

## THE MIDDLE PALEOLITHIC OF MURCIA

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### Abstract

Thirty-six Middle Paleolithic sites are currently known in Murcia. The open air localities correspond to patches or scatters in surficial position, with one cluster of four sites in the Yecla plateau suggesting that, where flint is concerned, a simple model of reduction-with-distance to source underlies inter-assembly variability. Five stratified cave and rockshelter sites show logistical use with a fragmentary representation of the flint production chain and transport of curated items over significant distances. The coastal sites document the exploitation of eulittoral shellfish as a food resource. The associated human remains are of Neandertals, with evidence for their survival to at least 34.5 ka <sup>14</sup>C BP at Sima de las Palomas.

**Key words:** Middle Paleolithic, Neandertals, Murcia (Spain).

### Resum. El paleolític mitjà de Múrcia

Hi ha 36 jaciments del paleolític mitjà coneguts a la regió de Múrcia. Els jaciments a l'aire lliure són tots de superfície. Una concentració en els altiplans de Yecla indica que, per al cas del sílex, la variabilitat industrial observada pot explicar-se a través d'un model senzill en el qual el grau de reducció està en funció de la distància a les fonts de matèria primera. Els cinc jaciments de cova o abric coneguts contenen ocupacions de tipus logístic amb cadenes operatives de sílex representades de forma molt parcial i el rebuig de peces retocades transportades des de distàncies importants. En els jaciments costers es documenta el consum de mol·luscs de la zona eulitoral. Les restes humanes de la Sima de las Palomas proven la pervivència dels Neandertals en la regió fins almenys el 34.5 ka <sup>14</sup>C BP.

**Paraules clau:** Paleolític Mitjà, Neandertals, Múrcia.

### Resumen. El Paleolítico Medio en Murcia

Hay 36 yacimientos del Paleolítico Medio conocidos en la región de Murcia. Los yacimientos al aire libre son todos de superficie. Una concentración en el altiplano de Yecla indica que, para el

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caso del sílex, la variabilidad industrial observada puede explicarse a través de un modelo sencillo en el que el grado de reducción es función de la distancia a las fuentes de materia-prima. Los cinco yacimientos de cueva o abrigo conocidos contienen ocupaciones de tipo logístico con cadenas operativas del sílex representadas de forma muy parcial y descarte de piezas retocadas transportadas desde distancias importantes. En los yacimientos costeros se documenta el marisqueo de moluscos de la zona eulitoral. Los restos humanos de la Sima de las Palomas prueban la pervivencia de los Neandertales en la región hasta por lo menos 34.5 ka <sup>14</sup>C BP.

**Palabras clave:** Paleolítico Medio, Neandertales, Murcia.

### Résumé. Le Paléolithique Moyen de Murcia

Il y a 36 gisements du Paléolithique Moyen connus dans la région de Murcia. Les sites en plein air sont tous en surface. Une concentration dans le haut plateau de Yecla indique que, dans le cas du sílex, la variabilité industrielle observée peut s'expliquer à partir d'un modèle simple dans lequel le degré de réduction est en fonction de la distance aux sources de matière première. Les cinq gisements connus, en grotte ou sous abri, contiennent des occupations de type logistique où les chaînes opératoires du sílex sont représentées de façon très partielle et les pièces retouchées abandonnées dans les gisements ont été transportées depuis de longues distances. Les sites côtiers documentent l'exploitation des fruits de mer de la zone eulittorale. Les restes humains de la Sima de las Palomas prouvent que les Néandertaliens ont survécu dans la région jusqu'aux environs de 34.5 ka <sup>14</sup>C BP.

**Mots clés:** Paléolithique moyen, Néandertaliens, Murcie (Espagne).

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### Introduction

A search for «Middle Paleolithic» in the database maintained by the regional government returns a total of 31 sites (<http://www.arqueomurcia.com/index.php?a=yacimientos>; access date, October 12, 2008). Of these, the Cueva Negra del Estrecho del Río Quípar (Caravaca) is now known to date to the late Lower or early Middle Pleistocene and to contain Acheulian, not Mousterian assemblages (Walker *et al.* 2006b). In contrast, six other sites that the literature considers to be of Middle Paleolithic age or to feature Middle Paleolithic occupations are either not included in the database or catalogued under a different period: Cueva Berme-

ja, Las Peñicas (a dredged location in the port of Puerto de Mazarrón) and four open air localities in the Yecla plateau (table 1).

Of these 36 sites, only 16 have published stratigraphic or site formation studies associated with them: eight are open air, six are rockshelters and two are caves (fig. 1). The informative potential of many is, however, rather limited (table 2). Thus, it is on the basis of only the better contexts (nine in total) that a critical review of the evidence and a synthesis concerning the technology, subsistence and settlement of the Murcia Middle Paleolithic will be proposed here.

