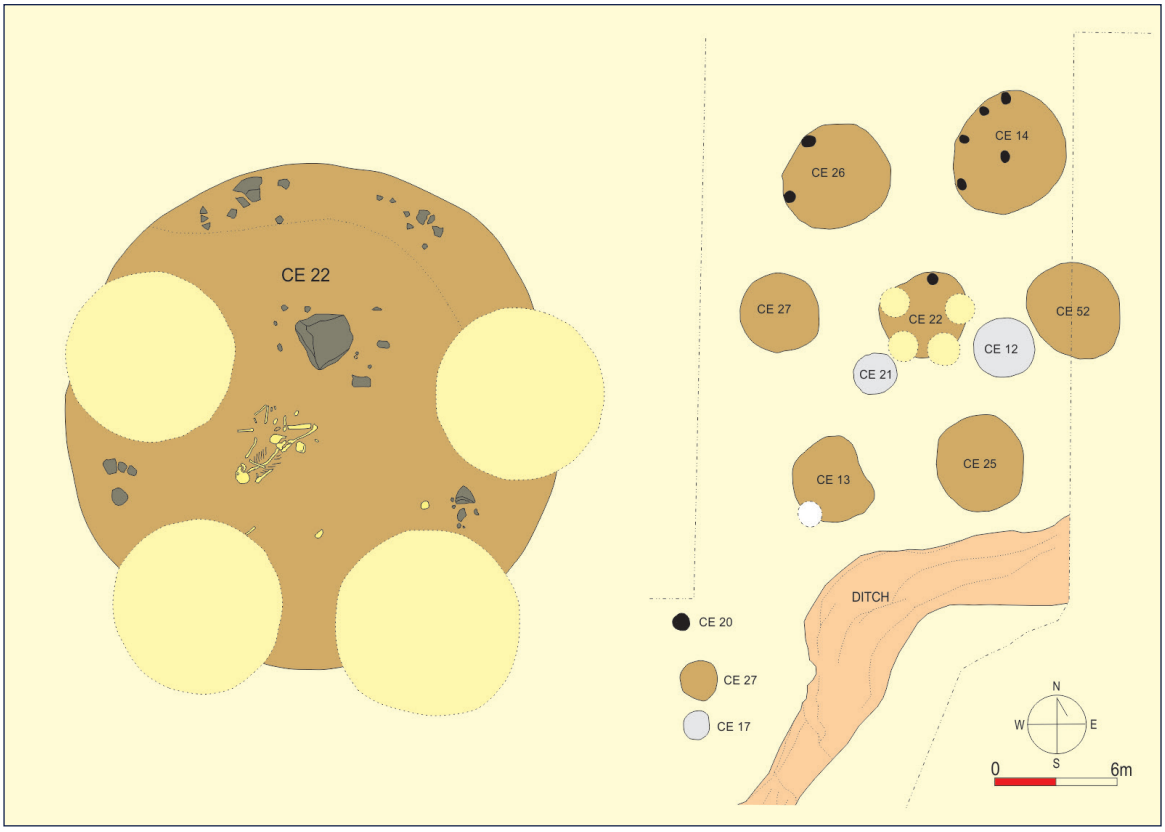

Fig. 3. Necropolis 1. Map of all mortuary structures and detail of central burial structure CE22, modified from site map by José Luis Serrano Peña. Figure courtesy of Pedro Díaz-del-Río.

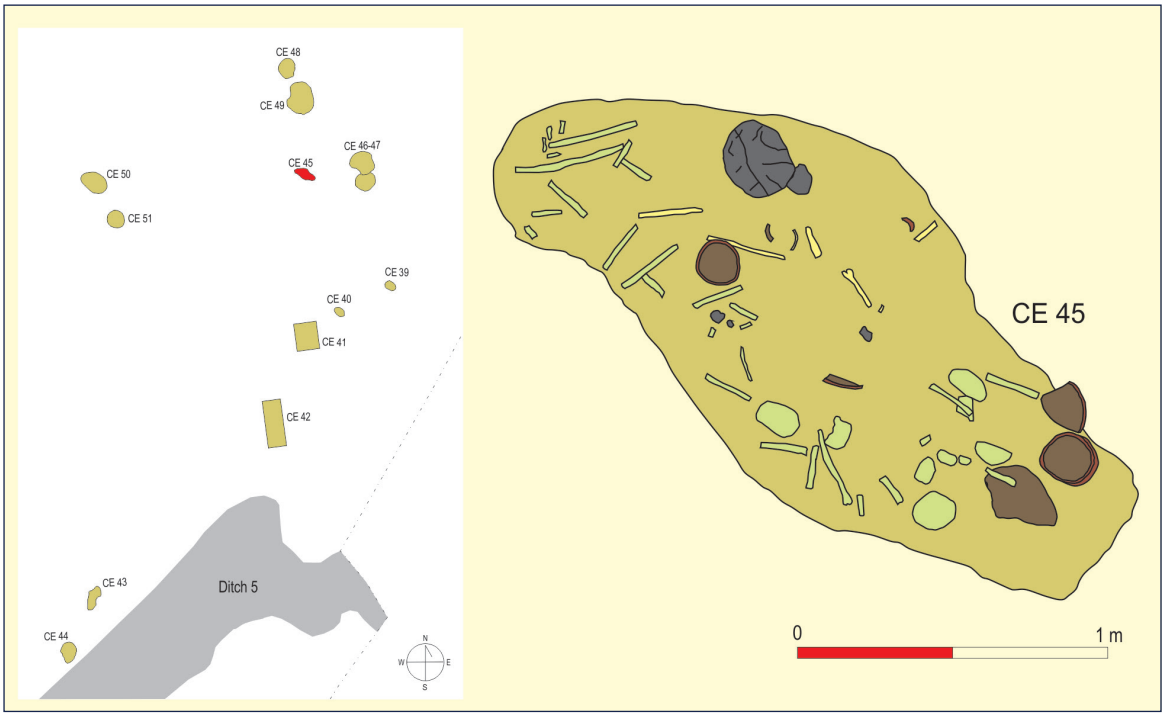

Fig. 4. Necropolis 2. Location of structures relative to Ditch 5, with close-up of CE 45, modified from site maps by Maria del Carmen Pérez Martínez. Figure courtesy of Pedro Díaz-del-Río.

Excavation photographs and hand-drawn site maps reveal that remains from all mortuary structures are disarticulated and show no evidence of deliberate organization. N2 grave goods included possible bone hairpins, one sword blade with rivets from Structure 44, and large and often well-preserved ceramics from multiple structures (Pérez Martínez, 2005). Here, AMS radiocarbon dates taken from human mandibles show two distinct periods of use: a phase of Late Copper Age mortuary activity during the mid-third millennium BC, followed by an Early Bronze Age phase during the late-third and early-second millennium BC (Beck, 2016a).

Necrópolis 4 (N4) was discovered in 1957, when local construction revealed traces of prehistoric mortuary activity and members of the Institute of Jaén Studies visited the site to survey the available archaeological material (Espantaleón Jubes, 1957). After examining a sample of the grave goods interred within the cave, they categorized the mortuary area as "Eneolithic" and likely Bronze Age in date. Ricardo Espantaleón Jubes, the archaeologist tasked with the first excavations at the site, initially identified two mortuary caves (Espantaleón Jubes, 1957), though at least two more ("*Cueva III*" and "*Cueva IV*") were discovered nearby in subsequent years, likely forming part of a more expansive cave complex (Lucas de Pellicer, 1968). At N4, Espantaleón Jubes described the first "Cave of the Column" as incorporating a large standing column surrounded by a semi-circular space. The space was reported to contain a 'radiating' distribution of human burials, in which flexed skeletons were arranged with their heads aimed at the walls. Many of the skulls were found in proximity to crude pots and spherical bowls that appeared to have been intentionally broken, and the crania were overlain with and crushed by stones of uniform size.

The second "Cave of the Child" consisted of an antechamber which led down into a rectangular door covered with two 'well-crafted' slabs of stone that opened into a second, larger chamber. Two niches, housing an adult and a non-adult skeleton, were carved into the walls of the second chamber. An additional niche, containing the remains of two non-adults, was excavated into the wall of the antechamber. In addition to the niche interments, the cave fill contained a large number of human remains. Grave goods from the Cave of the Child comprised bronze weapons (including an axe and dagger), loose pieces of bronze, ceramics, and stone tools.

