ROBERT SALA RAMOS *(EDITOR)*
EUDALD CARBONELL | JOSÉ MARÍA BERMÚDEZ CASTRO | JUAN LUIS ARSUAGA
(COORDINATORS)

PLEISTOCENE AND HOLOCENE HUNTER-GATHERERS IN IBERIA AND THE GIBRALTAR STRAIT:

THE CURRENT ARCHAEOLOGICAL RECORD

UNIVERSIDAD DE BURGOS
fundación atapuerca

B. Galván*, C.M. Hernández*, C. Mallol*, J. Machado*, A. Sistiaga*, F.J. Molina**, L. Pérez***, R. Alonso*, M.D. Garralda****, N. Mercier*****, J.V. Morales******, A. Sanchis*******, A. Tarriño********, J.A. Gómez*********, A. Rodríguez**********, I. Abreu*, P. Vidal******

El Salt. The Last Neanderthals Of The Alicante Mountains (Alcoy, Spain)

Since 1986 archaeological investigations have been conducted at the site of El Salt (Alcoy, Alicante) attempting to deepen the knowledge of its Paleolithic record from an integrated multidisciplinary perspective. The aim is to understand the MIS 3 Neanderthal population in the central region of the Iberian Mediterranean. The research comprises a wide range of studies, including analysis of site formation processes and the application of archeostratigraphic methods in the dissection of archaeological palimpsests (Machado *et al.*, 2011) with the aim of recognizing and describing settlement patterns, activity areas and the role played by environmental factors.

This enclave is located in a mountain area which has yielded several Middle Paleolithic sites in caves, rock shelters and open-air surfaces. All of them are between the Middle Pleistocene (Abric Pastor) and the end of MIS 3. Some of these places have provided a broad and diversified archaeological record, suitable to address one of the most controversial issues in current Paleolithic research: Neanderthal disappearance.

Despite many studies that have tried to address this phenomenon in Eurasia, macro-regional approaches have not solved the problem, demonstrating the need to promote regional research. In fact, an increasing number of late Middle Paleolithic deposits are reflecting significant variability. In this sense, current research in the Iberian Peninsula offers a complex scenario for the final stage of the Middle Paleolithic and the early Upper Paleolithic (Zilhão *et al.*, 2006; Jennings *et al.*, 2011; Baena *et al.*, 2012; Maroto *et al.*, 2012).

Research by our team in El Salt has recently provided data in conflict with previous models advocating persistence of the Neanderthal population in the Iberian Peninsula. This leads to questioning the role of Iberia as a refuge area for the last Neanderthals groups (Mallol *et al.*, 2012; Wood *et al.*, 2013; Hernandez *et al.*, 2013; Garralda *et al.*, i. p. and Galvan *et al.*, i. p.).

This paper summarizes the current state of investigations, with particular attention to the time frame, the sedimentary and paleoenvironment framework, and archaeological indicators, in order to recognize and sequence the context of Neanderthal occupations in the Alicante Mountains during MIS 3.

The site of El Salt

The site is located at the head of the Serpis River, 680 meters above sea level at the confluence of courses and Barchell Polop, two small tributaries. It is now an outdoor locality of about 300 m² situated at the foot of a 38 m-high limestone wall covered with travertine (Fig. 1b).

The wall corresponds to a thrust fault of Paleocene limestone over Oligocene conglomerates that led to the installment of a large travertine

---

* U.D.I. de Prehistoria, Arqueología e Historia Antigua. Grupo de Investigación Sociedades Cazadoras Recolectoras Paleolíticas. Universidad de La Laguna
** Dpto. de Prehistoria, Arqueología, Historia Antigua, Filología Griega y F. Latina. Universidad de Alicante
*** Dpto. de Historia e Hª del Arte, IPHES. Universitat Rovira i Virgili
**** U.D. de Antropología Física. Facultad de Biología. Universidad Complutense de Madrid
***** UMR 5060 CNRS-Université de Bordeaux
****** Dpto. de Prehistoria y Arqueología. Universidad de Valencia
******* Museo de Prehistoria de Valencia. S.I.P.
******** Dpto. de Geografía, Prehistoria y Arqueología. Universidad del País Vasco
********* Agencia Estatal de Meteorología. Valladolid
********** Dpto. de Prehistoria, Historia Antigua y Arqueología. GEPEG. Universidad de Barcelona

