

Querns and millstones from the Iberian Iron Age settlement of Cerro de la Cruz, Almedinilla, Córdoba, Spain

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Abstract: This paper presents an assemblage of Iron Age grinding stones from the Iron Age settlement of Cerro de la Cruz, Almedinilla, Córdoba (Spain). This Iberian Culture site dating from the 2nd century BC suffered a sudden violent destruction that left a number of its features, including mills, in their original working position. The assemblage comprises both manually driven rotary querns and larger millstones at times on podia driven from a standing position. This study also advances several spatial, economic and social analysis considerations, as well as an analysis of the seeds collected in the vicinity of one on the mills.

Keywords: Querns, millstones, Iron Age, Iberian Culture, palaeoethnobotanical remains

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Introduction

The Iron Age site of El Cerro de la Cruz is in the south-eastern corner of the Province of Córdoba (Spain) near the town of Almedinilla along the borders of the Provinces of Granada and Jaén (Fig. 1). It is in the heart of the Sub-Baetic Córdoba mountains separating the modern provinces of Cordoba and Granada. The site is an *oppidum* occupying the summit and the southern slopes of a hill. Its chronology can be securely placed in the third quarter of the 2nd century BC, corresponding to the Late Iberian Culture of the Iron Age (Quesada *et al.* 2014). It suffered a violent destruction by fire and sword, possibly at the hands of the Romans, and was subsequently totally abandoned. This phase of the site therefore represents a frozen 'fossil' or portrait of a razed Pre-Roman town. The excavation, so far, has explored a surface of over 1.000 m², and has unearthed up to four blocks of two-storeyed

houses with large cellars. The domestic areas are delimited by wide, straight streets.

Fragments of up to 31 individual millstones were brought to light during the seven excavation campaigns of the last three decades. They were recovered in each of the blocks, and distributed almost homogeneously throughout the site.

The rotary mills from the Iron Age levels belong to a limited number of types. It is assumed that they were intended to process grains for food production, most probably for human consumption. The presence of cereal, fruit and pulse remains in their proximity bolsters this notion. Moreover, there is no evidence suggesting the mills took part in other industrial activities. They are not associated, for example, with iron slag or cuttings as is the case at other sites (Risch 1995, 163).

This study refrains from offering the usual number of archaeological parallels as there are no comparable sites published Iron Age assemblages in

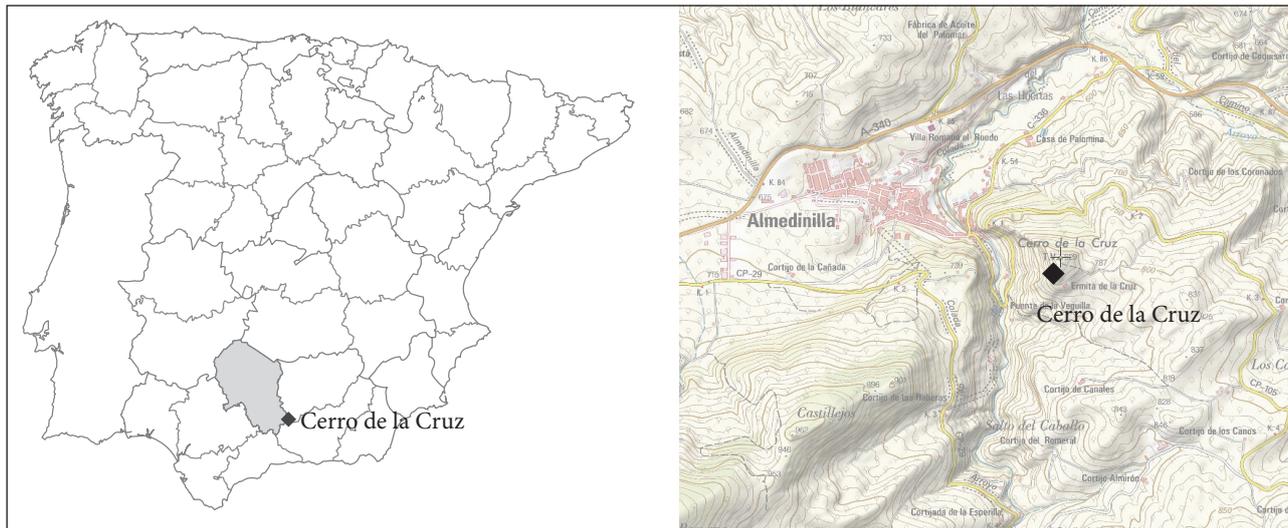


Fig. 1: Location of the settlement of Cerro de la Cruz, Almedinilla (Province of Córdoba, Andalusia), Spain.

Andalusia. Furthermore, publications of millstone assemblages from other regions such as Catalonia or Valencia, even though still part of the Iberian Culture as a whole, belong to different cultural contexts. Hence, the best option for this paper in the present state of research is to present a simple summary of the Iron Age mills excluding previously published Prehistoric and Medieval querns (Quesada *et al.* 2014).

Rotary querns and millstones

The Iron Age mills (Tables 1 and 2) belong to well-known models (Alonso 1996; 1997; Alonso *et al.* 2011; Berrocal 2006, Longepierre 2012, Anderson 2016) driven by a rotary motion.

The lower stationary stone bears a conical grinding surface and a hole at its summit to lodge a vertical spindle serving to assemble it with the

upper stone. The bi-concave upper stone has an eye in its centre that served to feed the grains. Opposite lateral cuttings in turn served to lodge the fittings of the rig to drive the upper stone.

Besides the rotary millstones, two saddle querns driven with a to-and-fro motion were recovered at the site. Although one (cat. 15) was found in Iberian Culture context, the two artefacts are most likely residual.

It is becoming more and more apparent from the absolute datings of a number of excavations in north-eastern area Iberia that the rotary movement in milling was introduced toward the middle of the first millennium BC in the Iberian Culture (Alonso 1997;1999; 2000).

