

# BRONZE AGE ANTLER AND BONE SPINDLE WHORLS IN THE SOUTHEAST OF IBERIA

Fusayolas de asta y hueso en el sureste de la Península Ibérica  
durante la Edad del Bronce

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**ABSTRACT** The elaboration of spindle whorls for the manufacture of thread using spindles is attested in the Iberian Peninsula from the end of the Neolithic. There is no evidence, however, of the use of materials other than stone or pottery to produce spindle whorls during this period. In the southeastern area of the Iberian Peninsula, spindle whorls of bone and antler begin to appear in archaeological contexts from the middle of the 2<sup>nd</sup> millennium. In this paper, we analyze the two different types of spindle whorls present and the techniques used in their manufacture. Likewise, we deal with the meanings of their presence in the framework of the textile production during the Middle and Late Bronze Age.

**Keywords:** Antler Spindle Whorl, Bone Spindle Whorl, Spinning, Textile Production, Bronze Age.

**RESUMEN** La elaboración de fusayolas para la producción de hilos mediante la utilización husos está atestiguada en la Península Ibérica desde finales del Neolítico. Sin embargo, no hay evidencias del uso de otros materiales distintos a la piedra o la cerámica para producirlos en este período. En el área sureste de la península Ibérica comienzan a aparecer fusayolas de hueso y asta en contextos arqueológicos desde mediados del segundo milenio cal BC. En este trabajo analizamos los dos tipos diferentes de fusayolas atestiguadas y las técnicas de fabricación utilizadas en su elaboración. Asimismo, abordamos los significados de su presencia en el marco de la producción textil de la Edad del Bronce y el Bronce Final.

**Palabras clave:** Fusayolas de asta, Fusayolas de hueso, Hilado, Producción textil, Edad del Bronce.

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## INTRODUCTION

Spindle whorls are an essential element to infer textile production in archaeological contexts. They are objects that function as a flywheel in a spindle: a rod tool used to produce thread. In general, spindles were made of wood, so very few have been preserved. For this reason, spindle whorls, mainly made of fired clay, indicate the presence of this instrument and allow us to infer the existence of the spinning process.

The evidence for spindle whorls in the archaeological record goes back to the Neolithic (Barber, 1991). Their presence itself indicates an increase in the productivity of labour, in relation to the previous forms of production, because it allows for the manufacture of more thread in less time. However, there is hardly any evidence of Neolithic spindle whorls in the Iberian Peninsula (López Mira, 1995). In the Southeast it is from the Copper Age onwards that they began to appear regularly, although it is always in small amounts in relation to the excavated area. In the Bronze Age, this proportion remained more or less constant during the first third of the second millennium BC, but they began to appear in greater numbers from the middle of the 2<sup>nd</sup> millennium BC onwards (López Mira, 1995, 2004).

Most of the spindle whorls found until now were made of clay. The fact that their number is so small during the first stages of the Late Prehistory in the Southeast Iberia makes us think that, possibly, they were also made of wood. However, from about the middle of the 2<sup>nd</sup> millennium cal BC the documented whorls were also made of osseous materials (López Padilla, 2011).

Pieces of this type, made from deer antlers, have been documented in some Bronze Age sites. To those already known from Cabezo Redondo (Villena, Alicante) (López Padilla, 2011:191), we must now add those recently found in the Argaric settlement of La Almoloya (Pliego, Murcia), even in greater numbers (Lull *et al.*, 2015:102). On the other hand, another type are the spindle whorls made of bone, which appear at the end of the 2<sup>nd</sup> millennium BC, although they only occur with regularity during the 1<sup>st</sup> millennium BC. From that moment, an exponential growth of the tools related to the spinning process is appreciated.

It is important to note that some researchers have related these antler and bone artefacts to other types of activities and functions: as a possible disk for the arc drill (Berrocal Rangel *et al.*, 2002; López Padilla, 2011:429); as a part of a horse bridle (Altamirano, 2012:89); or simply as buttons (Becker, 2005). However, the most defended hypothesis so far is that they were used as tools for textile activities (López Padilla, 2011; Laurito *et al.*, 2014; Llull *et al.*, 2015).

## ANTLER AND BONE SPINDLE WHORLS. CHARACTERISTICS AND MANUFACTURE PROCESSES

The presence of this type of artefacts made from osseous materials, which we interpret as spindle whorls, is evidenced in numerous archaeological sites in the

Southeast of the Iberian Peninsula (fig. 1). There are two types that we can clearly differentiate, both for the raw material with which they were made and for their shape. On the one hand, there are the spindle whorls made from the burr or coronet of deer antler, which have a discoid shape. On the other hand, those made of bone, manufactured from the femoral condyle of medium-large ruminants, mainly bovine, have a hemispherical shape.