This necropolis was most recently excavated in 2001 due to further construction at the site[5]. During the latest campaign, archaeologists uncovered the prehistoric entryways and antechambers for the "Cave of the Column" (which they renamed Tomb I) and the "Cave of the Child" (which they renamed Tomb II), mapping, excavating and recovering an important component of the site left undisturbed by Espantaleón Jubes in the 1950s and 1960s (Fig. 5). The

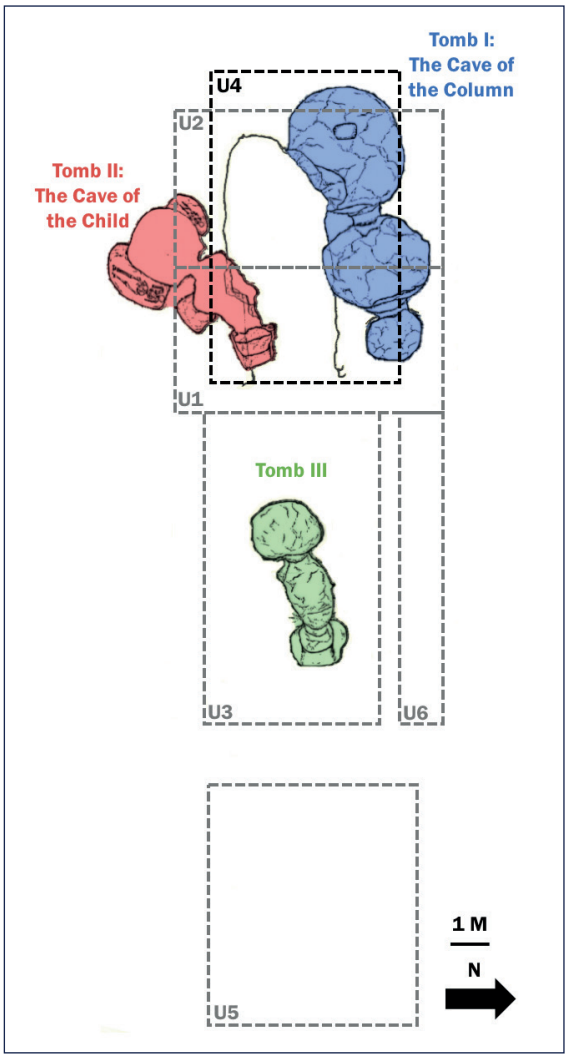

Fig. 5. Necropolis 4. Location of excavation units shown relative to Tombs I, II, and III. Map modified from original courtesy of Ana Manzano Castillo and José Luís Martínez Ocaña.

[5] MANZANO CASTILLO, A. and MARTÍNEZ OCAÑA, J. (2001): *Informe de la Intervención Arqueológica en C/ Cristo Rey N°5, de Jaén en Cuevas Artificiales de Marroquíes Altos*, Expediente 56/05, Guiomar H.C.M, Jaén.

excavators also discovered a third previously unknown and undisturbed tomb, which they named Tomb III[6], the only intact artificial cave at N4 to be excavated following contemporary archaeological standards.

The three mortuary caves were oriented NE-SW and shared a similar plan, with a vertical access shaft, antechamber, and chamber. Fragmented and commingled human remains, sometimes mixed with fragmented artifacts, completely filled all three caves. 331 kg of human remains were recovered from the three mortuary caves (272 kg from Tomb I and Tomb II, and 59 kg from Tomb III). AMS radiocarbon dates on human bone recovered from Tomb I and Tomb III suggest that both caves were in use during the early to mid-third millennium BC, contemporary to the construction and use of the two most interior ditches at Marroquíes.

4. METHODS

4.1. ESTIMATING THE MINIMUM NUMBER OF INDIVIDUALS (MNI)

MNI was estimated separately for each mortuary area due to differences in the preservation of human remains between mortuary areas, as well as differences in the archaeological collection and storage of skeletal material.

N1 was the sole mortuary area for which skeletal remains were excavated and stored as discrete individuals. Inhumations in this necropolis were documented by excavators with a set of detailed hand-drawn maps, which were used to guide subsequent bioarchaeological analysis. After completing analysis of the discretely bagged individuals, all of the available material from N1 was inventoried for all Copper Age structures identified in the site report. These materials were examined and screened for additional human remains. This inventory, combined with the overlapping elements that were occasionally recovered from the individual burials, produced an additional 149 human bones and 51 permanent teeth that could not be associated with distinct individuals. MNI analysis took into account the structural and stratigraphic provenience of these additional elements and compared them to the level of completion of the individuals documented on site maps. In some cases, such as instances in which element size and age could be assessed, these additional bones could be associated with identified individuals.

At N2, MNI estimates were made by structure, because bones from each structure were stored collectively. The element with the highest minimum number of elements (MNE) count was used to estimate the structure MNI. Because the volume of skeletal material was low for N2, it was possible to carefully compare refit humeri or complete molars from both sides to estimate MNI. As a result, the use of mirroring and pair-matching, guided by principles of anatomical symmetry, was used to construct the adult MNI estimate for each structure. A cautious approach was taken towards potential matches so as not to artificially inflate structure estimates – if there was modest chance that elements or teeth could be paired, they were treated as paired for purposes of MNI estimation. This pair-matching strategy thus likely underestimates, rather than overestimates, the number of individuals buried in this mortuary area. The non-adult MNI for N2 was estimated by examining all non-adult bones and estimating their age based on epiphyseal fusion and/or overall size (Baker *et al.*, 2005; Scheuer and Black, 2004). The number and age of non-adults were then compared to the elements that produced the structure MNE, to evaluate whether or not any of these elements could have come from non-adults.

Due to the high volume of human remains at N4, all of the materials were screened for any human dentition, loose teeth, or identifiable alveolar bone, and a complete dental analysis was conducted in order to estimate MNI. Two of the mortuary caves – Tomb I and Tomb II – were first partially excavated in the 1950s, and thus represent partially disturbed archaeological contexts. However, because the lower layers of cave fill were preserved intact, the 2001 campaign still represented an opportunity to examine the original organization of the site using rigorous contemporary methods of excavation and documentation. Additionally, a newly discovered third cave – Tomb III – was first excavated in 2001, and was the sole cave excavated *in situ* at that time.

[6] Note that "Tomb III" is a different artificial cave than the "Cueva III" mentioned by Espantaleón Jubes (1960). Cueva III is located approximately 20 m N/NW from the complex which includes the Cave of the Column, the Cave of the Child, and Tomb III.

The records of the 2001 excavation note that the upper layers of Units 1, 2, and 4 represent disturbed backfill consisting of fragmentary human bones and sediment from the excavations in the 1950s and 1960s (Fig. 4). This means that teeth recovered from these units could be from either Tomb I or Tomb II, as the excavations in the 1950s did not record the provenience of backfill sediment. It is thus impossible to determine where any recovered loose teeth were originally buried within these two tombs. As a result of the partially disturbed archaeological contexts of the teeth excavated from Units 1, 2, and 4 of Tomb I and II (referred to as Area 1) all teeth from these contexts were combined and analyzed to produce a single dental MNI estimate. Because Unit 3 from Tomb III (referred to as Area 2) was excavated *in situ*, a separate dental MNI estimate was produced for this area.

Non-adult dental MNI counts for both Area 1 and Area 2 at N4 were estimated by dividing non-adult teeth into age categories using the level of crown and root development for loose teeth, and dental eruption sequences for articulated teeth. The remaining loose developing permanent teeth, developing deciduous teeth, and deciduous teeth were divided into developmental stages using the Atlas of Tooth Development and Eruption (AlQahtani, 2009; AlQahtani *et al*., 2010), and a dental minimum number of elements (MNE) was estimated for each age category. The dental MNE was used to estimate the MNI for that same age category. Adult dental MNI was estimated with reference to the most commonly recovered apex complete permanent tooth. The combined adult and non-adult MNIs from Area 1 and Area 2 were then used to estimate an overall MNI for N4.

For all mortuary areas, dental notation follows the format "side-arcade-tooth category," as is customary in anthropological and paleoanthropological studies in the United States. For example, LuI2 refers to the "Left Upper Incisor 2"; deciduous dentition are expressed in lower case[7].

4.2. ASSESSING AGE AND SEX

Due to the fragmentary nature of the Marroquíes human remains, a range of techniques were used to estimate individual age-at-death. When skeletal completion allowed, non-adult age was evaluated using dental eruption, dental development, epiphyseal fusion, and element size (Scheuer and Black, 2004; AlQahtani *et al*., 2010). Non-adult individuals were defined as being <18 years of age, while adults were defined as being ≥18 years of age, based on the assumption that individuals in this age range would have been considered social adults in a prehistoric society. Adult age was assessed using dental wear (Gilmore and Grote, 2012), so as to produce comparable estimates for all three mortuary areas. Categorical age ranges originally developed by Vallois (1960) are most commonly used in research on Spanish skeletal collections, including previous research on N3 by Cámara Serrano *et al*. (2012a, 2012b). In the Marroquíes sample, these categories were defined using midpoint age estimates: pre-term infant (prenatal), child (birth–6.9 years), juvenile (7-12.9 years), adolescent (13-17.9 years), young adult (21-40 years), middle adult (41-60 years) and old adult (61+ years)[8]. When individuals were so poorly preserved that it was not possible to rigorously estimate age, element size was used to place individuals in the adult or non-adult category. A chi-square test was used to evaluate whether there were significant differences in the proportion of adults and subadults between N1, N2, and N4. All statistical analyses were performed in the statistical package R (https://www.r-project.org/).