Research in the last decade indicates the appearance from very early times of two main models: smaller hand-driven rotary querns and larger mechanisms with millstones found at times *in situ*

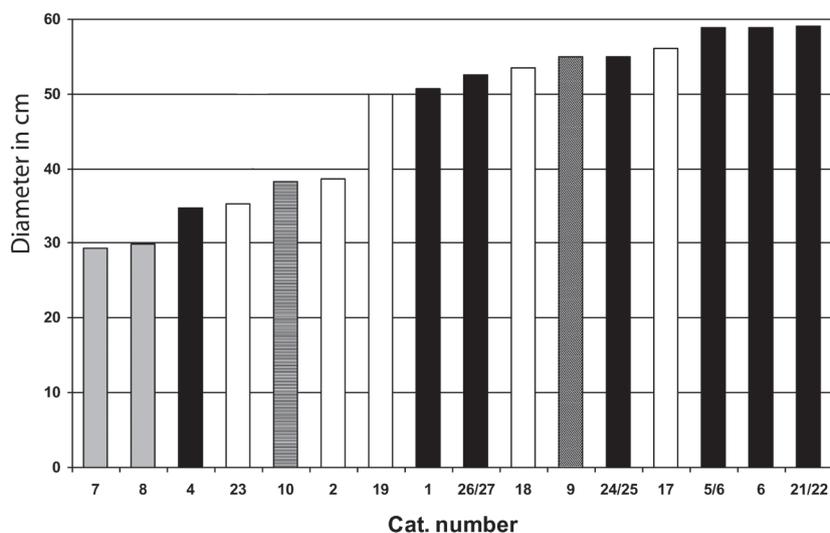


Fig. 2: Histogram representing the diameter of 16 different millstones. The hiatus between the diameters of 39 and 50 cm corresponds to the difference between the smaller hand-driven rotary querns and the larger pushing millstones. Thickness is not taken into account as this value is highly variable among the assemblage due to wear.



Fig. 3: Example of an exogenous granite hand-driven rotary quern from Cerro de la Cruz (cat. no. 7). Diameter 29.3 cm. This upper stone bears a lateral lug with a cutting serving to lodge the driving rig.

on podia indicating they were driven from a standing position (Alonso and Pérez 2014; Alonso *et al.* 2016). The mills of Cerro de la Cruz, although dating from the end of the Iron Age, are no exception.

The main difference between the two models is their size, and by consequence their means of traction. These factors will ultimately have an effect on their economic roles in the chain of production of foodstuffs in Iron Age Iberian society.

The presence of the two rotary mill types at Cerro de la Cruz is reflected in the histogram of the diameter of 16 mills (Fig. 2). There is, in fact, a clear difference between the smaller group with diameters ranging between about 30 and 40 cm typified by the granite upper stone (Fig. 3) and the larger group with diameters ranging from about 50 cm to 60 cm exemplified by the complete mill (cat. 24/25) on display in the Museum of Almedinilla (Fig. 4).

Mounting and driving fittings

Each of the two mill types share similar systems serving to assemble them (Fig. 5). The two stones are coupled and centred by means of the spindle projecting vertically from a hole in the centre of the lower stone that is inserted in the driving rig of the upper stone. The driving rig is fixed to the upper stone by opposite vertical fittings lodged in lateral cuttings of the upper stone (Fig. 6a). The cuttings are vertical slots at times in the form of a straight “I”, angled “L” or “inverted keyhole” (Fig. 6b). The last two types could have facilitated lifting the upper stone for cleaning and maintenance.

Although a veritable system of tentering that permitted to regulate the “light” or distance between the working surfaces of the two millstones cannot be excluded, the highly worn surfaces of their grinding surfaces suggest that the surfaces came into contact with each other regularly during milling.



Fig. 4: Example of an Iberian millstone from Cerro de la Cruz (cat. no. 24/25) in the Almedinilla Museum. Diameter: 55 cm. The vertical spindle and the wooden fittings of the driving rig are reconstructed.

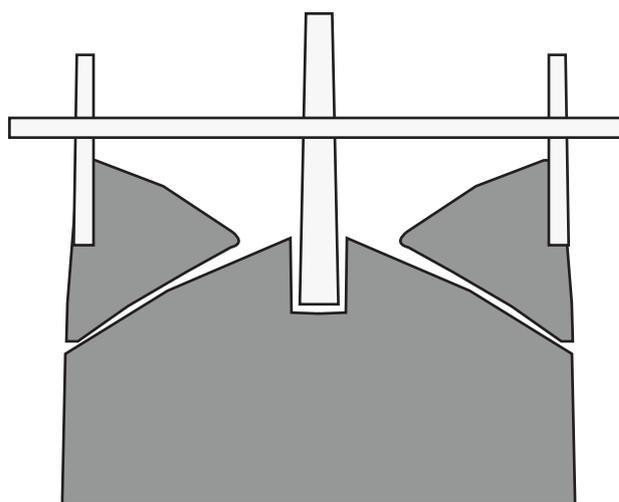


Fig. 5: Schematic representation of the means of assemblage and driving fittings of Iberian Culture rotary querns and millstones. In the case of larger millstones the lever was prolonged to one side (possibly to both) to facilitate driving the mill from a standing position.

