



The allure of rock crystal in Copper Age southern Iberia: Technical skill and distinguished objects from Valencina de la Concepción (Seville, Spain)



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ARTICLE INFO

Article history:

Available online 29 August 2015

Keywords:

Iberia
Copper Age
Lithic technology
Rock crystal
Megalithic monuments

ABSTRACT

Rock crystal appears relatively frequently in Late Prehistoric Iberian sites, especially in the form of micro-blades and knapping debris. With some exceptions, however, these finds have seldom been looked into in any detail, and therefore little is known about the technology involved in the use of this material, its social and economic relevance or its symbolic significance. In this paper we examine a collection of rock crystal artefacts recently found at Valencina de la Concepción (Seville, Spain), one of the largest 3rd millennium BC sites in Western Europe. Among the objects included in this study are a long dagger blade, twenty-five arrowheads and a core, all of which form the most technically sophisticated and esthetically impressive collection of rock crystal material culture ever found in Prehistoric Iberia. Through the analysis of the procedures and techniques applied in the production of these objects, the chemical characterisation of the raw materials through Raman spectroscopy and RTI image processing and the careful assessment of the archaeological contexts in which they were found, this paper makes a robust contribution towards the study of the role of rock crystal in Copper Age technology and society. Recent research suggest that Valencina was a major node in the circulation of exotic materials such as ivory, amber, cinnabar or flint in Copper Age Iberia, which provides a very good background to assess the relevance of rock crystal as a traded commodity. In addition we discuss the role of rock crystal as a marker of status in large megalithic monuments, as well as its possible symbolic connotations.

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1. Introduction

In prehistoric Europe, lithic utensils were largely made from varieties of cryptocrystalline sedimentary rock or other rocks with conchoidal fracture. Knapping of minerals such as rock crystal was less prevalent, due to their anisotropic structure. The term 'rock crystal' is applied to a monocrystal which is a variety of macro-crystalline quartz characterised by its hyaline appearance and ordered atomic structure, which determines specific knapping methods, following its internal structure (Crabtree, 1968: 10–11; Novikov and Radililovsky, 1990; Moure, 1994; Inizan et al., 1999: 19–23). In some European regions the

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exploitation of rock crystal may have been caused by the dearth of flint (Aubry and Igreja, 2009), although it has been observed that its exploitation could also be explained by its physical properties and symbolic value (Reher and Frison, 1991; Taçon, 1991; Sachanbiński et al., 2008). The limitations inherent to the manufacture of rock crystal objects in comparison with objects made from other raw materials are reflected in the reduced size of the knapped objects, their low level of standardisation and the particular features of the *chaîne opératoire* involved – including the frequent use of uncontrolled knapping on an anvil (Peña and Wadley, 2014). Nonetheless, a technique for working with rock crystal which overcame the aforementioned limitations was developed during Late Prehistory in certain European regions. This was the case of the south-west of the Iberian Peninsula in the third millennium BCE.

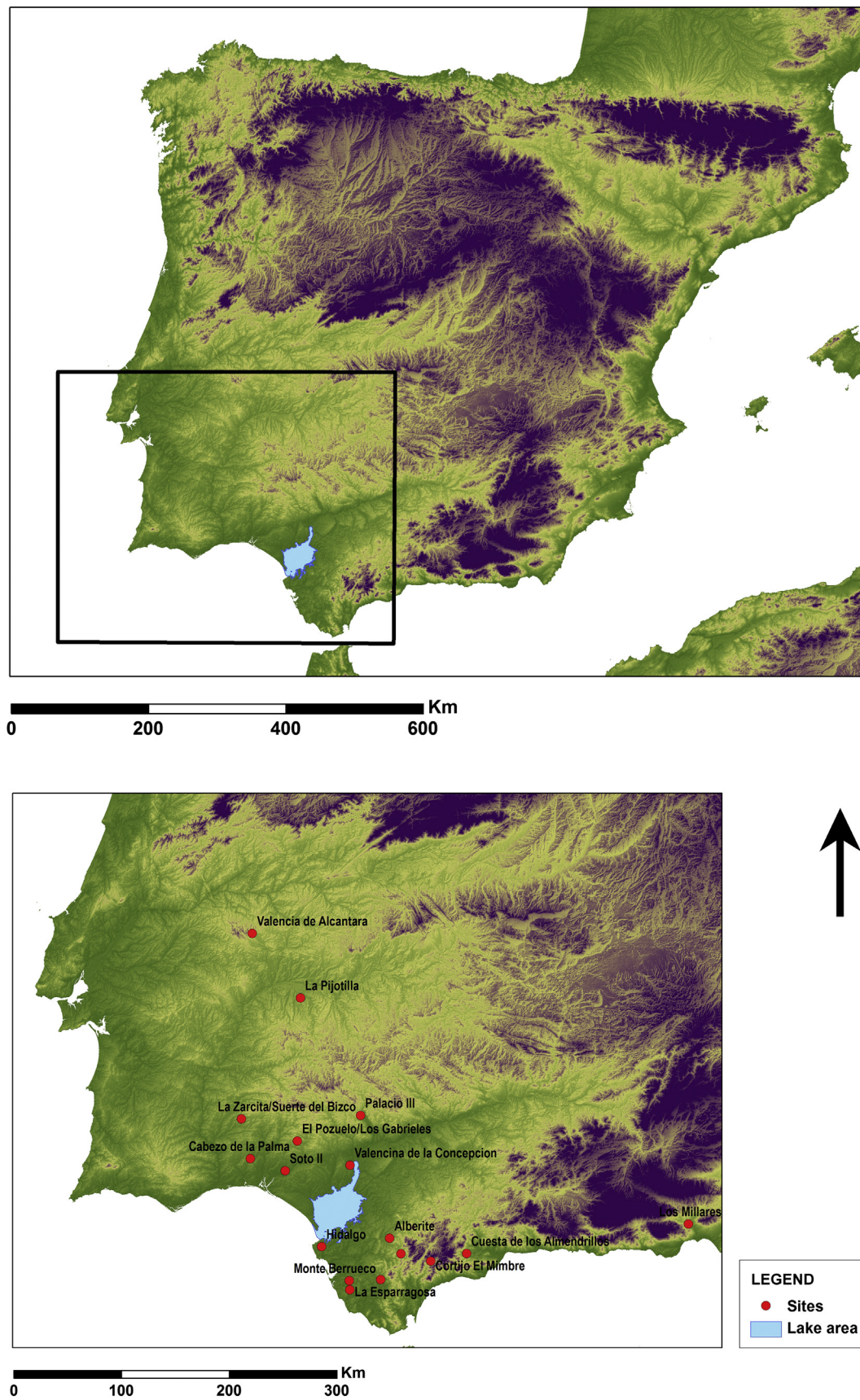


Fig. 1. Distribution of sites with objects of quartz and rock crystal of southern Spanish Late Prehistory.

Not as much research into the use of rock crystal in Iberian Late Prehistory has been carried out as into other exotic materials, such as variscite, ivory and amber. Since the 1980s a handful of articles (for example [Fábregas Valcarce, 1983](#); [Fábregas Valcarce and Rodríguez Rellán, 2008](#); [Forteza González et al., 2008](#)) as well as numerous references in excavation reports and studies of lithic technology have noted the importance of this raw material. However, it was not until a recent synthesis was published ([Costa Caramé et al., 2011](#)) that we began to acquire a general idea of its importance in the fourth and third millennia BCE, a period in which it was valued particularly highly and would seem to have been very socially significant. According to this synthesis, in the Spanish southwest (regions of western Andalusia and Extremadura - a territory with an area of 129,902 km²) rock crystal items have been found in 33 different structures, mostly megalithic monuments ([Table 1, Fig. 1](#)). Some items came from tombs of the same necropolis. For a further five sites, items more vaguely described as “quartz crystals” (and others) are mentioned that could allude to rock crystal ([Costa Caramé et al., 2011](#)). The vast majority of these structures only contained one or two objects, with a few exceptions, such as the dolmens of Lanchas I (Valencia de Alcántara, Cáceres), El Corchero (also in Valencia de Alcántara), and Ontiveros (Valencia de la Concepción, Seville), in which 15, 12 and 16 arrow heads were found respectively, as well as the Cuesta de Los

Almendrillos megalith (Ardite, Málaga), from which 10 micro-blades were collected. From a functional viewpoint, rock crystal appears in these contexts either in its natural form, with very little or no processing (which is the case with nodules, monocrystals and prisms), as arrowheads or, more commonly, as micro-blades and small extraction cores ([Costa Caramé et al., 2011: 261](#)). The only exceptions to this general rule are two perforated beads from Los Millares (Almería) and two more from Las Lanchas I and Datas II megaliths respectively (both belonging to the megalithic site of Valencia de Alcántara, in Cáceres). This suggests that in Iberian Late Prehistory there were well defined patterns for selecting raw materials according to the use or function they would be given. Stones such as variscite and amber seem to have been exclusively used to make body ornaments, whereas rock crystal was predominantly used to manufacture arrowheads and micro-blades, although quartz monocrystals and prisms were used in their ‘natural’ state, perhaps as personal, apotropaic objects (such as amulets or charms). In the Palacio III megalithic funerary complex (Almadén de la Plata, Seville), a set of monocrystals, prisms and nodules of various types of quartz, which had not been (or hardly had been) processed, were identified: they were interpreted as amulets, talismans, charms or even heirlooms ([Forteza González et al., 2008](#)). The only piece of rock crystal in the Palacio III burial complex was a micro-blade ([Forteza González et al., 2008](#)).

Table 1

Objects of quartz and rock crystal of southern Spanish Late Prehistory. Source: Modified from [Costa Caramé et al. \(2011\)](#).

