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Sala de las Chimeneas, Maltravieso cave (Cáceres, Spain)**

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## Colgantes en conchas marinas del Paleolítico superior de la Sala de las Chimeneas, Cueva de Maltravieso (Cáceres, Spain)

**KEY WORDS:** Upper Paleolithic, Personal ornaments, *Littorina obtusata*, *Patella vulgata*, mobility pattern, Tagus River.

**PALABRAS CLAVE:** Paleolítico superior, Elementos ornamentales, *Littorina obtusata*, *Patella vulgata*, patrones de movilidad, río Tajo.

**GAKO-HITZAK:** Goi Paleolitoa, Elementu apaingarriak, *Littorina obtusata*, *Patella vulgata*, higikortasun-patroiak, Tajo ibaia.

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### ABSTRACT

This work presents the findings from a taxonomic, technological and use-wear study conducted on two anthropogenic, perforated seashells that were recovered from the Sala de las Chimeneas, inside the Maltravieso cave site, Cáceres (Spain). Through morphometrical and use-wear analysis, the authors have characterized perforation techniques and the use of shells as decorative pendants. The selection of the represented species (*Littorina obtusata* and *Patella vulgata*) for the manufacture of ornamental elements is frequent in Palaeolithic contexts. These species are less frequent in Epipalaeolithic contexts and testimonial in producing economies, above all in the case of *L. obtusata*. Contextualisation of these archaeological remains within the framework of the western European Upper Paleolithic ornamental sets has allowed the identification of parallels between the specimens of Sala de las Chimeneas and some of late Pleistocene deposits located in the Portuguese stretch of the Tagus River. The ornamental pieces presented in this study suggest that, at the end of the Pleistocene, the Tagus basin heavily influenced the landscape conception and mobility patterns of groups of hunter-gatherers, affecting their level of interaction with the Atlantic coast and with hunter-gather groups located in the western reaches of the Iberian Peninsula.

### RESUMEN

Se presenta el estudio taxonómico, tecnológico y traceológico de dos ejemplares de conchas marinas perforadas antrópicamente procedentes de la Sala de las Chimeneas de la cueva de Maltravieso, Cáceres, España. A través del estudio morfométrico y traceológico se han caracterizado las técnicas de perforación y el uso de las conchas como elementos de adorno-colgantes. La selección de las especies representadas (*Littorina obtusata* y *Patella vulgata*) para la realización de elementos ornamentales es frecuente en contextos paleolíticos, escasa en contextos epipaleolíticos y testimonial en contextos de economías productoras, sobre todo en el caso de *L. obtusata*. La contextualización de estas evidencias arqueológicas en el marco de los conjuntos ornamentales del Paleolítico superior del Oeste europeo ha permitido advertir paralelos entre los ejemplares de la Sala de las Chimeneas y algunos yacimientos del Paleolítico superior situados en el tramo portugués del río Tajo. Los restos ornamentales que se presentan en este trabajo indican que la cuenca de dicho río debió condicionar de forma importante la concepción del territorio y los patrones de movilidad de los grupos cazadores-recolectores del final de Pleistoceno, así como sus relaciones con la costa atlántica y con otros grupos de cazadores-recolectores costeros del oeste de la Península Ibérica.

### LABURPENA

Antropikoki zulatutako itsas maskorren bi aleren azterketa taxonomikoa, teknologikoa eta trazeologikoa aurkezten da, Maltravieso (Cáceres, Espainia) haitzuloko Sala de las Chimeneas izenekotik ateratakoak. Azterketa morfometrikoaren eta trazeologikoaren bidez, zulatze-teknikak nolakoak ziren eta maskorrak apaingarri-zintzilikari gisa erabiltzen zirela ondorioztatzen da. Apaingarriak egiteko erabiltzen zituzten espezieen aukeraketa (*Littorina obtusata* eta *Patella vulgata*) sarritan agertzen da Paleolitoaren testuinguruan, gutxitan Epipaleolitoan eta oso-oso gutxitan ekoizpen-ekonomiatan; batik bat, *L. obtusata*. Ebidentzia arkeologikoak Europa mendebaldeko Goi Paleolitoko apaingarrien artean kokatuta, paralelismoak aurkitu dira Sala de las Chimeneas izenekoan aurkitutako aleen eta Tajo ibaiaren Portugalgo zatiko Goi Paleolitoko aztarnategien artean. Lan honetan aurkezten diren apaingarrien hondakinek adierazten dute ibaiaren arroak lurraldearen ikuskeran eta ehiztari-biltzaileen taldeen higikortasun-patroietan eragin garrantzitsua zuela, bai eta Atlantikoko itsasertzarekiko eta Iberiar penintsulako mendebaldeko ehiztari-biltzaileen beste talde batzuekiko harremanetan ere.