---

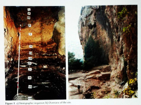

Figure 1. a) Stratigraphic sequence; b) Overview of the site.

formation stretching more than 2.5 km at the foothills of Sierra de Mariola. It is a vast travertine construction linked to the Barchell River. The watercourse was blocked by the limestone, forming a lake whose waters would spill over the tall wall in the form of cascades and waterfalls. This paleolake has been identified by the existence of paleolacustrine travertine and limestone sediments resting on Miocene marls in the area above the site, known as "Cases del Salt".

The space occupied by humans at the bottom of the wall was sheltered by a large travertine overhang, which at times of maximum development covered almost the entire excavated surface. The onset of the projection still remains in place and several associated fallen blockshave been found on the ground about 8 and 10 m away from the wall. The blocks are stratigraphically correlated with the archaeological sequence, indicating that the falls occurred throughout the Neanderthals occupation period.

The human occupation surface next to the wall was relatively flat, with water from the travertine system possibly flowing downhill at about 13 m from the wall, forming ramps and stepped platforms down to the river. In sum, El Salt exhibits a strategic position amidst various biotopes (plain, mountain, river valley, springs and a lacustrine-marshy environment). It is immersed in a mountainous area rich with a diversity of resources.

General description of the archeostratigraphic sequence and chronological framework:

The archeosedimentary deposit of El Salt is 6.3 m thick. It was initially studied by P. Fumanal, who distinguished 13 lithostratigraphic units (Fumanal, 1994) (Fig. 1a). Subsequent work led to subdivision of the sequence into 5 segments, according to their macroscopic textural features,

---

as well as their archaeological content. The description of each segment is presented below, from base to top:

1. **Unit XIII:** This is a lithochemical layer of unknown thickness (>0.50 m), it is archaeologically sterile, dated at the top by J. Bischoff (J. Geol. Survey, USA) to 81.5 + / – 2.7ky and 80.1 + / – 4 ky (MIS 5a) using the Th / U method. It represents a subhorizontal platformat the foot of the fault and has been exposed in different parts of the site. The archaeological deposit rests on this platform. To date, the only evidence of human activity associated with this unit consists of a small area of the platform exhibiting thermal alteration (subcircular, 0.60 m diameter) at the top of the unit, in direct contact with overlying SU XII.
2. **Units XII to IX:** This segment has an average thickness of 1.5 m and is characterized by dark brown, loose, fine sands containing abundant combustion residues.

   These units yielded an accumulation of large travertine blocks, weighing several tons, along with a large number of smaller sized-blocks, interpreted as the first episode of overhang collapse. The accumulation rests directly on the platform (SU XIII).

   On the other hand, Units SU XII to IX are characterized by the presence of frequent combustion features, many of them have been identified as structures, simple hearths of various sizes (0.20 to 1 m diameter). They are primarily located near the travertine wall. These features are usually associated with rich archaeological assemblages composed by abundant anthropogenic faunal remains, lithic objects and limestone pebbles with marks of use. This segment of the archeosedimentary deposit represents a dense palimpsest of recurrent human occupations. Preliminary results of our integrated studies point to the existence of activity areas, these correspond to the generic model of "hearth-related assemblages" (Vaquero and Pastó, 2001; Dorta *et al.*, 2010).This part of the sequence has been dated by thermoluminescence (TL) to between 60.7 +/- 8.9 and52.3 +/- ky (Galvan *et al.*, i. p.).
3. **Units VIII to Lower V:** The thickness of this segment ranges between 1.5-2.8 m and is composed of silty and sandy clay. It is characterized by a gradual decrease in archaeological evidence. For instance, only seven combustion features were documented, compared to 54 hearths in SU IX and X. There is also a significant decrease in the lithic and faunal record.