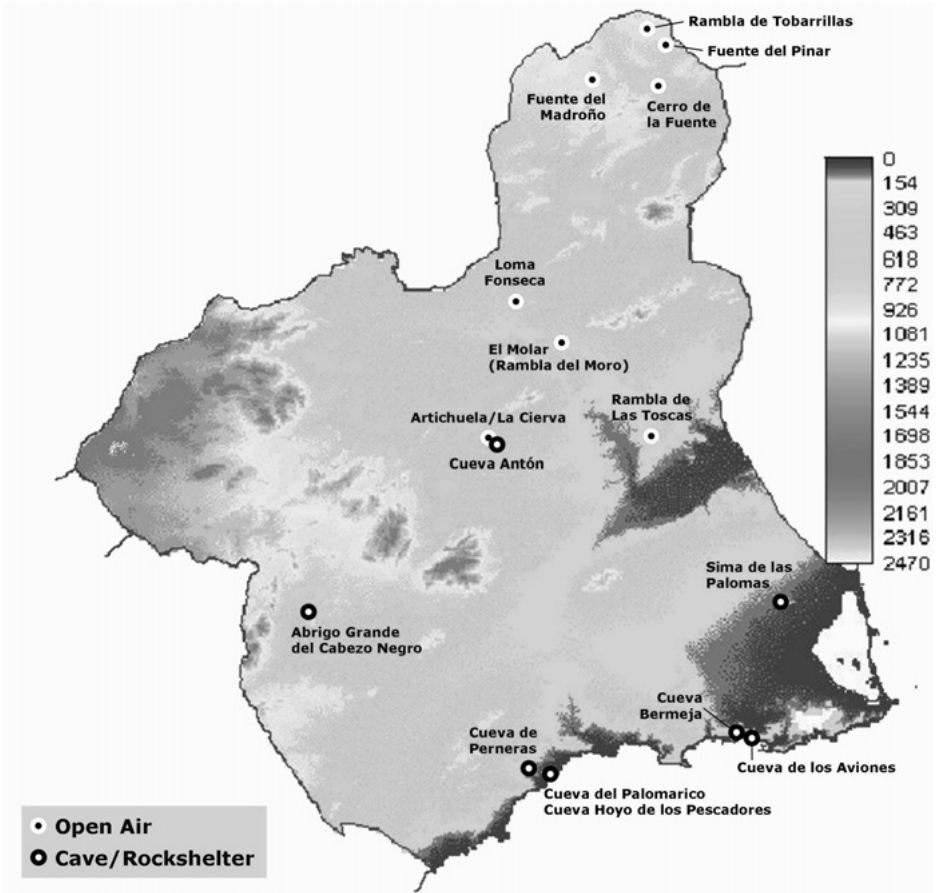


Figure 1. Location of the Middle Paleolithic sites of Murcia with a stratigraphic or site formation context. Map elevations in meters amsl.

*The Yecla plateau sites*

López (1993-94) discussed an ensemble of four open air sites clustered within a circle of 10 km radius immediately west and northwest of the town of Yecla. In all cases, the find localities consist of patches of flint artifacts lying on the surface of Quaternary geomorphological units (glacis

and fluvial terraces), and are closely associated with perennial sources of water (as indicated by the toponyms — Cerro de la Fuente, Fuente del Pinar, Fuente del Madroño). Despite the small size of the collections, the fact that the sites are located within a single geomorphological unit, in close proximity, and featuring a single type of raw-material, with known sources,

**Table 1.** The Middle Paleolithic Murcia. Site gazetteer.

Municipality	Type	Site	References
Abarán	Open air	El Molar (Rambla del Moro)	López 1997-98
Calasparra	Open air	Almadenes	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
Cartagena	Cave	Cueva de los Aviones	Montes 1987, 1988, 1989, 1991b, 1993; Rodríguez & Montes (1985)
	Rockshelter	Cueva Bermeja (o Vermeja)	Cacho 1980, 1981; Martínez 1989; Montes 1996
Cieza	Open air	Almadenes I-VIII Bolvax El Calvo Loma Fonseca	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a> <a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a> <a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a> López 2004
Jumilla	Open air	Fuente de la Solana de Sopalmo	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
		Loma de las Gateras	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
Lorca	Rockshelter	Abrigo Grande del Cerro Negro Cueva Pernerás	Montes & Rodríguez 2002  Cacho 1980, 1981; Montes 1985a, 1985b, 1987, 1988, 1991a
	Open air	Ermita de Santa Leocadia	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
Mazarrón	Rockshelter	Cueva del Palomarico Cueva Hoyo de los Pescadores	Cacho 1980, 1981; Montes 1987 Cacho 1981; Montes 1987
	Underwater	Las Peñicas	Montes 1987
Molina de Segura	Open air	El Fenazar	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
		El Montañal	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
		Ermita de Beltrán	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
		Rambla de las Toscas Salmas	López 1993-94, López et al. 1999, 2003-04 <a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
Mula	Open air	Artichuela/La Cierva	López 2006
	Rockshelter	Cueva Antón	Martínez 1997
Murcia	Open air	Cejo del Águila	<a href="http://www.arqueomurcia.com/">http://www.arqueomurcia.com/</a>
Torre Pacheco	Cave	Sima de las Palomas	Walker 2001; Walker & Gibert 2007; Walker et al. 2004, 2006a, in press
Yecla	Open air	Cerro de la Fuente	López 1993-94
		Fuente del Madroño	López 1993-94
		Fuente del Pinar	López 1993-94
		Rambla de Tobarrillas	López 1993-94

**Table 2.** The Middle Paleolithic of Murcia. Information-poor localities with published data concerning stratigraphy or site formation.

Site	Description
Artichuela/ La Cierva	A 6.25 ha geoarcheological survey yielded lithic artifacts in debris-flow deposits accumulated over Middle Pleistocene fluvial sandy silts, possibly derived from a shallow, emptied rockshelter situated upslope. One hundred and twenty-five artifacts were recovered in two excavated areas (totaling ca. 300 m <sup>2</sup> ): all were flint, 13% were cores, 55% were flakes, and the remainder were debris. Retouched tools were entirely lacking.
Cueva Bermeja	Siret describes a 2.5 m stratigraphy with three levels: lower, 1 m-thick, «decadent Mousterian;» middle, 80 cm-thick, Solutrean; upper, 70 cm-thick, Magdalenian. Cacho (1980, 1981) cleaned Siret's trench and identified intact deposits into which she excavated a 2 m <sup>2</sup> area down to 60 cm. Montes (1987) describes 29 tools in the lower level (15 flint, 11 quartz, 3 quartzite), among which four flint sidescrapers and 18 notches and denticulates.
Cueva del Palomarico	No remnant is extant, but Montes (1987) reports on a few finds made in the backdirt of the 19th-century excavator, Siret, who described a 2 m stratigraphy divided into three levels. On the basis of a backed-and-shouldered point, the upper level is Upper Palaeolithic (Solutrean or Solutreogravettian). A mixed middle level separates it from the lower, Mousterian one, which was «poor» and yielded mostly small, «not well made» and «difficult to classify» quartz artifacts.
Cueva Hoyo de los Pescadores	A 65 cm-thick brecciated remnant, with two levels (upper, 15cm; lower, 50 cm) separated by a paleosoil is described by Montes (1987), who also recovered a few lithics (mostly quartz), as well as bone and shell, in the excavator's backdirt. The collection from Siret's 19th-century's excavations contains nine retouched tools: four points, four backed knives and one sidescraper.
El Molar	A 40 km <sup>2</sup> geoarcheological survey of the valley of Rambla del Moro recovered surface artifacts derived from eroded cobble deposits. One artefact concentration (Sector 1) yielded 122 artifacts (find-density = 2.8/ha), of which 70% were quartzite and 30% flint. No retouched tools were found, only cores, flakes and debris.
Loma Fonseca	This locality corresponds to a low-density lithic scatter recovered on the surface of an extensive outcrop of eroded alluvial fan deposits.
Rambla de las Toscas	Five artefact patches, yielding a total of 379 artifacts, were found over a surveyed area of 1.5 km <sup>2</sup> (find-density =2.5/ha). The finds were contained in cobble deposits covering thin silts and clays accumulated by overland flow over weathered, pre-Quaternary colluvial surfaces. Quartzite comprised 91% of the assemblage, flint 8%. The assemblage is mostly comprised of cores, flakes, and core-tools (picks, choppers), with rare sidescrapers. Based on the illustrated material, the numerous «denticulates» correspond in fact to edge-damaged items, the presence of which is to be expected given the high-energy context of the finds. Since there is at least one biface, the chronological homogeneity of the collection cannot be ascertained: it may well be in part of Lower, not Middle Paleolithic age.