## 1. INTRODUCTION

The use of shells as personal ornaments is generalized in the Upper Palaeolithic, for hence it has been recog-

nized as one of the earliest manifestations of symbolism than can be related to modern human behaviour (Kuhn *et al.* 2001, d'Errico *et al.* 2003). Three principal causes have been established to justify the presence of the

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shells in archaeological contexts: natural intrusions, food or raw material. The microwear study of the perforation, identified in some shells, allowed the identification of two types of objects: man made manipulated and natural origin (d'Errico *et al.* 2003, Stiner 2003).

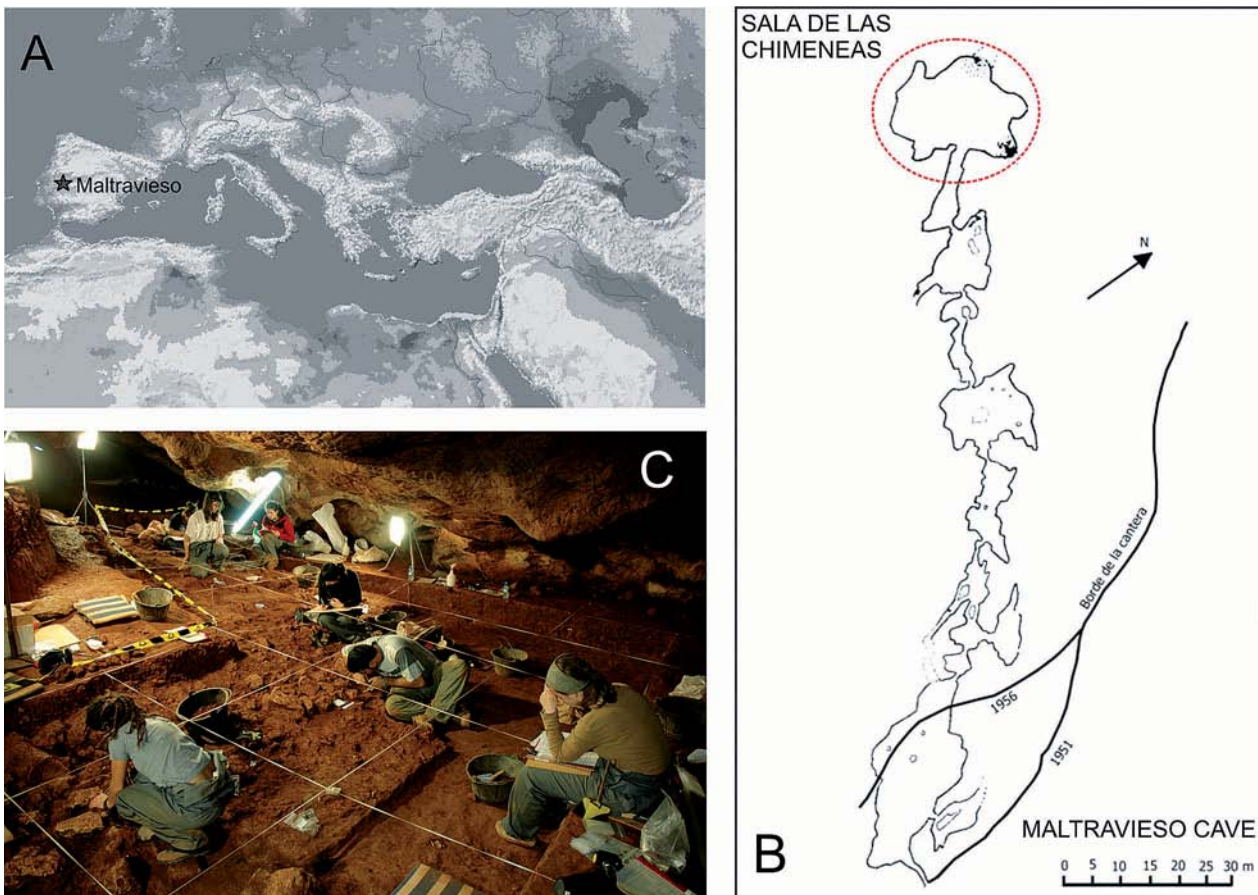
However the origin of the shells cannot only provide information about mobility patterns and exchanges between groups also it can lead to palaeocological, chronological and behavioural patterns (Sacchi 1986, Tabourin 1993, Álvarez-Fernández 2001, Vanhaeren *et al.* 2004, Vanhaeren and d'Errico 2006, Álvarez-Fernández 2008).