There are also differences in the ways of supplying raw materials to manufacture both types of tools. Clearly, the supply of bone spindle whorls requires a part of the animal, that can only be obtained if it is dead. Therefore, in most cases these animals would have been slaughtered. However, in the case of antler whorls, slaughtering the animal is not necessary. An example is the case of Cabezo Redondo, where the analysis of the proportion between antler artefacts (in relation

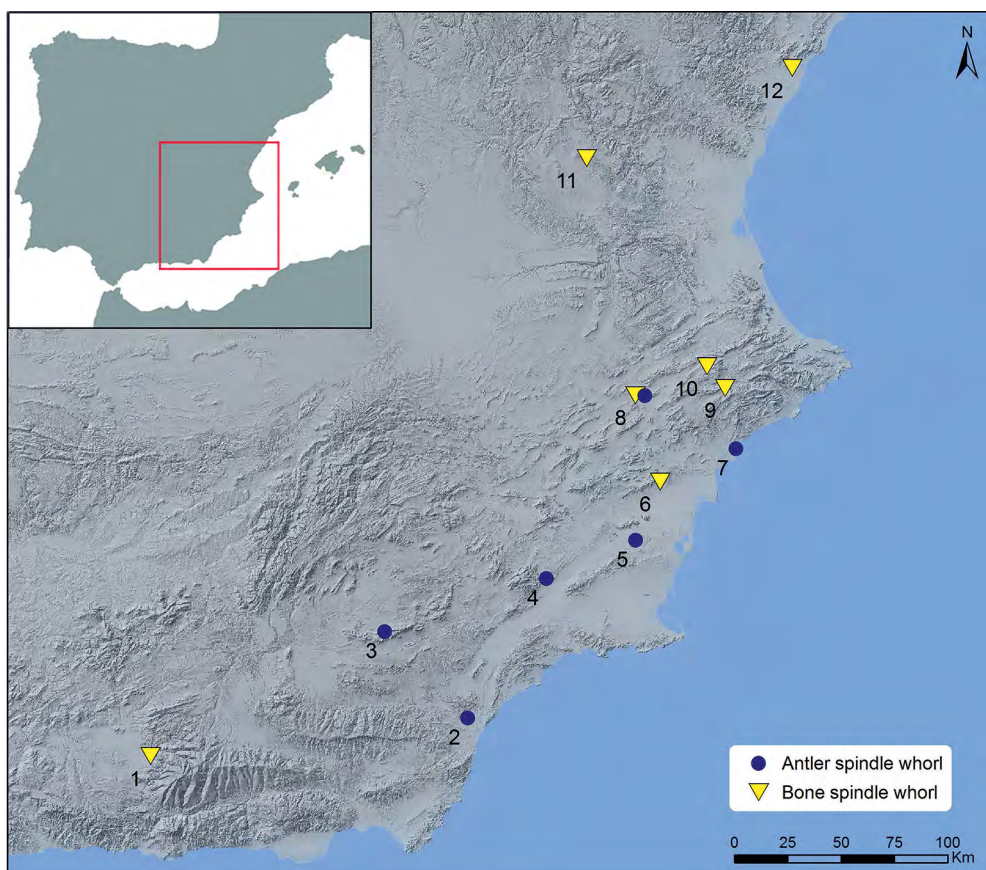


Fig. 1.—Distribution of archaeological sites with presence of antler and bone spindle whorls: 1, Cerro de la Encina; 2, El Oficio; 3, Fuente Amarga; 4, La Almoloya; 5, Laderas del Castillo/San Antón; 6, Peña Negra; 7, Illeta dels Banyets; 8, Cabezo Redondo; 9, El Puig; 10, Cabeçó de Mariola; 11, Los Villares; 12, Vinarragell.

to the whole worked bone documented) and the remains of deer bone registered, shows a clear disproportion in favour of the former. This can be interpreted as an indicator that the gathering of deer antler from seasonal shedding would be the main way to obtain this raw material (López Padilla, 2011:319; López Padilla *et al.*, in this volume).