allowed inter-assemblage variability to be studied irrespective of geographic and availability issues.

Based on dimensional and relative abundance parameters (table 3), the four localities were interpreted as functionally related, structurally different poses of a single settlement system with two main types of sites: the «base camp», exemplified by Cerro de la Fuente (small, exhausted cores; retouched tools in high percentage; abundant sidescrapers); and the «workshop», exemplified by Rambla de Tobarrilla and Fuente del Madroño (few retouched tools, mostly notches and denticulates, with rare sidescrapers; cores and flakes of larger size). As fig. 2 makes it clear, the key factor underlying variation between these two extreme poles is distance to raw-material. In all cases, this parameter is a good predictor of the length of cores and blanks, which decreases with distance, and of an assemblage's sidescraper index and overall percentage of retouched tools, which increase with distance.

The Yecla plateau sites thus provide a model against which to assess the characteristics of the lithic assemblages recovered in the stratified, cave and rockshelter sites of the region (fig. 3), to which we now turn.

### *Abrigo Grande del Cerro Negro*

Developed along a fault that separates Paleocene marls from Neogene limestone, this North-facing shallow shelter dominates the eastern headwaters of the Rio Turilla from an elevation of some 200 meters above the current valley bottom. Subsequent to significant pot-hunter destruction of the richer deposits along the wall, three seasons of archeological work excavated an area of ca.7.5 m<sup>2</sup> to a depth of ca.90 cm (Montes & Rodríguez

2002). Although subdivided into six different units, all made up of light-colored, highly carbonated, compact sands containing small, angular limestone debris, the stratigraphic sequence comprised between bedrock and a 10 cm-thick caliche deposit was reported by the excavators to a single period of occupation. The archeological remains are almost entirely lithic artifacts, all on flint and featuring levallois reduction methods. The scarce faunal remains recovered correspond to a single *Equus* sp. individual.

The lithic assemblage totals 26 cores, 805 flakes and 134 retouched tools, the latter corresponding to 14.27% of the blanks and featuring a sidescraper index of 37.31 (table 4). Despite the fact that flint is immediately available, the figures match the «base camp» extreme of the Yecla sites' range of variation, and, at first glance, thus falsify a simple reduction-with-distance model. However, it is not clear whether the flint variety present in the local source is that used for the sidescrapers. Until a proper raw-material provenience study is conducted, it remains possible that, as the model would predict, the sidescrapers reflect imports while the unretouched blanks reflect on-site production. On the other hand, the small number of cores is at first glance inconsistent with a workshop interpretation of the site. The excavators' solution to this apparent conundrum is that that production would have been effected at the nearby points of extraction, with no need for whole blocks of raw-material to be transported to the place of residence.