Site	Artefacts (count)	Reference
4th–3rd Millennium BCE		
Alberite (Villamartín, Cádiz)	Prism (1) of rock crystal	Ramos Muñoz and Giles Pacheco, 1996
La Esparragosa (Chiclana de la Frontera, Cádiz)	Prism (1) of “Jacinto de Compostela” quartz	Dominguez-Bella et al., 2008: 222
El Juncal (Ubrique, Cádiz)	Core (1) of rock crystal	Gutiérrez López, 2007: 296
Paraje de Monte Bajo, Tomb E3 (Alcalá de los Gazules, Cádiz)	Blades (4) of rock crystal	Lazarich González et al., 2010: 199
Cabezo de la Palma (San Bartolomé, Huelva)	Core (1) of rock crystal	Piñón Varela, 2004
Cortijo El Mimbire, Dolmen 3 (Alpandeire, Málaga)	Cores (2) and arrow heads (2) of rock crystal	Garrido Luque et al., 1984: 143
Cuesta de los Almendrillos (Ardite, Málaga)	Blades (10) of rock crystal	Fernández Ruiz and Márquez Romero, 2004
El Pozuelo, Dolmen 1 (Zalamea la Real, Huelva)	Cores (2) and pendant (1) of rock crystal	Cerdán Márquez et al., 1975
El Pozuelo, Dolmen 5 (Zalamea la Real, Huelva)	Cores (4) of rock crystal	Cerdán Márquez et al., 1975
El Pozuelo, Dolmen 7 (Zalamea la Real, Huelva)	Cores (3) of rock crystal	Cerdán Márquez et al., 1975
Hidalgo (Sanlúcar de Barrameda, Cádiz)	Core (1) of rock crystal	Carriazo y Arroquia, 1975
La Encina (Valverde del Camino, Huelva)	Blade (1) and core (1) of rock crystal	Cabrero García, 1978
La Pijotilla, Tomb 3 (Badajoz)	Blade (1) of rock crystal	Polvorinos del Río et al., 2002
Lanchas I (Valencia de Alcántara, Cáceres)	Arrow heads of rock crystal (15) and white quartz (16) and bead (1) of rock crystal	Bueno Ramírez, 1988: 35–52
Huerta de las Monjas (Valencia de Alcántara, Cáceres)	Arrow heads of rock crystal (1) and white quartz (1); microlith (1), flake (1), core (6), micro-scraper (1), micro-blades (2), segment (1), debris (4), quern (1) prisms (3) of white and hyaline quartz.	Bueno Ramírez, 1988: 61–77
El Corchero (Valencia de Alcántara, Cáceres)	Arrow heads (12) of rock crystal; microliths of rock crystal (2) and white quartz (1)	Bueno Ramírez, 1988: 78–84
El Palancar (Valencia de Alcántara, Cáceres)	Arrow heads of rock crystal (1) and white quartz (2)	Bueno Ramírez, 1988: 93
Zafra II (Valencia de Alcántara, Cáceres)	Arrow heads of rock crystal (2) and white quartz (1); cores (4) of rock crystal; micro-blade (1) of rock crystal	Bueno Ramírez, 1988: 95–111
Tapias I (Valencia de Alcántara, Cáceres)	Blades (2) and cores (2) of rock crystal; arrow heads (2) and core (1) in white quartz	Bueno Ramírez, 1988: 114–123
Datas II (Valencia de Alcántara, Cáceres)	Arrow heads of rock crystal (2) and white quartz (1); bead (1) in white quartz	Bueno Ramírez, 1988: 135–146
Cajirón I (Valencia de Alcántara, Cáceres)	Ball (1) of rock crystal in a natural state and small flake (1) of rock crystal	Bueno Ramírez, 1988: 151 y 156
La Zarcita (Santa Bárbara de Casas, Huelva)	Core (1) of rock crystal	Cerdán Márquez et al., 1975
Los Gabrieles, Dolmen 6 (Valverde del Camino, Huelva)	Blade (1) and core (1) of rock crystal	Cabrero García, 1978
Los Gabrieles, Dolmen 4 (Valverde del Camino, Huelva)	1 quartz crystal	Linares Catela, 2009: 220
Los Hurones (Ubrique, Cádiz)	Quartz monocrystal (1)	Hurtado Pérez, 2009: 79
Los Millares, Tomb 37 (Santa Fe de Mondújar, Almería)	Bead (1) of quartz	Almagro Basch and Arribas Palau, 1963: 124

Table 1 (continued)

Site	Artefacts (count)	Reference
Los Millares, Tomb 63 (Santa Fe de Mondújar, Almería)	Beads (4) of quartz	Almagro Basch and Arribas Palau, 1963: 118
Los Millares, Tomb 3 (Santa Fe de Mondújar, Almería)	Beads (2) of rock crystal	Almagro Gorbea and Arribas Palau, 1963: 116
Martín Gil (Zalamea la Real, Huelva)	Arrowheads (1) of rock crystal	Cerdán Márquez et al., 1975
Palacio III, Hoard (Almadén de la Plata, Sevilla)	Monocrystals (2) of quartz and bead (1) of carnelian	Forteza González et al., 2008
Palacio III, Tholos (Almadén de la Plata, Sevilla)	Monocrystals (2) and nodules (3) of quartz and blade (1) of rock crystal	Forteza González et al., 2008
Puerto de los Huertos (El Berrocal, Huelva)	Prisms (3) of rock crystal	Linares Catela and García Sanjuán, 2010: 142
Soto II (Trigueros, Huelva)	Fragments (2) of rock crystal	De Balbín Behrmann and Bueno Ramírez, 1996
Suerte del Bizco (Santa Bárbara de Casas, Huelva)	Undetermined (1) of rock crystal	Pinón Varela, 2004
2nd Millennium BCE		
Monte Berruco (Medina Sidonia, Cádiz)	Quartz crystals (several, not specified)	Escacena Carrasco & De Frutos Reyes, 1981: 171–172

The empirical evidence regarding the provenance of the rock crystal and quartz found in these megalithic monuments is very scarce. We can mention the analysis of the magnificent smoky quartz monocrystal found in the dolmen of Alberite (Villamartín, Cádiz), for which a non-local origin connected with the pegmatite rock deposits located in the igneous massifs of the Spanish Central System was suggested (Domínguez-Bella and Morata Céspedes, 1995: 141). In the Palacio III megalithic complex, the monocrystals found in the *tholos* (ornaments 4 and 5) were both classified as belonging to the milky variety, which is translucent (i.e. not transparent and with white colour), and interpreted as relatively rare specimens that were difficult to obtain. This would mean they were likely to have been traded at a supra-local level, but a concrete place of origin could not be established. Additionally, of the pieces from the Iron Age collection found in the gallery dolmen of the Palacio III megalithic complex, the prase quartz crystal (piece no.2) is an extraordinarily exotic specimen (even exceptional from a crystallographic perspective) and therefore, in all probability, would have been a highly prized and valuable object due to its rarity. Locations at Llerena or Malpartida de la Serena (Badajoz), or even certain mining areas in the south-east of Córdoba were suggested as potential places of origin for these items (Forteza González et al., 2008: 148–149; Murillo-Barroso et al., 2015a: 328–329).

In view of the relative frequency with which quartz and rock crystal appear in southern Iberian (collective) funerary contexts of the 4th and 3rd millennia BCE, their disappearance from such contexts (both individual and collective), in the Early Bronze Age (from the beginning of the 2nd millennium BCE), is truly striking. It would seem that, between the end of the 3rd and the beginning of the 2nd millennium BCE the use of this raw material as grave goods was almost entirely abandoned.

This article is intended as a contribution into the research of rock crystal use among the communities of Copper Age southern Iberia. The starting point for this study is a remarkable set of unpublished objects from the Chalcolithic site of Valencina de la Concepción (Seville). Among these are a dagger blade, 15 arrowheads and a core found in two major megalithic monuments, plus other smaller items found in non-megalithic structures. Because of their size and technical characteristics, both the dagger blade and the core are unique specimens in the archaeological record of Late Prehistoric Iberia. Their technomorphological, geochemical and contextual analysis throws new light on the use and social significance of rock crystal, a subject on which little research had been previously carried out.

2. Contexts and methods

2.1. Contexts

The settlement of Valencina de la Concepción-Castilleja de Guzmán (henceforth Valencina), is located in the lower Guadalquivir valley, within the metropolitan area of Seville. Valencina is one of the largest (around 450 ha) and most significant sites for the study of Copper Age Iberia. In the last few years, various publications have given international dissemination to the research being carried out in this site, providing new ideas and valuable data related to key aspects of third millennium BCE Iberian societies, such as economic production, craft specialisation, metallurgy, circulation of exotic raw materials (in some cases from outside Iberia), burial practices, social complexity, etc. — see for example Nocete Calvo et al., 2008; Costa Caramé et al., 2010; Rogerio Candellera et al., 2013; García Sanjuán, 2013; García Sanjuán and Murillo-Barroso, 2013; García Sanjuán et al., 2013; Nocete Calvo et al., 2013; Cáceres Puro et al., 2014; Murillo-Barroso et al., 2015b; etc. To date, no systematic study of Valencina's rock crystal finds had been carried out.

According to the data compiled for this paper (Table 2, Fig. 2), rock crystal has been found in 8 different sectors of the site: Ontiveros, PP4-Montelirio, Montelirio *tholos*, La Huera, La Cima, IES and Trabajadores and García Lorca streets. The findings come from the three great megalithic monuments (Ontiveros, Montelirio and Structure 10.042–10.049 from the PP4-Montelirio sector), a hypogeum (La Huera), three burial pits (Structures 10.015–21–61 and 10.043 in PP4-Montelirio), three non-funerary pits (IES, La Cima and Trabajadores street) and various other negative non-funerary structures (García Lorca street). In addition to this, two of the finds are from particularly poorly documented stratigraphic units of the PP4-Montelirio sector which were not connected to any recognisable architecture of deposit (UE-919 and UE-345). In all non-megalithic contexts, identified objects consist of small blades and lithic debris, but in the three large megalithic structures mentioned, much more sophisticated artefacts were found, including arrow heads (16 in Ontiveros and 15 in the Montelirio *tholos*), a dagger blade (Structure 10.049 of the PP4-Montelirio sector) and a large core with extractions (Montelirio *tholos*). It is these last pieces, all found in excavations carried out in recent years and as yet unpublished, which this article focuses on. In view of this distribution, rock crystal appears to have been found throughout the entire site, although all the most sophisticated finished artefacts (arrow heads and dagger blade) have been found in its southern sector, where most (but not all) of the major megalithic