The manufacturing techniques of both raw materials vary slightly, although in both cases they involve the sawing and drilling of the selected raw material block. It should be noted that the variability in the finishing of the antler pieces is quite large: some have abrasion on the outer perimeter, eliminating the irregularities of the deer burr, whereas others do not. Perhaps the most relevant fact is that, in all cases, metal tools seem to have been used in the manufacturing process.

For this paper, we have analyzed 13 spindle whorls made from osseous material, of which eight are made from red deer antler and five made of bone.

### **Antler spindle whorls**

Two of the antler spindle whorls lack an archaeological context. Nevertheless, they were found in two Bronze Age settlements that have a wide chronology, with Argaric and Post-argaric phases of occupation. Both artefacts are currently curated in the Archaeological Museum of Alicante —MARQ—. The first antler whorl belongs to the Furgús Collection. Consequently, it certainly comes from one of the two large Argaric sites, San Antón (Orihuela, Alicante), or Laderas del Castillo (Callosa de Segura, Alicante), excavated at the beginning of the 20<sup>th</sup> century in the South of Alicante by the Jesuit priest Julio Furgús (1937). However, it is not possible to determine in which of the sites it was found. Only half the artefact is preserved, but it is apparent the piece originally had a perimeter with one regular and another irregular surface. The maximum diameter of the original artefact would be 4,8 cm, while the weight of the preserved portion is 24.6 g (fig. 2.7).

The other spindle whorl made of antler, for which we do not know the accurate archaeological context, is the one found in Illeta dels Banyets (El Campello, Alicante) (Soler Diaz, 2006) (fig. 2.6). It is complete and has a discoid shape, although with a slight ellipsoidal tendency, and an irregular perimeter. Its maximum diameter is 6.5 cm and its weight is 47 g.

Cabezo Redondo has yielded a large number of antler spindle whorls. In fact, until the recent findings of La Almoloya (Pliego, Murcia) (Lull *et al.*, 2015), was the Bronze Age site which had provided the major amount of this type of tool: a total of six. Five antler whorls are complete, two of which have their perimeter completely regularized (fig. 2.3 and 2.4), while the other three have an irregular unpolished perimeter (fig. 2.1, 2.2 and 2.5). Spindle whorls with the regularized perimeter required a greater work investment, probably because they were designed to produce a yarn of better quality than the others, whose irregularities did not affect the desired product of lower quality. Their dimensions and weight vary (tables 1 and 2).

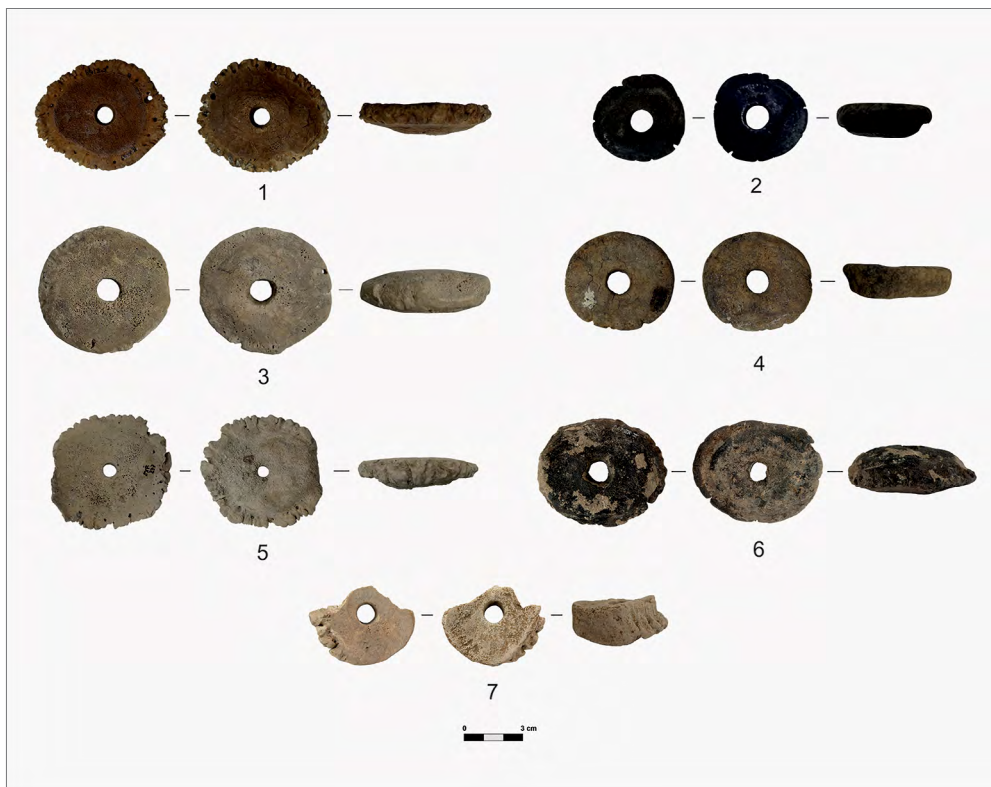


Fig. 2.—Antler spindle whorls. 1-5, Cabezo Redondo; 6, Illeta dels Banyets; 7, Laderas del Castillo/San Antón.