### *Cueva Perneras*

Despite the name, this site is in fact a rockshelter excavated in a Miocene cal-

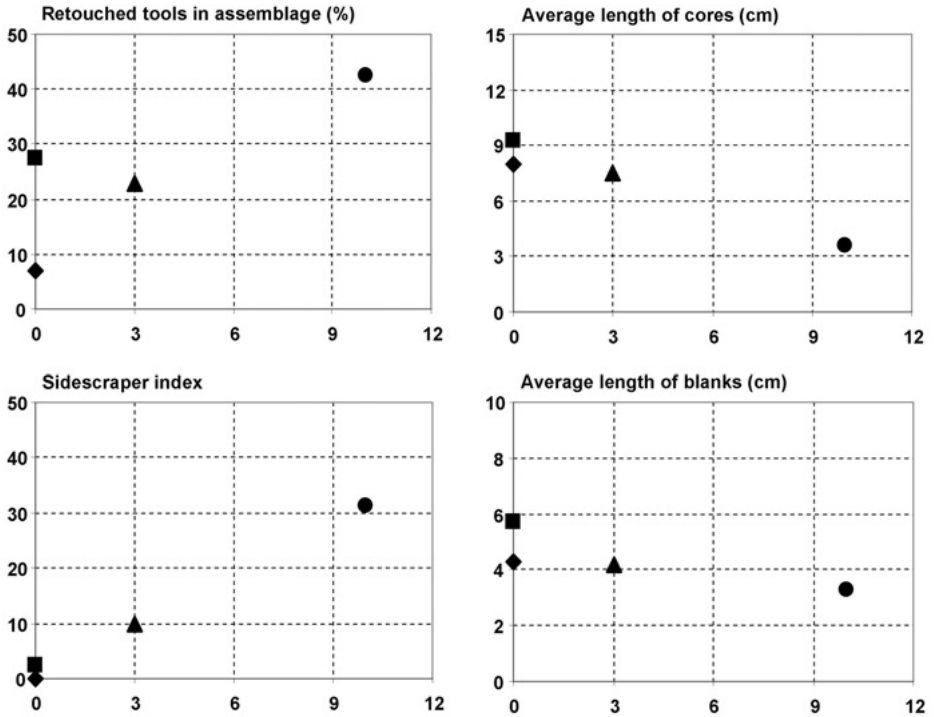
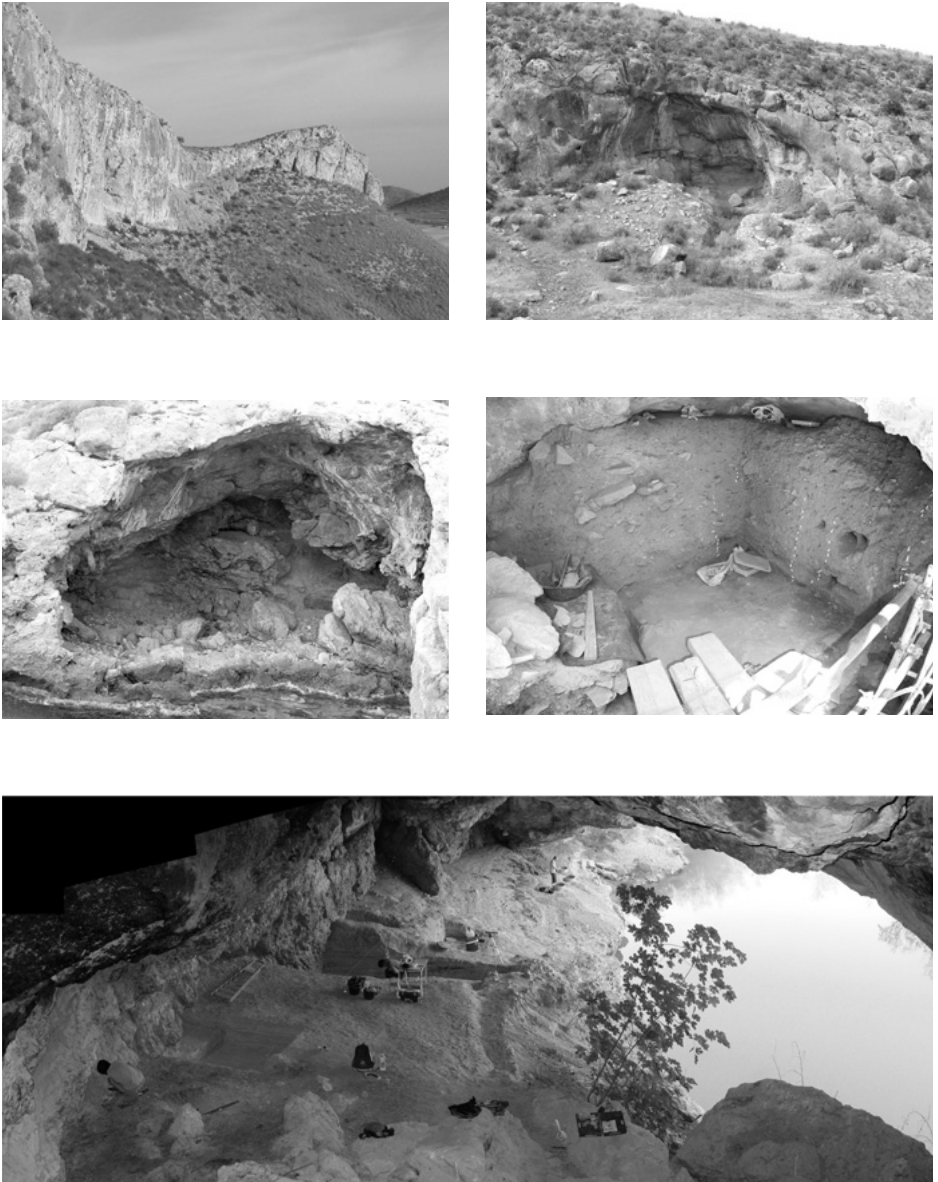


Figure 2. The Yecla Plateau sites. Assemblage variation with distance to raw-material (km). Diamonds: Rambla de Tobarrilla. Squares: Fuente del Madroño. Triangles: Fuente del Pinar. Circles: Cerro de la Fuente.

carenite escarpment exposed by the deep incision of a small arroyo into the underlying Triassic dolomites. It has a large porch facing due south and overlooking the Rambla de Ramonete, which joins the Mediterranean at the beach of Calnegre, located at a distance of ca.4 km as the crow flies. Before fill-up and overhang collapse, a well-illuminated, sheltered space with an area in excess of 150 m<sup>2</sup> was available for occupation. Moreover, as suggested by a number of different clues, fresh water sprung from the back wall of the shelter in Upper Pleistocene

times, adding to its attraction as a camp-site of choice.

Nineteenth-century excavations by Siret completely emptied the interior area of the site. However, two intact, ca.20 m<sup>2</sup> exterior remnants were left on each side of the long sagittal trench cut by Siret into the slope deposits that originally sealed the shelter. The eastern remnant was partly excavated in the early 1980s by Montes (1985a, 1985b, 1987, 1991a), who profiled Siret's trench to bedrock and excavated the adjacent 6 m<sup>2</sup> (grid units B-C/1-3) down to the base of sublevel 11 of the



**Figure 3.** Middle Paleolithic cave and rockshelter sites of Murcia. Top left: Abrigo Grande del Cerro Negro. Top right: Cueva Perneras. Middle left: Cueva de los Aviones. Middle right: Sima de las Palomas Upper Cutting (at the end of the 2007 field season). Bottom: Cueva Antón (during the 2008 field season).



