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Red deer antler technology and early modern humans in Southeast Europe: an experimental study

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ABSTRACT

In technological approaches to prehistoric industries, there is currently a renewed interest in the transformation of osseous materials. This approach requires the construction of a technical reference base of manufacturing stigmata, as well as of the procedures and methods used to produce tool blanks.

One of the better known processes for the production of blanks in the Upper Palaeolithic is extraction by a double longitudinal groove, observed only in the Gravettian. Aurignacian artefacts indicate that during this period blanks were obtained through a procedure of longitudinal fracturing (splitting) or diffuse percussion fracturing. The manner of implementing these procedures is, however, still poorly known.

In order to better characterise this stage in the manufacturing of blanks for antler points, we conducted an experimental study. Based on a thorough analysis of the Spanish archaeological materials, we tested the procedure of fracturing by indirect percussion on deer antler. The results provide new criteria for the identification of blanks and their manufacturing processes. They also emphasize the possibility of predetermining the size of the blank and, consequently, the size of future projectile point.

1. Introduction

At the beginning of the Upper Palaeolithic in Europe, the technical and symbolic innovations that characterize the Aurignacian become prominent. Among these, the transformation of osseous raw materials is a key element. In this technical domain, we see major changes starting at the beginning of the Aurignacian, in contrast to the poverty of the osseous technology during the Middle Palaeolithic (Tartar, 2004). New materials (ivory, antler) are exploited by new techniques and innovative concepts (Christensen, 1999; Liolios, 1999; Tartar, 2009; Tejero, 2010; White, 2007).

One of the most important changes that took place in the Upper Palaeolithic is the emergence of systematic osseous industry productions. Unlike bone, which can be fractured for both technical and food-processing purposes, the exploitation of antler responds to purely technical objectives. Studies of numerous sites have shown that deer antler was processed exclusively to obtain blanks for the manufacturing of spear points (Liolios, 1999; Tejero, 2010). Occasionally, some of these blanks were used to manufacture intermediate pieces, but usually when a "manufacturing accident" occurred, making the morphometric features of the piece unsuitable for spear points (as observed at El Castillo). In addition, Palaeolithic artisans made a significant technical investment in the production of split-based points. This is undoubtedly due to their role as a hunting weapon; due to the careful preparation required to manufacture an effective hunting weapon, a high status would have been attributed to them by hunter-gatherer groups whose survival depended on hunting.

Until now, studies of split-based points have been unable to resolve certain problems related to the technology of this object. Very few experimental studies with the aim of characterizing their technological features have been conducted, most having focused on their hafting and projectile launching systems (Knecht, 1991, 1997; Nuzhnyi, 1998). It is nonetheless important to obtain knowledge of the debitage (blank production) phase of these objects, defined as the manner in which the blanks used to manufacture these objects were obtained.

The best documented debitage technique applied to osseous materials in the Upper Palaeolithic is that of extraction by longitudinal grooving and wedging. The evidence for this technique does not appear until the Gravettian period, however (Goutas, 2004).

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Prior to this time, during the Aurignacian, other techniques were used to produce artefacts from bone materials. Based on a study manufacturing by-products, these techniques seem to have consisted of fracturing by percussion flaking (Averbouh, 2002) (splitting being one of these fracturing techniques). Fracturing as a debitage technique persisted throughout the Upper Palaeolithic, though the double grooving technique also became common, particularly in the Magdalenian culture.

In recent years, virtually all technological studies of the transformation of osseous materials during the Aurignacian have concluded that splitting (and not grooving) was used to produce tools, especially projectile points (Christensen, 1996; Knecht, 1991, 1993; Liolios, 1999; Tartar, 2003b). However, no study provides precise details on how this technique might have been performed, and it thus remains poorly understood.

In order to better characterize this phase of the manufacturing of projectile points, we conducted an experimental program based first on a technological analysis of the antler artefacts found in the late Aurignacian occupation levels (*lato sensu*) of sites in Cantabria and northeastern of Spain (Conde, Cierro, El Castillo, Covalejos, Labeko Koba and Reclau Viver). Although split-based points are widespread throughout Europe, few technological studies of them have been conducted. Since one of us (J.-M. T) has studied all of the Spanish assemblages, we decided to focus on these assemblages, which allow us to make solid comparisons with the experimental materials (Fig. 1).

2. The experimental program

Aurignacian assemblages – both lithic and osseous – were carefully examined to ensure that we employed materials as similar as possible to those found in this archaeological context. At all points in the experiment, we therefore used tools similar to those most likely to have been employed in the production of artefacts by splitting in the Aurignacian. We also benefited in this regard from advances made through the experiments of other researchers (see below).