TABLE 1  
ARCHAEOLOGICAL SITES WITH PRESENCE OF ANTLER AND BONE SPINDLE WHORLS

<i>Archaeological site</i>	<i>Material</i>	<i>Shape</i>	<i>Diameter (cm)</i>	<i>Weight (g)</i>
Illeta dels Banyets (El Campello, Alicante)	Antler	Discoid	6,5	47
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	4,8	19,1
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	6,7	39,1
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	6,2	55,2
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	6	33
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	5,4	35
Cabezo Redondo (Villena, Alicante)	Bone	Hemispherical	3,8	14
Peña Negra (Crevillente, Alicante)	Bone	Hemispherical	3,34	5,73
Cabeçó de Mariola (Alfafara, Alicante)	Bone	Hemispherical	4,1	12
Cabeçó de Mariola (Alfafara, Alicante)	Bone	Hemispherical	3,9	11
El Puig (Alcoy, Alicante)	Bone	Hemispherical	3,5	11

TABLE 2  
 CABEZO REDONDO. ANTLER, BONE AND CLAY SPINDLE WHORLS  
 (\* Approximate weight of clay spindle whorls according to López Mira (1995: Fig. 5);  
 \*\* real weight of clay spindle whorls calculated for this research)

<i>Archaeological site</i>	<i>Material</i>	<i>Shape</i>	<i>Diameter (cm)</i>	<i>Weight (g)</i>
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	4,8	19,1
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	6,7	39,1
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	6,2	56,2
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	6	33
Cabezo Redondo (Villena, Alicante)	Antler	Discoid	5,4	35
Cabezo Redondo (Villena, Alicante)	Bone	Hemispherical	3,8	14
Cabezo Redondo (Villena, Alicante)	Clay	Discoid	5,4	65*
Cabezo Redondo (Villena, Alicante)	Clay	Discoid	5,1	50*
Cabezo Redondo (Villena, Alicante)	Clay	Discoid	4,6	30*
Cabezo Redondo (Villena, Alicante)	Clay	Discoid	6,9	55*
Cabezo Redondo (Villena, Alicante)	Clay	Discoid	6,5	85*
Cabezo Redondo (Villena, Alicante)	Clay	Discoid	3,9	25*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	4,4	70*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	5	50*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	4,3	40*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	3,9	50*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	5	65*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	5,2	60*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	3	45*
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	2,9	18**
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	3,3	36**
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	3,7	47**
Cabezo Redondo (Villena, Alicante)	Clay	Biconical	4,2	56**

Other settlements where these antler tools were found are El Oficio (Cuevas de Almanzora, Almería) (Siret and Siret, 1890: lám. 62.20) and Fuente Amarga (Galera, Granada) (Fresneda *et al.*, 1999:234). From published pictures and data, we know that the diameters of these tools are similar to those we were able to analyze, although we do not know significant details such as the weight of each specimen.

### **Bone spindle whorls**

The most ancient bone spindle whorl analyzed here is the one from Cabezo Redondo (fig. 3.1), although we do not have accurate information about its provenience. It has a hemispherical shape and is slightly higher than the rest —2.3 cm

