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The use of quartz during the Lower Palaeolithic in northeastern Iberia

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ABSTRACT

This article analyses the use of quartz as a raw material during the Lower Palaeolithic in the northeast of the Iberian Peninsula. We studied the use of quartz at 9 sites with chronologies ranging from the end of the Early Pleistocene to the end of the Middle Pleistocene. Quartz was used in all assemblages studied, and was always collected close to the sites, most of all in the form of pebbles from river basins. There was a differential selection of raw materials, including quartz, according to the technical strategy that humans wanted to implement. Despite the apparent simplicity of operational schemes carried out using quartz, we found factors that point to a remarkable conceptual complexity in the handling of this rock, as for example knowledge of the characteristics and mechanical possibilities of quartz, and the adaptation of operational schemes to the properties of this raw material.

1. Introduction

Quartz is a raw material that was used for knapping tools throughout all Prehistory, from the Early Pleistocene to the Holocene (Bracco, 1997). However, until recently, artefacts made of quartz have not received the same attention by researchers as other lithic industries knapped with rocks such as flint. Why has the quartz industries not attracted the interest of researchers until recently?. First, artefacts knapped with this material have less morphological standardisation than objects knapped with other rocks, such as flint. This is due to certain characteristics typical of quartz, such as fracturing (Dickson, 1980; Mourre, 1996). Identifying stigma resulting from knapping quartz is not always easy and requires in-depth knowledge of the processes of knapping with this material (de Lombera Hermida, 2009; Driscoll, 2011). Therefore, the lithic quartz industry is difficult to study. The morpho-technical and typological criteria based on the study of collections of flint extrapolated to the quartz assemblages creates uncertainty in the classifications (Knutsson, 1998, 2014). Many quartz objects do not fit the models elaborated from the study of flint objects. This has led lithic quartz assemblages to be considered archaic and thus linked to opportunistic strategies, with little operational and conceptual complexity (Knutsson, 2014). Quartz was often considered a secondary raw material, as a last resort when no other high quality rock was available. All this has led to an underestimation of the importance of quartz in many lithic assemblages.

Fortunately, new technological and experimental approaches that have emerged in recent years have allowed a better understanding of the importance of this raw material (Knutsson, 1988; Tallavaara et al., 2010; Driscoll, 2011; Driscoll and Menuge, 2011; Driscoll et al., 2015; Knutsson et al., 2015).

The abundance of quartz in all environments and its resistance to erosion and chemical changes make it one of the most abundant lithic resources. Nevertheless, the widespread use of quartz at many sites of diverse chronology may be related not only to its abundance in different environments, but also to its mechanical and petrological properties. The knapping of quartz provides tools with resistant edges and furthermore, quartz is particularly suitable for work involving percussion (de Lombera-Hermida et al., 2011).

2. Objectives

This paper analyses the use of quartz as a raw material in a concrete geographical area during a specific chronological period: we studied the lithic quartz industry of sites located in northeastern Iberia and ascribed to the lower Palaeolithic. These deposits range in age from the end of the Early Pleistocene to the end of the Middle Pleistocene.

Data about some of the Middle Pleistocene sites mentioned in this work have already been published but often in local journals or books, that are not easily available. Thus, our first objective is to

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publish this data in an international journal according to standard procedures. On the other hand, the novelty of this work is to develop an approach that places emphasis in the management of quartz, beyond a general description of the technical features of the lower Palaeolithic lithic industry. Therefore, our goal was to understand the role played by quartz as a lithic raw material at these sites.

The main research questions we asked were: Are there differences in the use of quartz by geographic area in the context of the NE of the Iberian Peninsula?; Are there differences in the use of quartz according to the chronology of sites?; Is there some kind of differential management of quartz for carrying out certain production strategies and/or for the retouching of tools?; and, in a more general sense, Can we recognize patterns of raw material procurement?. Lastly, Can the prevalence of quartz as raw material determine an overall simplification of the lithic technology?

3. Materials

This work was based on the analysis of the use of quartz at 9 sites located in the northeast of the Iberian Peninsula (Fig. 1, Table 1). The sites were selected according to two main criteria: first we prioritised materials from sites that had been excavated and therefore had a stratigraphic context. We thus included lithic assemblages from excavations, but in some cases we took into account some materials that were the product of systematic surveys. We also tried to include deposits with radiometric dating. Unfortunately there are few well-dated sites from the Lower Palaeolithic in the NE of the Iberian Peninsula (Table 1). Specifically, we included data from two Early Pleistocene sites (Vallparadís and La Boella), and 7 sites assigned to the Middle Pleistocene.

The Barranc de la Boella archaeo–palaeontological complex (La Canonja, Spain) is located near the city of Tarragona at 55 m above the sea level (5 km from the Mediterranean coast). La Boella is part of the terrace system of the lower Francolí River Basin (Vallverdú et al., 2014). Since 2007, three main locations were excavated: Pit 1, La Mina and El Forn. The 9 m thick sedimentary succession at Barranc de la Boella contains six lithostratigraphic units (Unit I to Unit VI, from bottom to top). To date, excavations have been carried out in Unit II of the three locations, while the other units have only been sampled (Mosquera et al., 2016). Faunal remains and lithic industry came mainly from units II and III.

