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Morphotechnical analysis and raw material management at level G of Las Fuentes de San Cristóbal (Huesca, Spain). Preliminary comparative technological study with level Ga at Payre (Ardéche, France)

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Abstract

Level Ga of Payre (Ardèche, France) and level G of Las Fuentes de San Cristóbal (Pre-Pyrenees of Huesca, Spain) belong to the same geographical context, southern Europe. Payre´s Ga level is situated in MIS 7 by U/Th dates, while Las Fuentes de San Cristóbal G level, must be assigned to MIS 3. Despite their chronological difference both industrial assemblages have been assigned to Mode 3 or Mousterian.

Le niveau de Ga Payre (Ardèche, France) et le niveau G de Las Fuentes de San Cristóbal (Pre-pyrenees de Huesca, Espagne) appartiennent au même contexte géographique, le sud de l'Europe. Le niveau Ga de Payre est situé au MIS 7 OIS U / Th dates, tandis que le niveau G de Las Fuentes de San Cristóbal doit être attribué à OIS 3. Malgré leur différence chronologique, les deux assemblages industriels ont été attribuès à Mode 3 ou Moustérien.

Keywords: Las Fuentes de San Cristóbal, Payre, Mousterian, raw materials, technology.

Introduction

The aim of this paper is to compare the management of technology and raw materials between two different sites with different chronology and geographical situation but both belonging to the Mousterian technology. The methodology used is the Logical Analytical System, created by Carbonell, Guilbaud and Mora (1981) and born as an alternative to the traditional classification systems, completing the analytical system introduced by Laplace (1963).

Level G of Las Fuentes de San Cristóbal

The archaeological site

The site of Las Fuentes de San Cristóbal is located in the Veracruz village, in the oriental area of the Huesca province (northeastern Spain).

It is located between the exterior Axial mountain area and the Middle Depression of the Pyrenees Chain, at the entrance of the narrow mountain pass of San Cristóbal, of which adopt its name. It is located 820 m a.s.l. and at 20 m from the current bed of the Isábena River. This area shows a complex system with wide hydrographic valleys, formed by the Ésera, Isábena and Noguera-Ribagorzana rivers (Rosell *et al*., 2000; Menéndez, 2005; Menéndez 2006; Menéndez *et al.*, 2008; Menéndez et al., i.p; García-Antón *et al., i.p*). The site was discovered in 1998 during a road extension's work. Rescue archaeological excavations have been conducted in the site during 5 years (until 2002). Besides the damage, the excavation of a great part of the archaeological sequence has been possible. The sedimentary deposit of Las Fuentes de San Cristóbal has 5 meters of stratigraphy, where it has been possible to identify 9 archaeological

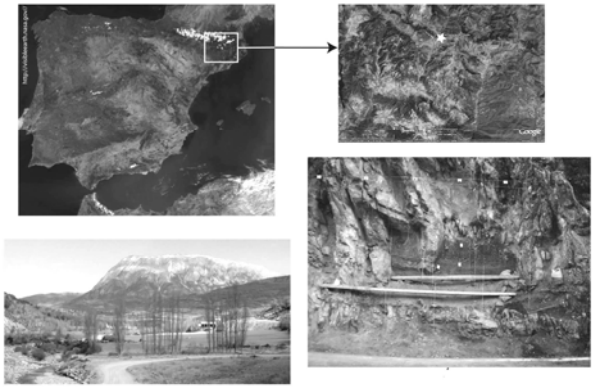

Fig. 1. Situation of Las Fuentes de San Cristóbal (modified from García-Antón *et al., i.p*).

levels with lithics (Menéndez, 2005; 2006; Menéndez *et al.*, 2008; García-Antón *et al., i.p*),faunal remains (Rosell *et al*., 2000), pollen grains (Llácer, 2005), coals (Allué, 2003) and remains of hearth, being the industrial set the richest.

The absence of dating for this level up to this moment does not allow attributing a chronology to level G. However, some coal samples are being studied on the marc of the project "Chronological and cultural context of the final Middle Palaeolithic in the Peninsular North" (HUM2004-04679-Spanish Department of Culture and Education).

Nevertheless, it has been stated the existence of a basal level formed by rounded pebbles over which level G is located, being therefore subsequent to this chronology. So, level G would be positioned during MIS3.