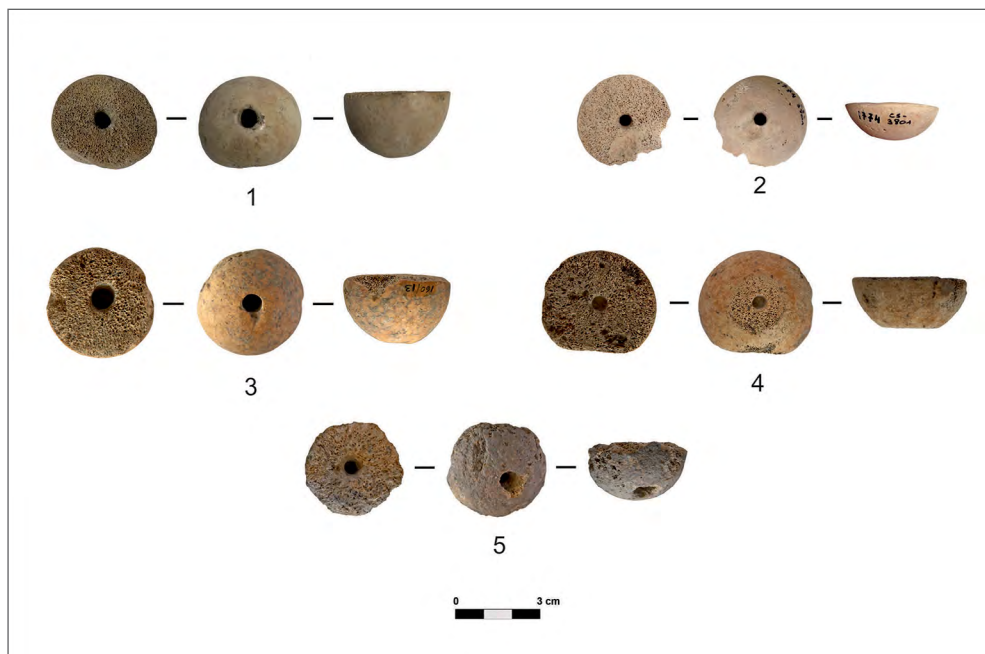


Fig. 3.—Bone spindle whorls. 1, Cabezo Redondo; 2, Peña Negra; 3-4, Cabeçó de Mariola; 5, El Puig.

high—. Its weight is 14 g and its maximum diameter is 3.8 cm. The surface around the edge of the hole shows a slight gloss which may have been caused by friction with the wooden spindle shaft.

Corresponding to the final context of the Late Bronze Age, at the beginning of the first millennium BC, in the important settlement of Peña Negra (Crevillente, Alicante) two bone whorls were found in Sector II (PN I) (González Prats, 1985; 1990). One of them was very fragmented (González Prats, 1990: 87) and the other almost complete (González Prats, 1985: fig. 58). The complete piece (fig. 3.2) has smaller dimensions and weighs less than the whorl documented in Cabezo Redondo: 1.31 cm high, 3.34 cm maximum diameter and weighing 5.73 g.

From the same period, corresponding to the Late Bronze Age levels of the long-term site (9th to 1st cent. BC) of Cabeçó de Mariola (Alfafara, Alicante; Bocairante, Valencia) (Grau Mira and Segura Martí, 2016), are two bone spindle whorls. These pieces were found together, in the same stratigraphic unit —UE 4001— (Grau Mira, personal communication), but present significant differences. One is hemispherical and has significant signs of wear in its perforation (fig. 3.3), while the other has its bottom part flattened (fig. 3.4), like those found in Cerro de la Encina (Altamirano García, 2012:90, lám. 8: f) and Vinarragell (Mesado Oliver, 1974:42 and 90), and shows an incomplete drilling without signs of wear (fig. 4). For this reason, we think that its manufacture process was unfinished. They have a weight of 11 and 12 g and a maximum diameter of 3.9 and 4.1 cm, respectively.