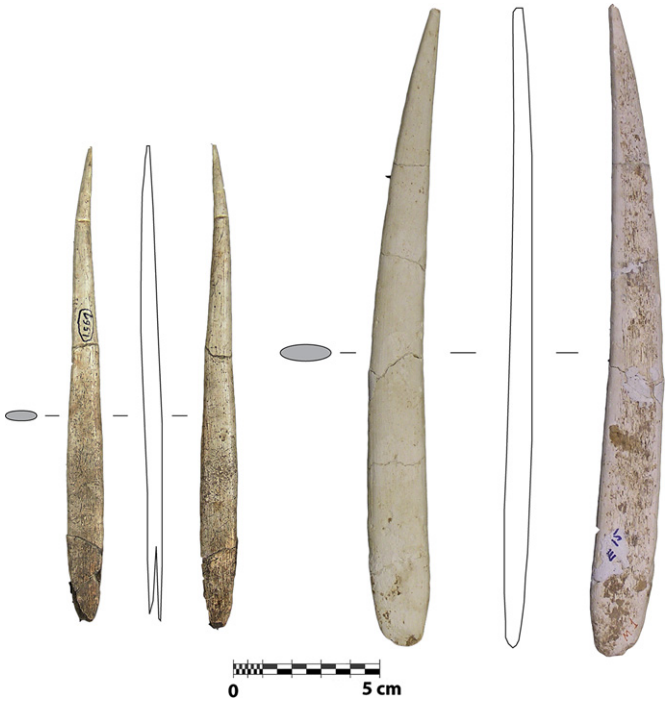

Fig. 1. Left: split-based point such as those found in the Aurignacian transitional level at El Castillo cave – Delta (18) level (16.9 cm). Right: lozenge-shaped point from the Evolved Aurignacian in Mallaetes (Valencia) – level C15 – (22.2 cm).

2.1. Starting from a simple fracture plane

Artefacts produced by fracturing using indirect percussion (splitting) or direct percussion techniques are difficult to identify in the archaeological record. In fact, the only stigmata produced using these techniques are fracture planes, which thus constitute key elements in the identification of these artefacts, since they display very few obvious scars. This has sometimes resulted in their not being considered as elements of the industry given that stigmata of this type (fracture planes) can originate from post-depositional processes associated, above all, with changes in the organic fraction of the osseous material and the weight of sediments or falling blocks. The erroneous identification of stigmata as being natural has undoubtedly contributed to the rarity of identifications of this technical procedure to date.

The morphology and dimensions of artefacts produced using this technique are rarely predetermined. Nonetheless, a degree of homogeneity can be discerned within the assemblages. The artefacts usually have an elongated form (rods, or *baguettes*, with a rectangular or sub-triangular morphology), with rectilinear or oblique fracture planes on their lateral edges. When the two edges come together at one end, it is also possible to observe traces of the final extraction resulting from the breakage from the blank form (Fig. 2).

2.2. Archaeological context

2.2.1. The Iberian Aurignacian

The Iberian Aurignacian was characterised based on studies conducted in the 1980s that focused on the regions occupied during this period: Cantabria (Bernaldo de Quirós, 1982), Northeast Iberia (Soler, 1982), the southeastern zone (Cacho, 1980) and the Mediterranean zone (Valencia region) (Villaverde, 1983-1984). This chronology has been little modified to date. Recent contributions to our knowledge of the Iberian have addressed its chronological limits based on new radiocarbon dates (Cabrera et al., 2004) and technological studies of lithic industries (i.e. Arrizabalaga, 2000).

The internal chronology of the period consists of a simple sequence that includes an Archaic Aurignacian, a Typical or Old Aurignacian and an Evolved Aurignacian. The first Aurignacian settlement of Iberia appears be very early based on C14 dates from some northern sites, such as El Castillo (Cantabria) and Arbreda (Catalonia). Both were occupied at around 38,000–40,000 BP (Bischoff et al., 1989; Cabrera and Bischoff, 1989). Around 28,000 BP the first Gravettian industries appear.

The sites selected for this study, and briefly presented below, include most of those at which split-based points, intermediate pieces, antler blanks and by-products have been found in the Spanish Aurignacian. The Conde and Cierro caves were excavated the early and middle parts of the last century by Conde de la Vega del Sella and F. Jordá respectively. Both contained levels dated to the Old Aurignacian (A, B at Conde; 6, 7, 8 at Cierro) (Bernaldo de Quirós, 1982). H. Obermaier excavated El Castillo at the beginning of the 20th century with the aid of H. Breuil and other important scholars of this time. Obermaier established an archaeological sequence with two Aurignacian levels (Delta and Gamma) (Cabrera, 1984). Since 1980, a team led by V. Cabrera and F. Bernaldo de Quirós has continued research at the site. This new work as resulting in a refinement of Obermaier's sequence. The Aurignacian levels have been renamed as 18 and 16. Level 18 is attributed at a "transitional Aurignacian" with a mixture, according to the excavators, of technological elements belonging to