Concerning the archaeological record, faunal assemblages mainly consist in cervids (Cervus elaphus), equids (Equus caballus) and rhino, and some undetermined herbivores. The high degree of fragmentation and alteration did not permit an exact taxonomical identification in many cases.

There is a predominance of long bones fragments of medium-sized animals (Rosell *et al*., 2000; Menéndez *et al.*, 2006).

Anthracological and palynological studies (Allué, 2003; Llácer, 2005) showed the presence of a woodland area as well as a general trend to climatic worsening from the bottom to the top of the sequence. Palynological analyses are focussed mainly on levels M to P. They show a predominance of typical species from warmed and humid environments in P level (*Pinus* sp, *Juniperus* sp., *Ulmus* sp.) as well as different species of grasses and other taxons indicating the existence of river beds near the site. Towards the top of the sequence taxonomical diversity decreases and species associated to warmed conditions appear.

Lithic raw materials and technology at Las Fuentes de San Cristóbal.

Level G yielded a number of 4,440 lithic items, from which a sample of 2,199 has been analyzed. Flint is the most represented raw material (73.5%), followed by limestone (11.26%), porphyry (6.8%), quartzite (6.52%), sandstone (42%) and (in a very low percentage), lydite (0.26%) and quartz (0.21%) (Menéndez, 2005; 2006; Menéndez *et al.*, 2008; Menéndez et al., i.p; García Antón *et al.*, i.p).

Most of the raw materials appeared at level G are present in variable percentage.

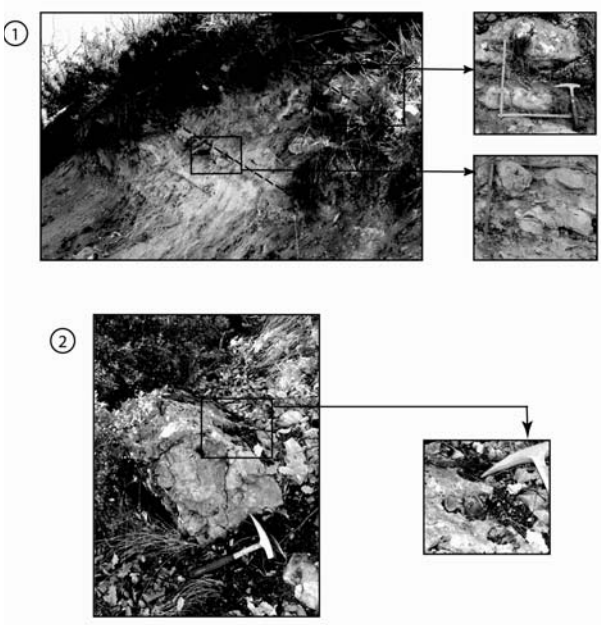

Fig. 2. Primary flint formations. 1. Capella, 2. Egea (modified from García-Antón *et al., i.p*)

Primary flint formations are located in two different areas. First, the Capella-Canal del Buitre area, which comprises several formations of Paleogen age, such as the Puy de Cinca formation, and containing siliceous strata. This formation is located about 9 Km far from the archaeological site (Menéndez, 2005; 2006; Menéndez *et al.*, 2008; Menéndez *et al., i.p*; García Antón *et al., i.p*).

The second formation is the Egea formation. The Egea cliff erodes some of the Cretaceous limestone formations of the Turbón Massif. Westwards the town of Egea a bed of Santonien (Upper Cretaceous) marly limestone has been found. This flint is not suitable for knapping due

to its abundance of internal oxidized fracture planes that hamper proper flaking. It is greatly represented among the cliff's colluviums, also

