
On the shore of Mediterranean sea. The end of the palaeolithic on the coast of Málaga (South of Spain)

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ABSTRACT

The coast of Málaga constitutes a key territory for documenting the end of Palaeolithic times in the westernmost corner of the European continent. We present an overview of the economic, cultural and symbolic models documented in settlements from this region. Along with it, some of the main questions that will help to frame the research in this area are set out. Lastly, the use of the coastal fringe is discussed from the standpoint of mobility and economic strategies from southern Iberia, taking into account the hinterland and Guadalquivir basin territories.

1. Introduction

The coast of Málaga (Fig. 1) constitutes one of the key geographical areas for the study of the end of the Upper Palaeolithic and the beginning of the Holocene in the south of Iberia. Among other reasons, we could expose:

- a) This area had particular palaeoenvironmental conditions during the end of the last glaciation, which allowed the establishment of an ecosystem without current analogues (vid. Cortés-Sánchez et al., 2008).
- b) A connection with cultural change processes (technological, economic or symbolic) that spread through technocultural, socio-economic and symbolic networks at the end of the upper Pleistocene in western Europe, in general, and in the Iberian Mediterranean in particular.
- c) One of the first areas in southern Iberia in which Neolithic innovations were incorporated (Cortés-Sánchez et al., 2012).

A historiographic enquiry in the southern end of the Iberian Peninsula shows that the research has focused principally on

documented sites in coastal areas, while the inland areas barely had records (vid. Cortés-Sánchez et al., 2013 with references). As a result, the coastal area has determined the knowledge of the human population in a chronological range c. 15,000 and 7,000 cal BP in southern Iberia. However, these sites only represent one of the poles of the human population articulation in this geographical area. In this sense, in recent years, the works carried out in locations attributable to the Magdalenian-Epipaleolithic horizon begin to show a similar outlook expressed in other northern regions of western Europe.

2. Coastal archaeological sites

The coast of Málaga has several mountain ranges that reach close to the coast. On its hillsides, the contact areas with the coast are areas in which diverse karst systems have been developed and deposited numerous archaeological fills (Fig. 1). This fact has attracted the attention of numerous researchers since the late 19th century, so that more than twenty sites with hunter-gatherers' archaeological remains are known today. This concentration of sites forms one of the areas with the highest number of archaeological records in southern Iberia inserted between the end of the Pleistocene and the beginning of the Holocene.

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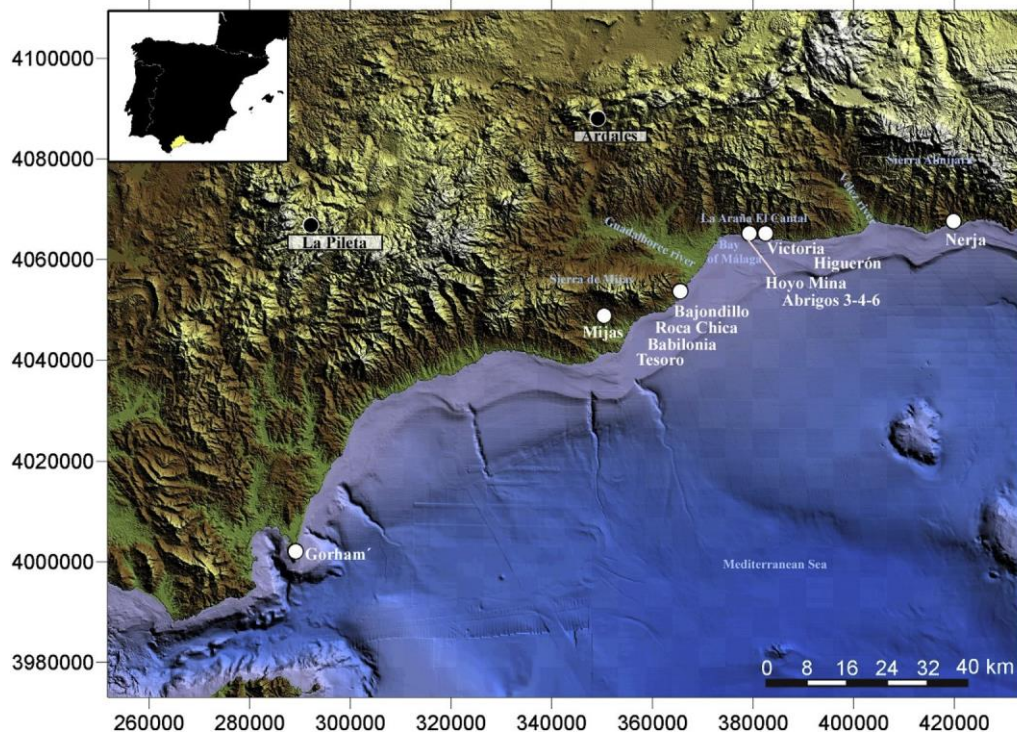