The scarcity of Upper Palaeolithic sites in the Iberian plateau led some researchers to pose the depopulation hypothesis during the Last Glacial Maximum (Ripoll and Municio 1999, Corchón 2002). However, this picture has recently changed due to exhaustive works of some researchers that support the revised hypothesis highlighting preservation problems, archaeological survey and absence of karstic systems as major shortcomings, ruling out, therefore the depopulation hypothesis (see: Delibes and Díez 2006).

The same prospective was shared by some researches for the Extremadura case (Barrientos *et al.* 1985, Cerrillo 1996, Enríquez 1995, Enríquez 1997, Enríquez & Mordillo 1982;), this all despite the knowledge since 1956 of a rich sample of Rock-Art in Maltravieso cave (Callejo 1958). Recently, the discovery of other sites of Palaeolithic Rock-Art (Collado 2004) indicates that Maltravieso is not an isolated case.

## 2. THE MALTRAVIESO CAVE

The Maltravieso cave site is located in the surroundings of the city of Cáceres (Extremadura, Spain) (Fig 1A), inside the karst of Palaeozoic limestone called "*Calerizo Cacerense*". Since 2001 Maltravieso cave has been studied by a multidisciplinary group, "Primeros Pobladores de Extremadura /IPHES-URV". The results which are emerging from current research are summarized in the vast sedimentary complexity of the cavity and its protracted use by part of the hominid groups from at least 183 ky BP until the Bronze Age (Barrero *et al.* 2005).



**Figure 1.** 1a) Map with the location of the Maltravieso Cave 1b) Circuit of the Maltravieso cave with the location of the Sala de las Chimeneas. 1c) Open-area excavation of the Sala de las Chimeneas.