   Another accumulation of large blocks was identified at the top of SU VI, indicating further roof collapse. This segment has bring in TL dates of 52.3 + / – 4.6 ky to 47.2 + / – 4.4 ky. Lower SU V has been dated by OSL to 45.2 + / - 3.4 ky (Galvan *et al.*, i. p.).
4. **Upper Unit V:** Only 0.50 m of sediment has been preserved, as this unit was partially truncated by an erosive episode of Holocene age. It comprises generally massive sandy silts, capped by a gravelly deposit (the top 0.20 m).This unit is archaeologically sterile except in the mentioned upper coarse part, where two flint blades were found together with several undiagnosed small lithic objects and a small combustion feature. The sterile segment of the unit has been dated by OSL to 44.7 + / – 3.2 ky (Galvan et al., i. p.).
5. **Units IV to I:** This is 1.3 m thick segment consisting of an accumulation of pebbles and gravel in a silty clayey matrix. This Holocene deposit is in erosional contact with the one above. It contains reworked materials of different time periods; mainly late Upper Paleolithic, Epipaleolithic / Mesolithic and early Neolithic.

Human Occupations Older Than 50 ky (Su XII To Ix)

In general, human populations in El Salt seem to respond to a pattern of short duration as manifests different temporal indicators, mainly inferred from the spatial distribution of hearth, units of raw material and lithic refitting. Therefore aspects as the presence of clearly delineated accumulations around combustion structures, with little interaction among them are interpreted as inferred from the relations between their respective materials, the incompleteness of the operational chains, quantitative shortages and unidirectional of refitting. The evidence supports recycling of lithic or the importance of geogenic against anthropogenic sediment inputs.

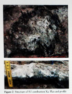

Figure 2. Structure of SU combustion Xa. Plan and profile

At microstratigraphic scale, there is a low proportion of anthropogenic elements versus geogenic and biogenic soil material (detrital sand, humified organic matter and animal excrements).

The position of the thermally altered objects associated with the combustion structures are basic to establish relationships of synchrony or diachrony among the materials constituting the archaeological palimpsests. Field observations and experimental work have enabled us to determine that the black layers of combustion structures from El Salt were produced by the carbonization of organic matter in the soil on which the fires were made (Mallol *et al.*, 2013). The surfaces of these layers correspond to human occupation surfaces. Consequently, they become fundamental archeostratigraphic landmarks for the study of archaeological site formation processes.

From a diachronic perspective, the remains of combustion exhibit spatial recurrence. The hearths were preferentially located near the travertine wall. Hearths were simple (fire made on the ground), large (1 m diameter) and small (0.60 - 0.20 m). They are often found in clusters.

The combustion structures studied (54) (Mallol *et al.*, 2013) show very good states of preservation (Fig. 2). Some were found intact, including a millimeter-thick layer of calcitic ash with a pseudomorphic cellular structure corresponding to pine wood. Others are dismantled and display structural features that suggest trampling. According to the latter, the phytolith content and lipid analysis data, the black layers of the studied hearths, which range in thickness from 1 to 3 cm, have a low degree of thermal alteration (<400°). Microscopically, they are mainly composed of soil organic matter (SOM; humified leaves, stems, roots, woody tissue, amorphous organic particles, fungi and spores) in a sandy matrix bioturbated by worms and abundant microfaunal bone and coprolite fragments of different animals, as well as seed coats from the fruits of *Celtis sp.* The representation of flint microflakes, charcoal and bones of meso and macrofauna in the black layers is low and reflects weak anthropogenic impact. The overlying and underlying sediment has a lighter color due to the scarcity of microscopic charred plant remains.

The study of travertine thermal alteration, limestone, flint and fauna reveals that they reached temperatures of 700 °C and 800 °C. Nevertheless the midrange for heat modification is around the 450 °C-500 °C, according to the type of hearths documented in these archaeological units.

In this part of the sequence, episodes of abandonment in the overall context of the stratumhas been perceived despite its homogeneous appearance; its recognition during the excavation process is highly difficult. This has been made possible by a multianalytical approach based on the study of the horizontal and vertical distribution of the soil by the use of GIS, the micromorphological analysis of archeological series associationsand sedimentary lipid markers due recognition, as well as the presence / absence of chemical markers of human presence. Integrated treatment of this information has isolated these episodes of abandonment from the identification of small levels concerning 1 and 3 cm thick throughout the intervention area.