Fig. 1. Coast of Málaga. Archaeological sites mentioned in the text.

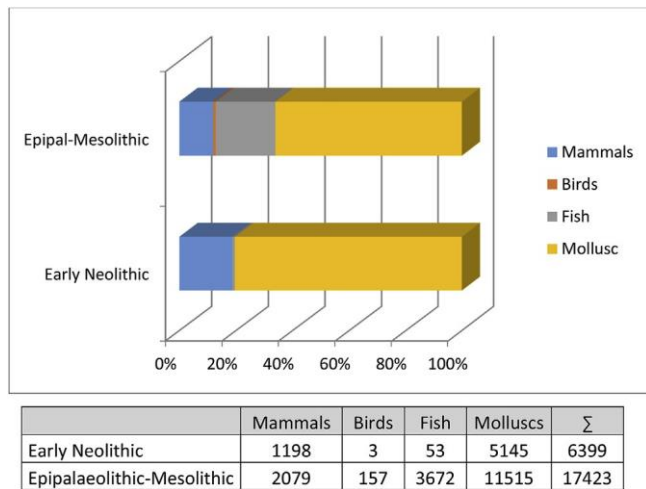


Fig. 2. Nerja cave. Tardiglacial-early holocene. Fauna.

The recurrence in the use of these sites on the coast of Málaga has constituted an area with great stability in the frequencies of the settlements and a big similarity in the dynamics of the economic systems, linked to technocultural networks along the Iberian Mediterranean. This behaviour and a high deposition rate, in these sedimentary fillings of karst cavities near the coast, have determined the existence of thick

archaeological deposits with an age predominantly ascribed to the end of the Late Glacial and the beginning of the Holocene. These processes are perceived in the karst massifs of the region (Mountain ranges of Mijas-Torremolinos, Karst Complex of La Araña and Nerja Cave): Nerja, Hoyo de la Mina, Abrigo/6 of Complejo del Humo, Victoria Cave, Higuierón Cave, Babilonia, Tesoro, Bajondillo and Roca Chica (Fig. 1).

Bajondillo Cave, located in the travertines of Torremolinos, has an archaeological sequence that begins in the middle Pleistocene and reaches the Holocene (Cortés-Sánchez et al., 2011, 2019). Recently, the most recent section datings have been increased, which have allowed to assign the chronocultural distribution of the sequence Bj/6-Bj/2 between the Late Glacial and the first stages of the Holocene (Table 1).

Bajondillo increases the archaeological sites with evidence of a systematic use of coastal resources. Thus, the samplings carried out during the campaigns in 2000 and 2002 show the gathering of various marine molluscs species in an environment that alternated rocky and sandy areas (Table 2).

In the same area of the travertines of Torremolinos (Fig. 1) there are other locations in cavities attributable to the end of Upper Palaeolithic, but worse documented (e.g. Roca Chica, Tapada, Babilonia or Pellejera documented in surface surveys) (Cortés-Sánchez, in preparation), that confirm the importance of this area for the last hunter-gatherers that dwelled the region.

At the eastern end of the bay of Málaga (Fig. 1) we find each groups of sites in two karst massifs separated by the Totalán, a seasonal river. On the western side, we find the karst massif of La Araña, in which

Table 1

Bajondillo Cave. Dates from levels Bj/2-Bj/5.1) The ages have been calibrated by IntCal13 (Reimer et al., 2013) in Calib 7.0.4 (Stuiver and Reimer, 1993), 1) this paper, 2) Cortés-Sánchez (2007).