The mammal taxa identified at the Barranc de la Boella sites includes *Mammuthus meridionalis*, *Hippopotamus antiquus* and *Dama cf. vallonetensis* (Vallverdú et al., 2014). There are also small mammals such as *Mimomys savini* and *Victoriamys chalinei* (Lozano-Fernández et al., 2014). According to Vallverdú et al. (2014) the biostratigraphy of small mammals indicates a temporal span set between the late Early Pleistocene and the early Middle Pleistocene. Palaeomagnetic data indicates that the upper stratigraphic units (IV to VI) have normal polarity while the lower units (I to III) have reversed polarity. The radiometric dates measured in samples from unit II cover the time span between 0.876 ± 0.08 Ma and 1.076 ± 0.07 Ma. Cosmogenic analyses were conducted on Units I and II at El Forn and La Mina (Vallverdú et al., 2014). The dates provided for Unit II support the lithostratigraphic correlation between the locations of La Mina and El Forn, and indicate a minimum precise radiometric average date of 1.00 ± 0.068 Ma. Therefore, the lithic assemblages found within Unit II at Barranc de la Boella can be ascribed to the late Early Pleistocene (0.96–0.78 Ma) (Vallverdú et al., 2014). For Mosquera et al. 2016 the three locations are more or less contemporary. To date, 304 artefacts have been recovered at the 3 main assemblages of La Boella.

Vallparadís is an open-air site located in the city of Terrassa. Excavations between 2005 and 2008 affected deposits of Early and Middle Pleistocene age on the left bank of the Vallparadís stream (Martínez et al., 2010). Twelve stratigraphic units were identified. These stratigraphic units correspond to fluvial levels, that is, sedimentary clay deposited in a context of flood plains, weakly developed river bars and travertine formations, interspersed with levels of alluvial sedimentary clays, alluvial/colluvial conglomerates and a marsh level rich in macromammals and fossilised wood remains (bottom of EVT4) (Martínez et al., 2014). Lithic industry and faunal remains were found in stratigraphic units EVT2-7. Unit EVT7 (some 780 m^2 and 1.5 m deep) was excavated following an extensive archaeological methodology. In unit EVT7 two archaeological levels were identified (10 and 10c) and faunal remains and lithic objects were recorded.

According to Martínez et al. (2014), magnetostratigraphic analysis and biochronological micromammal data allow us to divide the sequence excavated at Vallparadís into three parts: the lower levels EVT12–EVT8, with an age of 1.07–0.99 Ma, correspond to the Jaramillo event; the middle units EVT7-bottom unit EVT3, with an age of 0.99–0.78 Ma, correspond to the phase between the Jaramillo event and the Matuyama-Brunhes boundary; and the units from EVT3 to EVT1, with an age of <0.6 Ma, correspond to the Middle Pleistocene. Duval et al. 2015 obtained a weighted mean ESR age estimates of 858 ± 87 ka for EVT-7 (which includes archaeological level 10). This age coincides with previous dates of 0.83 ± 0.07 Ma

Table 1
General features of the assemblages (sites and/or levels) studied in this paper.

Site/Level	Context	Age	MIS	Lithic sample	Faunal remains
La Boella, La Mina Unit II	Open air	1.00 ± 0.068 Ma cosmogenics	28	80	YES
La Boella, El Forn Unit II	Open air		28	99	YES
La Boella, Pit 1, lev. 2	Open air		28	125	YES
Vallparadís lev. 10/10c	Open air	858 ± 87 ka (ESR)	21	10,754	YES
Puig d'en Roca Excavació (PREX)	Open air	Middle Pleistocene Late Mindel or Mindel-Riss	12–11	3305	NO
Cansaladeta level K	rockshelter	395 ± 27 (TT-OSL)	11	728	YES
Cansaladeta level J	rockshelter	360–420 ka (ESR-Uranium series)	11	1071	YES
Cansaladeta level E	rockshelter	380 ± 30 ka (TT-OSL)–392 ± 30 (TT-OSL)	11	1675	YES
Cansaladeta level D	rockshelter	372 ± 34 ka (TL) 380 ± 30 ka (TT-OSL)	11	3280	YES
Cansaladeta level C	rockshelter	<372 ± 34 ka (TL)	10	437	YES
Cau del Duc de Torroella (CDTM)	Cave	350 ka −135 + 10/−9 ka	9–6	2518	YES
Nerets	Open air	Late Middle Pleistocene	9–6	1009	NO
Domeny Industrial	Open air	317–90 ka	9–6	465	NO
La Jueria	Open air	317–90 ka	9–6	490	NO
Mollet I	Cave	215 ka	7	77	YES

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