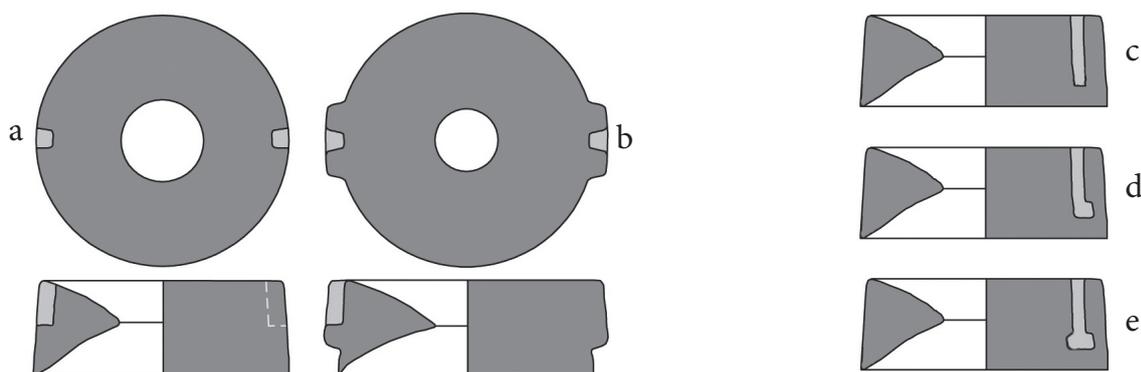


Fig. 6: Driving features found on both rotary querns and larger millstones. a) cutting or b) lugs. The cuttings can take the form of c) straight "I", d) angled "L" and e) "inverted" keyhole slots.

Rotary querns	Cat. n°	Nature	Diameter (cm)	Stratigraphic Unit	Square	Situation	Room/Wall	Comment
	2	Upper stone	38	-	-	Out of context	-	
	4	Upper stone	34,7	-	-	Out of context	-	
	7	Upper stone	29,3	Context g (Bolsa 83)	J15-W	<i>In situ</i>	Room AI (=II)	
	8	Upper stone	29,9	US1295	K13	Displaced	Room XIV (between UC1213; UC1213; UC1199).	
	10	Upper stone	38	-	-	Out of context	-	
	23	Re-shaped Lower stone	35	US 1147	H14	Displaced	Room XXI (E)	Re-used

Rotary millstones	Cat. n°	Nature	Diameter (cm)	Stratigraphic Unit	Square	Situation	Room/Wall	Comment
	1	Upper stone	50,6	Context c (Bolsa 12.68)	F13	Displaced	Room O	
	3	Upper stone		-	-	Out of context	-	
	5/6	Complete mill	58,9	Context b	F14	<i>In situ</i>	Room O	
	9	Upper stone	55	-	-	Out of context	-	
	17	Lower stone	56,1	US 1020	I12	<i>In situ</i>	Room V	
	18	Upper stone	53,4	US 1161	G12	Displaced	Room XVIII	Unfinished
	19	Lower stone	50	-	-	Out of context	-	
	20	-	52,5	-	K16	Displaced	Room AE	Lost
	21/22	Complete mill	59	US 1267	J12	<i>In situ</i>	Room V	
	24/25	Complete mill	55	Context a	L15	<i>In situ</i>	Room AB	
	26/27	Complete mill	52,5	Context b	J15-W	<i>In situ</i>	Room II (AI)	

Table 1: List of the Iron Age rotary querns and millstones at Cerro de la Cruz. The missing catalogue numbers correspond either to saddle querns or medieval mills not included in the study. *In situ*: discovered in its original working place; *displaced*: apparently not in original location; *out of context* (without precise archaeological context). Mills cat. no. 29 and 30 have been lost since publication of a previous article (Vaquerizo *et al.* 1991).

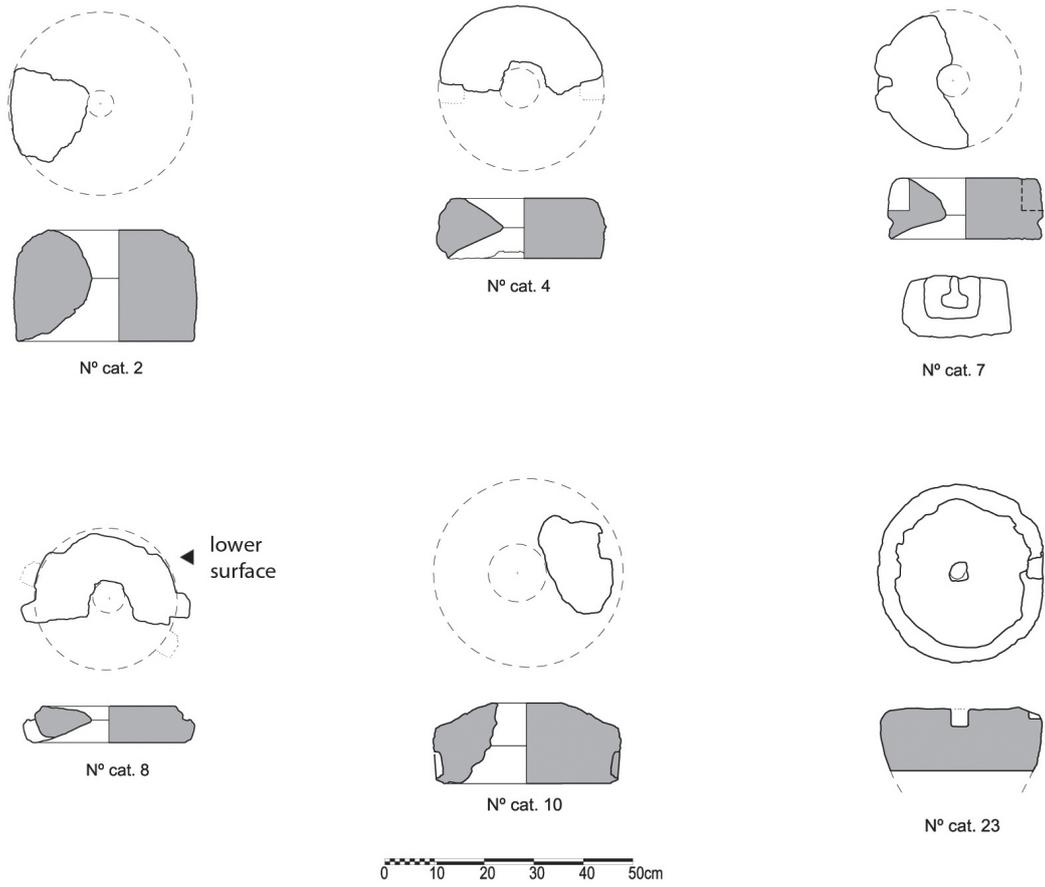


Fig. 7: Iberian rotary querns from Cerro de la Cruz.