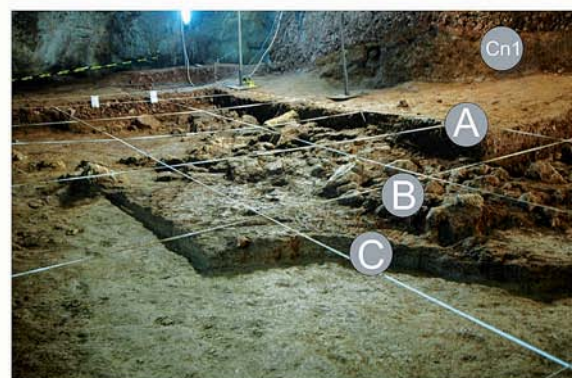
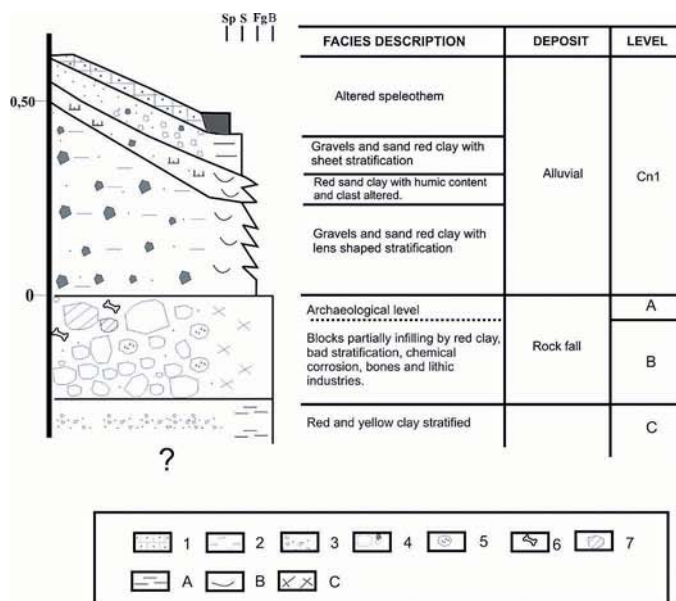
The cavity consists of a series of intercommunicated rooms through corridors. At the moment, archaeological excavations are carried out in two of them: Sala de los Huesos (where an archaeo-paleontological record has been unearthed belonging to the second half of the middle Pleistocene) and the Sala de las Chimeneas. The latter is located at the bottom of the cavity (Fig 1B). Its name comes from the karst formations present in the ceiling of the cavity in the form of chimneys (ceiling tubes). The walls of the room contain a rich set of Palaeolithic Rock-Art in the form of hands in negative and engraving (Callejo 1958, Ripoll *et al.* 1999). During the archaeological seasons of 2005-2006 the research group began the open-area excavation of the room, with an area of 36 m<sup>2</sup> (Fig 1C) unearthing stone tools and faunal remains. The archaeological work at the Sala de las Chimeneas has revealed a stratigraphic sequence consisting of 4 levels (Fig. 2), the characterization of this sequence is based on the sections of the central alluvial cone (CN1) and the formations documented during the archaeological excavation, due to the impossibility of a stratigraphic pit test. The CN1 corresponds to the top of the cone, formed by fallen material from the ceiling tube at this point of the room; archaeological remains have not been documented in this level. The archaeological level (Level A) corresponds to the first phase of fine material input, a matrix of clay with slight organization. Underneath this layer there is the Level B. This is a gravitation rock fall, situated on top of Level C, laminated clay that does not

seem to be related to the material from the ceiling tube whose thickness is unknown. Level A covers, in the form of a mantle, level B. Most of the archaeological remains were made available at the base level and between the blocks.

The archaeological record is composed by a stone tool set of 74 objects made primarily in quartz and to a lesser extent on quartzite and chert. It is important to highlight the lack of chert in the area, the nearest source is 100 Km away (Peña *et al.* in press.). The faunal remains are well represented as well as preserved, number of remains superior to four thousand NR. In this sample the most represented taxon is rabbit showing anthropic alterations in form of cutmarks (Rodríguez-Hidalgo 2008). During the excavation there have been located, among this archaeological record, the two shells that form the purpose of this study. The dating of the archaeological level through radio/geological and chronological techniques is ongoing.

**3. TAXONOMICAL AND TRACEOLOGICAL ANALYSIS**

Classical Linnaean classification using different atlas of malacology including (e.g. Poppe and Goto 1991) and the comparison with the specimens of the reference collection held at Palaeontology Department of the University of Barcelona have been applied for the taxonomical determination of the specimens.



**Figure 2.** 2a) Sedimentology and stratigraphy of Sala de las Chimeneas Sedimentology of Sala de las Chimeneas (Mancha, personal comunicacion). Word abbreviated: Sp, Speleothem; S, Sand; Fg, Fine gravels; B, Blocks. Lithology: 1, Altered speleothem; 2, Humic content; 3, Sand and clay; 4, blocks of limestone and gravels (lithic clast); 5, quartz; 6, archaeological material; 7, chemical corrosion. Sedimentary structure and limits, A: Laminated; B: Lens shaped; C: Massive 2b) Main stratigraphic levels.



The represented taxa correspond to two marine molluscs of the species of *L. obtusata* and *P. vulgata* (Fig. 3) only present in the European Atlantic coast, being more abundant within this area in northern latitudes. The two specimens have perforations in their surface.