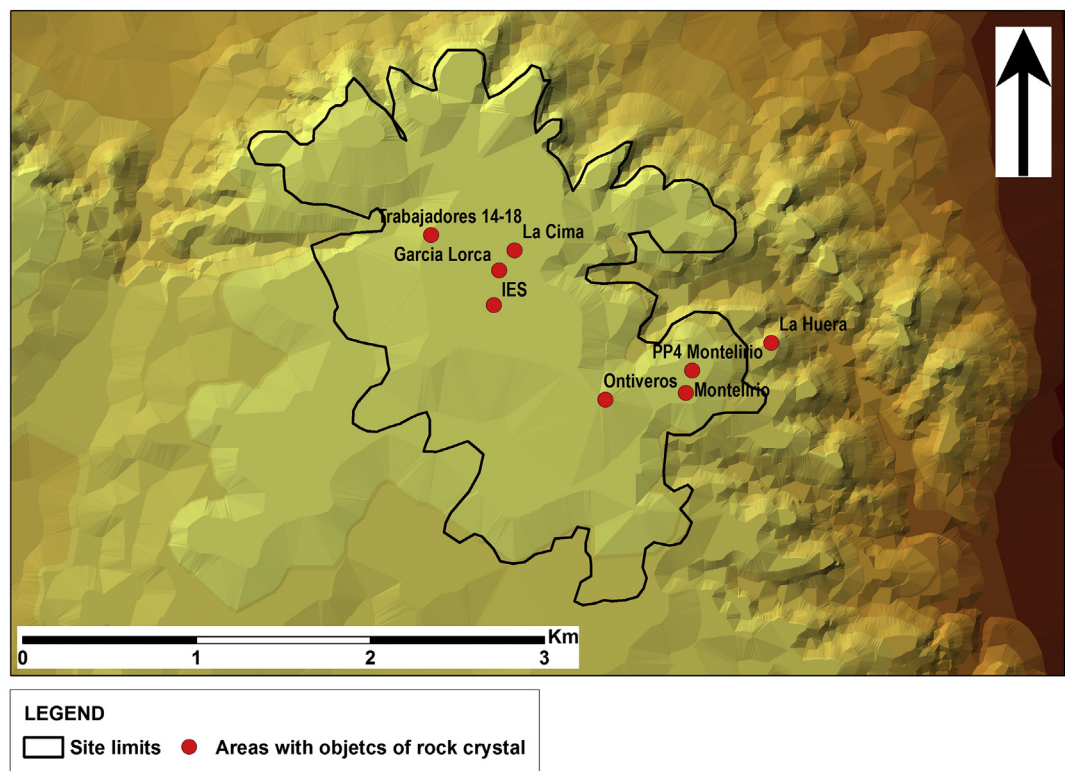


Fig. 2. Distribution of sectors with rock crystal objects at Valencina.

structures appear. Put together, all these objects provide valuable new data for the study of rock crystal as an exotic raw material in Chalcolithic Iberia from a techno-morphological, geochemical and contextual point of view. Fig. 3 shows an image of the set of items from the Montelirio *tholos* and PP4-Montelirio sector, together with the arrow heads discovered in Ontiveros.

short 1.9 m-long corridor, a secondary chamber, 2.7 m in diameter, is accessible (Fig. 4A). The whole construction, which extends over 43.75 m in total, is made of large slabs of slate, which were also used for the corridors' sides as well as the chambers and the main corridor's roofing. The corbelled roofing of the two chambers was built with sun-dried mud. A total minimum number of 25 in-

Table 2
Objects of rock crystal found at Valencina de la Concepción, sorted by Sector.

Sector	Context	Artefacts (count)	Previous references
Ontiveros	Megalith (Funerary)	Arrow heads (16)	Carriazo y Arroquia, 1962
García Lorca Street	Pits (Non-Funerary)	Debris and small fragments (15)	J. M Vargas Jiménez, Pers. Comm.
La Huera (Sevilla)	Hypogeum (Funerary)	Cores (2)	Méndez Izquierdo, 2013: 305–306
PP4-Montelirio	UE-345	Debris (1)	This paper
PP4-Montelirio	UE-919	Debris (1)	This paper
PP4-Montelirio	Structure 10015-21-61. Pit (Funerary)	Small blade (1) debris (2)	This paper
PP4-Montelirio	Structure 10043. Pit (Funerary)	Small blade (1)	This paper
PP4-Montelirio	Megalith (structure 10.049, upper level) (Funerary)	Dagger blade (1)	García Sanjuán et al., 2013
Montelirio	Megalith (tholos) (Funerary)	Arrow heads (15), small blades (4) and core (1)	This paper
Trabajadores Street	Pit (UE-92) (Non-Funerary)	Debris and small flakes (Not specified)	López Aldana and Pajuelo Pando, 2013: 159; Pajuelo Pando, Pers. Comm.
La Cima	Pit (Non-Funerary)	Cores, small blades and debris (18)	Ruiz Moreno, 1991: 462
IES	Pit (Non-Funerary)	Debris and small fragments (51)	Schuhmacher et al., 2013: 499; J. M Vargas Jiménez, Pers. Comm.

The Montelirio *tholos* was excavated between 2007 and 2010, and with the exception of a preliminary report (Fernández Flores and Aycar Luengo, 2013) and some results of the anthropological study (Fontanals-Coll et al., 2015) remains basically unpublished. It is a great megalithic construction with a 39 m corridor leading to a main chamber which is 4.75 m in diameter from which, through a

dividuals has been identified within the construction (20 in the large chamber, two in the small one and three in the corridor). Inside Montelirio, an extraordinary set of sumptuous grave goods was found, the most notable of which is an unspecified number of shrouds or clothes made of tens of thousands of perforated beads and decorated with amber beads, but including also other

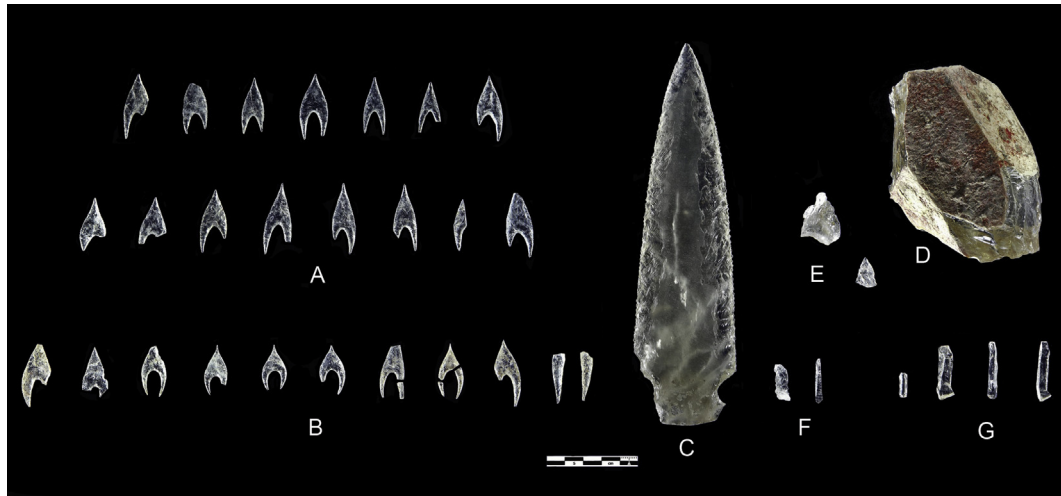


Fig. 3. Objects studied in this paper. A: Antiveros arrowheads; B: Montelirio *tholos* arrowheads (selection); C: PP4-Montelirio dagger blade (Structure 10.049); D: Montelirio *tholos* core; E: PP4-Montelirio knapping debris (from UE-345 on the left and UE-919 on the right); F: PP4-Montelirio micro-blades (from Structure 10.015 on the left and Structure 10.043 on the right); G: Montelirio *tholos* microblades. Photograph: Miguel Ángel Blanco de la Rubia.

remarkable objects such as flint arrow heads with long lateral appendices, four fragments of gold blades, ivory objects, etc. (Fernández Flores and Aycaz Luengo, 2013).

The 15 arrow heads, 4 blades and the rock crystal core of the Montelirio *tholos* (units 318 and 328) correspond to two altered levels (319 and 340 respectively), found at the back of the main chamber. The large number of rock crystal arrow heads and other materials found in the western zone (at the back of the chamber) is in stark contrast to the absence of these items in the rest of the chamber. The accumulation of arrowheads right in the north-western zone, next to the main chamber's access corridor (numbering at least 17 among rock crystal and other materials), suggest an offering similar to those discovered in the main corridor, where the arrowheads, although made of lower quality materials, were found in large groups associated with an altar and other offerings (plants). The core and the blades had been deposited in the central section of this same arch, coinciding with the area in which a set of clay baetyls appeared. However, signs of alterations in this area mean that their original position was more difficult to establish than in the previous case.

The PP4-Montelirio sector was excavated in 2007 and 2008. In January 2011 the Research Group ATLAS from the University of Seville began to study the materials deposited in the Archaeology Museum of Seville (100 boxes in total). Thus far, this study has focused mainly on Structure 10.042–10.049 from which various technically sophisticated ivory objects (García Sanjuán et al., 2013; Lucianez Triviño et al., 2014), cinnabar pigment remains (Rogerio Candellera et al., 2013), a piece of amber believed to be a flint dagger's pommel (Murillo-Barroso and García Sanjuán, 2013) and human remains (Robles Carrasco and Díaz-Zorita Bonilla, 2013) have been studied. Already published studies also include all of the sector's faunal remains (Liesau et al., 2014) as well as a large gold blade found in Structure 10.029 (Murillo-Barroso et al., 2015b).