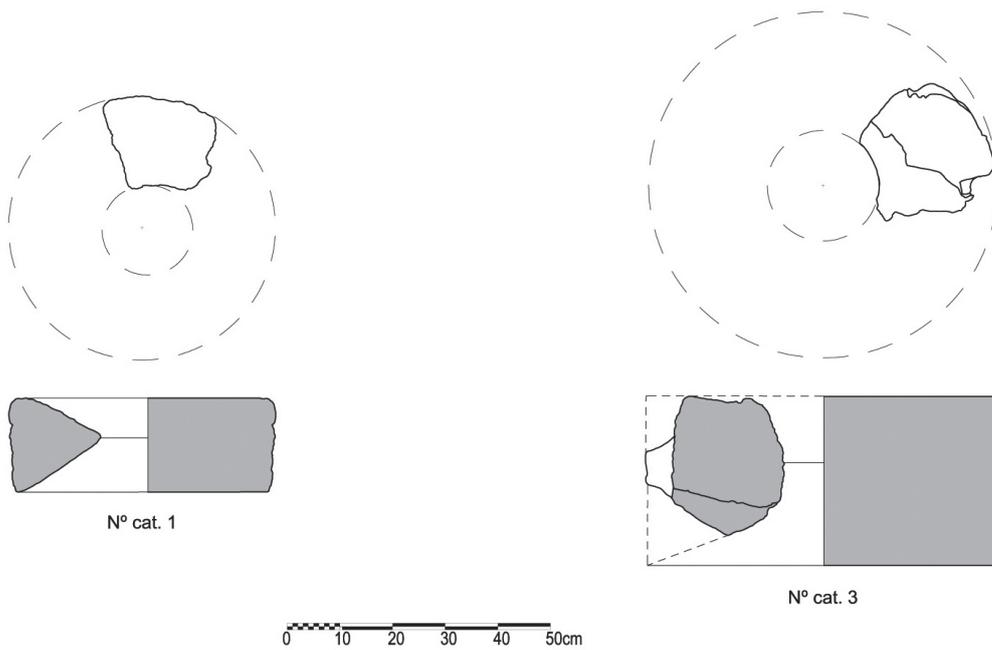


Fig. 8a: Iberian millstones from Cerro de la Cruz (continued on next page).