The identification of the perforation on the surface of the two specimens led the research team to carry out a microscopic analysis to classify the origin as either natural or anthropogenic. The study of the characterization of the perforations was based on the criteria developed by researchers as d'Errico (1993), Papi (1989) and Tabourin (1993); a binocular microscope (Optech

LS) and ESEM (EIF quanta 600) were used for the observation of the material.

#### *Littorina obtusata*.

The perforation is characterized by an irregular contour with an oval shape (3.58mm length and 2.88mm width) located on the dorsal upper view (6.55mm from the outer lip. Fig. 4A), the hole section is irregular. A group of tenuous parallel striae on the edges of the perforation (Fig 4C) have been identified, at the same time the external surface (Fig 4B) of the shell presents a generalized polishing, however the abrasion has been only recorded on the outline of the perforation (Figs. 4D and 4E).



Figure 3. Shells, object of study. Left side: *Littorina obtusata*, right side: *Patella vulgata*.

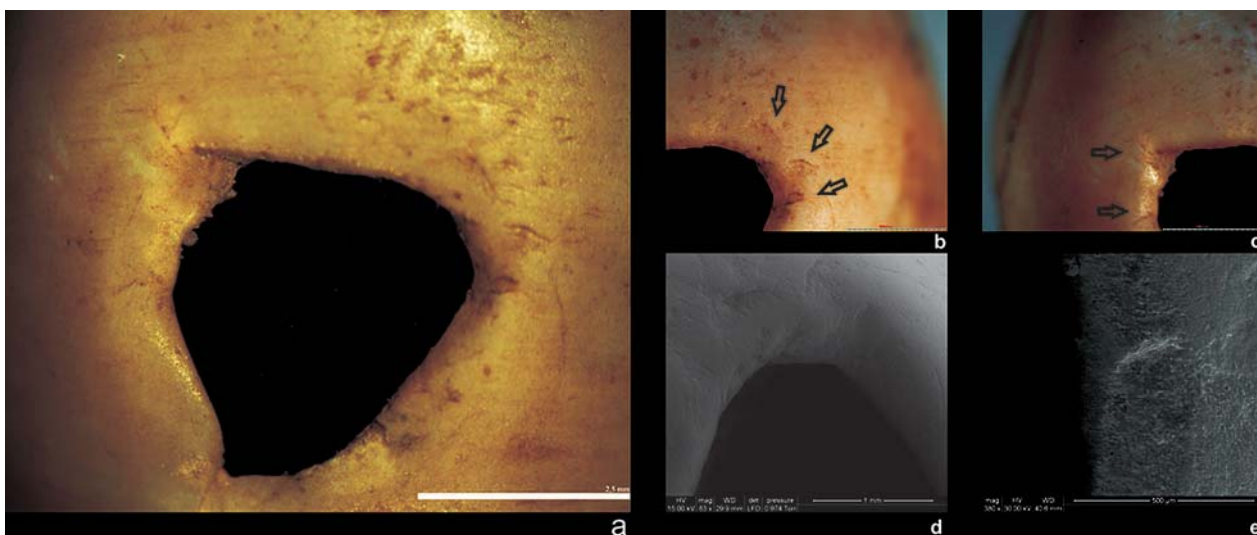


Figure 4. 4a) Perforation in *L. obtusata*. 4b) conchoidal scars. 4c) parallel striae. 4d) polishing in the outline of the perforation. 4e) detail of the abrasion in the outline of the hole.

*Patella vulgata*

A central perforation has been identified in this specimen with a circular outline slightly diverted from the top of the apex (6.68mm length x 5.97 mm width), presenting also a partial desquamation around the contour, the section is as well irregular.