Structure 10.042–10.049 is a two-chambered megalithic construction. This construction has an outer access corridor 13 m in length and 0.7 m in width (maximum), made from 57 slate slabs (29 on its northern side, 28 on the southern); at the end of this corridor is the first chamber, with a circular plan of 2.57 m in diameter, which was found disturbed by later activity. In the space between the access corridor and the first chamber, skeletal remains of four individuals were identified as well as some grave goods, including

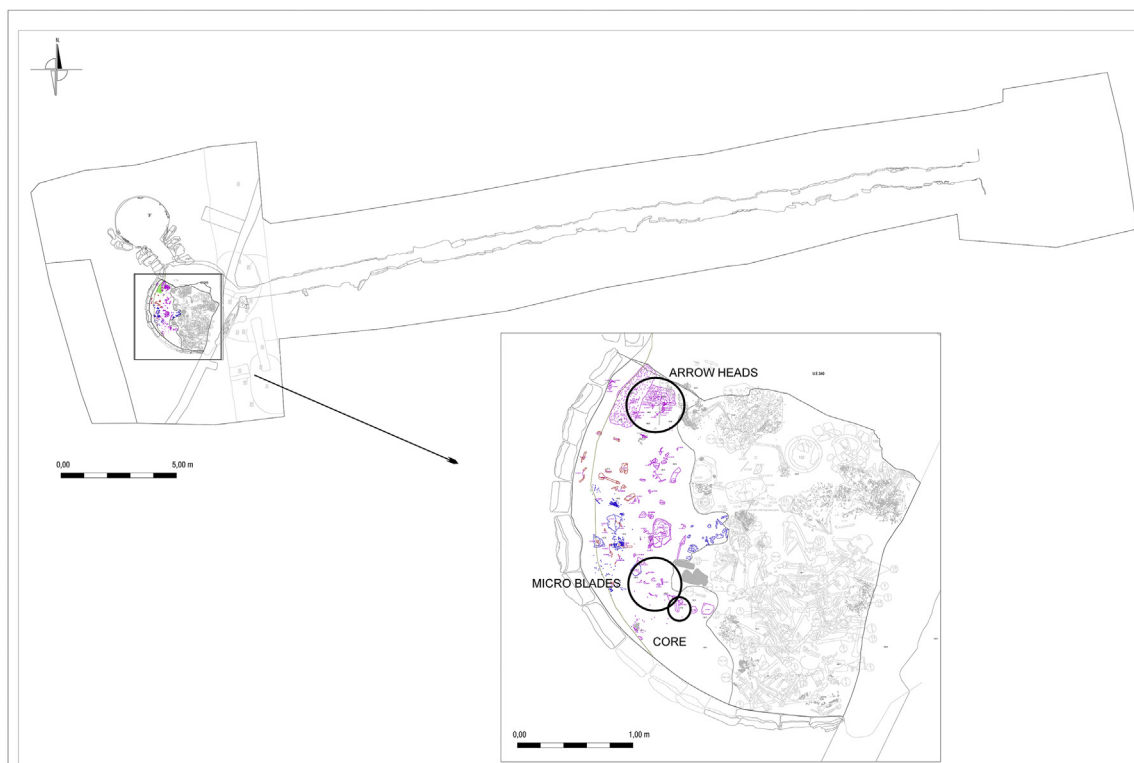
more than 2000 beads covered in red pigment, fragments of a fired clay figurine, more than 800 sherds of pottery (some of them intrusive wheel-thrown ones), fragments of 12 arrowheads, 3 blade fragments, some lithic chipping debris, very fragmented ivory objects, etc.

Beyond the first chamber, a second corridor of 2.52 m (length) by 0.51 m (width) and formed from 15 slate slabs (7 on the north side and 8 on the south) separates the first and the second burial chambers. This second chamber, found in a much better state of preservation than the first, has a maximum diameter of 2.1 m and is formed from 23 slabs of slate (Fig. 4B). The excavation inside the second chamber led to the identification of two stratigraphically-independent deposits separated by a set of 22 slate slabs laid horizontally which may be interpreted as some sort of 'seal' between the lower and upper depositional levels, although perhaps they were originated from the collapse of some structure (this hypothesis is, however, far more unlikely).

The lower depositional level of the second chamber contained the articulated inhumation of a young male individual aged between 17 and 25 (Robles Carrasco and Díaz-Zorita Bonilla, 2013: 377) lying in the foetal position, in connection with a large set of grave goods, including: an undecorated elephant tusk (laid above the head), one 'almond-rim' type plate, a set of 23 flint blades, one flint halberd with an amber pommel (already mentioned above) as well as numerous ivory objects (for a study of some of them see García Sanjuán et al., 2013). Red pigment made from cinnabar had been sprayed all over this individual and the objects surrounding him. In the upper depositional level of the second chamber the finds comprised five ceramic pots (two complete plates – one with red pigment – and two half plates, one of them also with red stains), 38 whole flint blades and 16 fragments of other blades, one flint arrow head, numerous ivory objects (most of them decorated and quite fragmented, between them a palette and the terminal extreme of a tusk, both decorated), 90 beads, and an ostrich egg (which has now disappeared) as well as the remarkable rock crystal dagger blade studied in this paper.

The Ontiveros dolmen, 1 km to the southwest of Montelirio and PP4-Montelirio, was partially excavated between the end of 1948 and the beginning of 1949 (Carriazo y Arroquia, 1962: 211–212). The monument's precise morphology is as yet unknown as it was found underneath an occupied dwelling so it could not be fully excavated. The excavator explored 10 m of the outer part of the

A



B

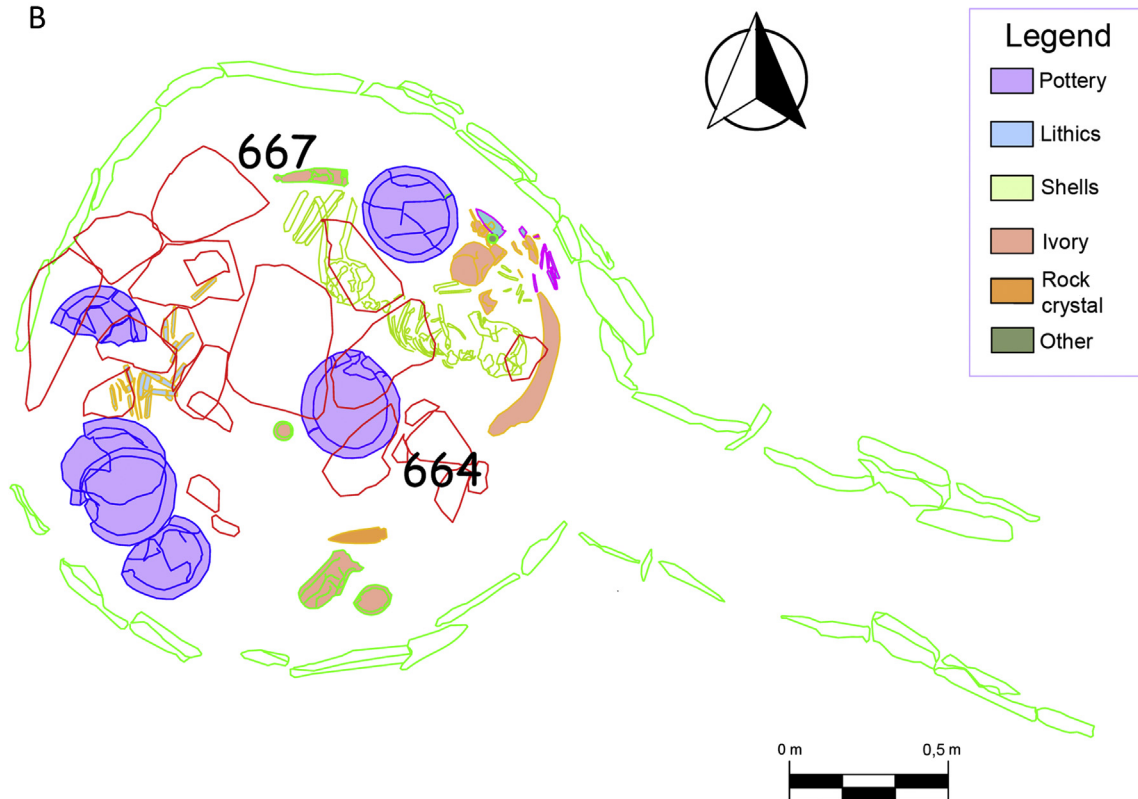


Fig. 4. Plans of the main features discussed in the text, showing the location of the rock crystal artefacts: A) Montelirio tholos; B) PP4-Montelirio Sector Structure 10.049. Drawings: Álvaro Fernández Flores and José Peinado Cucarella.

corridor as well as the atrium, which was semi-circular in plan and delimited by slabs of slate, like the corridor. Some of the slabs were reported to have been covered by a layer of intense red pigment. The finds reported include six small fragments of hand-thrown pottery, one blade and one “point” of flint, as well as 23 arrowheads including 10 made of limestone, 7 made in flint and 16 made in rock crystal. The flint arrowheads show long lateral appendices very much like the ones found in the Montelirio tholos. Evidence of Roman building activity in the form of bricks and tiles was found inside the corridor. In this paper we use the 16 rock crystal arrow heads found in Ontiveros and currently kept in the Archaeology Museum of Seville as a base for comparison with those of the Montelirio tholos.

2.2. Methods

Characterisation analysis was carried out using confocal micro-Raman spectroscopy (Smith and Clark, 2004; Edwards and Chalmers, 2005). This vibrational technique provides information on the molecular structure of both organic and inorganic materials. A beam of monochromatic light generates inelastic scattering of the light upon impact with the material being studied, providing signs of small changes in frequency specific to the chemical structure of the body and independent from the incident light's frequency. The items studied using confocal Raman spectroscopy were the core and one arrowhead from the Montelirio tholos and the dagger from Structure 10.042–10.049 of the PP4-Montelirio. None of the other arrowheads were studied due to conservation issues.

A labRAMHR spectrometer (Jobin-yvon, Horiba) fitted with an optical microscope with $\times 10$ and $\times 50$ lenses (Olympus, Japan) was used. A green laser (532 nm) was used and the Raman signal was captured by a CCD detector (1064×256 pixels) and kept cool using a Peltier device. The data were processed using LabSpec Software (Horiba, Japan).

In order to obtain Raman spectra, samples up to 5 mm in length were placed on a sample holder. The mapping of the inclusions corresponding to the core and the dagger were carried out in $1 \mu\text{m}$ steps along both the X and the Y axes. The relationship of the intensity between the 467 cm^{-1} wave, characteristic of the quartz, and the 1575 cm^{-1} waves in the dagger's case and 2930 cm^{-1} in the core's were measured in each spectrum, since they were the inclusions' characteristics (graphite, and kerogen respectively). Subsequently, depending on this relationship, a colour is assigned at this juncture, which will ultimately unite those adjacent to create the map. Black colours thus exclusively indicate the presence of quartz, whilst the appositions are marked by blues and reds.