Layer	Sample	Laboratory	Years BP	d13C0/00	pM	2σ Cal BP(1)	Note
Bj/2	Cereal	Beta-2841145	6070 ± 40	-21.3	-	7151-6793	1
Bj/3	Charcoal	Ua-18269	7475 ± 80	-24.4	-	8423-8060	2
Bj/4	Charcoal	Ua-21999	7325 ± 65	-24.8	-	8312-8008	2
Bj/5	Pulmonate shell	CNA-3874.1.1	11662 ± 43	-7.19 ± 1.50	23.42 ± 0.13	13576-13419	1

Table 2
Bajondillo cave/2000–2002. Molluscs.

Bj/3. Mesolithic	NR	MNI	Bj/4. Epipaleolithic	NR	MNI	Bj/5. Magdalenian	NR	MNI
<i>Mytilus galloprovincialis</i>	1	1	<i>M. galloprovincialis</i>	1	1	<i>M. galloprovincialis</i>	6	5
<i>Neopycnodonte cochlear</i>	1	1	<i>Cerastoderma cf. edule</i>	1	1	<i>Modiolus</i> sp.	1	1
<i>Cerastoderma edule</i>	1	1	<i>Patella caerulea</i>	4	4	Mytilidae sp.	1	1
<i>Cerastoderma cf. edule</i>	1	1	<i>Stramonita haemastoma</i>	1	1	<i>Chamaelea gallina</i>	1	1
<i>Siphonaria pectinata</i>	1	1	<i>Melanopsis praemorsa</i>	17	17	<i>Tapetinae?</i> sp.	1	1
Mollusca sp.	1	1	<i>Melanopsis laevigata</i>	1	1	Mollusca sp.	3	1
<i>Melanopsis laevigata</i>	9	9	<i>Theba pisana pisana</i>	8	8	<i>Melanopsis praemorsa</i>	8	8
<i>Iberus marmoratus</i>	1	1	<i>Otala lactea lactea</i>	2	2	<i>Otala lactea lactea</i>	2	2
Σ	16	16	Σ	35	35	Helicidae sp.	1	1
						<i>Balanus cf. trigonus</i>	1	1
						Σ	25	22

several cavities were developed. Three of them have human occupations assignable to the Magdalenian-Epipalaeolithic: Hoyo de la Mina, Abrigo 4 and Abrigo 6/Complex of Humo. In Hoyo de la Mina the works have been more intense and have allowed to document more diagnostic sequences (Ferrer et al., 2005), in which we can find Magdalenian, Epipalaeolithic, Mesolithic and Neolithic occupations. On the other hand, Abrigo 6 conserves important deposits that include Magdalenian and Epipalaeolithic levels, although they have been barely sounded so far (Ramos et al., 2005).

To the west of the Totalán river, we find two other cavities, Higuerón and Victoria (Fig. 1). Victoria was sampled in the 1970s, but both data and results are barely known (Forte, 1973), except for the presence of diagnostic Magdalenian elements (Cortés-Sánchez, 2002). Further east, we find Nerja Cave, the most excavated site (between 1959 and today) and better contextualized for this period on the coast of Málaga (Aura et al., 2001, 2002; 2010, 2016; Simón-Vallejo, 2003).

Although the works during 1963–1964 verified the presence of occupations assignable to the Upper Magdalenian, both by the presence of very characteristic knapped lithic industries and by the presence of harpoons or straight hooks. However, those excavations were never published due to several vicissitudes, so the confirmation of the existence of Upper Palaeolithic in southern Iberia was prolonged until the 1980s (Aura, 1986).

Actually, some works are being carried out both in the bay of Málaga and on hinterland archaeological sites with the aim of re-constructing the palaeoclimatic and palaeoenvironmental dynamics. These are based on the comparison of stratigraphic sequences and high resolution regional climatic records. The newness in research affects both sites with a strong historiographic responsibility, on which they continue going in-depth (Nerja), and new contributions in the western sector of Torremolinos (Bajondillo, Roca Chica or Babilonia). Another area studied, the travertines of Mijas, at about 400 m s.l. and 5–10 km from the actual coast, allow us to point out the idea about the frequentation of coastal areas much more extensive from the territorial point of view than the considered before so far. In this sense, the dating of the travertines, which indicate ages of the Upper Middle Pleistocene (TM-1) (TM-2) and ages of MIS 3 and MIS 2 (Guerra-Merchán et al., 2017), as some evidence recovered in surface surveys in both travertine deposits (Osunilla and Mijas-Town sectors) allow a frequent attendance during the Late Upper Palaeolithic.