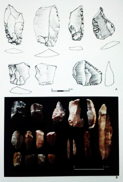

Figure 3. Lithic industry. A) Middle Paleolithic. B) Upper Paleolithic.

The remains of 50 ky previous occupations reflect, although not exclusively, diversified and preferential use of local resources. The lithic raw materials, hunting registration and identified fuels, show a minimum holding territory that is confined to Alcoy valleys environment, characterized by its high biodiversity and accessibility to supply distances around 10 km.

Flints found in El Salt comes mostly from siliceous formations identified in Mesozoic and Cenozoic levels of the Alicante Prebaetic system, formed in marine platform environment (flint-type Mariola, Upper Campanian- Maastrichtian) or reef / toward reef (flint type Serreta-ilerdean or Beniaia, probably ilerdean). The Serreta type is the most widely used not only in this field, but in all places, from the Middle Paleolithic to the Neolithic (Molina *et al.*, 2011). Its acceptance occurred in the Oligocene detrital deposits, where the blocks freed by erosion and resedimented result easier to collect with the technology of Neanderthal groups. During conducted geoarcheological surveys it has been possible to locate capturing areas of this lithological variety with signs of Middle Paleolithic exploitation in Penella. This site is located on the northern slope of La Serreta and Aigüeta Amarga, both within 3 to 5 km radio from El Salt (Molina *et al.*, 2011).

Several tools, retouched or not, were added to the site already configured, while some were collected and reused in the settlement itself. Knapping processes have also been identified, usually ascribed in the Levallois methods and linked to the development of subsistence activities (butcher and vegetable processing, as well as leather and wood working in different states) (Rodriguez *et al.*, 2002) and repair actions of cutting edges (Fig. 3a). A comprehensive set of limestone pebbles with different traces of human manipulation (staking, linear impacts, cuts, wear and fractures) interpreted in the clearest cases as hammers, anvils and retouches increases the evidentiary record concerning to highlighted activities.

The faunal assemblage performs similar pattern to other deposits of the Iberian Mediterranean lift from MIS 3, characterized by exploitation centered on goats (*Capra pyrenaica*), deer (*Cervus elaphus*) and horses (*Equus ferus* and *Equus hydruntinus*). Along with these and in a timely manner, we have identified a use of small prey (lagomorpha, *Oryctolagus cuniculus*) Nonetheless, most of all Leporidae of El Salt relates to the contribution of raptors. Similarly, the presence of bovine (*Bos primigenius*), turtles (*Testudo hermanni*) and carnivores is timely. Particularly of the latter a unique carnivore dental remaining indeterminate has been recognized, without any evidence of its action on the bone assemblage.

Traces of defleshed bone and intense fracturing reflect faunal exploitation in order to exploit all possible nutrients. The discarded after consumption are distributed throughout the excavation area. There is especially an accumulation near the travertine wall, where the size of the fragment also decreases compared to the outer zone. In the same way, thermal alteration is another constant phenomenon in all archaeological faunal linked to heated waste management and the use of residues as fuel. Our experimental studies helped to raise the possibility that some of the material provided in previous occupations is affected unintentionally by different combustion events made after its deposit.

Neanderthal occupations after 50 ky

This period is represented by the stratigraphic units VIII to lower V and its main feature is the progressive decrease of human impact, compared to the significant increase of geogenic processes in the formation of archaeological sedimentary deposit (Galvan *et al.*, i.p.)

In the stratigraphic unit VIII four combustion structures have been identified and only three in the SU VII, despite widely excavated area (40 m²). The lower incidence of hearths across this deposit stretch entails a coarser distribution of the materials, without recognizing clear accumulation as described for the oldest sedimentary units. The faunal and lithic record, especially the limestone pebbles with traces of human manipulation also show a gradual downsizing of resources (Galvan *et al.*, i.p.)