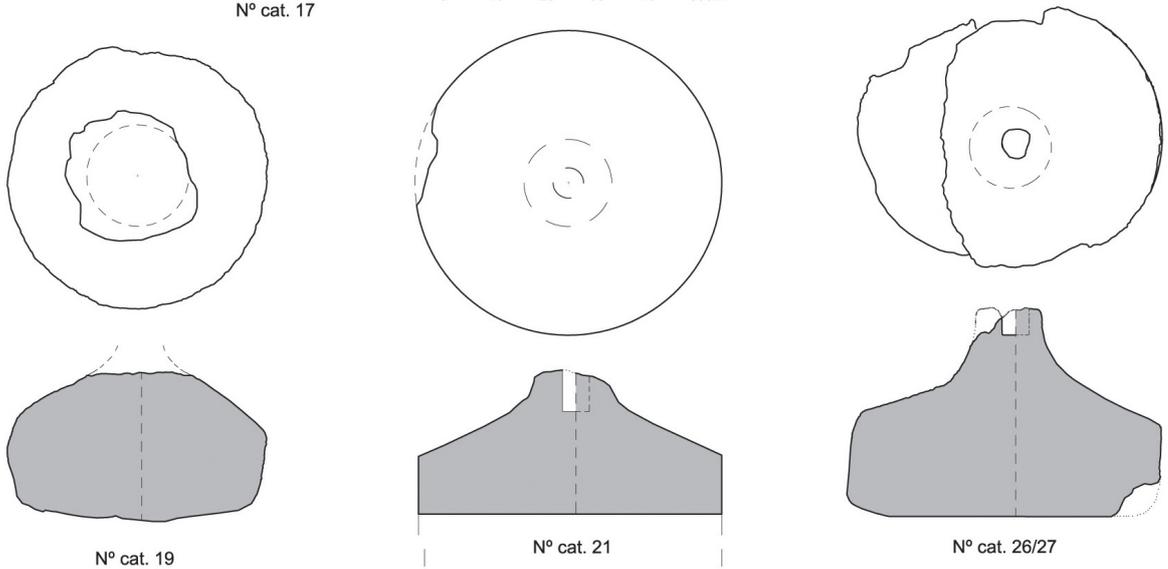
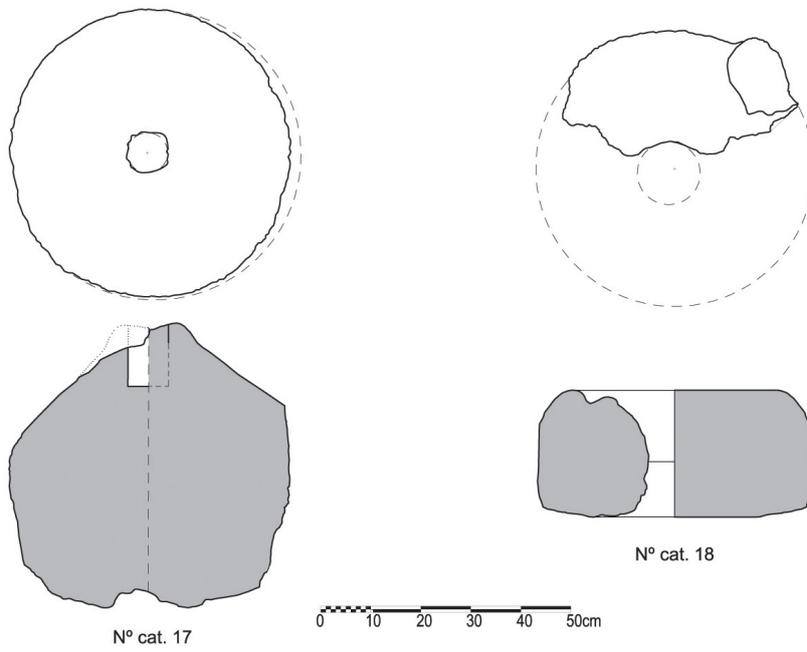
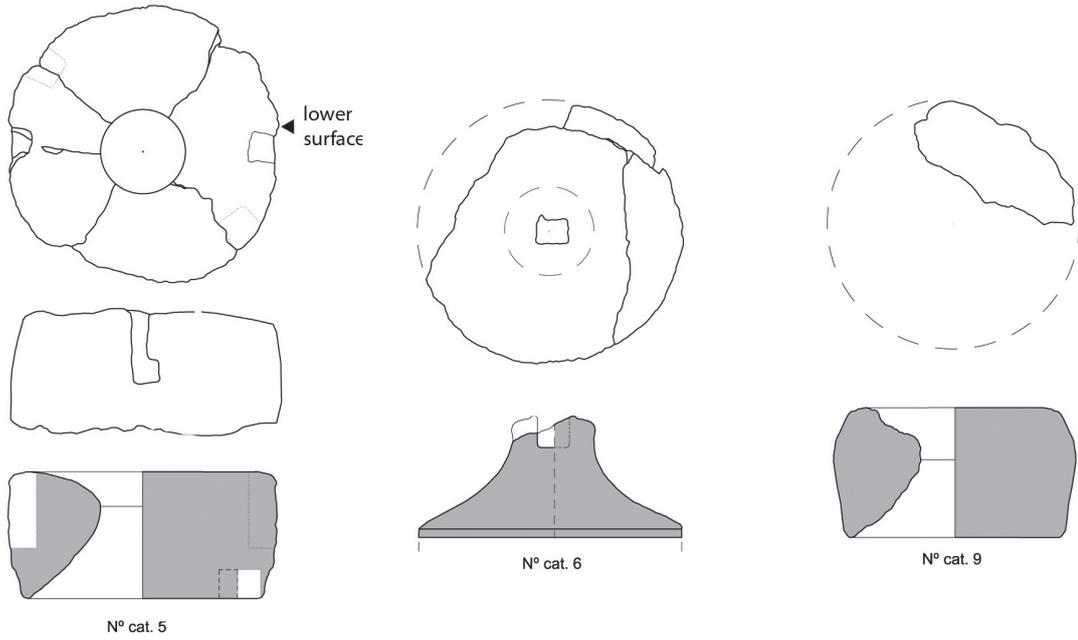