The contour of the perforation presents a mild polished surface, being more intense on one side of it (Fig 5A and 5B). The outermost lip of the shell

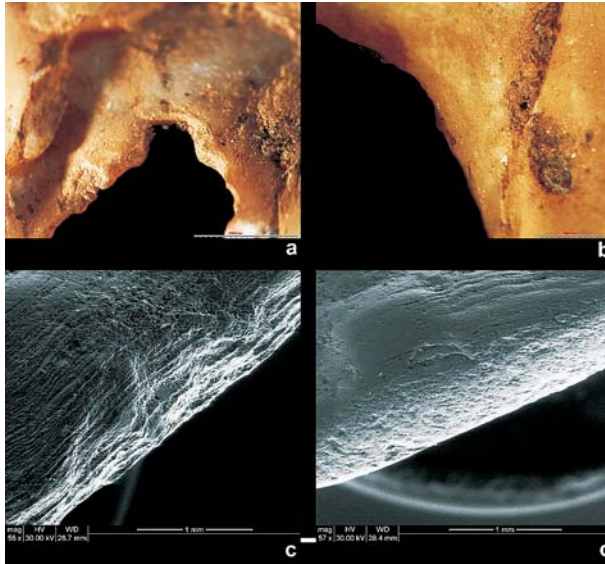


Figure 5. 5a and b) Detail of the perforated zone in *P. vulgata* with a more aggressive abrasion. 5c) Outside contour of the *P. vulgata*, non polished control-zone. 5e) Outside polished contour in *P. vulgata*.

presents a partial fracture, showing both polishing and abrasion on the edge; therefore, the identified outline characteristics of the perforation are similar to those recorded for the *L. obtusata* (Fig 4c and 4d). The observed characteristics allow us to rule out a possible natural origin for the perforations, reinforcing the anthropogenic fracturing hypothesis. Once established the origin of the perforation the following step was to identify the perforation technique carried out and the utility of the shells as hanging elements.

According to d'Errico (1993) the perforation techniques can be identified through the observation of three traits: contour of the hole, morphology and microscopic damage; based on the results of the study eight types of perforation techniques were established by the researcher (Table 1). Recently a study was carried out by this research team on Littorinacea sample (Rodriguez-Hidalgo *et al.* forthcoming) stated those techniques presented by d'Errico (1993), and a new one was identified. This new technique named Inside-Out Bipolar Percussion has proved to be the most effective for the perforation of small spiral-shelled molluscs. The Inside Out Bipolar Percussion develops as follows:

a.) A bone or horn perforator, supported on a flat surface, is introduced through the aperture of the shell; b.) a small pebble is used to hit the surface of the shell at the opposite point of the active part of the punch; c.) This position leads to an inter-

		Action origin				Outline			Morphology							Microscopical criteria									
		Bivalvia		Gastropoda		Circular	Elongated	Irregular	Cylindrical	Cylindrical convex	Conic convex	Conic straight	Conic concave	Biconic concave	Linear	Irregular	Attack surface			Opposite surface					
		External side	Internal side	External side	Internal side												Impact point	Impact striae	Tool striae	Desquamation	Crack	Man-made abrasion	Natural abrasion	Conchoidal scars	Crack
Natural Action	Predator	X	X		X			X	X	X															
	Natural fracture	X	X		X	X							X		X		X	X		X	X	X	X	X	X
Anthropogenic Action	Punctate direct percussion	X	X		X	X									X	X		X	X			X	X		
	Diffused direct percussion	X	X		X	X									X	X	X	X	X			X	X		
	Indirect percussion	X	X		X	X		X							X	X		X	X			X	X		
	Pressure	X	X		X	X		X							X			X	X			X	X		
	Sawed	X	X				X					X						X					X	X	
	Rotate perforation	X	X	X		X				X	X						X	X				X			
	Abrasion	X	X		X	X								X							X		X		
	Scraped	X	X			X				X					X			X				X			
	Inside-Out Bipolar Percussion			X	X			X							X		X	X							

Table 1. Features for the determination of the origin and perforation technique on shells. The X show d'Errico observations (1993). In black, features present in archaeological *L. obtusata*; in grey, features presents in archaeological *P. vulgata*. The last row present the damage produced by Inside-Out Bipolar Percussion according to own experimental criteria. Table modified from d'Errico (1993).

nal and external pressure (bipolar) on a specific point of the shell. The result is a perforation with irregular contour, with presence of desquamation and conchoidal scars on the outside of the element. The diagnostic elements of this perforation technique are presented in Table 1. The coincidence of characteristics between the experimental results and the archaeological element lead to consider that the above mentioned technique was probably used to perforate the specimen *L. obtusata*.