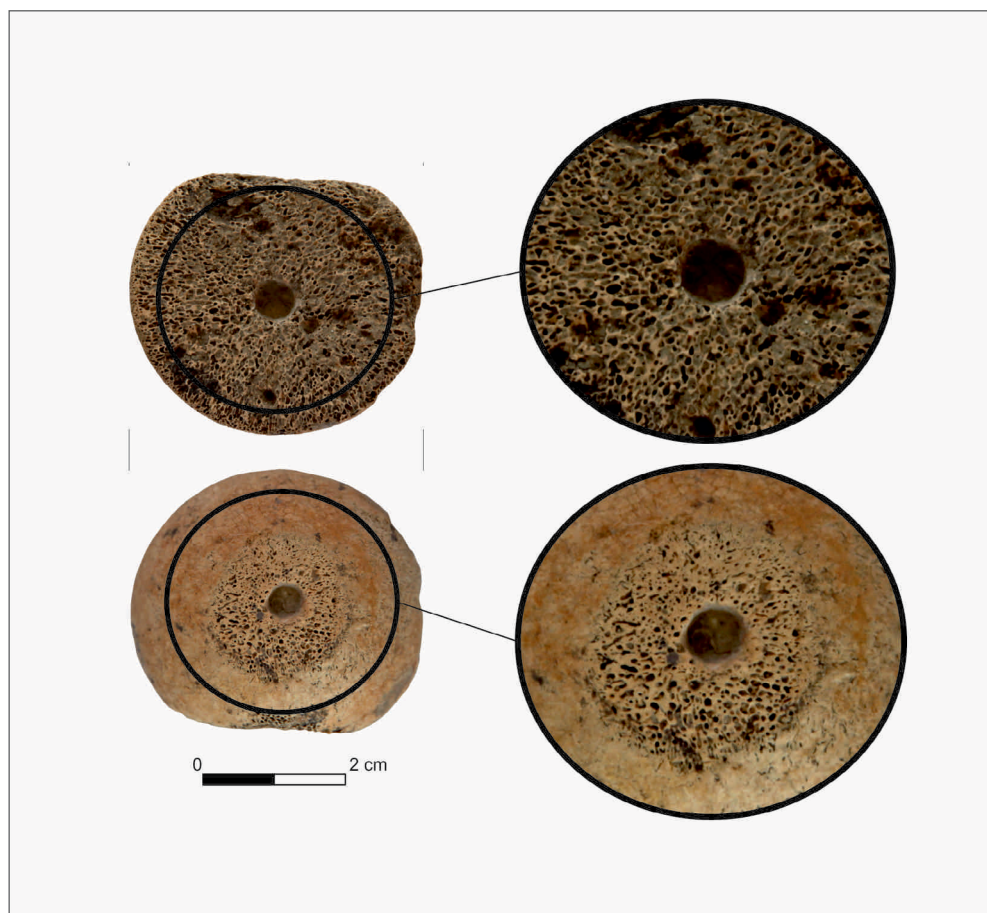


Fig. 4.—Detail of the incomplete drilling of the bone spindle whorl from Cabeçó de Mariola.

Another tool of the same type comes from El Puig (Alcoy, Alicante) (Grau Mira and Segura Martí, 2013) (fig. 3.5). It was documented in Early Iron Age contexts —UE 10000— (Grau Mira, personal communication), which shows its continuity in time. Curiously, it presents the worst preservation conditions and its perforated shaft is not straight, it is askew. This characteristic makes us doubt its purported use as spindle whorl, although its close resemblance to the other bone whorls does not allow us to discard it. Regarding its weight, it is very similar to the other examples —11 g—.

This type of spindle whorls was also found in other sites dating to the final period of the Late Bronze Age, such as the one documented in Cerro de la Encina (Altamirano García, 2012) or the two found in Vinarragell (Mesado Oliver, 1974). The precise data of these three pieces are not published, so that we have to calcu-



late their dimensions from the photographs and drawings. It is possible to infer maximum diameters ranging between 4.2 and 5.5 cm. In Los Villares (Caudete de las Fuentes, Valencia) another bone whorl was found, whose approximate weight is known, in the range between 0-10 g (López Mira, 2004:86), although we do not know if it belongs to the Late Bronze Age or from the Iron Age.

## FUNCTIONAL FEATURES AND CHRONOLOGY

From the data we have just reviewed, and according to their geographical and chronological distribution in the Southeast of the Iberian Peninsula, it can be said that both types of spindle whorls were commonly used in advanced stages of Bronze Age —from 1750 cal BC onwards—. However, it seems that discoid antler type had a more restricted distribution in time and space. They are present in the late Argar, between 1750 and 1500 cal BC, and in Post-argaric contexts, earlier than 1200 cal BC, but then they seem to disappear. In addition, their distribution is almost completely restricted to the Argaric territory and its periphery.

On the other hand, hemispheric bone spindle whorls —whose presence in Late Bronze Age contexts prior to 1200 BC is attested in Cabezo Redondo— prolonged their use in time until the Iron Age and even in Historic Times (Gutiérrez Cuenca and Hierro Garate, 2010). Their distribution is not restricted to the Southeast but is much wider. In fact, one of the areas where they have been documented in greater quantity is in the North of the Iberian Peninsula, specifically in Bronze Age and Early Iron Age settlements of the Ebro Valley (París and Bardaviu, 1924; Castiella, 1994; Harrison *et al.*, 1994).