**Table 3.** Flint economy of the Yecla plateau sites (data from López 1993-94).

	Rambla de Tobarrilla	Fuente del Madroño	Fuente del Pinar	Cerro de la Fuente
Distance to raw-material (km)	0	0	2	10
Artifacts (N)	100	91	70	179
Cores (%)	26.00	13.18	4.28	10.61
Retouched tools (%)	7.00	27.47	22.86	42.46
Sidescraper Index	0	2.53	10.00	31.25
Notch & Denticulate Index	28.37	31.64	11.66	8.75
Average core length (cm)	8.00	9.29	7.50	3.56
Average blank length (non-retouched only; cm)	4.28	5.72	4.20	3.27

**Table 4.** Lithic economy parameters of Mousterian assemblages from cave and rockshelter sites of Murcia (data from Montes 1987 and Montes & Rodríguez 2002).

	Cerro Negro	Perneras IX	Aviones I	Aviones II	Aviones III	Aviones IV
Blanks (N) (flakes, «pseudoflakes» and tools)	939	645	95	106	163	104
Blank length (non-retouched only; cm)	—	3.2±0.9	3.3±0.8	3.5±0.8	3.5±0.9	3.5±0.9
Tools (% of all blanks)	14.27	8.22	11.39	18.34	13.21	8.22
Sidescraper Index	37.31	22.64	28.57	27.27	30.00	35.71
Quartz:Flint ratio (all blanks)	0.00	9.57	4.94	12.25	9.19	3.95
Quartz:Flint ratio (only tools)	0.00	1.60	1.00	3.40	2.33	0.62

observed stratigraphy, which, from top to bottom, Montes divided into four main units: levels I-IV, Magdalenian with Holocene intrusions; level V, Aurignacian; levels VI-VIII, Mousterian in a reddish matrix; level IX, Mousterian in a dark-brown to black matrix (this unit was initially subdivided in six parts, IX to XIV, subsequently recognized to correspond to a single stratigraphic unit designated IX as a whole). The existence of typical Aurignacian material among the >100,000 items forming Siret's collection in the National Museum (Madrid) had also been pointed out by Cacho (1980, 1981).

Results from a cursory appraisal (April 23, 2008) of the material from Montes' excavations housed in the Museo Regional (Murcia) somewhat rectify these characterizations. Level V contains unillustrated material identical to that found in the overlying levels (namely, tiny prismatic bladelet cores for the production of <15 mm long blanks), and there is nothing among the illustrated lithics — not even the supposedly diagnostic nosed and nucleiform scrapers — that would be out of place in a Magdalenian assemblage. Thus, although the site may well have been occupied during the Aurignacian,

particularly where its interior area is concerned, there clearly was no distinct Aurignacian level in the exterior area excavated by Montes. However, flint items of unambiguous Early Upper Paleolithic affinities were indeed present in the reddish Mousterian levels VI-VIII; for instance, level VIII yielded an excellent burin on concave truncation made on a blade with continuous scalariform retouch (misclassified as a sidescraper by the excavator; Montes 1987: fig. 23; Montes 1991a: fig. 5; reproduced in fig. 4 here). Although a Gravettian age cannot be excluded, this piece would fit comfortably in Late Aurignacian assemblages (e.g., the Aurignacian III-IV of La Ferrassie) such as that documented in Iberia by the Portuguese open air site of Vale de Porcos (Zilhão 2006).

Given the above, only the material from Montes' level IX can be considered as an uncontaminated reflection of the stone tool economics of the Middle Paleolithic occupants of Perneras (table 4). Locally available quartz is the dominant raw-material, while flint was obtained from sources that, according to Montes (1987), were in some cases as distant as the Sierra Espuña, some 40 km inland. In good agreement with a reduction-with-distance model, flint blanks were retouched to a much larger extent than quartz ones. Alongside discoidal and other more expedient reduction methods, the levallois technique was used, and irrespective of raw-material, i.e., for flint as well as quartz. Where retouched tools are concerned, most quartz ones are notches, denticulates or backed knives, while most flint ones are sidescrapers.

A few large mammal diaphyseal fragments from level IX were interpreted as bone tools (Montes 1991a: figs. 6-7).

Although an anthropic origin of the breaks cannot be excluded in at least a few instances, none of these items bears clear evidence of having been deliberately shaped or modified. Instead, they simply reflect the high level of fragmentation of the mammal bone remains, explaining why, despite the significant number of items recovered, Montes (1991a) could only identify a small number to either red deer or rabbit. Shells of the land snail *Iberus alonensis* are numerous and speculated to possibly stand for its exploitation as a food source. Most likely, however, this material accumulated naturally (a process that is ongoing at the site in the present) and represents post-depositional, recent Holocene intrusions into the Pleistocene deposits. In contrast, a few shells or shell fragments of marine mollusks (*Monodonta*, *Mytilus* and *Patella*) testify to the on-site discard of sea food debris. Given the considerable distance to the extant coast line, this evidence implies delayed consumption and the possession of the container technology required to effect the transport of live shellfish over walking distances of about one hour, if not more.

### *Cueva de los Aviones*

This currently uninhabitable sea cave is excavated in the tract of Triassic dolomite coastal escarpment defended by the Fuerte de Navidad, at the entrance to the port of Cartagena. The original fill has been almost completely removed by marine erosion, but a brecciated remnant surviving against the northwestern wall of the site was partially excavated in 1985 (Montes 1987, 1988, 1989, 1991b, 1993). Over a thickness of ca. 3.5 m, six stratigraphic units were recognized, the uppermost four being archeologically fertile and separat-

**Table 5.** Archeological contents of the excavated area of the Cueva de los Aviones brecciated remnant (data from Montes 1987, 1991b, and unpublished field documents).

	Level I	Level II	Level III	Level IV
Excavated area (m <sup>2</sup> )	0.54	3.14 <sup>a</sup>	4.70	5.70
Average thickness (m)	0.80	0.35	0.20	0.30
Excavated volume (m <sup>3</sup> )	0.43	1.10	0.94	1.7
Stone tool blanks (N)	95	106	163	104
Unidentified mammal bone fragments (kg)	2.25	1.80	10.45	4.08
MNI of main edible shellfish genera	43	54	153	141
<i>Cardium</i>	1	1	–	–
<i>Cenastoderma</i>	–	–	–	2
<i>Mytilus</i>	23	4	16	18
<i>Patella</i>	6	40	70	34
Find density for stone tool blanks (N/m <sup>3</sup> )	221	96	173	61
Find density for mammal bone (kg/m <sup>3</sup> )	5.23	1.64 <sup>b</sup>	11.12	2.39
Find density for edible mollusks (MNI/m <sup>3</sup> )	100	49	163	82

<sup>a</sup> although a total of 3.70 m<sup>2</sup> were excavated in this level, the area occupied by a large boulder in square B1 must be excluded from volume calculations.