Assessments of sex for N1 and N2 used standard non-metric scoring techniques any preserved portions of the pelvis and skull (Buikstra and Ubelaker, 1994); the majority of human remains from these two mortuary areas were too fragmentary to employ discriminant function techniques or metric approaches. At N1, it was possible to evaluate the sex of 18/31 (58%) adult individuals, while at N2, human skeletal remains were

[7] Full list of abbreviations: Side: L = left; R = right. Arcade: l = lower (mandibular); u = upper (maxillary). Tooth category: I1 = permanent central incisor; I2 = permanent lateral incisor, C = permanent canine; P3 = permanent third premolar; P4 = permanent fourth premolar; M1 = permanent first molar; M2 = permanent second molar; M3 = permanent third molar; i1 = deciduous central incisor; i2 = deciduous lateral incisor; c= deciduous canine; dm1 = deciduous first molar; dm2 = deciduous second molar.

[8] Because non-adults were defined as individuals < 18 years of age in this study, a new age category of "very young adult" (18-20.9 years) was added to these categorical ranges. The creation of a new age category allowed for the comparisons of non-adults between N1, N2 and N4, while still being able to collapse the "adolescent" and "very young adult" categories to compare the age distributions from N1, N2, and N4 to those from N3.

more fragmentary, and sex could only be estimated for 4/25 (16%) adult individuals. At these two mortuary areas, the features most commonly used to assess sex were the Greater Sciatic Notch and non-metric traits of the cranium, particularly the mastoid process (Beck, 2016a).

At N4, all fragments of mandibles that could be identified were collected during the dental inventory, and 109 of 360 mandibles or mandibular fragments preserved sufficient portions of the mandibular body or ascending ramus to score non-metric traits. The mental eminence could be scored for 89 mandibles (as outlined in Buikstra and Ubelaker, 1994), while the gonial angle could only be scored for 14 mandibles, therefore the mental eminence was used to provide assessments of sex for this mortuary area. To avoid double-counting mandibles, observations were only counted if Region 7 in Knüsel and Outram's (2004) fragmentation-zonation scoring guide was present. In total, it was possible to evaluate sex for 84/165 (51%) adult individuals from N4 using the right half of the mental eminence.

The disparity in the sample size of adult individuals for which it was possible to assess sex at N1 (N = 18), N2 (N = 4) and N4 (N = 84) led to the use of a Fisher's exact test to evaluate whether there were significant differences in the counts of each sex between these three necropolises.

4.3. ASSESSING MORTUARY TREATMENT

At N1 and N2, mortuary treatment was evaluated by examining levels of skeletal and dental completion relative to MNI. For these two mortuary areas it was as also possible to review site maps and photographs in order to determine whether burials were primary or secondary. In general, primary burials showed higher levels of dental and skeletal completion than secondary burials (Beck, 2016a). Forensic research has also demonstrated that secondary burials preserve fewer teeth, and the pattern of dental preservation produced by secondary burials is particularly distinguished by the absence of the anterior teeth, as the incisors are most susceptible to loss after the decay of the periodontal ligament (Haglund, 1997).

After identifying primary and secondary burials from N1 and N2, differences in the patterning of dental preservation were examined for each type of mortuary treatment. This provided a set of comparative dental completion signatures (number of teeth observed / number of teeth expected based on MNI) from primary versus secondary burials. The primary and secondary dental completion signatures were then compared to the dental completion signature from N4, where preservation in dental patterning was the only possible means of analyzing mortuary treatment.

Non-adult dental completion was not assessed because of the reduced accuracy and high error due to the low rate of archaeological recovery of deciduous and developing deciduous teeth. Additional issues arose when evaluating representativeness for mixed dentition (developing deciduous, deciduous, developing permanent, and permanent) that was partially in articulation, and partially composed of loose teeth. For now, the adult observed and expected tooth counts provide the most straightforward signature of prehistoric mortuary treatment.

To compare how many of the expected teeth were present at N1, N2, and N4, an adult dental MNI was estimated for all mortuary areas using all observed adult teeth, factoring in antemortem tooth loss (AMTL) frequency. Dental MNI estimates, rather than skeletal MNI estimates, were used to produce expected counts of adult teeth for N1, N2, and N4 to ensure all data sets were comparable. At N1 and N2, dental MNI was estimated by structure, using the most commonly represented tooth type. At N4, dental MNI was estimated separately for Area 1 and Area 2. The dental MNI values for N1 and N2 fell short of the skeletal MNI estimates for those mortuary areas (Table 1). However, the dental MNI estimate for N4 likely also underestimates the skeletal MNI, and there is currently no means of comparing a dental and skeletal signature for this mortuary area. As a result, the use of the dental MNI at N1 and N2 provides a commensurate signature that can be used to establish the nature of patterning in primary versus secondary burials.

After the adult dental MNI estimates were calculated, data on all resorbed sockets for N1, N2, and N4 were combined to produce an expected amount of resorption by individual tooth category. The percentage of teeth which were resorbed for a given tooth category was then subtracted from the expected counts produced using the dental MNI for the mortuary area.

Necropolis / Mortuary Treatment	Skeletal MNI	Dental MNI	Dental MNI basis*	Dental MNI / Skeletal MNI
N1 Primary	17	14	RlM3, RuM3, RuC	0.82
N1 Secondary	12	6	RlM3, RuM3, RuC	0.50
N1 Total	31	20	RlM3, RuM3, RuC	0.65
N2	25	19	RuC1, RuI1, LlM2	0.76
N4	Not possible	145	RuC1	Not possible

*Dental notation follows the format "side-arcade-tooth category: R = Right, L = Left, l = lower (mandibular), u = upper (maxillary), M = permanent molar, I = incisor, C = permanent canine, numbers = position in arcade.

Table 1. Adult dental and skeletal MNI estimates for N1, N2, and N4.

5. RESULTS

5.1. MNI

Site maps of N1 document 46 human burials in six different structures. Ten of these inhumations could not be located in museum collections (four were missing from Structure 26, and five were missing from Structure 27). Over the course of bioarchaeological study, three additional individuals not documented on the site maps were discovered while examining loose human remains. Analysis also revealed that three burials that depicted on the site maps as single inhumations each contained the commingled remains of two people, bringing the total number of individuals analyzed to 42 (31 adults and 11 non-adults) (Table 2). Accordingly, while bioarchaeological data are available for 42/52 individuals, it is important to acknowledge that this analysis represents an 81% sample of the mapped mortuary population for N1.

Osteological preservation was so poor for three contexts at N2 (Structure 41, Structure 45, and Unit 47) that the highest MNE estimates were derived from permanent teeth. For the remaining excavation contexts (Structure 39, Structure 43, and Structure 44), adult MNI was calculated with reference to the number of humeri present. In total, N2 contained at least 25 adults and 8 non-adults.

A complete dental analysis was conducted for N4, where the most commonly recovered permanent teeth were right upper canines (N = 146). One lightly worn canine was removed because it had the potential to be associated with a non-adult in the 15.5-17.5-year age category, generating an adult MNI of 145 individuals (123 from Area 1 and 22 from Area 2). An age-stratified approach was used to estimate the non-adult MNI (Beck, 2016a), and produced an estimate of 60 non-adult individuals (42 from Area 1 and 18 from Area 2).

5.2. AGE

Overall, the three mortuary areas show similar demographic patterning, with non-adults making up between 24% and 29% of the total MNI (Table 3). A chi-square test showed no significant differences in the proportions of adults and non-adults across N1, N2, and N4 ($\chi^2 = 0.45441$, df = 2, p-value = 0.7968). No pre-term infants, and very few children under the age of 2.5 years old, were found at any of the mortuary areas. The adult assemblage is dominated by young adults, and middle and old adults are rare. The age categories that show the most variation between all three mortuary areas are juvenile and young adult, with proportionally more juveniles and fewer young adults represented at N2 than the other mortuary areas. However, these discrepancies are more likely related to the disparity in sample sizes between mortuary areas rather than true demographic differences.

5.3. SEX

Due to the fragmentary nature of the human skeletal remains at Marroquíes (particularly the poor representation of pubes, crania, and mandibles) most individuals preserved a limited sample of the suite of sexually dimorphic skeletal features. Sex could be assessed for 106/201 (53%) of the combined adult sample from N1, N2, and N4; 31 males or probable males and 47 females or probable females were identified from all mortuary areas (Table 4). Both males and females were interred at all mortuary areas, and slightly

Age Category	N1					N2						N4	
	S.13	S.14	S.22	S.27	S.52*	S.39	S.41	S.43	S.44	S.45	U.47	A.1	A.2
Adults (midpoint age ≥18 years)	11	11	1	8	1**	3	5	4	7	5	1	123	22
Non-adults (midpoint age <18 years)	5	6	0	0	0	0	1	2	3	2	0	42	18
Structure total	16	17	1	8	0**	3	6	6	10	7	1	165	40
Adult MNI	31					25						145	
Non-adult MNI	11					8						60	
Necropolis total	42					33						205	

*S = Structure, U = Unit, A = Area.