3. Hinterland archaeological sites

The knowledge about the end of the Upper Palaeolithic inland areas had a lacking in identity so far, due to the shortage in research projects dedicated to this subject. Thus, so far we only have a few locations (El Pirulejo, Nacimiento or Valdecuevas; Cortés-Sánchez et al., 2013 with references). However, recently, several sites were revalued or documented linked to the Guadalquivir river. These represent only a sample of what this river should have been during the Late Glacial and the early Holocene, one of the central areas for the population of southern

Iberia, following a well-studied model in other first-rate river contexts of western Europe (e.g. Ebro river; González-Sampériz et al., 2009; Utrilla et al., 2010).

Thus, recently, the investigation of El Pirulejo (Priego, Córdoba) has showed us the importance of the Guadalquivir basin for the human populations that lived during the Late Glacial. Thus, levels P/4 and P/3 illustrate the Middle and Upper Magdalenian (respectively ca. 17200–17900 cal BP and 14000–17000 cal BP).

Another remarkable site in southern inland of the Iberian peninsula is Nacimiento Cave (Pontones, Jaén). In level D, layer V, of this site, the fauna is relatively abundant although the recovered materials are not sufficient for an accurate chronocultural assignment. However, these remains point to the end of the Upper Palaeolithic (Cortés-Sánchez et al., 2013 with references).

On the other hand, the studies in process in classical sites such as Pileta Cave (Benaolán, Málaga), show the presence of “contemporary” Magdalenian occupations to some of the motifs on their walls, which have been demonstrated by some items (Cortés-Sánchez and Simón-Vallejo, 2007).

The studies about the hinterland archaeological sites in the province of Granada (Tajos de Marchales, Colomera, Granada) (García and Morgado, 2016), Córdoba (e.g. Alcolea, Córdoba) and Jaén (Nacimiento, Valdecuevas and Bedmar area) provinces (Cortés et al., 2014 with references), show that the “population poverty” of the Guadalquivir basin during the Late Glacial and early stages of the Holocene was only a matter linked to the shortage of research projects that have addressed this issue.

4. Economy of the last hunter-gatherers

In the coastal areas, the resources used are basically estuarine type, although alternating sand beaches and rocky areas. These zones present natural springs of great seasonal stability, as well as secondary deposits of raw materials (flint, quartzite, etc.) which are used systematically. In this case, the surface surveys have allowed the identification of lithic raw materials outcrops. Due to their scarce identity, were not included in the geological maps, as is the case of these quartz, quartzite and flint outcrops from the western area of the bay of Málaga, in the municipality of Torremolinos.

Nerja Cave, the best documented Late Glacial-Holocene site so far, has revealed the use of a coastal ecotone without current analogues that intensively exploits marine resources. Among these, we find the sawn, the arctic diver, the great skua and seals about hunting activities, and shellfishing (Alborán sea) and eggs about the gathering. About fishing activities, the species that we can find in this area are the cod, the haddock, the pollock and the cuddy, as well as scavenging and gathering at the coastal tanatocenosis in relation with animals like whales, dolphins and some molluscs, used to make personal ornaments (Cortés-Sánchez et al., 2008) Fig. 2.

Nerja is the oldest evidence about the use of coastal resources, in a level assigned to Evolved Solutrean, increasing their use during the

Table 3
El Pirulejo. Mammals.