Fig. 8b: Iberian millstones from Cerro de la Cruz (continued from previous page).

Spatial distribution

Rotary quern and millstone distribution

As note above, the different Iron Age rotary querns (Fig. 7) and millstones (Fig. 8) were bought to light in almost all the different blocks and in most of the dwellings of the settlement (Fig. 9). While a number were uncovered *in situ*, others were displaced.

This pattern of distribution suggests that there was no particular area for milling either at an industrial or more modest level. But, on the other hand, the high concentration of mills in a fairly restricted area (compared with the overall extension of the

site, estimated at around 40.000 m²) is remarkable. In fact, most rooms, houses and blocks in the area also contain large numbers of loom-weights (at times near the millstones), amphorae magazines and even underground water cisterns. This suggests that much of the space excavated so far might correspond to a quarter specifically dedicated to industrial activities as a whole, although not to a single particular type (Vaquerizo *et al.* 1991, 183). The absence of domestic hearths and fireplaces in the rooms at ground level also bolsters this notion.

The spread of the mills also suggests the absence of a specific space devoted to grinding, as mills appeared in corridors (XXII), in front of houses

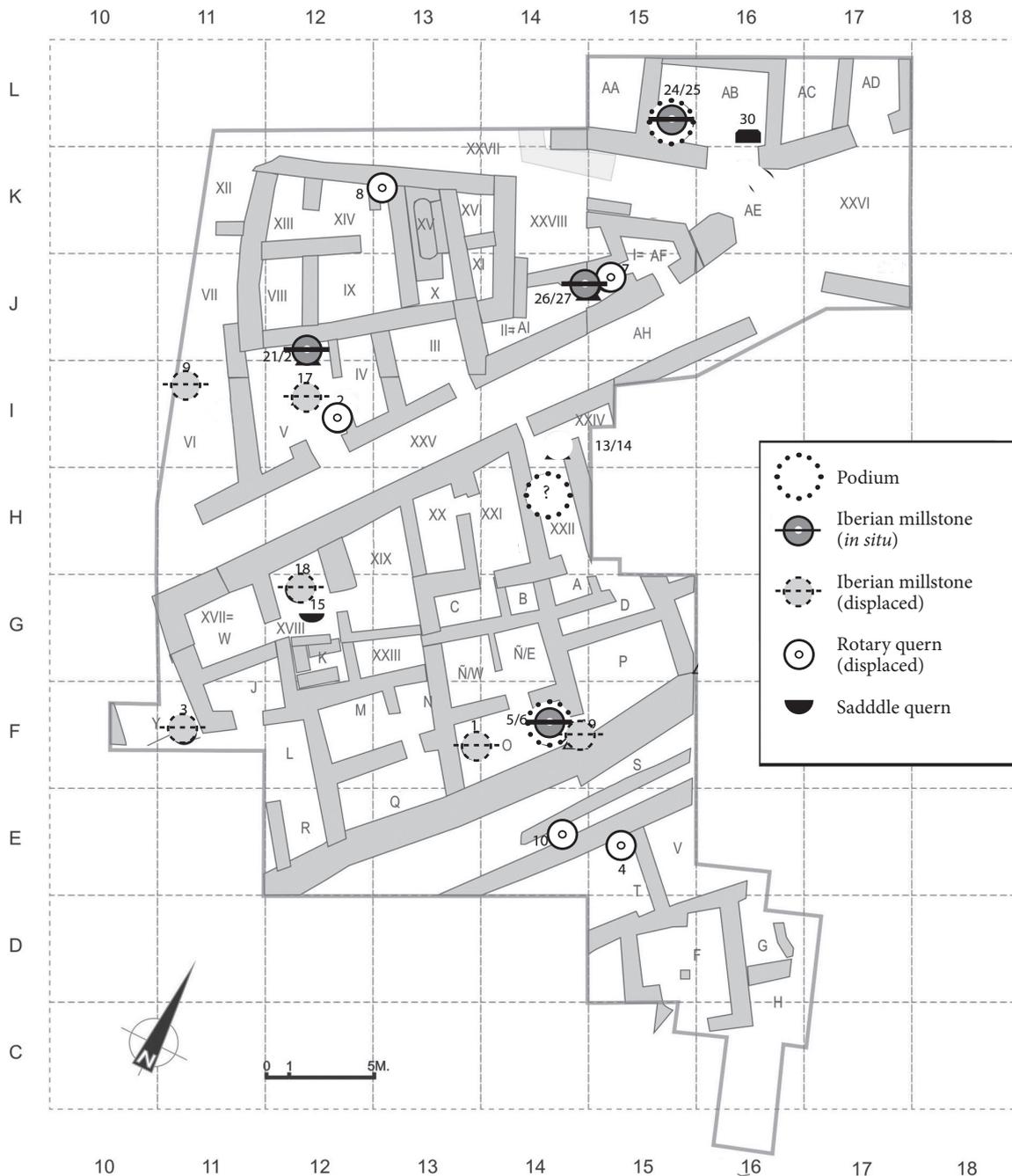


Fig. 9: Map of the settlement of Cerro de la Cruz with the position of the different mills.

(perhaps under porticoes, as in Room 'O') and in courtyards (Rooms V, AB). It is also noteworthy that the grain magazines and mills identified at the site were never found together. They are consistently in different rooms, often adjacent to each other (e.g. Rooms V/III; O/P, etc.).

Mills on upper floors?

The thickness of certain walls of the dwellings (many up to three feet) combined with notions gleaned from the stratigraphy suggest that some of the Iberian buildings had more than one floor and the upper floor could bear the weight of a mill. At other sites such as Mata de Campanario (Badajoz) up to 82% of the querns (in this case saddle querns) came from either upper floors or terraces (Rodríguez Díaz 2004, 275, figs 111-112). Although there is no undisputed evidence of mills on the upper floors or terraces at Cerro de la Cruz, certain mills such as cat. 26/27 in a layer of destruction of Room II, due to the limited space at ground level, could have originally come from the upper floor (Quesada *et al.* 2014, 90).

Millstone *podia*

There are at least two (possibly three) raised cylindrical features fashioned of stones and earth serving as bases or *podia* for mills (Fig. 10). Their function was to raise the mechanism to facilitate traction from a standing position.

These two *podia*, about 30 m apart, are found in sectors 'AB' and 'O'. The first is an open courtyard while the second measures about 100 cm in diameter and about 25 cm high. The stones serving for their construction are laid out in two concentric circles with the inner circle consisting of smaller modules. The mill's lower stone was set firmly into the body of the podium to about half of its height. After insertion, a layer of clay was applied over the structure resulting in a smooth finish. At shallow concave ring about 25 cm wide around the lower stone served as a "flour catcher". This canal contained an important amount of seeds (see below).

Podia are not uncommon in Iberian contexts. Similar features are recorded at the settlements of Alt del Punxó, Alicante (Espí Pérez 2009, 38) and