<sup>b</sup> 600 g of bone from this level were used for (unsuccessful) radio carbon dating in the UGRA lab.

ed into two major blocks by a 10 cm-thick caliche deposit found at the interface between levels II and III. Sterile levels V (a transgressive beach) and VI (continental sands) form the bottom third of the sequence.

This stratigraphic configuration suggests correlation of level VI with the penultimate glacial period and of level V with the later part of OIS-5. The abundance of anthropically accumulated marine mollusk shells in levels I-IV, in turn, suggests relative proximity of the site to the coast line at the time of occupation. This observation excludes an OIS-4 chronology for the overlying deposits, as at that time the Mediterranean sea level would have descended to between the 55 m and the 105 m isobaths (Rabineau 2006), implying, given the topography of the continental platform in the area (Montes 1987,

1991b), a distance to the site of up to 7 km. Assuming a Stage 3 chronology for the archeological deposits, the pedogenetic episode reflected in the accumulation of caliche in the upper part of level III could well correspond to one of the most pronounced D/O events of the Greenland ice core sequence, e.g., Greenland Interstadial 12, the onset of which dates to about 47,500 calendar years ago (Shackleton *et al.* 2004; Weninger & Jöris 2004).

Because of the morphology of the preserved remnant, the size of the excavated area increased considerably from top to bottom. Extrapolating from the average thickness of the different stratigraphic units and the area excavated for each unit, the volume of deposits that Montes sampled can be estimated to have varied between ~0.5 m<sup>3</sup> in level I and ~1.5 m<sup>3</sup> in level IV. These estimates carry a mar-

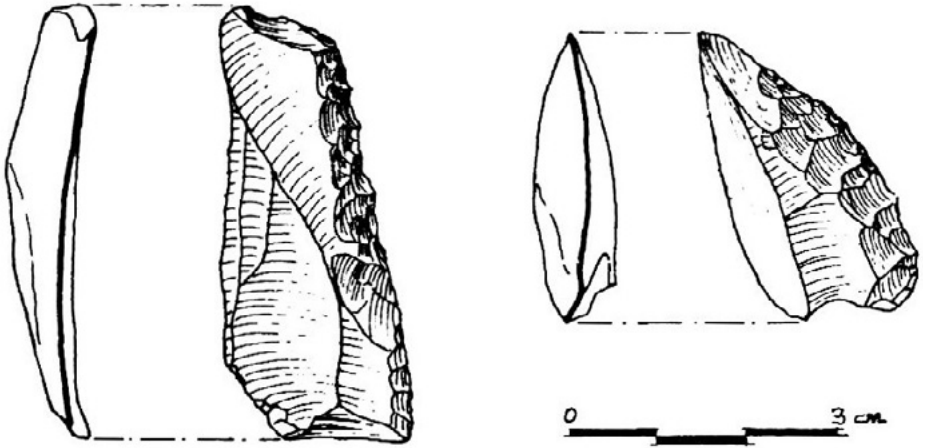


Figure 4. Middle and Upper Paleolithic items in level VIII of Montes' 1980s excavation of Cueva Perneras (from MONTES 1987: Figura 23). The piece on the left is a burin on concave truncation; that on the right is a sidescraper; their patina is also distinct.

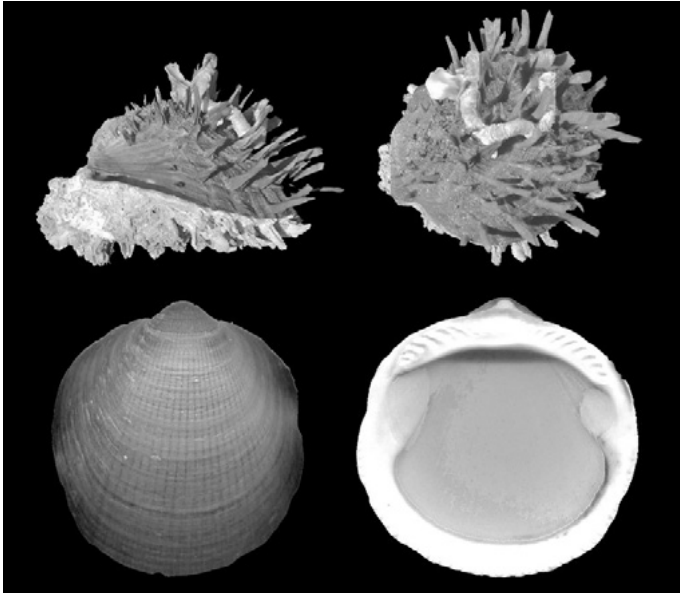


Figure 5. Infra- and circa-littoral species present in the Cueva de los Aviones marine mollusk shell assemblage that may have been used for symbolic or ritual purposes: top, *Spondylus gaederopus*; bottom, *Glycymeris bimaculata*.



Figure 6. Articulated Neandertal foot from Sima de las Palomas (after Walker & Gibert 2007: Figure 2).