**Structure 52 contained only a partial human fibula. The low levels of skeletal completion for this structure led to it being removed from the estimation of MNI for this bioarchaeological analysis.

Table 2. MNI estimates by structure or area for N1, N2, and N4.

Age Category	N1	N2	N4
Pre-term infant (prenatal)	0	0	0
Child (birth - 6.9 years)	8	2	29
Juvenile (7 - 12.9 years)	1	4	22
Adolescent (13-17.9 years)	2	2	9
Very young adult (18-20.9 years)	2	1	3
Young adult (21-40 years)	15	5	98
Middle adult (41-60 years)	5	0	7
Old adult (61+ years)	1	0	3
Total	**34**	**14**	**171**

Table 3. Counts of age categories from N1, N2, and N4. These counts are lower than the MNI for each mortuary area as it was not possible to assess the age of every individual represented in the MNI.

Assessment	N1	N2	N4	Total
Probable Female/Female	10	2	35	**47**
Indeterminate	1	1	26	**28**
Probable Male/Male	7	1	23	**31**
Not Possible*	13	21	61	**95**
Total Assessed	**31**	**25**	**145**	**201**

*A designation of "Not Possible" means that sexually dimorphic nonmetric traits were either not preserved, or were too poorly preserved, to assess sex for these individuals..

Table 4. Assessments of sex for adults from N1, N2, and N4.

more females than males were identified for both N1 and N4[9], with a F:M ratio of 1:0.7 at N1, 1:0.6 at N4, and 1:0.7 for the combined sample of N1, N2, and N4 (Table 4).

Fisher's exact tests found no significant differences in sex between N1 vs. N2 (p-value = 1), N2 vs. N4 (p-value = 1), and N1 vs. N4 (p-value = 1).

5.4. MORTUARY TREATMENT

At N1, skeletal and dental completion analyses supported the initial qualitative categorizations of mortuary treatment that were based on an examination of the site maps (Table 5). The 21 burials (17 adults, 4 non-adults) designated *primary* with reference to the maps were on average 41% complete[10], with an average of 20 ± 10 teeth per individual. The 18 burials (12 adults, 6 non-adults) designated *secondary* were on average 8% complete, with an average of 7 ± 6 teeth per individual. Two of the primary burials had no teeth present, and six of the secondary burials had no teeth present.

Teeth from N1 were well preserved, with 435 teeth associated with adult individuals, and 132 teeth associated with non-adult individuals. Adults preserved 447/902 (50%) of the teeth expected based on the adult MNI of 31, factoring in 9% AMTL. Non-adult individuals preserved 120/280 (43%) of teeth expected based on the non-adult MNI of 9[11]. As with

[9] Ten right mental eminences showed scores of "1." Mandibular gracility can be related to age as well as sex, so these were examined for evidence that could be used to assess age. Unfortunately, only two mandibles with mental eminence scores of 1 were associated with teeth, and the edentulous and fragmentary nature of the sample made age estimation problematic. In the absence of any clear indicators of non-adult status (e.g. small size, or open crypts for permanent teeth) all ten of these gracile mandibles were considered to be adult.

[10] The standard deviation for primary burials was 17%, while the standard deviation for secondary burials was 8%.

[11] Excluding individuals 14.15 and 14.31.1 – see Beck 2016a.

Age Category	Primary		Secondary	
	Count			
No. individuals	21		18	
Average no. bones	77 ± 32		16 ± 15	
Total no. teeth for adults	348		61	
Average no. teeth for adults	21 ± 8		5 ± 5	
Total no. teeth for non-adults	76		56	
Average no. teeth per non-adult individual	19 ± 10		9 ± 7	
	Percentage			
Average level of skeletal completion	41%		16%	
Minimum level of skeletal completion	10%		1%	
Maximum level of skeletal completion	74%		30%	
	Count	Percentage	Count	Percentage
Average no. teeth per adult individual	22 ± 8	64%	5 ± 5	16%
No. teeth in articulation for adults	154	44%	10	16%
No. teeth in articulation for non-adults*	21	28%	15	27%

*Teeth that were still in their crypts (e.g. not yet erupted) were not included in this count.to assess the age of every individual represented in the MNI.

Table 5.Quantitative differences between primary and secondary burials from N1.

Category	N1		N2	
	Count			
No. individuals	18		33	
Average no. bones per individual	16 ± 15		15*	
Average no. teeth per individual	7 ± 6		6*	
	Percentage			
Average level of completion	8%		8%	
	Count	Percentage	Count	Percentage
No. teeth in articulation	17	36%	16	10%

* For N2, it was not possible to calculate the standard deviation for the number of bones or teeth per individual because burials were commingled. Here, the total number of bones and total number of teeth for the mortuary area was divided by the MNI for the mortuary area

Table 6. Quantitative differences between secondary adult burials from N1 and N2.

skeletal completion, primary burials showed higher levels of dental completion than secondary burials. Primary adult burials preserved 348/495 (70%) of their expected teeth, while secondary adult burials preserved only 61/349 (17%) of their expected teeth. Primary adult burials also showed higher levels of teeth articulated in mandibles and maxilla – 154/348 (44%) of the teeth from primary burials were articulated, and only 10/61 (16%) of the teeth from secondary burials were articulated. Similarly, primary non-adult burials from N1 preserved 76/130 (58%) of their expected deciduous, developing permanent and permanent teeth, while secondary non-adult burials preserved only 56/192 (29%).

All burials from N2 show relatively low levels of dental and skeletal completion, supporting the conclusion that this mortuary area contained predominantly secondary burials. At N2, the structure that came closest to achieving its expected levels of skeletal completion (Structure 44, with 16% of expected bones) fell short of the primary burial average of 41% skeletal completion from N1. All other structures at N2 show only 2% levels of skeletal completion. The teeth from N2 also display a secondary pattern, with particularly low levels of incisor representation (Fig. 6).

In order to establish whether the N2 dental completion signature fell closer to the N1 primary burial signature or N1 secondary burial signature, expected tooth counts were calculated relative to the adult skeletal MNI for each mortuary area (N1 primary = 17 adults, N1 secondary = 12 adults,

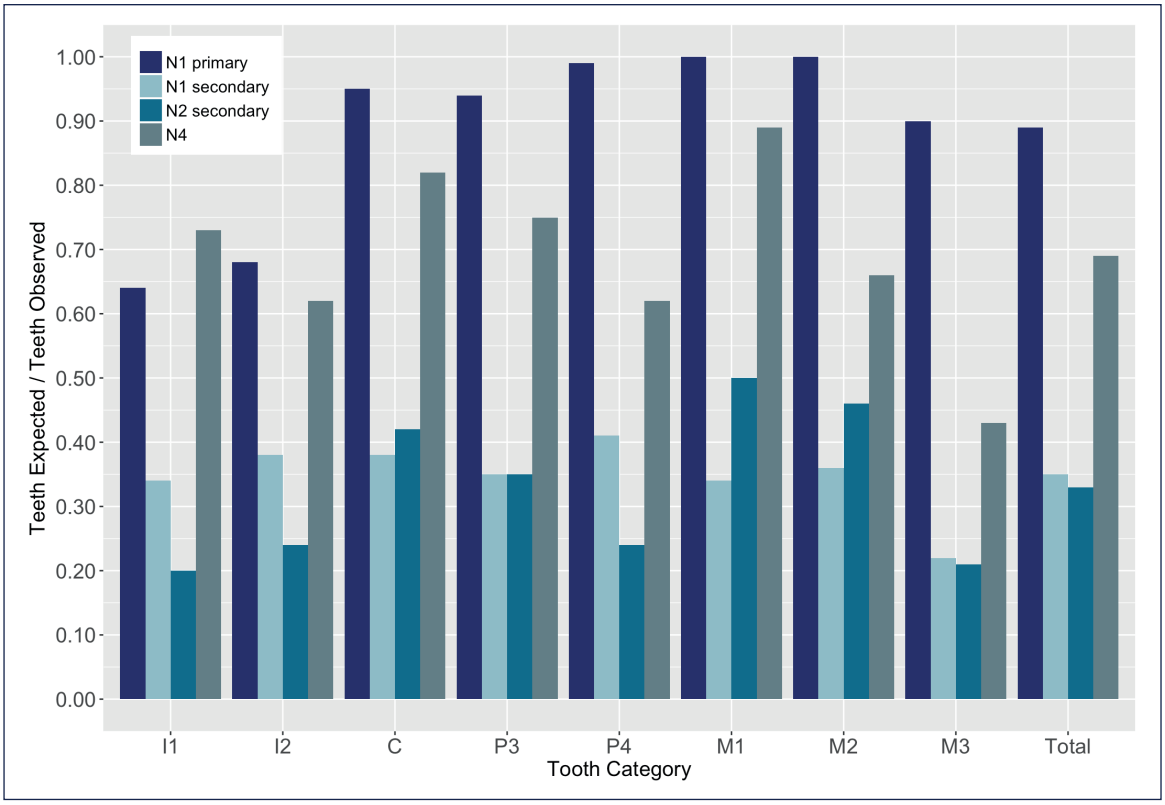

Fig. 6. Dental completion signatures for primary and secondary burials at N1 and N2, compared with the dental completion signature at N4.*

N2 = 24 adults)[12]. For every tooth category, N2 observed values fall closer to observed values for N1 secondary burials than to N1 primary burials. On the whole, the N2 signature is comparable to the N1 secondary burial signature (Table 6) with low levels of completion, lower numbers of teeth per burial, and few teeth found in articulation.