To investigate the functionality and possible role of these artefacts, it is necessary to analyze their characteristics. We know from experimental archaeology and ethnography that the two basic parameters are weight and maximum diameter (Barber, 1991; Andersson Strand and Nosch, 2015). The shape is important but does not significantly influence the yarn (Gleba, 2008:106). In contrast to the clay spindle whorls, weight of those made of osseous materials varies in time, depending on environmental circumstances. In the case of bone whorls, their weight when fresh is 10-15 g heavier than a few months after their manufacture (Laurito *et al.*, 2014:163). This weight loss is due to the disappearance of the water and organic components of the bone.

Two different groups of bone and antler spindle whorls are clearly observed when weights and maximum diameter are compared (fig. 5). The 20 g of separation between the two types, and the different diameter, could be indicating differences in the specific functionality to produce threads of different twist, thickness and quality, and probably different fibre.

Antler whorls might have been preferable for spinning bast fibres. They are heavy, most of them with a weight that ranges between 33 g and 56 g (only one weighs 20 g), and have a large diameter, between 5 and 6.5 cm. These features might have been optimal for spinning strong and coarse fibers. Another proposal,

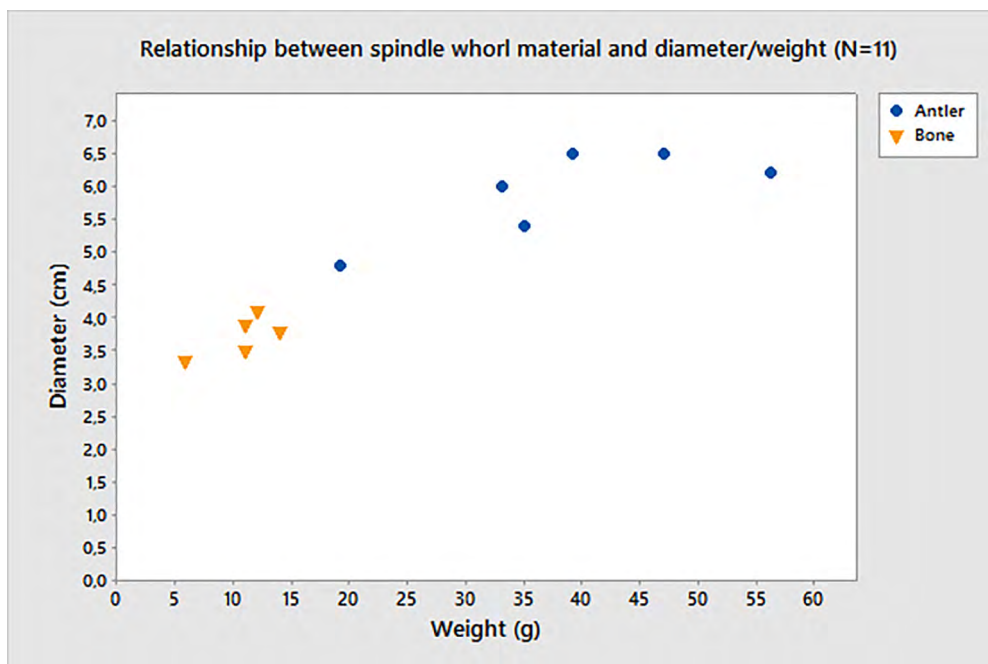


Fig. 5.—Scatter plot of the relationship between spindle whorl material and diameter/weight.

because of their discoid shape, is that they could have been used for plying, that is, for spinning two or more threads together (Gleba, 2008:140).

On the other hand, bone spindle whorls have quite different features. They have a homogeneous and light weight, between 10 and 15 g, and a shorter maximum diameter. Its shape, weight and size seem to be optimal for spinning fine thread of medium twist (Gleba, 2008:138), such as, for example, wool.

### A SIGNIFICANT EXAMPLE: CABEZO REDONDO

Because of its size and wealth, Cabezo Redondo was possibly the most important settlement in the Southeast of the Iberian Peninsula during the Late Bronze Age (1600-1200 cal BC). Regarding textile production in general, it is one of the archaeological sites excavated until now that has the highest number of evidences of textile tools (Soler García, 1987; Jover Maestre and López Padilla, 2013; Hernández *et al.*, 2016). Concerning spinning, it is possibly the site with the greatest number and variety of spindle whorls dating to this period. In fact, it is the only settlement where whorls of the two osseous types have been recovered: antler and

bone. In this sense, it is also significant that it offers us contextual information, which allows a better understanding of the role of artefacts related to textile activities. An example is the Department XXIX, where the last antler whorl was found. This artefact was associated with bone awls and non-worked vegetable fibres (Hernandez *et al.*, 2010:3-4).