The identified marks on the elements of *Patella vulgata* indicate an inside-out perforation, due to the presence of scars on the external surface of the shell; the resulting hole is characterized by a highly irregular circular section, due to the recognition of those traits, experimentation and application of d'Errico (1993) criteria the perforation technique has been identified as indirect percussion or pressure (Table 1). Damage has been noticed on the edge of the outer fracture; however the process that could cause such impact on the shell has been unidentified. A conclusive aspect can be posed in relation to the parallels observed for the polished surface that reinforce the anthropogenic origin of the alterations.

Two characteristics can be recognised from the previous assessment: macroscopic analysis of the two perforation outlines reveals the use of the shells as hanging elements, and the general polish on the outline and specific located abrasion present in the perforations could indicate a preferential friction zone.

#### 4. DISCUSSION

The studies of perforated shells proceeding from western European sites indicate the importance in the selection of *L. obtusata* as raw material for the confection of ornamental objects. However, within the different Upper Palaeolithic periods their presence varies significantly. During the Gravetian and the Solutrean a fifth part of the documented shells belong to the *L. obtusata* species, being less represented during the Aurignacian and Magdalenian period (Vanhaeren & d'Errico 2002).

The compilation and revision of the malacology studies carried out in different archaeological sites in the Iberian Peninsula show special leading role of *L. obtusata* during the Upper Palaeolithic (Moreno 1995, Vanhaeren *et al.* 2004, Álvarez-Fernández 2006, Vanhaeren and d'Errico 2006).

Moreno's studies (1995), focused on peninsular sites, show the lack of these gastropods in post-

Palaeolithic chronologies. The presence of *P. vulgata* is chronologically more extensive, although it is rarely found perforated (Vanhaeren and d'Errico 2002). In the Cantabrian region and the Ebro valley, emphasizes the use of *L. obtusata* as beads during the Upper Palaeolithic. During the Epipalaeolithic and Mesolithic its presence is scarce, to the detriment of *Trivia* sp. Regarding *Patella vulgata*, its presence during the Magdalenian and the Azilian in Cantabrians sites is alimentary related due to the location of the sites near to the coast, examples are La Garma A and Asturian shell-middens (Álvarez-Fernández 2005).

Central Portugal sites must be taken into account for malacofauna studies not only because their geographical proximity to Extremadura also because the documented presence of the species *L. obtusata* within the shell collections for the realization of hanging elements. In these collections it can be observed that *L. obtusata* is the mollusc most used for the realization of the hanging elements. At the Grota do Caldeirão it has been documented in Early Upper Palaeolithic, Solutrean and Magdalenian layers (Zilhão 1997; Capellez 2003). In this sample *P. vulgata* is also present, although the specimens are not perforated (Chauviere 2002).

In the site of Lagar Velho, *L. obtusata* occurs in the terminal-Gravetian burial layer and in the occupation layers on terminal- Gravetian and medium-Solutrean (Vanhaeren and d'Errico 2002). The presence of shells on the aforementioned sites has been interpreted as grave goods included in burial contexts (Chauviere 2002; Vanhaeren & d'Errico 2002). Other Portuguese sites that present *L. obtusata* in their layers of medium-Solutrean are Lapa do Anecrial, with non-perforated specimens, Lapa do Suão, whose items have perforations and Vale Boi site at south western Portugal (Bicho *et al.* 2003).

Broadening the geographical scope, the association of *P. vulgata* and *L. obtusata* as hanging elements is also document in the Gravetian levels of Gargas (Foucher 2006) and Aurignacian level of Rothschild (France). In the Peninsula, as has been mentioned previously, *P. vulgata* is present in Solutrean levels of the Grota do Caldeirão site. Together with this case, the presence of both species has been documented in Upper Palaeolithic and Epipalaeolithic levels of Balmori, Cueto de la Mina, Abittaga, Santimamiñe, Riera, Rascaño, Piélagos, Peña del Perro, Pendo, Lumentxa and La Garma (Moreno 1995, Vanhaeren & d'Errico 2002, Álvarez-Fernández 2006).