Adult mortuary treatment at N4 was evaluated by comparing the N4 dental completion signature to the primary and secondary dental completion signatures from N1 and N2. For all broad tooth categories (I1, I2, C, P3, P4, M1, M2, M3), N4 percentage expected values fell either above primary values (I1) or between primary and secondary values (I2-M3) (Fig. 6). The N4 percentage expected values were closer to the N1 percentage expected values for the most mesial teeth in the arcade (I1, I2, C, P3) as well as M1, and closer to the secondary signature for all of the distal teeth in the arcade except M1 (P4, M2, and M3).

Overall, the dental completion signature at N4 falls closer to the N1 primary burial signature, which suggests that the majority of interments at N4 were likely primary burials. However, because the N4 values are intermediate between the primary and secondary signatures, it is likely that a portion of individuals from this mortuary area received secondary burials.

6. DISCUSSION

Patterns of representation at N1, N2, and N4 suggest that mortuary practices at Marroquíes were inclusive in regards to aspects of individual identity such as age and sex. Both males and females were interred at all mortuary areas, and slightly more females than males were identified for both N1 and N4, and for the combined sample of N1, N2, and N4. These ratios, showing the identification of slightly more females than males, are part of a larger pattern also observed in the analysis of N3 (Cámara Serrano *et al.*,

[12] The Unit 47 cranium was removed from the skeletal MNI for N2 in this analysis, because a portion of the associated teeth were not yet apex complete.

2012a). At Tramo 3, they document 49 females and 36 males (1:0.7), at Paseo Estación, three females and four males (1:1.3), and at García Triviño, six females and six males (1:1) (Cámara Serrano *et al*. 2012a: 57). At Tramo 3, which contains the greatest number of burials at N3 (N = 164), the authors note that an "imbalance in sex" is only recognized in Structure 4 (six adult males and four adult females) and Structure 2 (six adult females, six indeterminate adults). These studies reveal two important results. First, sex imbalances are relatively slight at all mortuary areas, and second, there are no collective inhumations where only one sex is represented (assuming that in areas like Structure 2 from Tramo 3, some of the indeterminate individuals were males).

Fosa común 1 (F1) presents the sole exception to this inclusive pattern. Four of the five individuals deposited in this area were adults, and all were assessed as male based on non-metric characteristics of the mandible (Sánchez *et al*., 2005). However, F1 is a simple deposition of human remains within Ditch 5, interred in a pit that was dug after the abandonment and destruction of a nearby fortified structure and the in-filling of the ditch itself. The formal differences in the location and organization of this mortuary deposit, the limited number of individuals present in the interment, and the absence of grave goods all suggest that F1 represents a social process distinct from those responsible for the necropolises.

Though results of bioarchaeological analyses show that mortuary practices included both males and females in relatively equal proportions, there are two indications of mortuary distinctions related to sex. The first is the placement of a young adult male (estimated midpoint age 25 ± 4 years) in Structure 22 at N1. This individual burial contrasts with the surrounding structures, which all contain three or more individuals. While both males and females were interred in these peripheral and communal mortuary structures, CE.22 was the only structure at N1 containing a single individual. Given the spatial organization of the necropolis, the unique individual interment, and the relatively early dates for this burial (see Beck, 2016a), this individual may have acted as some kind of foundational deposit.

The second indication of a mortuary distinction possibly related to sex is found in Tomb I at N4. Manzano Castillo and Martínez Ocaña (2001) describe the interior organization of the tomb as a "chaotic" deposition of disarticulated human remains, in which the only deliberate internal organization seemed to be the concentration of crania and long bones against the walls of the chamber. The archaeologists observed only one individual that preserved any degree of anatomical connection: a skull with two articulated cervical vertebrae (Fig. 7). This degree of preservation suggested that this individual was deposited prior to skeletonization. The skull was centrally located within the tomb, and the preserved anatomical articulations may have extended beyond the vertebrae; however, the remains were covered by a portion of the limestone roof that had fallen on top of the rest of the body. This differential treatment and level of articulation led Manzano Castillo and Martínez Ocaña to posit that this may have been the final interment in Tomb I:

> "we assume, taking into account that we are dealing with a case of collective burials and that it was found in the central place of the chamber, it was likely the last burial conducted in this tomb, that produced associated grave goods comprising a copper knife, ceramic objects, shells (located next to the cranium), flint tools; and the stacking or removal of earlier inhumations to the sides of the room, provided a position of privilege for this last inhumation" (Manzano Castillo and Martínez Ocaña, 2001:21, translation by author).

Subsequent bioarchaeological analysis revealed that this individual (MN.2.167) was a probable male, with an extremely well-preserved cranium, mandible, and teeth and an estimated midpoint age of 26 ± 4 years. Only limited claims can be made with a sample size of two individuals, but it is interesting to note that adult males appear to have been used for foundational or closing interments at two different necropolises. Cámara Serrano *et al*. note a similar pattern in their discussion of mortuary treatment at N3, where they interpret the initial disarticulated secondary burials of males as indicative of their status as "facilitating ancestors," while subsequent and more complete female burials are testament to the importance of matrilineal lineages at the site (2016:165).

A small number of adult individuals from Marroquíes have both assessments of sex and available strontium isotope ratios. However, in the

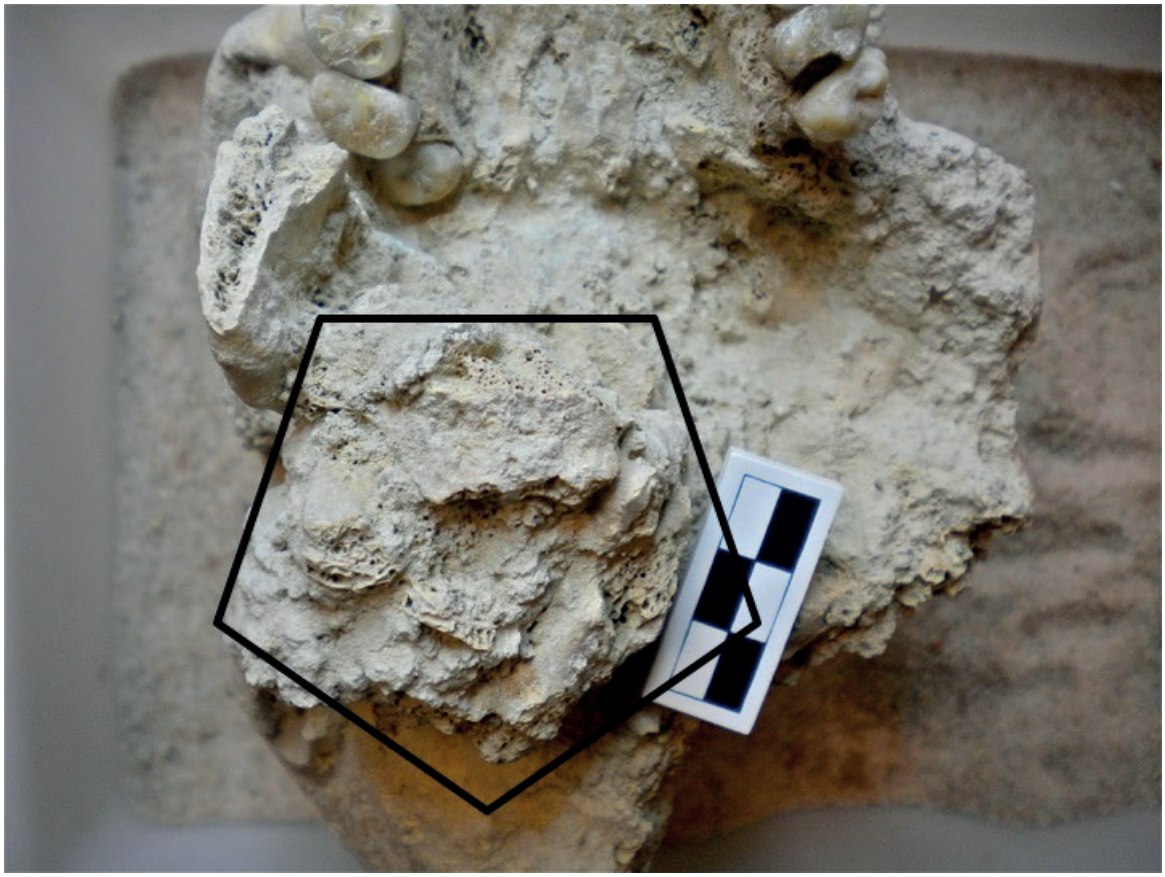

Fig. 7. Inferior view of cranium MN. 2.267.01 from N4, showing articulated cervical vertebrae. Anterior = towards top of photo.