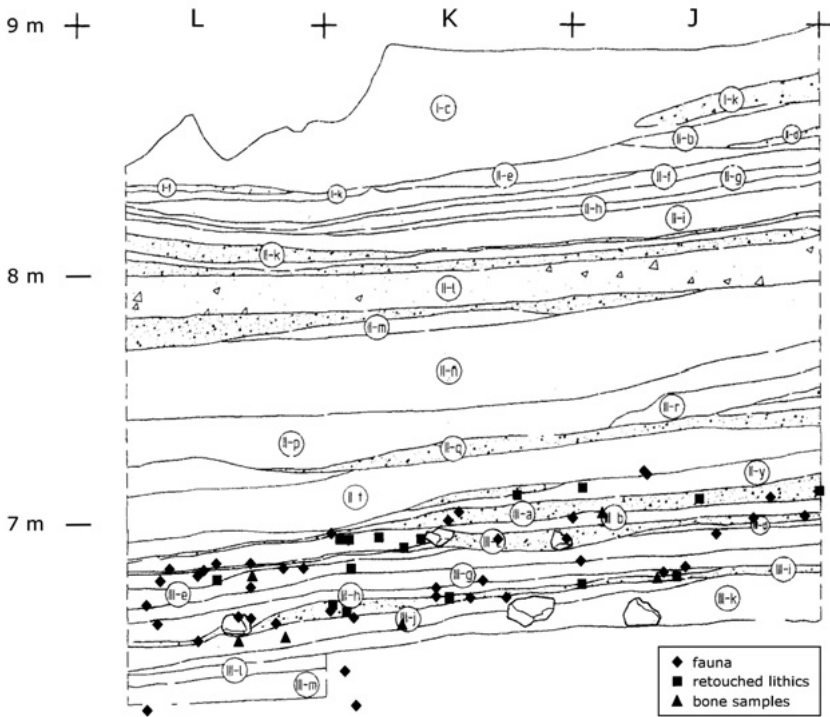


Figure 7. Cueva Antón 1991. Projection over the 20/19 profile (i.e., along the E-W axis of the grid) of selected piece-plotted finds (coordinated bone and retouched lithics).

gin of error, and it cannot be excluded that inter-level spatial variation (i.e., variation in where at the site the different categories of finds preferentially accumulated at different times in the history of its human use) was greater than the stratigraphic variation documented in the small area that was available for excavation. Bearing this in mind, the find density parameters calculated on the basis of Montes' data suggest that level III was the richest of the sequence, especially where the mammal bone and mollusk shell assemblages are concerned (table 5).

These observations are consistent with the twin notions that, as discussed above, level III formed at a time of global climatic amelioration (entailing a decrease in the size of ice caps and relatively high sea levels), and that the resulting closer proximity of the site to the coast underlies the observed increase in the local consumption of sea foods. The range of mollusk species exploited suggests in turn that the Cartagena OIS-3 coast line, although situated farther to the south, was topographically and ecologically similar to that of the present, i.e., consisted of a landscape of rocky, high escarpments that were interrupted by small, sheltered beaches wherever the cliffs were cut by the mouths of rivers and minor streams. This inference is consistent with the fact that, besides rabbits and horse, ibex is the only other mammal species represented in the fauna, almost entirely made up of fragmentary, unidentifiable material (Montes 1987, 1991b).

The lithic assemblages are mostly quartz, suggesting that flint is non-local; however, the levallois method was used in the reduction of both kinds of raw-materials. The absence of flint cores and the high values of the Sidescraper Index (a tool

category for which flint was preferentially used) replicate the Yecla sites «base camp» pattern. The long-distance transport, curation and reduction of the finer raw-materials is corroborated by the fact that the representation of flint increases markedly when only the retouched tools are considered (table 4). Bearing in mind that, among unretouched blanks, quartz vastly outnumbers flint (in proportions that vary between 4:1 and 12:1), average blank length also reflects the small size of even the flakes made on the locally available rock. The same phenomenon is apparent at Cueva Perneras. Pending further investigation, this may reflect cultural preference, economizing behavior (the edge length to blank weight ratio increases as overall size decreases), or technological constraints (such as cobble size at the source).

Remarkably, the Aviones assemblage of marine mollusks also contains infra- and circa-littoral specimens that must reflect beach collection of shells brought up from the sea bottom by the waves: *Glycymeris bimaculata* (22 specimens, mostly in levels I-II, none in level IV) and *Spondylus gaederopus* (two specimens, in levels I and IV) (Montes 1987, 1988, 1991b, 1993). These shells (fig. 5) may have been collected for use as tools for different conceivable purposes (such as ochre containers or drinking cups), but it is striking that, upon examination of the collection housed in the Cartagena Museum (April 18, 2008), the only two *Glycymeris* shells that are intact, both from level II, bear large perforations of the umbo (a photo of one, *in situ* at the excavation, is published in Montes 1993: 9). Therefore, pending the results from ongoing use-wear analysis and investigation of the origin of the perforations (natural versus anthropic),

the possibility of a symbolic function, perhaps as personal ornaments, must be entertained. In this context, one must also note that, in Holocene times, the bright red upper valve of *Spondylus gaederopus* was widely used for ritual and symbolic purposes (Borrello & Micheli 2004).

### *Sima de las Palomas*

The Sima de las Palomas is a deep karstic shaft located in the south facing slope of the Cabezo Gordo hill, overlooking the nearby Mar Menor lagoon. Once completely filled-up, it was emptied by nineteenth-century miners searching for water, who only left an 18 m high column of sediment brecciated against the rear wall. The discovery of a Neandertal skull and mandible outcropping from the upper levels of the column triggered an archeological excavation project directed since 1994 by Michael Walker and the late Josep Gibert.

Walker *et al.* (2008) summarize currently available evidence concerning the stratigraphy, dates, and human remains recovered in the Upper Cutting area, at the top of the shaft, where the sequence comprises two main units. An uppermost, loose, reddish cave earth deposit contained fragmentary remains (mostly loose teeth and mandibular fragments) of several Neandertal individuals and is radiocarbon-dated to  $34,450 \pm 600$  BP (OxA-10666) (ca.39.7 ka cal BP). An underlying, heavily cemented grayish deposit has yielded articulated skeletal parts of at least four different Neandertal individuals (fig. 6), one of which directly dated by U-series to the time interval comprised between 50,000 and 60,000 years ago.

According to Walker (2001), the associated lithics are made on flint, quartz,

rock-crystal, limestone and quartzite, with the nearest known source of good quality flint being 20 km away. The retouched tool assemblage includes Tayac, Levallois and pseudo-Levallois points, convergent scrapers, sidescrapers and notched and denticulated pieces. Where faunal remains are concerned, rabbits predominate among the mammals, with several species of carnivores (panther, hyena, wolf) and herbivores (horse, deer, ibex) being also represented, alongside birds and tortoises.