The technological analysis focused on determining knapping methods through diacritical examination (Dauvois, 1976: 195; Baena Preysler and Cuartero Monteagudo, 2006) as well as standard diagnostic criteria (Pelegri, 2000, 2002) to reconstruct the chaîne opératoire (Pelegri et al., 1988; Sellet, 1993; Shott, 2003). A Leika 2000 binocular microscope and macro-photographic image captures have been used to recognise certain knapping marks. In addition, in order to further examine the marks left on the objects by the manufacturing process the dagger blade was recorded by Reflectance Transformation Imaging (RTI), which is a digital image processing method that enables surfaces that have been worked on to be accurately examined.

RTI uses the transformation of the reflectance properties of any surface through contrast enhancement to improve the perception of its micro-topography by using Polynomial Texture Maps (Malzbender et al., 2000, 2001), which are image-based representations of functions of two independent parameters (lu and lv), contained in every pixel, specifying how the green, red and blue bands (RGB) vary according to the direction of a light source.

Polynomial Texture Maps can be obtained through multiple photographs of a fixed object from a fixed camera with varying lighting directions. The combination of Polynomial Texture Mapping and RTI provides real-time rendering, interactive visualization of changing lighting conditions and performance of enhancements of the captured reflectance functions, revealing the most subtle details of a surface. Compared to other methods of image processing, RTI does not involve 3D geometry, which makes it very affordable in terms of costs and processing time (Mudge et al., 2006).

3. Techno-morphological analysis

3.1. Core and micro-blades

On a quantitative level, the presence of knapped rock crystal objects in southern Iberia Peninsula is better represented by small cores and micro-blades extracted by pressure knapping. Given its large size, the core deposited in the Montelirio tholos (Figs. 5–7) is therefore an extraordinary find. The core, used for the extraction of small blades, is supported naturally by a hexagonal rock macro-crystal, four of whose faces are recognisable. The extractions were prepared through faceted pressure planes, a fairly common procedure in the Neolithic to produce blades and micro-blades. However, this procedure was not commonly used for the production of siliceous rock blades in the third millennium BCE. Several unipolar blades were noted in the core, in a semi-enveloping front, except for the sides and the rear section. All the extractions are parallel to the mineral's face, meaning the core is structured like a prism from the pressure plane. One, or at most two, sets of blades were extracted, as the first extractions. Therefore, the core was deposited in the tomb before it became depleted, which further underlines its value as a grave good.

If we analyse the “biography” of this object, a remarkable conclusion is reached: its most recent exploitation was its use as a core. One of its faces has a sawed surface (Fig. 7). The first step to process the quartz monocrystal was to cut a fragment using this technique. This enabled a rectangular support to be obtained, which would subsequently be processed to create a knapped object. The sawing was parallel to one of the hexagonal faces. A



Fig. 5. Core from the Montelirio tholos. Photograph: Miguel Ángel Blanco de la Rubia.



Fig. 6. Core from the Montelirio *tholos*. Photograph: Miguel Ángel Blanco de la Rubia.

problem in the last phase of extracting the sawed fragment, carried out through hammering, caused the monocrystal to fracture. This led the craftsman to abandon the task of “cutting up” the mineral, later moving on to pressure knapping to create blades on two of its faces’ planes, those that had not been sawed.

One interesting problem is how the monocrystal was sawed. Ideally, a lithic material with two fundamental characteristics is required to saw rock crystal. The first of these characteristics must be mineralogical, with greater hardness (Mohs) than hyaline quartz, for example with minerals such as Zoisite, Epidote (6–7), Clinozoisite (7) Staurolite, Almandine (7–7.5), Zircon, Andalusite (7.5), Spinel (8) or Corundum (9). The second must be structural, as penetrative foliation is required, where minerals are oriented as a result of the high pressure the rock has been subjected to. Consequently, thanks to this foliation (schistosity), the rock is more suitable for being transformed into the thin, flat tool required for this purpose. Metamorphic rocks with these characteristics must be produced in an area of mid-to high-grade regional metamorphism, as micaschists or quartz schists in amphibolite or eclogite facies, where any of the aforementioned minerals would be located. To our knowledge, there is no record of a tool made with any of the minerals mentioned above in southern Spain’s Copper Age, but the know-how and craftsmanship required to work with rock crystal could well have been restricted to a small group of skilled people rather than being widespread, which may have rendered the tools involved very difficult to trace archaeologically.

The Montelirio core is a unique example of how Copper Age craftspeople worked rock crystal to create standardised supports. Two methods were used: a) Sawing to attain wider and longer supports; b) pressure to procure blades. The Montelirio core, while uncommon, is not the only one of its kind. Another specimen with identical characteristics is mentioned in the region’s archaeological records, forming part of the grave goods of the now-disappeared El Minguillo I dolmen (Cordoba) (Leisner and Leisner, 1943: 190, plate 53).

There are other knapped objects inside the Montelirio *tholos* along with the core: four micro-blades (between 20 and 30 mm in length) which are not connected to the core’s products. Furthermore, there is also a flake of a core’s “crust” from a large crystal’s

plane, and 15 foliaceous arrowheads, all of which have a concave base and long lateral appendices.

3.2. Arrow heads

Rock crystal arrowheads can now be said to be a prominent element of the most sophisticated material culture found at Valencina. A set of 16 of these arrowheads was found during the excavations carried out in the Ontiveros megalithic monument between December 1948 and February 1949 (Carriazo y Arroquia, 1962) (Fig. 8). Similar arrow heads, 15 in total, have also been found in the Montelirio *tholos* (Fig. 9). All these arrowheads were made by pressure-knapping and were of the same type: a more or less rounded concave base with long lateral appendices and micro-denticulated edges that were produced with an object provided with a hard tip of barely 1 or 2 mm. The long lateral appendices of these arrowheads are similar to those made in flint, of which a number of examples are known in the Montelirio *tholos*. However, even greater skill must have been required to produce these unique features when using rock crystal.

The width of these foliaceous points (around 20–30 mm) enables us to surmise the type of support necessary to produce them, which rules out the possibility that a laminar support was used. However, the bifacial knapping present in this rock crystal points was carried out using the principles of conchoidal fracture. This was possible because the craftspeople followed the axes parallel to the mineral’s direction of growth. Foliate arrowheads have been found in other megaliths in the region, such as Cortijo Mimbre (Málaga), Minguillo (Cordoba) and El Pozuelo (Huelva). Their typology is different, as they tend to be triangular with slightly concave or marked bases, and they do not display the long lateral shafts found in the Valencina ones.

3.3. Dagger blade

The rock crystal dagger blade appeared in the upper level of Structure 10.049 of the PP4-Montelirio sector, in association with an ivory hilt and sheath, which renders it an exceptional object in Late Prehistoric Europe (García Sanjuán et al., 2013) (Figs. 10 and 11). The dagger was discovered in the south side of the chamber (the left side as you enter it) very close to the chamber wall and less than a meter from the entrance (García Sanjuán et al., 2013). The blade is 214 mm in length, a maximum of 59 mm in width and 13 mm thick. Its morphology is not unheard of in the Iberian Peninsula, although all the samples recorded thus far were made from flint and not rock crystal. Foliate bifacial macro-elements with lateral notches separate the blade from the heel to be fixed to the ivory handle. Knapped artefacts with a similar typology are well represented in funerary contexts in southern and western Iberia (Leisner and Leisner, 1943; Forenbaher, 1999). However, they are quantitatively scarce in comparison to other types of knapped lithic tools found in Late Neolithic and Copper age burials.

The manufacture of the rock crystal dagger blade must have been based on an accumulation of transmitted empirical knowledge and skill taken from the production of flint dagger blades as well from know-how of rock-crystal smaller foliaceous bifacial objects, such as Ontiveros and Montelirio arrowheads. Some of the characteristics of the technological process involved in its production can be deduced from the observable technical marks on the piece (Figs. 12 and 13). From all this we can develop the following hypothesis about the *chaîne opératoire* verified during the production stage:

- Obtaining the raw material. The piece’s size is indicative of the original mineral support. It was obtained from a large

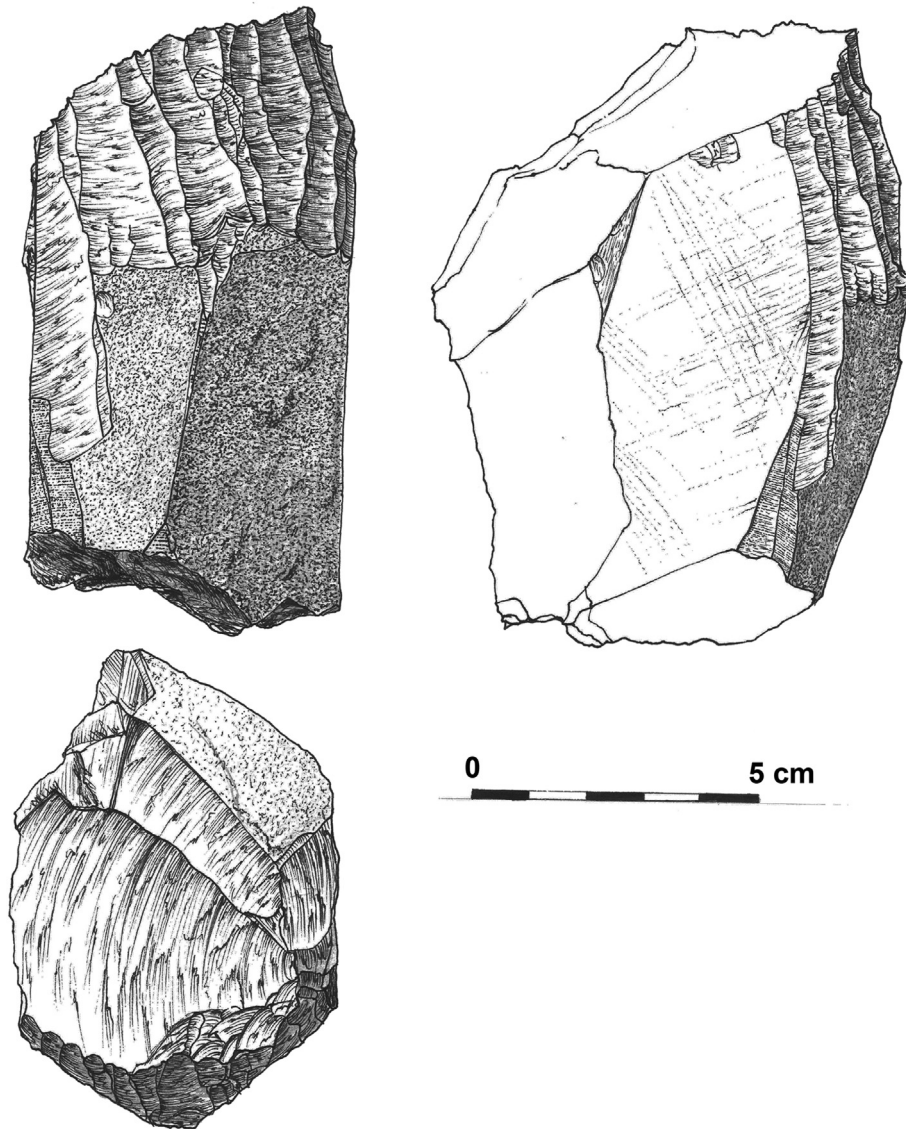


Fig. 7. Core from the Montelirio tholos. Drawing: Moisés Bellilty.

monocrystal at least 220 mm in length and 60 mm in width. Given that these single crystals are hexagonal, they would have a similar width along all their different axes.