The choice of certain species for the realization of personal ornaments could be conditioned by the availability of the material, therefore the biogeography is an important element to take into account (Stiner 2003). However, other authors suggest that ethnic and cultural preferences are those that determine this choice (Vanhaeren & d'Errico 2006).

The case of the Sala de las Chimeneas fits the Atlantic context of the Iberian Peninsula. The presence of ornaments made out of *L. obtusata* shells in this area can be determined by two aforementioned factors: biogeography and cultural preferences, however a conclusive hypothesis cannot be posed for the studied specimens recovered from Sala de las Chimeneas at the moment.

Despite the small number of recovered beads a possible cultural homogeneity can be suggested between the middle basin of Tagus River (for which Maltravieso represents the only site of the Upper Palaeolithic) and Portuguese Atlantic coast with a major density of sites. The presence of exotic raw material as seashells and chert at Sala de

las Chimeneas suggest long distance interaction during this chronology. As has been documented by Bicho (Bicho 1997, Bicho *et al.* 2003) long distance human interaction existed during Upper Palaeolithic period either via Atlantic coast or inland-coastal routes, sometimes forming networks over 1000 kilometres. The presence of exotic raw material in the Sala de las Chimeneas could indicate the existence of these networks from the Atlantic coast and inland, possibly through the river valley routes (Fig 6).

## 5. CONCLUSIONS

Although the sedimentary and archaeological context of Sala de las Chimeneas where the shells were recovered is not yet determined, the presence of Upper Paleolithic materials, as chert for the production of blades, reinforce the posed hypothesis for the archaeological context. Chert presence indicate a catchment of raw materials at a long distance (Peña *et al.* in press.) as the source areas of this raw material are over a hundred kilometres away from the Maltravieso cave.



Figure 6. Orientation map of the Maltravieso cave and other sites, of the Portuguese Upper Palaeolithic included in the basin of the river Tagus.



This characteristic indicates a high degree of mobility for these groups, as well as the possibility of exchanges between them. Along with these archaeological remains, the rich set of Rock-Art present in the Maltravieso cave is the main evidence of human transit inside the cavity during the Upper Palaeolithic.

The two specimens correspond to Atlantic seashells; one is the *L. obtusata* and the other *P. vulgata*. The anthropogenic contribution to the site of these two elements is indisputable. The technological study reports the man-made nature of the perforations. The microwear suggests their use as ornamental elements.

The Maltravieso cave, included in the Basin of Tagus River, is about 300 km. from the Atlantic coast, following the course of the river to its present outlet. The orohydrography in which the site is included was probably a determining factor for communication and mobility patterns during Upper Palaeolithic period. This fact is supported by the existence of a series of Portuguese Upper Palaeolithic sites, whose archaeological contexts show parallelisms with Sala de las Chimeneas. The intense settlement of the Atlantic and the Mediterranean coasts of the Iberian Peninsula during the Upper Palaeolithic contrasts with the lack of recorded sites located in the interior during the same chronological period.

The case of Maltravieso cave can be used as a reference site to establish the mobility patterns among human groups during the Upper Palaeolithic. In this regard, the available archaeological record suggests the probability of using the valleys of main rivers as transit routes from the coast to the peninsular inland. The high mobility of these groups as well as the extensive network could be identified as seasonal movements or as communication channel between the groups. The presence of the materials can also provide valuable information for designing the territory where these groups developed their activities, as well as, establish a possible relationship between sites or neighbours in the Upper Palaeolithic, in Portuguese Tagus and the interior of the Peninsula.

At present, the archaeological work at Maltravieso Cave site is at a technical stop. The continuation of this is essential, since we must take into account that Maltravieso is the only case available throughout Extremadura for the knowledge of Upper Palaeolithic hunter-gatherers groups.

## 6. ACKNOWLEDGEMENTS

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## 7. ADDENDA

During the publication of this document, we have obtained the radiometric dating of two charcoal fragments from the archaeological level with an age of 17,840 BP and 17,930 (AMS), resulting in the first dating for this period at regional level.

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