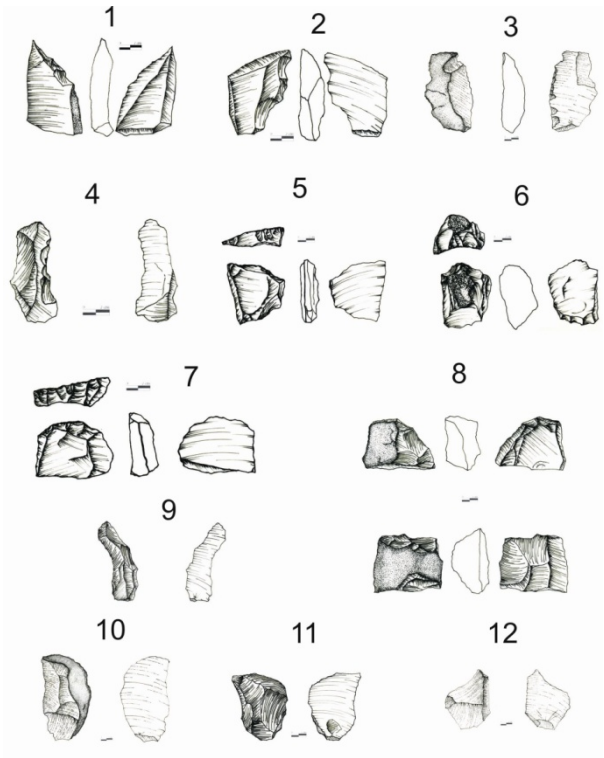

Fig. 3. Las Fuentes de San Cristóbal`s G lithic industry. 1-7 retouched tools, 8 cores, 9-12 flakes (drawings L. Menéndez).

appearing in the Rialbo River (García-Antón *et al., i,.p*). It is highly represented in level G of Las Fuentes de San Cristóbal site. This formation is about 24 Km far from the site.

The structural categories (Logical Analithical System, Carbonell *et al.,* 1981) defined on this level (Menéndez, 2005; 2006; Menéndez *et al.*, 2008; Menéndez *et al., i.p*) show a greater abundance of knapping products with more than 95% of the total, whereas the cores are not so abundant with 0,8% (24 pieces). Most of them (95%) are fully preserved, and 0.3% are core fragments. This fact allows us to infer that the knapping strategies of these hominids were mainly oriented to obtain this kind of products.

Butts and dorsal surfaces of flakes are characterized by a little presence of cortex, accordingly to the majority of cores, which are in the final phase of knapping, especially those made in flint. This set of characteristics may be related to a hyper-exploitation of cores and/or to a previous knapping in the collecting areas before entering the occupation. The greater presence of non-cortical products is likely related to this fact.

Regarding the knapping methods, there is a dominance of the discoid method, followed by the multifacial multipolar method, which could be related to the maximal use of the raw material. In this sense we also have to emphasize the presence of a high number of cores made on flakes. We have also observed the presence of two pieces whose morphotechnical features approach those described by certain authors in order to define the Levallois method (Boëda, 1994).

Retouched tools are 67, representing the 2.2% of the whole assemblage of level G. From a typological point of view, denticulates dominate, particularly D23 or racloir denticulé, followed by side-scrapers mostly of them R11 or *racloir marginal* and R21 or *racloir lateral* (Laplace 1973), and also a little number of end-scrapers.

Level Ga of Payre

The archaeological site

The site of Payre (Combier, 1967; Massaoudi *et al.*, 1993; Moncel *et al.*, 1991; Moncel, 2003), discovered in 1954 by J. Combier, is located in the south-east of France, in the gorge of a small river, tributary of the Rhône, between the confluence of this river and the Payre´s valley. It is situated in a small terrace on a Kimméridgien-Portlandien limestone secondary formation rich in flint

The cavity is included in a karstic complex made up of several shelters and fissures, among which two cavities conform the deposits of Payre 1 and Payre 2 with a Middle Palaeolithic record, in addition to a third shelter with a Calcolithic occupation (Payre 3).

The stratigraphy of Payre 1 and 2 comprises ten levels, five of which yielded lithic industry (Moncel, 2003; Chacón, 2005; Menéndez *et al.*, 2008) and faunal remains. From layer J to F humans and carnivores like bears occupied alternatively the cave. However, the lastest ocupation took place in the open-air area, out of the cave.

Twelve human teeth and a fragment of occipital were discovered among the faunal and lithic records (Moncel and Condemi, 1996).

Líthic industry is present in all levels, especially in D and F, with a more intense occupation of the cavity. According to Moncel (Moncel *et al.*, 1991), this industrial set would be assigned to Mousterian Charentian of Ferrasie facies with certain characteristics of the Typical

Mousterian. Several palinological studies point to open vegetation of temperate climate, drier in the base that in the top of the sequence (Kalai *et al.*, 2001).