### *Cueva Antón*

This rockshelter is excavated into the base of an E-W, 25-30 m high, Eocene limestone escarpment located on the right bank of the Mula river, at the entrance to the canyon of El Corcovado, nowadays largely submerged by the La Cierva dam reservoir. Salvage work undertaken in 1991 exposed a >4-m-thick fluvial sequence containing Mousterian occupations in level III of the described stratigraphy (Martínez 1997).

Over the ca.9 m<sup>2</sup> excavated, >1000 mammal bone fragments were recovered, some of which identified to two species, rabbit and red deer. The lithic assemblage comprised 351 artifacts, mostly debitage and knapping debris reflecting the exploitation of a limestone raw-material that is locally available as river cobbles. This rock represents some two-thirds of the lithic inventory, where quartzite is represented in small amounts; the remainder corresponds to different varieties of flint that, combined, make up a quarter of the collection. All the 18 retouched tools are described as sidescrapers, and all but one are made on flint.

Although treated en bloc, the fauna and lithics from level III were actually



**Figure 8.** Cueva Antón 2008. Lithic artifacts from level I-k, the uppermost human occupation recognized so far. Left: exhausted centripetal core. Center: denticulated piece. Right: splintered piece.

recovered across the fourteen sublevels into which the excavators divided this ca. 1 m-thick package of fluvial sands. For the most part, however, they came from sublevel III-f (the richest in lithics) and III-j (the richest in faunal remains). Using the coordinates recorded in the bags containing individual piece-plotted items in the collection housed at the Museo Regional, Murcia (accessed for cursory study and sampling on January 16, 2006), a projection of selected cut-marked faunal remains and retouched tools along the main stratigraphic dip suggests that, in fact, only two occupation horizons exist in level III (fig. 7). In all likelihood, these occupations were organized around two *in situ* hearths represented by charcoal concentrations identified in sublevels III-c and III-j.

The high resolution of the stratigraphy and its potential for the preservation of the spatial structure of the habitat in the low-energy beach deposits forming

level III justified further excavation of the site, which began in 2006 under the direction of the present authors. The focus of current work is the high-precision dating of the sequence (via radiocarbon, OSL, U-series and microtephras) and the drawing of paleoenvironment information from the sediments themselves and from their well-preserved and abundant natural contents: lagomorphs, micromammals, aquatic mollusks, land snails, wood charcoal and pollen. Prior to the intended open area excavation of level III, the overlying units I and II are currently under investigation and, in the new trenches opened in 2007-08, have also yielded evidence of occupation by Middle Paleolithic people in sublevels I-k, II-l, II-u and II-y (fig. 8). Although scarce, the artifacts are diagnostic, and suggest ephemeral visits to a site where, in these times, the main accumulator of bone must have been the eagle-owl, as the associated faunal assemblages



are almost exclusively formed of (pre-dominantly juvenile) rabbit material.

## Conclusions

The lack of chronological control is at present the major obstacle to a better understanding of the patterns that can be drawn from the evidence reviewed above. By the same token, it prevents adequate assessment of the scant paleoenvironmental information derived from the palynological results obtained at Cueva Perneras and Sima de las Palomas by Carrión *et al.* (1995, 2003). Bearing in mind our current lack of control of the chronological factor and of its potential impact on the perceived variation, the following conclusions on the Middle Paleolithic of Murcia seem at present to be warranted:

1. Human settlement is known in coastal, lowland and high plateau environments but not in montane settings beyond ~700 m amsl.
2. At least during OIS-3 times, coastal sites bear unambiguous evidence of the exploitation of marine resources, namely shellfish, which are transported to residential localities situated >4 km inland; whether the consumption of sea foods carried a marked seasonal signature or was effected all year round is currently unknown.
3. Rather than reflecting Middle Paleolithic subsistence, middens of the *Iberus alonensis* land snail in cave and rockshelter sites are natural (and often intrusive), while rabbit remains are primarily accumulated by birds of prey (e.g., eagle-owls).
4. Flint is the raw-material of choice for the production of stone tools, is exclu-

sively used when immediately available, and is transported across the landscape over distances of up to 40 km, generating severely truncated *chaînes opératoires* at cave and rockshelter sites that are distant from the sources.

5. The percentage of sidescrapers among the retouched tools increases with distance to raw-material source, while the size of unretouched flint blanks decreases, suggesting curation of the finer raw-materials and supporting an economy view of retouch as a technical behavior dictated primarily by sharpening and resharpening needs and constraints.
6. Although the lack of measurements precludes a more precise assessment, it is apparent from the material illustrated in the literature that most sidescrapers were discarded in a stage of their life history where further resharpening would entail a reduction of length to <3-4 cm, suggesting the operation of ergonomic factors (hand size, hafting, or other).
7. When flint is distant, locally available raw-materials (quartz, quartzite, limestone) are primarily exploited, often with recourse to the same levallois methods used for flint but with very low indices of secondary edge modification, generating retouched tool assemblages mostly made up of notches and denticulates.
8. The associated human remains are of Neandertals; pending further taphonomic investigation of the articulated skeletons currently under excavation at the site, the evidence from Sima de las Palomas hints at funerary behaviors involving deliberate burial, as documented in the Middle Paleo-

- lithic of France, Belgium and Germany.
9. The perforated *Glycymeris* shells and the intact valves of *Spondylus* from Aviones probably are symbolic artifacts, with the former conceivably representing objects of personal ornamentation.
  10. The radiocarbon dates, corroborated by U-series results, obtained for the uppermost levels of the Sima de las Palomas document the persistence of Middle Paleolithic technologies and associated Neandertal populations up to at least 34.5 ka <sup>14</sup>C BP (ca.39.7 ka cal BP); the exact timing of their

subsequent replacement by Upper Paleolithic modern humans is currently unknown, but the evidence from Cueva Pernerás suggests that the earliest Upper Paleolithic of the region is of Aurignacian affinities.

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