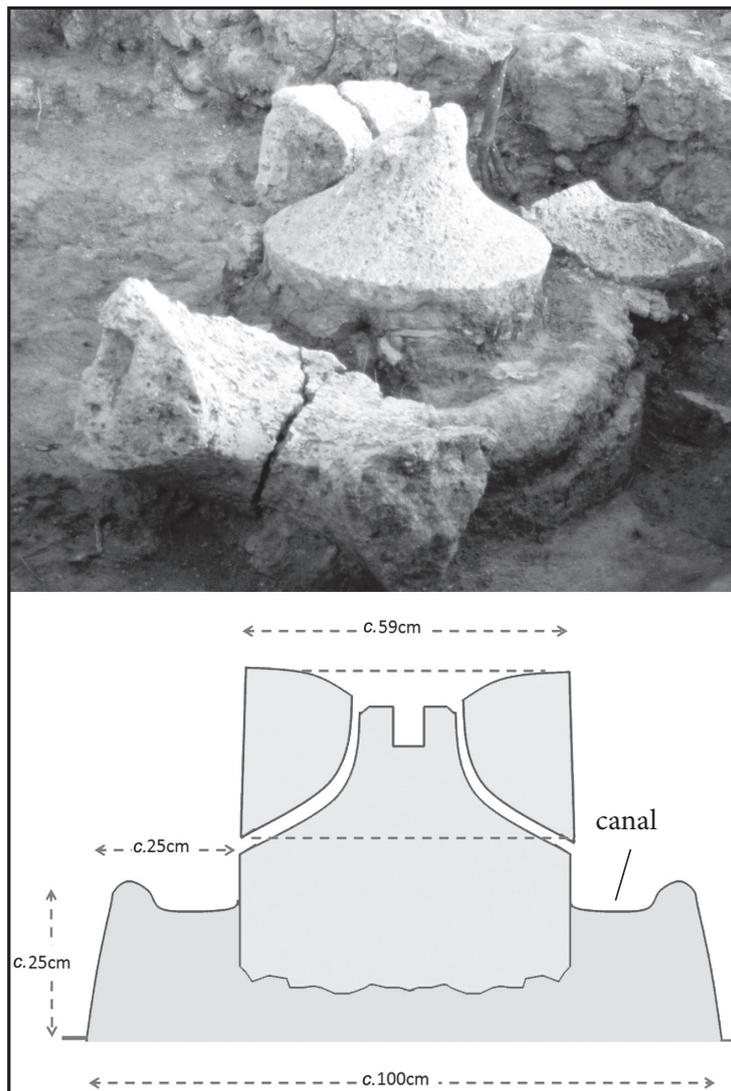


Fig. 10: Schematic reconstruction of the mill (cat. nr. 5/6) of Sector 'O'. The lower stone is firmly set in the podium that is equipped with a canal serving as a "flour catcher".

Torre la Sal (Cabanes, Castellón) (Flors 2009, 192). At El Tossal de Sant Miquel de Liria in Valencia the podium is 1 m wide and 28 cm high (Bonet 1995, 179, 356, fig. 187). At Castrejón de Capote (Badajoz) in southern Extremadura the podium bearing an *in situ* mill measures about 85 cm in diameter and 40 cm in height raising the top of the upper stone and its theoretical lever to a height of about 1 m (Berrocal 1998, 284, fig. 26.1), a height indicative of a driving from a standing position. Yet this site, like those from the north-east of the Iberian Peninsula, is linked to a different cultural framework.

At Puntal dels Llops (Olocau, Valencia) the podium was equipped with a sort of canal (Bonet Mata 2002, 57) similar to that of Cerro de la Cruz. The podia of other sites such as Tossal del Moro de Pinyeres (Tarragona) (Arteaga *et al.* 1990, 61 ff. and fig. 9) and Taratrato de Alcañiz (Teruel, Zaragoza) (Berrocal 2007, 283, fig. 6.1) differ in that they are square instead of circular. It is noteworthy that the podium of the last site is equally equipped with a canal (Berrocal 2007, 283, fig. 6.1).

Inferring grinding motion from mill location

A number of the mills were found in proximity of walls. One interpretation of this position is that they were in storage. If, on the other hand, they were in their working position, a complete 360° rotation does not appear to be possible. But of course, this is based on the presumption that complete rotation was the usual grinding practice (Borges 1978, 120).

It cannot be excluded that the upper stone could have been limited to a sequence of movements from 90° to 180°, in a sort of swinging movement, rhythmically moving the handles to and fro. This semi-rotary movement would allow many mills to be operated in confined spaces such as the corners of rooms. This is also consistent with the proximity of certain podia to the walls, as in the case of cat. 5/6 and, even more, that of cat. 24/25. In accordance with this interpretation we advance that most of the mills found *in situ* could have been in use at the moment of the destruction of the site.

By contrast, the option allowing a full 360° rotation is that millers of the Iberian Culture were familiar with the technique of the connecting rod, permitting them to drive a large heavy mill from a stationary position. This would have required a simple wooden rod equipped at its end with either a perforation or with a loop attached to the handle. Although this system of traction is identified in ethnological contexts and in medieval iconography (Comet 1997), there is no evidence that it was known in the Iron Age.

One particular mill (cat. 21-22), mounted *in situ*, is remarkable and puzzling as the upper stone is upside down and broken in several pieces. Why was the upper stone mounted in this manner? The possibility that it was deliberately sacrificed by the settlement's invaders is appealing albeit unfounded.

Petrography

In spite of the absence of formal petrographic analyses, it is evident that the majority of the millstones were fashioned from local porous, cream-coloured rocks. These include the relatively soft limestone tufa (known locally as “travertine”) and the much harder “cariola” limestone from a much older geological layer (Anderson 2011). The hypothesis of local rock exploitation is backed by what appears to be an unfinished millstone (cat. 18).

An important exception is a granite rotary quern upper stone (cat. 7; *cf.* Fig. 3) equipped with a lateral lug bearing an inverted “keyhole” cutting. The presence of a granite model among the porous limestones is not surprising as granite was widely exploited for querns since Prehistory. Yet in this case, the quern is an import since the nearest granite outcrops are about 100 kilometres away. This is the only example of an exogenous rock among the the Iron Age assemblage. There is, for example, no evidence of the import of basalts, a rock that was widely distributed throughout the south of Spain in the subsequent Roman period (Anderson 2016).

Rotary querns bearing lug handles such as cat. 7 are common in Iberian Iron Age contexts elsewhere in the Iberian Peninsula (Alonso 1999, 254; Alonso 2000, 135; Alonso Pérez 2014, fig. 5; Asensio *et al.* 2000-01, 69; Espí Pérez *et al.* 2009, fig. 11; Sanmartí *et al.* 1992, fig. 37). The inverted “keyhole” type of cutting is also characteristic of the Iberian Iron Age (Burés *et al.* 1993: 134, fig. 14; Checa *et al.* 1999; Asensio *et al.* 2001: 68, Plate 6, M-7 and M-17; Anderson 2016, 29).

Millstone re-use

Some of the millstones at Cerro de la Cruz were re-used for purposes other than grinding. The upper cone of lower stone (cat. 23) was cut transforming it into a cylinder with a flat surface. Although the reason behind this change is not known, its position in a room close to a wall suggests that it might have served as a base for a wooden post. Another half rotary quern was found upside down, close to the floor, in the corner of a room (cat. 8) where it could have served as a base for a vase or amphora. In any case, the re-use of millstones at Cerro de la Cruz after their active life is not surprising as millstone re-use is common throughout all periods of time.