RAW MATERIALS	STRUCTURAL CATEGORIES						TOTAL
	Hammer-stones	Retouched artifacts	Cores	Flakes	Fragmented flakes	Fragments (*)	
Sandstone				20 (50)	12 (30)	8 (20)	40 (1.3)
Limestone	10 (3.1)	2 (.6)	5 (1.5)	111 (33.9)	85 (26)	114 (34.9)	327 (10.9)
Quartzite (grey)		1 (.3)	2 (1.5)	63 (46.7)	36 (26.7)	33 (24.4)	135 (4.5)
Quartzite (red)		1 (2.6)		20 (52.6)	6 (15.8)	11 (28.9)	38 (1.3)
Quartz			1 (20)		1 (20)	3 (60)	5 (.2)
Lydian stone		1 (20)				4 (80)	5 (.2)
Porphyry (grey)		3 (4.8)	1 (1.6)	27 (42.9)	16 (25.4)	16 (25.4)	63 (2.1)
Porphyry (green)				18 (60)	4 (13.3)	8 (26.7)	30 (1)
Porphyry (pink)	2 (1.8)		2 (1.8)	40 (36.7)	36 (33)	29 (26.6)	109 (3.6)
Peridotite				1 (100)			1 (.03)
Flint 1 (*)		49 (2.4)	23 (1.1)	776 (38.5)	516 (25.6)	651 (32.3)	2015 (67.4)
Flint 2 (**)		10 (4.5)	1 (.5)	94 (42.5)	70 (31.7)	46 (20.8)	221 (7.4)
TOTAL	12 (.4)	67 (2.2)	35 (1.2)	1170 (39.1)	782 (26.2)	923 (30.9)	**2989**

Tab. 1. Las Fuentes de San Cristóbal. Raw materials and structural categories of the sample (modified from García-Antón *et al, i.p*).

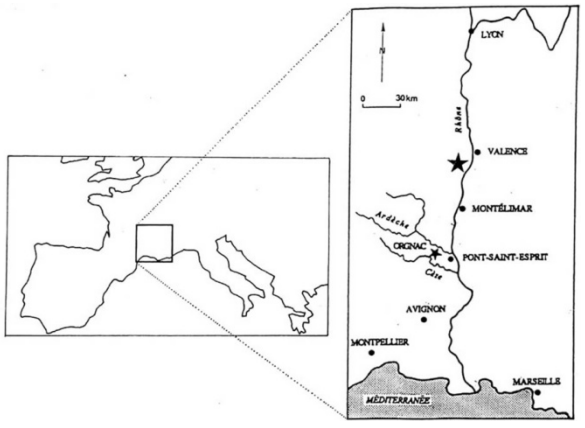

Fig. 4. Situation of Payre (modified from Menéndez *et al.*, 2008).

Dates of level G, made by TL, U-series and ESR range from 161±18 to 339±44 ka, with five falling in the 210–280 ka age interval (Valladas *et al., i.p*), becoming the oldest level of occupation in this karstic complex and, with Orgnac 3, in the valley of the Rhône.

The site has provided relatively well preserved and abundant faunal. Mammals are very well represented in number of remains and in species. Nevertheless level G stands out by being the poorest in this kind of remains. Bisons dominate, followed by *Capreolus capreolus* and large bovids. The presence of *Rhinocerus hemitoechus* and some carnivores is stated also.

Lithic raw materials and technology at Level Ga of Payre

In order to make a preliminary morphotechnical analysis of level Ga of Payre, we have selected a sample of 555 pieces (Natural Bases, Negative Bases of Exploitation and Configuration, Positive Bases and Negative Bases of Second Generation of Configuration) (Menéndez, 2006; Menéndez *et al.*, 2008). There are some problems with certain materials that show serious problems of preservation, especially basalt and sometimes limestone.

Flint is the most abundant raw material in Payre. It is mostly a crude type material, with medium aptitudes for knapping, with a kidney shape aspect. Besides the presence of a variety of fine grain that appears in a form of nodules, it has been also documented another variety in a chocolate-brown shade, located in the area of Rochemaure-Maysse. The former types of flint appear in the immediate surroundings (3-5 km) of the cave, as well as in the alluvial deposits (as the rest of raw materials like limestone, basalt and quartz). The last variety, that appears in a lower percentage, is located in the Rochemaure-Maysse area, about 15 km south of the site .