- b. Extraction of the support. The two faces of the dagger are polished. Polishing was part of the support's preparation. The raw material is normally reduced in its bifacial elements through percussion. Given that in this case percussion reduction is impossible due to the internal structure of the crystal, polishing may have been the technique chosen to work the large support without causing any accidents or fractures, thus reaching one of the growth axes facilitating the subsequent knapping, which would have been similar to conchoidal fracture. We can deduce that reducing a hexagonal monocrystal by polishing all its six axes, each nearly 60 mm in size, must have required a considerable effort. A second option would have been to extract a rectangular support of a similar size to that of the finished object through sawing parallel to one of the faces. This is a procedure that must have been used to prepare supports for arrow heads with long lateral appendices. The technical marks show the two faces were polished from one corner to the other descending from left to right.

- c. Shaping (Façonnage): The next task was to shape the sharp edges of the blade and lateral notches that made it fit with the ivory handle. This was carried out by applying pressure bifacially. The edges have at least begun to notably reduce in size through knapping. These raised areas were subsequently polished in order to even out the edges before the dagger blade's edges were formed definitively.
- d. Final retouching: The last task was to retouch the edges by micro-denticulation and to produce the lateral notches so the handle could be attached. This task was also carried out by applying pressure from the tip towards the base, although no unique superimposition process on subsequent raised areas was found.

The morpho-technology of this rock crystal dagger blade can be seen in common lithic flint products from other regions throughout southern Iberia. They are most prevalent along Portugal's Atlantic seaboard, particularly in the Tagus estuary, where there are tombs such as the Casainhos dolmen (Leisner, 1965: plate 22), San Martinho de Sintra (Leisner, 1965: plate 32) and Folha das Barradas (Leisner, 1965: plate 35), among others. In the south-west of Spain,

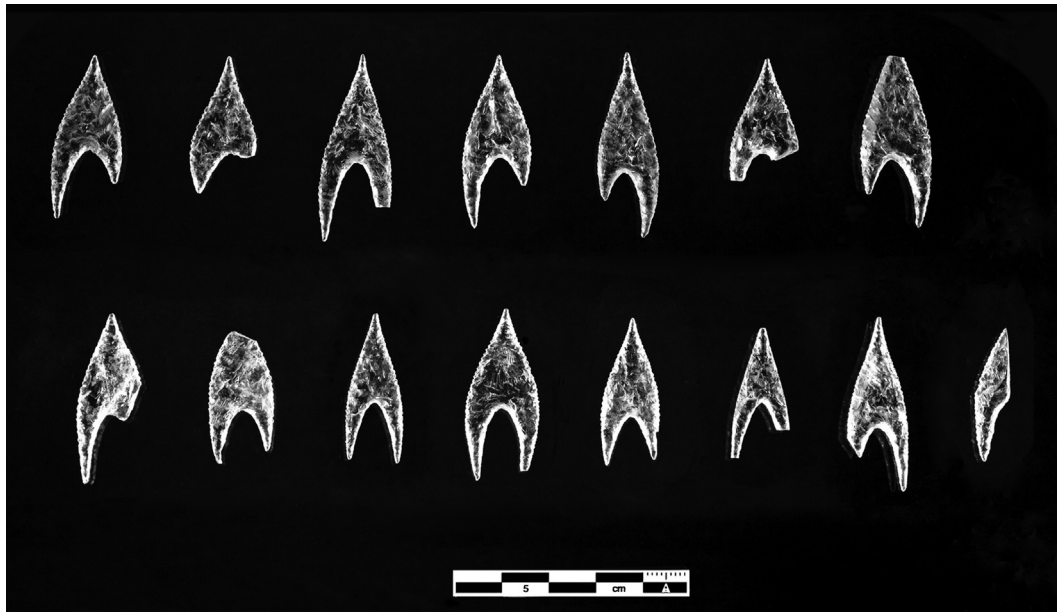


Fig. 8. Arrowheads from Ontiveros. Photograph: Miguel Ángel Blanco de la Rubia.



Fig. 9. Arrowheads from the Montelirio *tholos* (selection). Photograph: Miguel Ángel Blanco de la Rubia.

as well as in Valencina, there are similar bifacial elements, with lateral notches, in the *tholoi* of La Zarcita (Cerdán Márquez et al., 1975) and El Moro (Garrido Roiz and Orta García, 1967) in Huelva, as well as the hypogea of Torre Melgarejo (Cádiz) (González Rodríguez and Ramos Muñoz, 1990). They can also be found in the southeast of the peninsula in the necropolis in Los Millares (Almería) (Leisner and Leisner, 1943: illustration 10–11). In general, with the exception of the specimen found in La Garma (Omoño, Cantabria), a natural cave burial dating to the middle of the 3rd

millennium cal BCE (Arias Cabal et al., 1999) this is a technology only found in southern Iberia and, more specifically, in the southwestern quadrant.

4. Geochemical characterisation

Geochemical analysis through Raman has been carried out on three of the items: the core and one arrow head fragment from the Montelirio *tholos* and the dagger blade from PP4-Montelirio. Two



Fig. 10. Dagger blade from Structure 10.049 (PP4-Montelirio sector). Photograph: Miguel Ángel Blanco de la Rubia.

are indicative of larger rock macrocrystals. Given that a larger set of objects was found in the Montelirio *tholos*, the same process has been applied to a arrow head found in this tomb in order to establish whether it could match the core found in the same tomb.

All three items analysed contain some evidence of organic matter, from either bitumen or graphite (Figs. 14 and 15). This indicates that the traceable hyaline quartz these objects were made from is of hydrothermal origin. Given that this organic matter is involved in the circulation process of these quartz-rich fluids on sedimentary host rocks, the quartz must have crystallised with organic matter inside it. In this respect, it could be argued that there are slate-based materials where the mineralisation process occurred, ruling out the possibility that this hyaline quartz came from pegmatitic granitic material. Consequently, we can deduce that the source of this hyaline quartz must be restricted to an area with an abundance of hyaline quartz mineralisation from slate-based, lutaceous or greywacke-like materials. This line of thought brings to mind two very different paleo-domains. The first of these is in the Nevado-Filábride territory of the Baetic System (where there is an abundance of schists and micaschists) and the second is

in the schist-greywacke domain in the Central Iberian Zone of the Iberian Massif. In contrast, in granite batholiths of the Central Iberian Zone, for example the Nisa-Alburquerque batholith, there is another series of mineralisations in pegmatites and quartz veins, in particular wolframite–cassiterite, tin and niobium–tantalum, lithium in aluminosilicate and phosphate form, and uranium (Gallego, 1992; Gumiel et al., 2002).

Therefore, although the specific point of provenance of the rock crystal dagger, arrowhead and core cannot be precisely pinpointed at this stage, the results obtained here suggest two potential sources, both located several hundred km away from Valencia. The Central Iberian Zone of the Iberian Massif was suggested as a potential source for the large monocrystal found in the Neolithic dolmen of Alberite. On the other hand, the Baetic System is a known source of flint circulating in southern Iberia during the third millennium BCE (Afonso Marrero et al., 2011; Morgado et al., 2011), which makes it a good candidate to be the source of at least some of the rock crystal studied here.

5. Discussion

5.1. Singularity of the technological process

Lithic technology achieved a high mark in the southern Iberian Copper Age (Nocete Calvo et al., 2005; Morgado et al., 2011; Morgado and Pelegrin, 2012). Specialisation is not only reflected in the exploitation of minerals carried out by certain communities with access to the region's best outcrops of siliceous rock (Ramos Millán et al., 1997; Linares Catela et al., 1998; Morgado and Lozano, 2011), but also by the development of complex production systems involving specific knapping methods and techniques (Morgado et al., 2009). This was reinforced by the use of specific knapping tools such as copper awls (Pelegrin, 2006, 2012; Pelegrin and Morgado, 2007). Blade technology and bifacial foliaceous products (commonly called 'halberds' and 'daggers') represent the benchmark of this Copper Age advanced lithic technology that with the start on the Bronze Age would disappear almost completely.

The exploitation and knapping of rock crystal was an adaptation of this sociocultural process. Contrary to the case of flint or variscite, no prehistoric rock crystal mines have been identified in the Iberian Peninsula. As ethnographic data suggest, this raw material could have been exploited just occasionally and opportunistically by small groups or even individual specialists, without complex logistical organisation (Brandl and Trnka, 2014: 124). Craft processes for producing unique objects such as the dagger from Valencia's Structure 10.049 and the arrow heads with long lateral appendices from Ontiveros and Montelirio are part of the 'heritage' of craftsmanship in lithic work achieved by Copper Age societies. However, the motives behind making them from hyaline quartz, and not flint, must have been very specific (perhaps connected to some sort of symbolism being attributed to this material) and involved a series of specific adaptations. We must depart from the mineral structure itself in order to establish how these craftspeople worked.