strontium sample of 36 adult individuals for which it was possible to assess sex, the three non-local individuals were female (Díaz-Zorita Bonilla *et al.*, under review), a result which agrees with recent studies of on sex and mobility in Copper Age Central Spain (Díaz-del-Río *et al.*, 2017), and contributes to research on mobility related to patrilocality in Spain during this period. Finally, the grave goods at some mortuary areas (for example, the copper knife discovered in close proximity to MN.2.167.01), may have had gendered implications. Future efforts that focus on a full material cultural analysis of the artifacts included in these interments, particularly combining them with provenience and bioarchaeological information, may shed more light on the intersection of gendered identities and material culture at the site.

Just as mortuary treatment at Marroquíes was inclusive with regards to sex, funerary practices were also inclusive with regards to age. All mortuary areas include children, juveniles, and adolescents, though pre-term infants are absent, corresponding to a broader pattern within Late Prehistoric Iberia (Waterman and Thomas, 2011). N3 has a similar proportional representation of non-adults (32%) (Cámara Serrano *et al.*, 2012a), and one of the five individuals (20%) included in the F2 deposit is likewise non-adult, between 12 to 16 years of age (Sánchez *et al.*, 2005) (Table 7). Adult representation is characterized by a disproportionate number of younger adults of 20-40 years of age, a pattern which also occurs at Valencina de la Concepción (Costa Caramé *et al.*, 2010). However, the higher number of young adults, lower number of middle adults, and the virtual absence of individuals older than sixty years of age at Marroquíes is likely an artifact of the limitations of bioarchaeological methods for estimating age (see Gilmore and Grote, 2012: 187), rather than a true absence of older adults.

It is not only the presence of non-adults at Marroquíes that is important, but also their funerary treatment. Bioarchaeological analysis has shown that when non-adults were buried with adults at N1 and N2, they were treated in a similar fashion to adults (Beck, 2016b). At N1, where adults received primary and secondary burial, non-adults also received

Mortuary Area	Pre-term infant (prenatal)	Child (birth-6.9 years)	Juvenile (7-12.9 years)	Adolescent (13-17.9 years)	Total	Percentage of total MNI
N1	0	8	1	2	11	26%
N2	0	2	4	2	8	25%
N3	4	34	18	7	63	36%
N4	0	29	22	9	60	29%
F2	0	0	0	1	1	20%

Table 7. Count of non-adults by age category for all analyzed Marroquíes mortuary areas. Data for N3 taken from Cámara Serrano *et al.*, 2012a. Data for F2 taken from Sánchez *et al.*, 2005.

both forms of mortuary treatment. At N2, where adult skeletal completion is low for all mortuary areas, non-adult skeletal completion is also low for all mortuary areas (Beck, 2016b), suggesting that the majority of individuals interred in this mortuary area received secondary burials. Given that secondary burials represent the conclusion of a multi-stage mortuary program, it appears that non-adults participated in all stages of this program. Finally, preliminary attempts at evaluating dental completion signatures for non-adults show that the N4 sample falls between the signatures for primary and secondary burials from the N1 and N2 sample (Beck, 2016a). However, future research dedicated to developing more rigorous expected tooth counts for non-adults is still necessary. The inclusion of non-adult interments in the artificial caves does, however, suggest that younger individuals had access to most of the forms of mortuary treatment available at Marroquíes

While non-adults are thus included in funerary practices, there is still some evidence for age-based distinctions in mortuary treatment. Four of the five mortuary areas show an absence of pre-term infant burials, and relatively young infants with midpoint age estimates under three years are also rare (none at N1, one at N2, and nine at N4). Some very young infants may have been included in communal burials, as demonstrated by the four pre-term infants reported for N3 (Cámara Serrano *et al.*, 2012a). However, in a pre-industrial population with high child mortality, it is likely that these individuals represent only a fraction of the infants that died.

The absence of the remains of the youngest members of society from mortuary contexts is a phenomenon frequently documented in both archaeology and ethnography, and has been linked to both the unique social status of infants and the existence of liminal ceremonies designed to confer "personhood" (Beck, 2016b). Taphonomic studies have also shown that in many forensic and archaeological contexts infant bones deteriorate more rapidly than adult bones (Lewis, 2007), and there are high levels of inter-site variability in the preservation of non-adult skeletal remains (Guy and Baud, 1997; Manifold, 2010). Accordingly, there are a number of possible explanations for the near absence of infants at Marroquíes, including the differential preservation of infant skeletal remains, the existence of social norms that associated achievement of "personhood" with older developmental stages, the need to survive of specific "rites of passage" (van Gennep, 1960) before burial, or infants' more constrained sphere of social influence (Waterman and Thomas, 2011).

A second pattern that suggests possible age-based distinctions in mortuary practice is the absence of single non-adult burials. The few instances of single burials at Marroquíes – the individual central burial from N1, the individual cranium from Unit 47 at N2, and the partially articulated final interment from N4 – were all of adult individuals. At Tomb II at N4, one non-adult individual was accorded a degree of spatial differentiation through their placement on a lateral niche carved into the cave wall. However, in this instance the younger individual was flanked by an adult burial in a parallel niche on the opposite wall (Espantaleón Jubes, 1957) (Fig. 4). These individuals were not recovered as they fell outside the spatial boundaries of the 2001 excavations, so it is impossible to assess their developmental age, the accuracy of the initial reconstruction, or to determine whether these interments also date to the Copper Age.

The only exception to the absence of single non-adult burials is the possible infant burial documented during the excavation of N2. Though no neonatal bones were located in the museum

during bioarchaeological analysis, an infant burial is identified on the map for Structure 44, *Planta* II as a "concentration of small remains – possible infant burial," which the site report describes as being placed on a ceramic platter, estimating that the bones were from an individual "0-3 years" of age (Pérez Martínez, 2005). Structure 44 has one radiocarbon date from an adult femur that dates to the Early Bronze Age (Beck, 2016a). As a result, the unique mortuary treatment accorded to this younger individual is likely an instance of later mortuary re-use of the site that reflects different social processes than those at play during the height of the Marroquíes occupation. Individual infant burials, particularly within ceramic vessels, are a characteristic feature of the later Bronze Age within Iberia (Lull Santiago *et al*., 2005), and so the documentation of an infant at this Early Bronze Age structure from N2 can be connected to a wider shift in regional mortuary practices.

Finally, the mortuary treatment of non-adults may be related to the wealth of the social unit responsible for interment. At N1 and N2, non-adult inhumations were concentrated in the structures with the highest numbers of burials. The two structures that house all of the analyzed non-adult burials from N1 also house deliberate animal burials. Though a more detailed analysis of the material culture accompanying the inhumations is ongoing, some of the wealthiest grave goods from N2, like the bronze halberd with rivets and five bone awls, come from Structure 44 and Structure 45, where the majority of the non-adults are interred. Research at other Late Prehistoric sites in the Upper Guadalquivir suggests that this may be a regional pattern. Venta del Rapa, only 20 km away from Marroquíes, is a Late Copper Age village dated to 2350–2000 cal BC. The necropolis at Venta del Rapa contains three mortuary structures in which 61 individuals are buried. Here, non-adults are also interred in the two mortuary structures that house the greatest numbers of burials (Lechuga Chica *et al*., 2014).

These distinctions in the mortuary treatment of non-adults suggest three broad patterns. First, though non-adult bodies were processed in the same way as adult bodies, the locations where they could be interred were constrained. Time and energy were invested in the mortuary treatment of non-adults, but their membership in a lineage or social group may have been a more powerful component of their social identity than their individual identity based on their accomplishments and relationship with other members of the settlement. Second, the restriction of non-adults to burials in communal mortuary contexts suggests that children and juveniles could not be buried on their own, potentially for religious, ritual, or social reasons. Finally, the potential correlation between non-adult burial and a higher number of grave goods makes it possible that the wealth of the social unit responsible for burial may have affected access to mortuary treatment. If interment was expensive in terms of time, energy, or significant resources, it is possible that not all social units could afford to bury their youngest members.