At the roof of SU VI a second episode of falling blocks from the big rock shelter overhang is recognized, which marks a turning point not only in the sediment dynamics, also significantly limited since anthropogenic contribution. From this unit, the only evidence of fire is represented by anthracological remains (less abundant than in the previous segment). The lithic, faunal remains, limestone, and travertine also present thermal alteration marks. This reinforces the idea of a gradual and steady process of decline in the Neanderthal footprint at the site among 52.3 + / – 4.6 ky BP and 45.2 + / – 3.4 ky BP, coinciding with the end of Heinrich Sevent.

The upper section of this sequence displays sedimentological traces indicative of an abrupt change. Indeed, the SU V is lithological different from the rest of the deposit. It is configured as a massive sand calcite layer, very fine, fresh and well-sorted to fossilize blocks and mega blocks from the collapse originated during the second episode of roof collapse.

This unit must be combined with a high sedimentation rate, given the fresh state of the sand calcite derived from the breakdown of rocky bed and massive structure that presents an assemblage. According to the chronostratigraphic framework provided by TL dates, this process may be hypothetically associated with severe aridification described for the central region of the Iberian Mediterranean during the H5 (Sánchez-Goñi and Harrison 2010).A dry or semi-dry climate context is consistent with the interruption of travertine and limestone bedrock. Both would be subject to a recurring solution and precipitation under humidity conditions. Added to this is the identification of authigenic gypsum crystals in SU VI and V as evidence pointing to the mentioned arid or semi-arid conditions.

In this framework is ascribed the finding of six dental remains(I^1 right, P^3 right, P^4 right, M^1 right, M^2 right and third molar remains, also right) located at the base of the SU V lower in a proper Middle Paleolithic archaeological context (Fig. 4). Its morphometric study has attributed a Neanderthal right hemimaxilla to a young individual (Garralda *et al.*, i.p.). The chronology of these fossils falls between 47.2 + / – 4.4ky (base of SU V lower) and 45.2 + / – 3.4 ky (roof SU V lower). This suggests that they represent some of the last Neanderthals in the region.

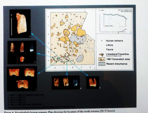

Figure 4. Neanderthals human remains. Plan showing the location of the teeth remains (SU V lower).

The Upper Su V: The Disappearance Of Human Occupation Evidence From The Middle Paleolithic

This unit has been identified only in the upper zone of the site, along the travertine wall. Its thickness exceeds 0.60 m in some places. These are subhorizontal beds and fine silts and very fine sands with massive structure and diffuse contacts. Specifically some facies of coarse sand and gravel (1-3 mm), with small blocks of limestone (10 cm) scarce and isolated within the thin deposit of this unithave been documented. The entire assemblage goes in the slope direction and out of the wallpackage. Its contacts to wall and roof are fuzzy. The OSL dating of the sediment is 44.7 + / -3.2 ky.

This deposit has been excavated in an area of about 30m², and throughout its development any evidence of human occupation has not been located.

At the roof of this unit, in diffuse contact, continues a deposit of about 0.30 m thick and a denser heterometric texture, consisting of silt, coarse sand and gravel. It incorporates lots of fragments and small blocks of limestone and travertine platelets. This deposit thins towards the wall and nozzle in the course of the slope, but its components do not show a preferred orientation. It was excavated in an area of 10 m² where it has been able to recover a small lithic assemblage composed by two laminar and some technologically undifferentiated flakes, next to small structure of combustion associated to abundant and dispersed anthracological material (about 700 units) under study. These few elements, sparsely diagnostics from the technological and typological point of view, constitute the first evidence of human presence after the discontinuity described above.

In neighboring Cova Beneito (Muro de Alcoy, Alicante) Middle Paleolithic sequence also crown a thick sterile deposit, similar to that referred to in the El Salt on which subsequent stratigraphic units assigned to early Upper Paleolithicare developed.

This pattern of discontinuity has been described in other Iberian sites (Mallol *et al.*, 2012), suggesting the existence of a depopulation of southern peninsular territory after the Neanderthals' disappearance and before the first signs of the presence of anatomically modern humans groups.