Therefore, the mobility and operational range of raw materials supply at Payre is essentially local, although the semi-local supply of Rochemaure-Maysse is confirmed.

The structural categories show a dominance of Positive Bases (flakes) with a total of 245 pieces, the majority of which do not show cortex, neither in the butt platforms nor in the dorsal surfaces. As in the case of level G of Las Fuentes de San Cristóbal, and considering also the little presence of cortical segments in the cores, this fact could be associated to a maximal use of the raw material, in special flint, and/or to a previous exploitation of the cores in the collecting areas before entering the occupation. All that may be the reason to explain the important percentage of cores on flake. On the other hand, most of the butt surfaces are single-faceted although the presence of faceted platforms (dihedral or multi-faceted) is significant. The multi-faceted platforms usually are associated to knapping

methods to predetermine the shape of the products (i.e. Levallois) (Boëda, 1994).

As regards the retouched tools it is worthy to note that the majority of the 103 pieces analysed (a total of 185 retouched edges) show retouch in

RAW MATERIALS	STRUCTURAL CATEGORIES							
	Hammer-stones	Choppers & chopping tools	Retouched artifacts	Cores	Flakes	Fragmented flakes	Indet	
Agate					1 (100)			**1 (100)**
Sandstone	1 (100)							**1 (100)**
Basalt	60 (42,3)	10 (7)	1 (0,7)	11 (7,7)	38 (26,8)		22 (15,5)	**142 (100)**
Limestone	10 (41,7)	2 (8,3)	1 (4,2)	2 (8,4)	9 (37,5)			**24 (100)**
Quartzite		1 (50)	1 (50)					**2 (100)**
Flint			102 (26,5)	65 (16,9)	197 (51,2)	21 (5,5)		**385 (100)**
Total	**71 (12,8)**	**13 (2,3)**	**105 (18,9)**	**78 (14)**	**245 (44,1)**	**21 (3,8)**	**22 (4)**	**555 (100)**

Tab. 2. Payre. Raw materials and structural categories of the sample.

a side, particularly the left one, being associated in many cases with an opposed cortical segment. This fact may be related to handling. Side scrapers dominate, especially R23 or *racloir latéro-transversal*, R21 or *racloir latéral* and R22 or *racloir transversal.*

There are also some pieces made in basalt, which can be defined as choppers and chopping tools, but the poor preservation of this material prevents its clear classification.

Discussion

Both two sites show a similar behaviour regarding the management of raw materials.

Also, in both cases we found a local or semilocal supplying in spite of the existence of better quality of flint varieties located at greater (gap). The rest of rocks, poorer in knapping quality,are located in the surroundings of both caves, in the alluvial deposits of the nearer rivers.

According to some authors, the priority in the supply of raw materials changes the distance, maybe when the barrier of 250ka is surpassed.

The gap is not abrupt but gradual in the time, such as the transition from Mode 2 to Mode 3.

Nevertheless the mobility range increases, the variety of used rocks grows, and the selection of better materials becomes of high-priority, perhaps in relation to the generalization of the predetermined knapping methods.

In the case of Payre this fact is appraised slightly and perhaps the chronological distance that it separates both deposits determines that the final rank of mobility is greater in the case of Las Fuentes San Cristóbal, where the flint located 24 km far appears in greater percentages than that one 15 km far from Payre). Anyway we have to consider the selection of the place of Payre, next to collecting areas immediate to the cave.

Also related with the management of raw materials, we found in both cases a hyper-exploitation of cores, lesser in the case of Payre since the collecting areas are closer.

Regarding the knapping methods, it stands out in both cases the use of the discoid method, Levallois and Kombewa method. Differences in the percentages of retouched tools (importance of denticulates in Las Fuentes de San Cristóbal and sidescrapers in Payre) are likely in relation with a different function of the occupations. On the other hand, the presence of several choppers or chopping tools could be related to the most archaic aspect of the industry of Payre, at the initial moments of the Mousterian.

Finally, considering the great chronological gap that separates both sites, it is possible to conclude infer a similar behaviour regarding the subsistence and mobility strategies of the human groups that peopled both sites.

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