Rock crystal is structured in such a way that each silicon atom is surrounded by and connected to four oxygen atoms, and each oxygen atom is connected to two silicon atoms, which creates a hexagonal grid. The mesh thus consists of groups of SiO_4 whose spatial orientation is different depending on the different planes in the crystalline structure. The oxygen silicon bond is polar and covalent, where the silicon atoms and oxygen are unable to move freely within the crystal. Therefore, the hyaline quartz crystal has a macromolecular structure, which makes it very hard. These crystal-chemical characteristics mean the crystal cannot be hit from any

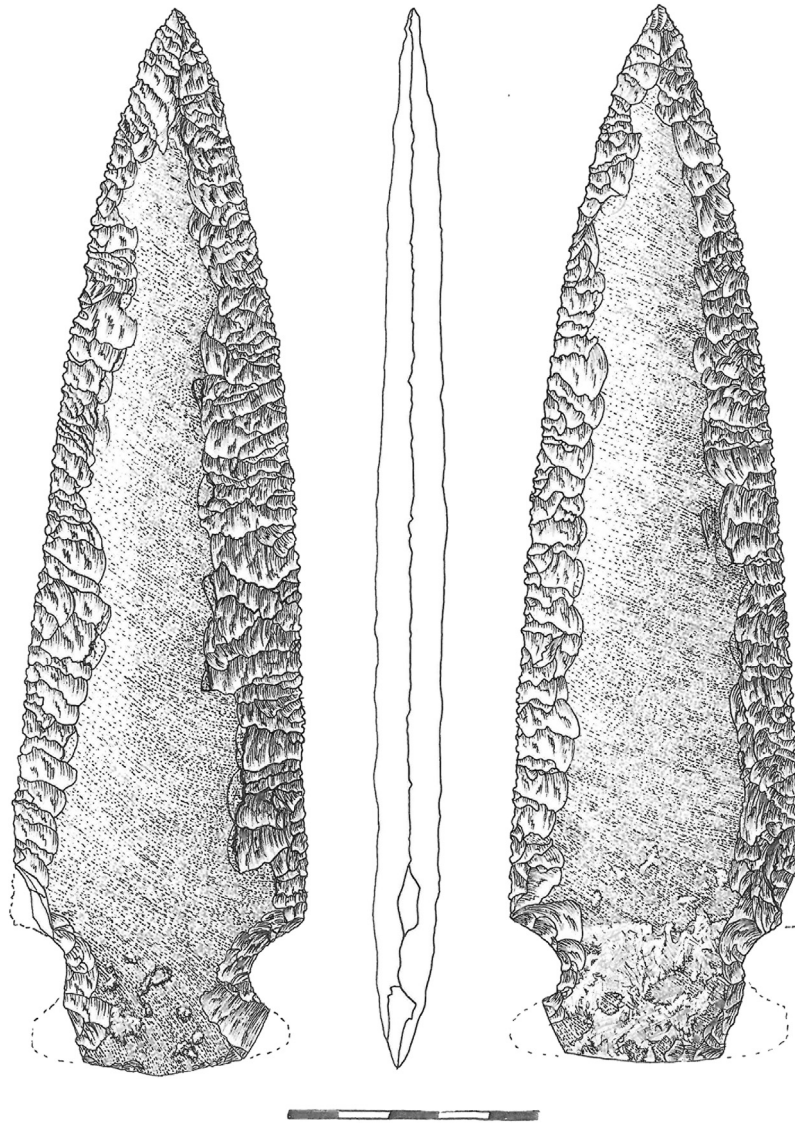


Fig. 11. Dagger blade from Structure 10.049 (PP4-Montelirio sector). Drawing: Moisés Bellilky.

crystallographic direction, since its conchoidal fracture is limited to its internal arrangement.

Consequently, rock crystal knapping has its limitations due to its crystalline structure, as experiments have shown (Crabtree, 1968: 10–11; Cotterell and Kamminga, 1982; Rami Soneira and Ramil Rego, 1997; Rodet et al., 2013; Peña and Wadley, 2014). Knapping associated with conchoidal fracture is possible parallel to the mineral's main growth axes. Pressure-extraction of flakes and small micro-blades less than 30–40 mm long should not have implied great technical challenges. These micro-blades and small cores are indicative of a separation with regionally developed Copper Age blade technology whose knapping method is rooted in Neolithic technology: a semi-enveloping extraction face with a faceted micro-blade extraction preparation procedure carried out by applying pressure (Morgado and Pelegrin, 2012).

However, producing foliaceous items involved a significant qualitative leap. There are only eight megalithic monuments in Andalusia with these arrowheads, although four of them (Ontiveros and Montelirio in Valencina together with Minguillo 1 and 4 in Villanueva de Córdoba), have nearly 90% of all the known artefacts. The typology of arrow heads is not particularly varied: they are triangular with a slightly concave base (Minguillo and El Pozuelo

dolmens), even those with somewhat developed concave bases, up to the more stylised ones with very developed lateral appendices, which are only found in Valencina.

Knapping these arrow heads with long appendices required a sufficiently long and wide rectangular support so they could be shaped through pressure retouching. The Montelirio core enables us to explain how this type of support was obtained, most probably by sawing parallel to one of the large hexagonal hyaline quartz monocrystal's faces. Sawing was used in European Late Prehistory on hard rocks without an optimal conchoidal fracture, recognised for cutting polished axes (Giot, 1952; Nougier and Robert, 1953; Cordier, 1987; Kelterborn, 1991; Croutsch, 2005; Paillet, 2005). This has also been observed in other regions in the world (Mirambell, 1968; Melgar Tísoc and Solís Ciriaco, 2013; Melgar Tísoc et al., 2013). This sawing procedure would have enabled an appropriate support to be obtained, which could be used for the subsequent pressure knapping task to shape the arrow heads with long shafts. Future experimental work will enable us to test the role of sawing in the making of these artefacts.

To date, the dagger from the PP4-Montelirio sector constitutes the greatest expression of hyaline quartz bifacial knapping known in Western Europe. It follows the typical Copper Age patterns in the

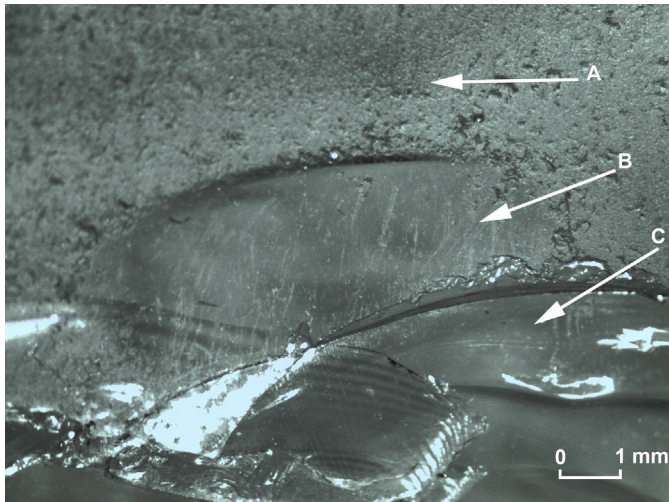


Fig. 12. Dagger blade from Structure 10.049 (PP4-Montelirio sector). Microphotograph showing A: Main polishing; B: Retouching and polishing of the reverse; C: Final retouching of the edge, without polishing.

bifacial knapping of macro-foliateous items made from siliceous rocks, though adapted to the monocrystal's structure. The raw material was a large macrocrystal of more than 200 mm in length. We cannot categorically confirm whether the support was extracted in a similar way to produce the arrowheads, i.e. through sawing. However, it is apparent that both sides were polished in one direction, descending from one corner to the other, which could be a sign of this technique. What is certain is that both sides were polished in preparation, followed by at least three stages, involving sculpture, polish and pressure sculpture of both sides. In short, at the very least various phases of work were carried out, combining different techniques which involved a considerable amount of skill

and work – complemented with the equally extraordinary skills involved in the making of the ivory handle of this dagger.

Therefore, we can confirm that the knapping of foliateous bifacial items constituted a qualitative leap in working with rock crystal. This implies that some individuals acquired a rare skill and savoir-faire that was passed down over time. This culminated in the craft specialisation of rock crystal work, with these objects bringing together the techno-economic characteristics of the concept: a rare raw material, a technical process involving an initiation and prolonged learning process and an end use beyond the practical use or the domestic context (Rosen, 1989; Roux and Pelegrin, 1989; Costin, 1991, 2001; Freidel, 1998; Pelegrin, 2007; Kerner, 2010). The dagger blade from PP4-Montelirio in Valencina de la Concepción is the best example of this and enables us to further understand the social structure of these communities and the use of such objects as valuable belongings (Osborne, 2004; Gally, 2010).