Furthermore, the data provided by José Antonio López Mira (1995) in relation to the dimensions and weight of some clay whorls from Cabezo Redondo, make it possible to compare them to those of antler and bone. In figure 6 it can be observed that most of the 23 spindle whorls are made of clay and have a very similar maximum diameter, between 4 and 5 cm. This contrasts with the features of the antler whorls, which usually have a larger maximum diameter, but are not heavier than the larger clay whorls. On the other hand, most clay whorls weigh more than the solitary bone whorl found, having the same diameter. This allows us to argue that bone whorls might have been appreciated for their light weight and small size, and the antler whorls for their long diameter, lower weight and possibly their durability, compared to clay whorls.

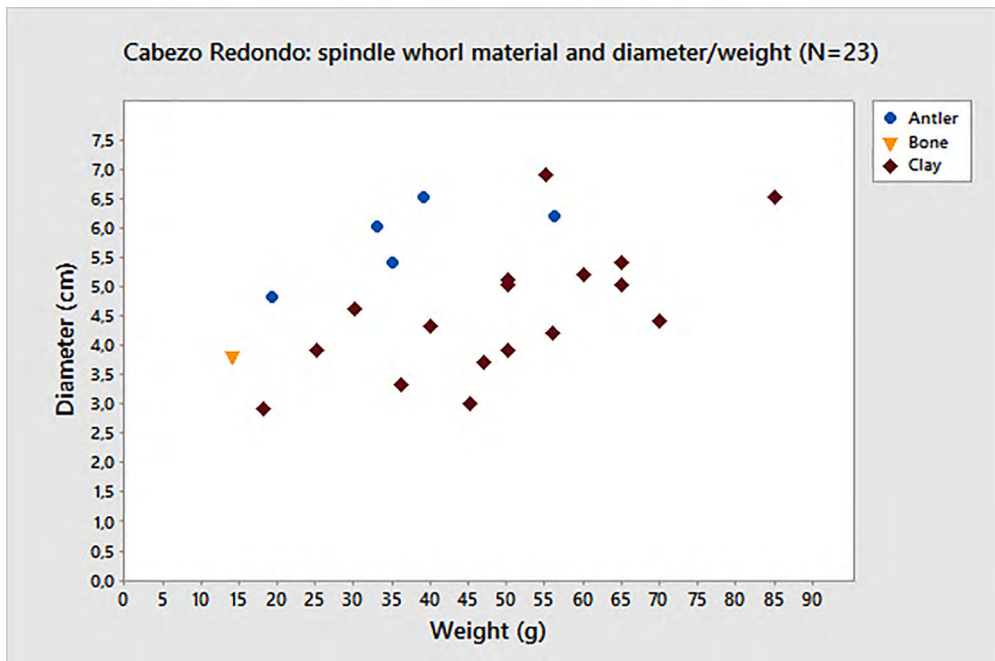


Fig. 6.—Scatter plot of the different type of spindle whorls from Cabezo Redondo.

## CONCLUSIONS

In conclusion, we argue that there are reasons to consider these osseous artefacts as tools for textile activities. In any case, we consider that this hypothesis should be corroborated by experimental studies. From our point of view, the production of these spindle whorls presents particular characteristics and they are explained in the general context of the development of textile production during the end of Prehistory in the Southeast of the Iberian Peninsula. This kind of artefacts appears in late moments of the Bronze Age, possibly because the raw material and the technological capability to manufacture them are available, and because the ratio of working time invested to manufacture them, and their durability, is optimal.

Antler spindle whorls are part of the significant changes that seem to occur in textile production towards the middle of the 2<sup>nd</sup> millennium cal BC in the Southeast, and could reflect the production of a greater variety of fibres, in important settlements such as La Almoloya and Cabezo Redondo. Due to their shape and the heterogeneity of their size and weight they could have been used for the manufacture of coarse threads, possibly with vegetable fibres.

Bone whorls, already present in Cabezo Redondo at the end of the second millennium cal BC, are generalized in the first half of the 1<sup>st</sup> millennium cal BC—when antler whorls no longer exist—as witnessed in the important settlement of Peña Negra. At that time, we begin to observe an exponential increase of evidences related to textile production, especially spindle whorls, becoming smaller and lighter, possibly for spinning fine and better quality thread or animal fibres, such as wool.

Therefore, the introduction of both types of tools could be directly related to the start of the process of intensification of textile production at the end of the 2<sup>nd</sup> millennium cal BC and with its greater development during the first half of the 1<sup>st</sup> millennium cal BC.

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