Almost all mortuary structures from N1, N2, and N4 are characterized by communal interments, whether burials are primary (N1), secondary (N1 and N2) or commingled cave depositions (N4). Despite this communal and inclusive approach in which individuals of both sexes and almost all ages are accorded the full range of mortuary treatment, there are some indications that particular individuals were singled out for differential treatment. For example, one burial from Structure 13 at N1 included a fragmentary upper rib, medial clavicle, and fragment of manual phalanx that all showed signs of burning. Post-mortem manipulation of human remains is also well-documented at N3 (Cámara Serrano *et al*., 2016), and the presence of empty structures at N1 that are similar in size and scope to the mortuary structures attests to the likely movement of bodies at the site.

What is clear is that multiple methods of interment were practiced simultaneously at Marroquíes. At N1, the co-existence of both primary and secondary burial may reveal the simultaneous presence of multiple mortuary treatments, or may be a snapshot of a trajectory from primary to secondary burial, with both ends of the spectrum represented. The intermediate dental completion signature at N4, falling in between the primary and secondary dental completion signatures from other mortuary areas, suggests that both primary and secondary burials were likewise interred in these artificial caves. Finally, the partial chronological overlap of N1, N2, and N4 indicates that multiple spaces were simultaneously in use for the burial of the dead at this site.

7. CONCLUSIONS

The bioarchaeological data presented in this study provide important new information about demography, mortuary practices, and social organization at one of the largest villages in Iberia during the 3rd millennium BC. The relatively even balance of male and female adults interred within the mortuary areas at Marroquíes suggests that the construction and maintenance of this Copper Age center was not underlain by the development of new distinctions in gendered identities. Likewise, the inclusion of individuals of all ages in the mortuary program, except for very young infants, suggests that conceptualizations of age and personhood did not change significantly from smaller-scale or earlier occupations. Adult and non-adult individuals, as well as males and females, are all represented by primary burials, secondary burials, and burials in the artificial cave system, suggesting that this new kind of large-scale settlement was not characterized by increasingly restrictive or hierarchical approaches to mortuary practices. Indeed, there appears to be little age- or sex-related mortuary segregation at Marroquíes, providing evidence that different kinds of social organization may have underlain the emergence of so-called "mega-villages" in Iberia, with increasing levels of social differentiation at sites like Valencina de la Concepción and Los Millares (Micó Pérez, 1995; Cámara Serrano and Molina González, 2005; Fernández Flores *et al.*, 2016), and the maintenance of relatively inclusive approaches to mortuary treatment and social organization at Marroquíes.

Broad similarities in demography and mortuary practices link the necropolises at Marroquíes, suggesting that funerary rituals acted as a common thread tying together the inhabitants of the site. However, the distinct spatial location of each necropolis also underscores the maintenance of mortuary areas specific to particular social units. The inclusive approach to mortuary treatment could represent a valorization of the larger community above the individual, a perspective that may have allowed for the organization of labor necessary to build the enclosure ditches and associated architecture. However, the burial of individuals in different mortuary areas around the settlement highlights the maintenance of spatial distinctions related to the social units responsible for organizing burial at Marroquíes. These distinct mortuary areas were preserved over several generations (Beck, 2016a), suggesting the deliberate and prolonged maintenance of the identities of the social groups responsible for burying the dead – kinship groups, sodalities, lineages, or otherwise.

Díaz-del-Río (2004a) has suggested that increasing factionalism between such groups may have led to the radical reorganization of the site in the late 3rd millennium BC. Continuing bioarchaeological research at this macro-village, as well as other villages in Iberia from the 3rd millennium BC, will shed light on why such new forms of social organization emerged, how such settlements were organized, and what life was like for the people who inhabited them.

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BIBLIOGRAPHY

ALQAHTANI, S. (2009): *Atlas of Human Tooth Development and Eruption*. Barts and the London School of Medicine and Dentistry, Electronic document, http://www.atlas.dentistry.qmul.ac.uk/, accessed May 10, 2017.

ALQAHTANI, S., HECTOR M. and LIVERSIDGE, H. (2010): "Brief communication: the London atlas of human tooth development and eruption", *American Journal of Physical Anthropology* 142, pp. 481-490.

ARANDA JIMÉNEZ, G., LOZANO MEDINA, Á., ESCUDERO CARRILLO, J., SÁNCHEZ ROMERO, M., ALARCÓN GARCÍA, E., FERNÁNDEZ MARTÍN, S., DÍAZ-ZORITA BONILLA, M. and BARBA COLMENERO, V. (2016): "Cronología y temporalidad de los recintos de fosos prehistóricos: el caso de Marroquíes Bajos (Jaén)", *Trabajos de Prehistoria* 73(2), pp. 231-250.

BAKER, B., DUPRAS, T. and TOCHERI, M. (2005): *The Osteology of Infants and Children*. Texas University Press, College Station.

BECK, J. (2016a): *The Bioarchaeology of Mortuary Practice at Marroquíes Bajos, Spain*, Unpublished PhD dissertation. University of Michigan, Ann Arbor.

BECK, J. (2016b): "Part of the family: Age, identity and burial in Copper Age Iberia", *Theoretical Approaches to Analysis and Interpretation of Commingled Human Remains*, (A. Osterholtz ed), Springer International, Cham, pp. 47-73.

BUIKSTRA, J. and UBELAKER, D. (eds.). (1994): *Standards for Data Collection from Human Skeletal Remains*, Arkansas Archaeological Survey Research Series No. 44, Fayetteville.

CÁMARA SERRANO, J. and MOLINA GONZÁLEZ, F. (2005): *Los Millares: Guía del Yacimiento Arqueológico*, Consejería de Cultura, Sevilla.

CÁMARA SERRANO, J., and MOLINA GONZÁLEZ, F. (2016): "Interpretación histórica y registro arqueológico en el estudio de la Prehistoria Reciente Andaluza", *El Registro Arqueológico y la Arqueología Medieval*, (A. Malpica and G. García-Contreras, eds.). Alhulia. Granada, pp. 25-70.

CÁMARA SERRANO, J., SÁNCHEZ SUSI, R., LAFFRANCHI, Z., MARTÍN FLÓREZ, S., RIQUELME CANTAL, J., SPANEDDA, L., GARCÍA CUEVAS, M., GONZÁLEZ HERRERA, A., JIMÉNEZ BROBEIL, S. and NICÁS PERALES, J. (2012a): "La cronología y variedad de los sistemas funerarios en Marroquíes. Una aproximación desde las excavaciones del sistema tranviario de Jaén", *SAGVNTVM. Papeles Del Laboratorio de Arqueología de Valencia* 44, pp. 47-66.

CÁMARA SERRANO, J., SPANEDDA, L., SÁNCHEZ SUSI, R., GARCÍA CUEVAS, M., GONZÁLEZ HERRERA, A. and NICÁS PERALES, J. (2012b): "La cronología absoluta de Marroquíes (Jaén) en el contexto de la Prehistoria Reciente del Alto Guadalquivir", *Antiqvitas* 24, pp. 81-94.

CÁMARA SERRANO, J., SÁNCHEZ SUSI, J., RIQUELME CANTAL, A., MARTÍN FLÓREZ, S., AFONSO MARRERO, J., PAU, C., GARCÍA CUEVAS, M., NICÁS PERALES, J., SPANEDDA, L., GONZÁLEZ HERRERA, A., JIMÉNEZ BROBEIL, S. and LAFFRANCHI, Z. (2016): "Culte aux ancêtres dans la période Chalcolithique de la Péninsule Ibérique? Le sacrifice d'animaux, la circulation des restes humains et la différence de traitment entre hommes et femmes dans les tombes du site archéologique à «Marroquíes» (Jaén, Espagne) trouvées dans les fouilles de la «Tranche 3» du système du tramway", *L'Anthropologie* 120(2), pp. 145-174.

CHAPMAN, R. (1981): "Archaeological theory and communal burial in Prehistoric Europe", *Pattern of the Past: Studies in Honour of David Clarke*, (I. Hodder, G. Isaac and N. Hammond eds.), Cambridge University Press, New York, pp. 387–411.

CHAPMAN, R. (2008): "Producing inequalities: regional sequences in Later Prehistoric southern Spain", *Journal of World Prehistory* 21, pp. 195–260.

COSTA CARAMÉ, M., DÍAZ-ZORITA BONILLA, M., GARCÍA SANJUÁN, L. and WHEATLEY, D. (2010): "The Copper Age settlement of Valencina de la Concepción (Seville, Spain): demography, metallurgy and spatial organization", *Trabajos de Prehistoria* 67(1), pp. 85-117.

DÍAZ-DEL-RÍO, P. (2004a): "Factionalism and collective labor in Copper Age Iberia", *Trabajos de Prehistoria* 61, pp. 85-98.

DÍAZ-DEL-RÍO, P. (2004b): "Copper age ditched enclosures in Central Iberia", *Oxford Journal of Archaeology* 23(2), pp. 107-121.