Fruits and seeds

A. M. Arnanz studied two assemblages of seeds recovered during the excavation of Room “O” (2000). The most frequent taxa of the first assemblage, recovered at floor level, are *Vicia ervilia* (bitter vetch) (87%) and *Vicia sativa* (vetch) (12%) (Fig. 8). Cereals and *Triticum* (wheat) varieties are also present in small quantities.

The second assemblage of seeds was collected on the podium of mill cat. 5/6. As in the first case, *Vicia ervilia* (bitter vetch) and *Vicia sativa* (vetch)

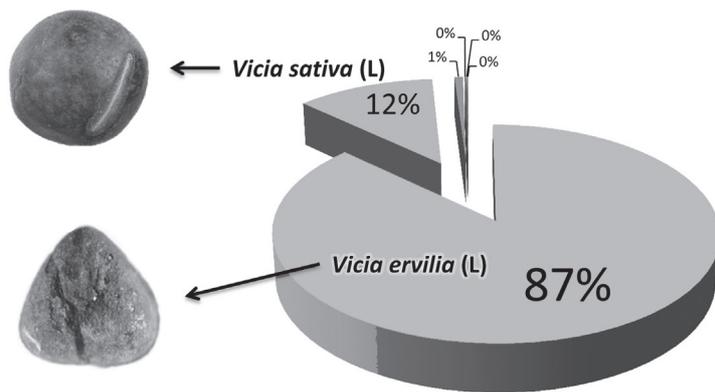


Fig. 11: Proportion of seeds recovered on the floor of sector 'O' (after Arnanz, 2000, modified).

dominate, followed by a few fragments of cereal and *Hordeum* (barley) (Fig. 9).

The dominance of pulses is obvious followed by a modest number of *Triticum aestivum/durum* (naked wheat), *Hordeum vulgare var. nudum* (naked barley), *Triticum dicoccum* (emmer), *Vitis vinifera* (grape vine), *Quercus* (acorn) and graminoids.

The question is the real significance of these particular species at this site. *Vicia sativa* (vetch) was known to have been consumed by humans since Chalcolithic times. *Vicia ervilia* (bitter vetch) is today normally associated with animal fodder. It has a toxic component harmful for humans, birds and pigs that does not affect cattle and sheep as long as consumption does not exceed 25% of their diet.

Many sheep and goat remains were recovered at the site and these animals may have consumed *Vicia ervilia*. By contrast, there is ample evidence of its consumption by humans (Arnanz 2000, 241). This pulse is known, for example, to have been consumed during the trying times during and after the Spanish Civil War (1936-39). Additionally, the

presence of these seeds bolsters the notion that their flour was intended for human - rather than animal - consumption. Although hardly present, the same may be said about acorn. The texts of Strabo (III,3,7) and Pliny the Elder (XVI,15) evidence its use as flour to bake bread, a popular item in the diet of Ancient Iberia. Moreover, the consumption of acorns in Late Iron Age contexts is recorded at the celebrated site of Numantia (Checa *et al.* 1999, 66-67).

The very small presence of wheat and other seeds can be explained as remnants of previous grindings. Alternatively, their low proportion could reflect the custom - well attested in more recent times - of crop rotation in order to increase the nutrients of the soil. This could lead to some residual plants growing in the wrong season and thus appearing in marginal proportions in the subsequent harvest.

Wheat and barley, as well as vine and acorns, are also recorded elsewhere at the site (Quesada *et al.* 2010, 92 ff.). Overall, the consumption both of grain and vetch must have taken place regularly at Cerro de la Cruz.

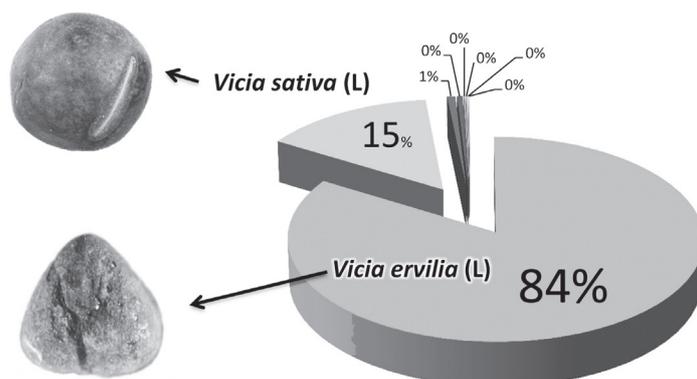


Fig. 12: Proportions of seeds recovered on the millstone podium, sector 'O' (after Arnanz, 2000, modified).

Socio-economic remarks

The concentration of important quantities of grain, legumes, oil and wine stored in certain spaces (particularly sectors III, P, J, M) suggests collective storage at a degree above that of the nuclear family, presumably under the control of leaders (maybe clan patriarchs). This is an argument in favour of a collective approach to food processing that would imply collective mills and collective grinding (Alonso *et al.* 2008; Cerro de la Cruz, Quesada *et al.* 2014).

On the other hand, it appears that both mills and storage areas at Cerro de la Cruz appear to be distributed evenly throughout the site (or at least throughout the excavated area), suggesting a more decentralised storage and milling. A quantitative analysis of storage capacity and likely consumption is currently underway so as to attain a better understanding of the problem.

Analogous questions are equally brought up in the study of other Iberian sites such as Cerro del Villar, Sa Caleta or La Bastida de les Alcuses (Delgado Hervás 2010, 36; Iborra *et al.* 2010, 109). Certain authors advance the hypothesis that mills belonged to the community and were thus instruments of a centralised economy. Their large numbers and concentrations in specific areas of the settlement could be further proof supporting this notion (Pérez Jordá *et al.* 2000, 162 ff.; Espí Pérez *et al.* 2009, 39-40, 46-47). Future findings at Cerro de la Cruz will eventually have a say in this.

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