5.2. Social dimension and symbolism

As well as emphasising the high level of technical skill achieved by the lithic knappers of Copper Age southern Iberia, this study enables the social and symbolic significance of rock crystal to be evaluated. At Valencina, rock crystal is present in various types of contexts, both funerary and non-funerary. Among the funerary contexts, there are relatively simple structures, such as the three pits in the PP4-Montelirio sector (Structures 10015-21-61 and 10043), or the La Huera hypogeum, which has relatively modest grave goods in both quality and quantity. The more technically sophisticated items, however, were deposited in the larger megalithic structures: Montelirio, Structure 10-042-10.049 and Ontiveros. As such, it is reasonable to assume that although the raw material was relatively available throughout the community that inhabited or frequented Valencina in the Copper Age, only the kin groups, factions or individuals who were buried in megaliths were able to afford the added value that allowed the production of

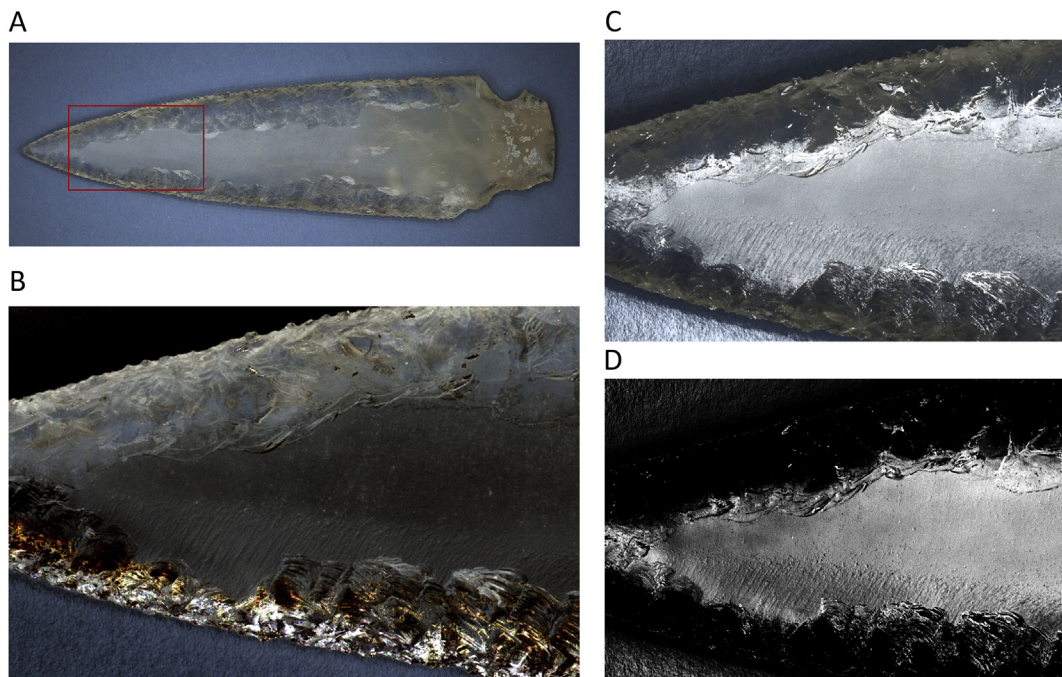


Fig. 13. Dagger blade from Structure 10.049 (PP4-Montelirio sector). RTI images of side B showing striation caused by sawing and/or polishing. A: Zoomed-in area; B: Rendering mode: Diffuse Gain (Gain 39); C: Rendering mode: Specular Enhancement (Diffuse Color: 65/Specularity: 70/Highlight Size: 75); D: Rendering mode: Specular Enhancement (Diffuse Color: 0/Specularity: 100/Highlight Size: 142). Photographs: Miriam Lucía Triviño.

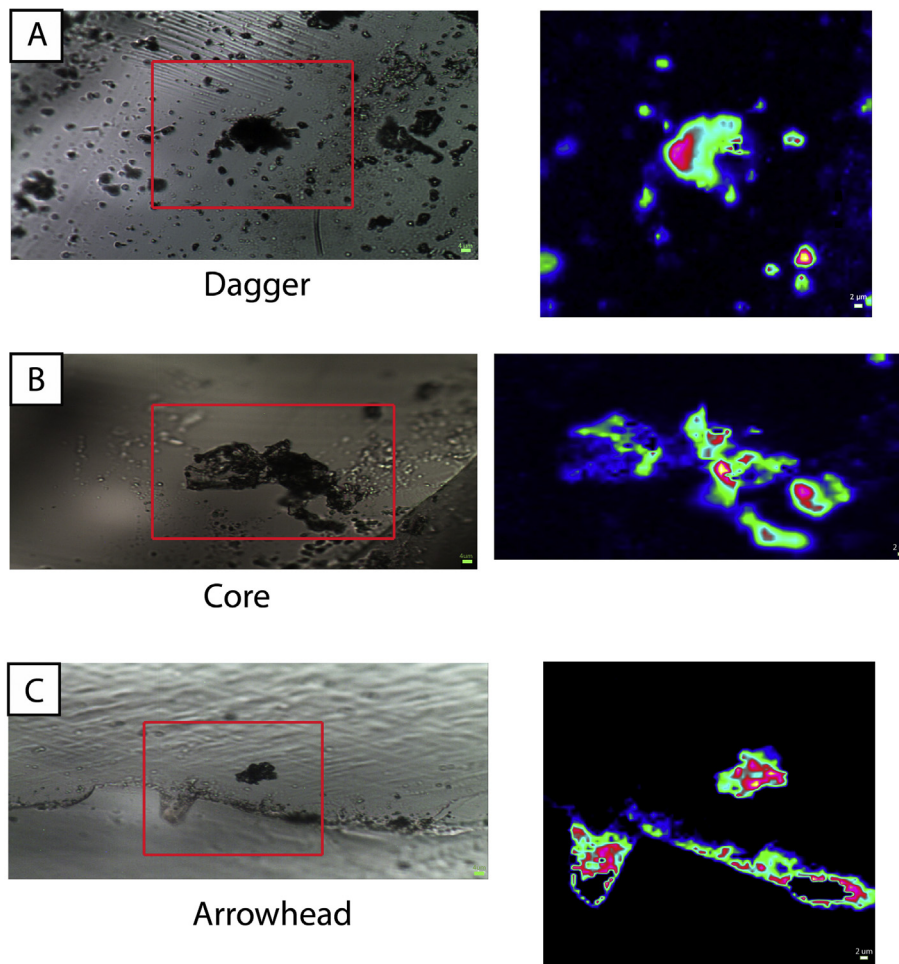


Fig. 14. Raman analysis: map.

sophisticated objects such as arrow heads or dagger blades. In this respect, however, it is important to note that, paradoxically, none of the most sophisticated artefacts studied in this paper can be ascribed to any particular individual: the rock crystal dagger from

Structure 10.042–10.049 was found in the upper level of the main chamber (10.049) in which no human bones were identified; in Montelirio, neither the core nor the arrowheads can be ascribed to any on 20 individuals found in the main chamber; lastly, in the case of Ontiveros, the only available publication offers no evidence that the 16 arrow heads were associated to any particular individual.

It seems therefore reasonable to suggest that rock crystal may have had a dual significance for the Chalcolithic society of Valencia. On the one hand, it had a social significance due to the exoticism of the material and the fact that its transformation required very specific skills and probably some degree of technical specialisation. These objects would have had a “surplus value” based on the exoticism and rarity of the raw material, the techno-economic investment of their manufacture (a know-how limited to very few people) and their use linked to the world of beliefs and funerary practices. They probably represent funerary paraphernalia only accessible to the elite of this time-period. The association of the dagger blade to a handle made of ivory, also a non-local raw material that must have been of great value, strongly suggests the high-ranking status of the people making use of such objects.

On the other hand, rock crystal must have had a symbolic significance as a raw material invested with special meanings and connotations. The literature provides examples of societies in which rock crystal and quartz as raw materials symbolise vitality, magical powers and a connection with ancestors (Eliade, 2001: 56–60; 2004: 19–20; Márquez Pecchio and Eielson, 1985). There is also a host of evidence that the raw material was used symbolically

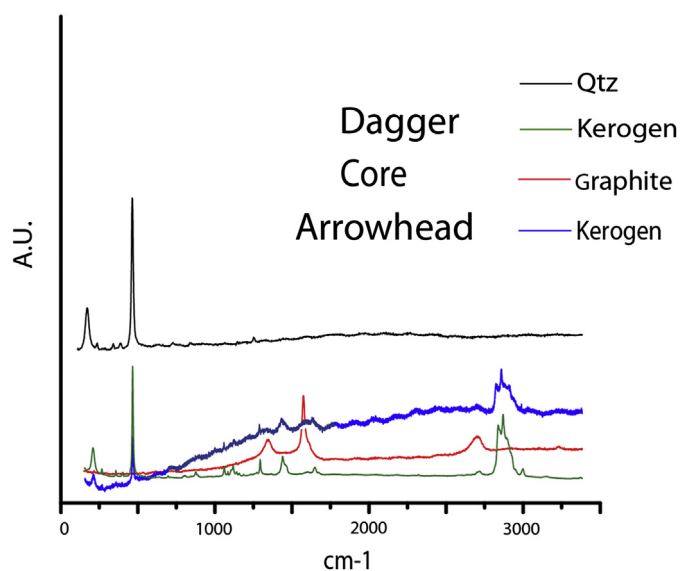


Fig. 15. Raman analysis: spectrum.

and apotropically in European Late Prehistoric literature (Cassen, 2000; Della Casa, 2005; Forteza González et al., 2008; Sachanbiński et al., 2008). In her analysis of European Neolithic religion, Marija Gimbutas linked the ritual and votive use of white quartz nodules to a symbol of death and regeneration often associated with funerary spaces (Gimbutas, 1996: 219). Quartz and rock crystal were even portrayed as rocks with great supernatural powers in European Christian tradition. In his *Lapidarium*, King Alfonso X the Wise of Castile (1276–1279 CE) emphasised its power to connect human beings with the spiritual world, as well as its ability to protect them from danger (Forteza González et al., 2008: 148). Therefore, among Copper Age people, the production of lithic arrowheads or blades from rock crystal probably transcended the mere social function attributed to otherwise common objects for daily use.

It is also equally important to mention that these exceptional rock-crystal objects further highlight the significance of Valencina as a central place receiving non-local exotic and foreign raw materials and goods. Following recent studies, Valencina stands out for being home to the largest Copper Age collections of gold (Murillo-Barroso et al., 2015b) and ivory (García Sanjuán et al., 2013) in Iberia, and also for having yielded significant collections of amber, cinnabar, high-quality knapped flint objects and copper artefacts. The presence of a significant number of scallop shells (*Pecten maximus*) used as grave goods in the PP4-Montelirio sector has recently come to light (Liesau et al., 2014). Scallops are a highly valuable species of marine mollusc and could also come under the category of exotic products. The discussion made in this article concerning rock crystal confirms Valencina's status as an exceptional location with a high concentration of exotic raw materials and rare products coming from all over Iberia and, in some cases, beyond.

Acknowledgements

We would like to thank Juan Manuel Vargas Jiménez and Ana Pajuelo Pando for the information they kindly provided regarding the excavated areas in IES, as well as García Lorca and Dinamarca streets. We also give our thanks to Ana Navarro Ortega, director of the Archaeological Museum of Seville, for enabling us to examine and photograph the pieces included in this study. This research was carried out within the research project “Study of the PP4-Montelirio Sector of Valencina de la Concepción, First Phase (2011–2014)”, approved by the Andalusian Regional Government.

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