Species	P/2	P/3	P/4	ΣMNI	Σ Remains
<i>Oryctolagus cuniculus</i>	87	263	402	752	12.528
<i>Cervus elaphus</i>	5	3	4	12	137
<i>Capra pyrenaica</i>	3	8	9	20	317
<i>Sus scrofa</i>	3	3	2	8	41
<i>Rupicapra rupicapra</i>	-	-	1	1	3
<i>Lepus granatensis</i>	3	2	-	3	5
<i>Felis silvestris</i>	-	-	2	1	2
<i>Lynx pardina</i>	3	2	1	3	6
<i>Vulpes vulpes</i>	-	-	1	1	1
<i>Mustela nivalis</i>	-	1	-	1	1
Carnivoro sp.	-	1	2	-	3

Magdalenian to Epipaleolithic transition, although the new research in Roca Chica could be inserted into this hiatus.

The exploitation of these resources increases during the Magdalenian-Epipaleolithic transition, where we can observe a continuity in the choice of these resources in relation to previous chronologies (both in shellfishing, fishing and hunting) (deers, rabbits, great diversity of fish, seals).

Inland, even in general now, only El Pirulejo allows an approximation to aspects associated with subsistence. In this case, it appears linked to the resources around the travertine system of Priego de Córdoba and the central core of the Subbaetic. This site presents the most complete Magdalenian sequence of the south of Iberia.

The hunting activities are based (Table 3) on the capture of rabbit (~96%) and some ungulates (deer, ibex, chamois and wild boar), of which only the ibex presents remarkable values (NMI = 2.13% in P/4 and 2.97% in P/3). The data in relation to the end of the Magdalenian in El Pirulejo (P/2) are importantly increased. The presence of the deer increases, exceeding this time the contribution of wild goats and wild boars (4.95% vs. 2.97% respectively) (Riquelme, 2008).

5. Symbolism

One of the elements of symbolic expression that frequently appear in the Late Glacial register in other sites of the area that we have been treating are the elements of personal ornament, generally on malacological support. We find ornamental pieces made on marine molluscs in inland deposits, such as the typical perforated Mediterranean *Mesalia mesal* found in El Pirulejo, which is 80 km from the nearest coast (Cortés-Sánchez, 2008).

The Palaeolithic portable art pieces are scarce in the south of Iberia, except in El Pirulejo (hinterland), which are actually being studied. We can just add some objects found in Nerja and Roca Chica.

In this sense, the maintenance of the main sites of the coast of Málaga between the Last Maximum Glacial and the Holocene (Nerja, Bajondillo, Hoyo de la Mina or Abrigo 6) can point out that the groups associated to these areas are linked to ancestral territories. In this line, the sites with rock art assignable to the Magdalenian that already had a strong symbolic importance (Solutrean or even earlier) are increased with iconography about this period. Thus, on the coast, we find graphic remains in Victoria, Higuero and Nerja assignable to the Late Glacial (Sanchidrián, 1994; Cantalejo et al., 2008), while, inland, La Pileta and

Ardales constitute the focus of the last cave graphic expressions during the Late Glacial in southern Iberia.

6. Economic changes

As stated above, the end of the hunter-gatherers economy in southern Iberia expresses a clear harmony with other geographical areas of western Europe in a close relation with coastal ecotones (vid. i.e. Aura et al., 2001, 2002, 2010, 2016; Cortés et al., 2008; 2013).

with the implementation of the Neolithic has long been subject to significant difficulties, linked to the absence of archaeological records in the coast of Málaga. This circumstance has supported the discussion about the function and use of these secular areas by hunter-gatherers communities during the Upper Palaeolithic and their probable abandonment before the arrival of the Neolithic innovations. Thus, the proliferation of archaeological sites assignable to the end of the Pleistocene and the beginning of the Holocene inland of Andalusia shows an increase of the use of the hinterland and an abandonment of the coastal areas.

In this sense, the works carried out in Hoyo de la Mina show a recurrent and very active occupation of these coastal areas during the Epipaleolithic and Mesolithic. Meanwhile, in Bajondillo, the available data show that this site maintains a continuity in relation to its occupation during post-Palaeolithic periods. Thus, at level Bj/3 we have a ¹⁴C dating (7475 ± 80, last quarter of 9th-millennium cal BP) associated to an important anthropic activity at the level. Since the sample was obtained at the base of the deposit, the rest of the stratum must culminate in moments very close to the arrival of the first Neolithic influences to the area, also documented in Bajondillo (6070 ± 40 [it should be taken into account that the sample does not come from the sedimentation wall of the stratum] or mid 8th millennium on calibrated BP dates).