El Salt subsequent to Middle Paleolithic

El Salt archeosedimentary sequence ends with a powerful erosive deposit where, 37 lithostratigraphic facies evidencing the succession of different erosion processes have been recognized. The first, very energetic and fast, hit part of the Pleistocene sedimentation. Nonetheless, subsequent events of variable energy, partially removed the gravel deposit itself, as the channel morphology show in the different layers that comprise it.

The clasticfraction of this deposit filled the karst system of El Salt with sediment. Its output abroad took place after the reactivation of the water circulation. This led to the opening of a cavity in the upper third of the travertine wall and expulsion from their sediment content.

The lithic record provides no doubts about the presence in El Salt of Magdalenian materials, Epipaleolithic / Mesolithic in the sequence (Fig. 3b). Between laminar and microlaminar cores there are diagnostic examples by standardization in the blank obtaining, thus as by the use of soft hammer and pressure flaking. A number of macroutensils are related to macrolithic denticulate *facies* typical of Mesolithic between the IX and early VIII millennium BP. Bipolar cores and *ecaillées* from the Gravettian and the Solutrean of Hispanic Mediterranean are also present in this data. The most problematic issue is to attribute specific materials to the early stages of the Upper Paleolithic, especially consideringits current redefinition after the controversy between the Aurignacian and the Gravettian (De la Peña, 2013) and the recent detection of anearly Upper Paleolithic in determinate, well described in Cova Gran (Martinez *et al.*, 2012).

The record seems to reveal a ceramic (continuous or discontinuous) occupation that can be bound between the Neolithic IA and the Bell-Beaker horizon transition (5500-2500 BP). The existence of fragments from large containers, especially amphora-like indicate El Salt could have some habitat stability. The transition of Bell-Beaker pottery is providing the *terminus post quem* for the deposition of gravels, being newer material enclosed therein.

Acknowledgments

This article is part of the research undertaken in the project I + D + I HAR2012-32703: *The disappearance of Neanderthals groups in the central region of the Iberian Mediterranean. A methodological proposal for approaching the historical process and paleoenvironmental framework* (MINECO-FEDER).

Thanks to Camilo Visedo Moltó Archaeological Museum, to the Excmo. Ayuntamiento de Alcoy and the General Direction of Cultural Heritage of the Generalitat Valenciana the support to archaeological research.

Valentín Villaverde*, Dídac Román**, Rafael Martínez-Valle***, E. Badal*, P.M. Guillem***, M. Pérez-Ripoll*, M.M. Bergadà****, C. Real*, M. Boso*

Cova de les Cendres

Cova de les Cendres opens to the sea at the cliffs of Punta de Moraira, 60m above sea level. It is a cavity of a certain extent, consisting of an outdoor space with a high vault presenting lots of cenital detachment blocks, particularly on its south wall, and another indoor space reached through a narrowing between the vault and the sedimentary filling of the surface whose final part is partially loaded by the sedimentation (Fig. 1). The archaeological excavation performed in this archaeological site have always been carried out in the inner part, reaching a surface of about 600 m².

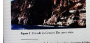

Figure 1. Cova de les Cendres. The cave's view.

H. Breuil visited and identified the place as an archaeological site in 1913. However, the first archaeological activities were carried out by E. Llobregat in 1974 and 1975 obtaining an important archaeological sequence especially relevant concerning the Neolithic. From the revision of the materials by J. Bernabeu and the identification of a harpoon and several pieces of Paleolithic typology, the possibility of the archaeological site to conserve Pleistocene chronology levels emerged, which is why a survey was practiced in 1981. These activities confirmed, with new materials, the importance of the Magdalenian levels and demonstrated the interest of the archaeological work. After some surveys in later years, the archaeological activities focused on Pleistocene levels have continued from 1995 until now.

Archaeological activities of Pleistocene levels started with a stratigraphic survey in squares A-17

---

* Departament de Prehistòria i Arqueologia. Universitat de València
** Departament de Prehistòria i Arqueologia. Universitat de València. TRACES UMR-5608. Université de Toulouse Le-Mirail
*** IVACOR. Generalitat Valenciana
**** SERP. Universitat de Barcelona