DÍAZ-DEL-RÍO, P. (2011): "Labor in the making of Iberian Copper Age lineages", *Comparative Archaeologies: The American Southwest (AD 900-1600) and the Iberian Peninsula (3000-1500 BC)*, (K. Lillios ed.), Oxbow Books, Oxford, pp. 37-56.

DÍAZ-DEL-RÍO, P. (2013): "Las agregaciones de población del III Milenio AC en la Península Ibérica", *El Asentamiento Prehistórico de Valencina de La Concepción (Sevilla):*

Investigación y Tutela en el 150 Aniversario del Descubrimiento de La Pastora, (L. García Sanjuán, J. Jiménez, V. Pérez, T. Moreno, and R. Cruz-Auñón eds.), Universidad de Sevilla, Sevilla, pp. 65-76.

DÍAZ-DEL-RÍO, P., WATERMAN, A., THOMAS, J., PEATE, D., TYKOT, R., MARTÍNEZ NAVARRETE, M. AND VICENT GARCÍA, J. (2017): "Diet change and mobility patterns in the Late Prehistory of Central Iberia (4000-1400 cal BC). The evidence of radiogenic ($^{87}Sr/^{86}Sr$) and stable ($\delta^{18}O$, $\delta^{13}C$) isotope ratios", *Archaeological and Anthropological Sciences* 9(7), pp. 1439-1452.

DÍAZ-ZORITA BONILLA, M. (2017): *The Copper Age in South-West Spain: A Bioarchaeological Approach to Prehistoric Social Organization*, BAR International Series S2840, BAR Publishing, Oxford.

DÍAZ-ZORITA BONILLA, M., BECK, J., BOCHERENS, H. and DÍAZ-DEL-RÍO, P. (Under Review): Isotopic evidence for mobility at large scale aggregations in Copper Age Iberia. The mega-site of Marroquíes (Jaén). Submitted to *Antiquity* 29 August 2017.

ESPANTALEÓN JUBES, R. (1957): "La necrópolis eneolítica de «Marroquíes Altos»", *Boletín del Instituto de Estudios Giennenses* 13, pp. 165-174.

ESPANTALEÓN JUBES, R. (1960): "La necrópolis en cueva artificial de Marroquíes Altos", *Boletín del Instituto de Estudios Giennenses* 26, pp. 35-50.

FERNÁNDEZ FLORES, Á., GARCÍA SANJUÁN, L. and DÍAZ-ZORITA BONILLA, M. (eds.). (2016): *Montelirio: Un Gran Monumento Megalítico de la Edad del Cobre*. Consejería de Cultura de la Junta de Andalucía, Sevilla.

GARCÍA SANJUÁN, L., VARGAS JIMÉNEZ, J., HURTADO PÉREZ, V., RUIZ MORENO, T. and CRUZ-AUÑÓN BRIONES, R. (eds.). (2013a): *El Asentamiento Prehistórico de Valencina de La Concepción (Sevilla): Investigación y Tutela en el 150 Aniversario del Descubrimiento de La Pastora*, Universidad de Sevilla, Sevilla.

GARCÍA SANJUÁN, L., TRIVIÑO LUCIAÑEZ, M., SCHUHMACHER, T., WHEATLEY, D. and BANERJEE, A. (2013b): "Ivory craftsmanship, trade and social significance in the southern Iberian Copper Age: the evidence from the PP4-Montelirio sector of Valencina de la Concepción (Seville, Spain)", *European Journal of Archaeology* 16(4), pp. 610-635.

GILMORE, C. and GROTE, M. (2012): "Estimating age from adult occlusal wear: a modification of the Miles method", *American Journal of Physical Anthropology* 149, pp. 181-192.

GUY, H., MASSET, C. and BAUD, C. (1997): "Infant taphonomy", *International Journal of Osteoarchaeology* 7, pp. 221-229.

HAGLUND, W. (1997): "Scattered skeletal human remains: search strategy considerations for locating missing teeth". *Forensic Taphonomy: The Postmortem Fate of Human Remains*, (W. Haglund and M. Sorg eds.), CRC Press, Boca Raton, pp. 383-394.

HORNOS MATA, F., ZAFRA DE LA TORRE, N. and CASTRO LÓPEZ, M. (1998): "La gestión de una zona arqueológica urbana: la experiencia de investigación aplicada en Marroquíes Bajos (Jaén)", *PH Boletín Del Instituto Andaluz Del Patrimonio Histórico* 22, pp. 82-91.

KNÜSEL, C. and OUTRAM, A. (2004): "Fragmentation: The zonation method applied to fragmented human remains from archaeological and forensic contexts", *Environmental Archaeology* 9, pp. 85-97.

LECHUGA CHICA, M., SOTO CIVANTOS, M. and RODRÍGUEZ ARIZA, M. (2014): "El poblado Calcolítico "Venta del Rapa" (finales III milenio cal. BC), Mancha Real, Jaén. Un recinto de fosos entre las estribaciones de Sierra Mágina y el Alto Guadalquivir". *Trabajos de Prehistoria* 71(2), pp. 353-367.

LEWIS, M. (2007): "Fragile bones and shallow graves", *The Bioarchaeology of Children*, Cambridge University Press, Cambridge, pp. 20-37.

LUCAS DE PELLICER, M. (1968): "Otra cueva artificial en la necrópolis «Marroquíes Altos», de Jaén (Cueva IV)", *Excavaciones Arqueológicas en España* 62, pp. 3-26.

LULL SANTIAGO, V., MICÓ PÉREZ, R., RIHUETE HERRADA, C. and RISCH, R. (2005): "Property relations in the Bronze Age of South-Western Europe: An Archaeological Analysis of Infant Burials from El Argar (Almería, Spain)", *Proceedings of the Prehistoric Society* 71, pp. 247-268.

MANIFOLD, B. (2010). "The representation of non-adult skeletal elements recovered from British archaeological sites", *Childhood in the Past* 3, pp. 43-62.

MICÓ PÉREZ, R. (1995): "Los Millares and the Copper Age of the Iberian Southeast", *The Origins of Complex Societies in Late Prehistoric Iberia*, (K. Lillios, ed.), International Monographs in Prehistory, Ann Arbor, pp. 169-176.

NOCETE CALVO, F., SÁEZ, R., NIETO, J., CRUZ-AUÑÓN BRIONES, R., CABRERO GARCÍA, R., ALEX, E. and BAYONA, M. (2005): "Circulation of

silicified oolitic limestone blades in south-Iberia (Spain and Portugal) during the third millennium B.C.: an expression of a core/periphery framework", *Journal of Anthropological Archaeology* 24(1), pp. 62-81.

OSTERHOLTZ, A. (ed.) (2016): *Theoretical Approaches to Analysis and Interpretation of Commingled Human Remains*, Springer, New York.

OSTERHOLTZ, A., BAUSTIAN, K. and MARTIN, D. (eds.). (2014): *Commingled and Disarticulated Human Remains: Working Toward Improved Theory, Method, and Data*, Springer, New York.

SÁNCHEZ, A., BELLÓN RUIZ, J. and RUEDA GALÁN, C. (2005): "Nuevos datos sobre la zona arqueológica de Marroquíes Bajos: el quinto foso". *Trabajos de Prehistoria* 62, pp. 151-164.

SCHEUER, L. and BLACK, S. (2004): *Developmental Juvenile Osteology*, Academic Press, San Diego.

VALERA, A., SILVA, A. and MÁRQUEZ-ROMERO, J. (2014): "The temporality of Perdigoes enclosures: absolute chronology of the structures and social practices", *SPAL. Revista de Prehistoria y Arqueología de la Universidad de Sevilla* 23, pp. 11-26.

VALLOIS, H. (1960): "Vital statistics in prehistoric populations as determined from archaeological data", *The Application of Quantitative Methods in Archaeology*, (R. Heizer and S. Cook eds.), Quadrangle Books, Chicago, pp. 186-204.

VAN GENNEP, A. (1960): *Rites of Passage*, University of Chicago Press, Chicago.

WATERMAN, A. and THOMAS, J. (2011): "When the bough breaks: childhood mortality and burial practice in Late Neolithic Atlantic Europe", *Oxford Journal of Archaeology* 30(2), pp. 165-183.

ZAFRA DE LA TORRE, N., HORNOS MATA, F. and CASTRO LÓPEZ, M. (1999): "Una macro-aldea en el origen del modo de vida campesino: Marroquíes Bajos (Jaén) c. 2500-2000 cal. ANE", *Trabajos de Prehistoria* 56, pp. 77-102.

ZAFRA DE LA TORRE, N., CASTRO LÓPEZ, M. and HORNOS MATA, F. (2003): "Sucesión y simultaneidad en un gran asentamiento: la cronología de la macro-aldea de Marroquíes Bajos, Jaén. c. 2500-2000 CAL ANE", *Trabajos de Prehistoria* 60, pp. 79-90.