For its part, the Neolithic in the sites of the coast of Málaga is utterly documented. Thus, since the second half of the 8th-millennium cal BP, the specific material culture of the period (ceramics, knapped and polished lithic industries, types of ornaments, etc.) and the development of agricultural activities are well documented (Nerja, Hostal Guadalupe, Roca Chica and Bajondillo) (Cortés et al., 2012). This emergence must be considered as a very fast colonization process. The data show a technological, subsistence and cultural break regarding an autochthonous Epipalaeolithic/Mesolithic and, accordingly, the arrival of Neolithic pioneers seems evident (Cortés-Sánchez et al., 2012).

However, the amount of Neolithic sites documented on the coast of Málaga in the second half of the 8th-millennium cal B.P. (Table 4) may be justified by a demographic incorporation of local populations. However, we must also consider the attachment to the hunter-gatherer's traditions or the deep cultural differences between these types of communities attached to a coastal and an agriculture and livestock economy. A possible "driving force" that accelerate the contacts and assimilation of populations could be the different records that show the existence of deep palaeoclimatic changes between ca. 8-7 cal ka BP in a vast region of Europe and Africa. The environmental repercussion could be very serious for human communities as it would affect both marine ecosystems and, in continental environments, the implementation of the Sahara (Cortés et al., 2012).

In this sense, beside this Neolithic main pathway, which occupies a good part of the northern Mediterranean coast, another southern one must be added. This was probably driven by the aridity process that will give room to the Sahara and that will affect to wide Northern regions of Africa. In the first case, the Epipalaeolithic/Mesolithic communities of

Table 4
Upper Palaeolithic-Neolithic sequence in the coast of Málaga.

Sequence/Site	Bajondillo	Hoyo Mina	Abrigo/6	Nerja	Others
Early Neolithic	Bj/2	HM/4	7	V-2	Roca Chica Hostal Guadalupe
Mesolithic	Bj/3	HM/5	-	M/12/117 V-3c?	-
Epipalaeolithic	Bj/4	HM/5	8	NM-13 VN-4	Victoria
Upper Magdalenian	Bj/5	HM/6	9	NM-14/16 NV.5/7	Abrigo 4 Victoria Higuero

the coast of Málaga supported their economic and subsistence model on resources that are declining, while the African continent is suffering the implementation of aridity conditions. The result was the abandonment of vast areas and the demographic pressure towards less affected areas, such as the Maghreb. Possibly, this had some impact on the arrival of the Neolithic to the coasts of Málaga (Cortés et al., 2012).

7. Conclusions

At the end of the Pleistocene, the communities show an increase in the coastal marine resources exploitation. Thus, the gathering of live species (birds, fish and molluscs) and the coastal thanatocenoses (molluscs or cetaceans) or secondary deposits (biotic and abiotic raw materials) are documented.

However, the dominant palaeoenvironmental conditions during the end of the Pleistocene lead us to think that the exploitation around the coast is linked “analogously” to the presence of a large river course. On the other hand, the documentation of sites located in the Guadalquivir river basin is allowing us not only to increase the knowledge about the human communities at the end of the Upper Palaeolithic in southern Iberia but also to address subsistence systems in a more coherent macro-territorial way. The lands away from the coast should have a fundamental role throughout the annual and interannual activities.

In this sense, the existence of coastal malacological remains in hinterland archaeological sites, as El Pirulejo, show the existence of both coastal-inland mobility routes and the exchange of resources between the different paleocommunities that inhabited the south of the Iberian peninsula.

Thus, as a conclusion, we can say that the coast of Málaga constitutes one of the main areas for human settlement in the south of Iberia during the end of the Pleistocene and the Initial Holocene, stable until the arrival of the Neolithic during the 8th millennium BP, bringing both technological and economic innovations.

In addition, mainly that coastal-inland relation that could involve the establishment of exchange and mobility networks, both resources and human groups, which played a fundamental role in the implementation of the Neolithic.

Declaration competing of interest

The authors declare that they have no known competing financial interest or personal relationships that could have appeared to influence the work reported in this paper.

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