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Bifaces used for percussion? Experimental approach to percussion marks and functional analysis of the bifaces from Terra Amata (Nice, France)

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ABSTRACT

The structural analysis of the bifaces from the site of Terra Amata shows that, for seven pieces, the working edge is the distal part of the tool. Two bifaces bear use marks on this transversal working edge that can be related to use in handheld percussion. A specific experimental programme was developed to test these observations, consisting of striking different materials (fresh bone, dry wood, and fresh wood) with replicas of archaeological pieces made with the same limestone pebbles as those from the site. These experiments confirm the link between the marks on the transversal biface working edges and percussion activities.

1. Introduction

Functional data relating to Middle Pleistocene bifaces are still relatively rare and only concern a small number of pieces. They point to:

- butchery activities: cutting meat (Keeley, 1980; Gysel and Cahen, 1981; Ollé, 2003; Garcia-Medrano, 2014; Soladenko et al., 2015) or disarticulation (Keeley, 1980);
- wood working: sawing (Binneman and Beaumont, 1992) and perforation (Keeley, 1980);
- cutting plants (Lhomme et al., 1998);
- percussive activities on hard material (Moncel, 1995; Mitchell, 1998; Weban-Smith and Bridgeland, 2001; Boëda et al., 2004) or on soil (Rots and Van Peer, 2006).

This data are not sufficient to generalize to all known bifaces through middle Pleistocene. Firstly, the analyses focus on bifaces that are remote in both time and space. This implies different environments, different raw materials, and also different techno-cultural systems. Secondly, the modes of action and the worked materials are highly variable. This suggests that it is a tool with multiple functional potentialities. These potentialities may be encountered on a single biface, having multiple cutting angles (Soriano, 2000; Boëda, 2001), or on different bifaces (with specific functional potential) within the same assemblage (Albrecht and Müller-Beck, 1988; Philipson, 1997). However, the identified functions are rarely related to the structure of the tool (Soriano, 2000; Claud, 2008).

The lack of functional data on the bifaces can be explained in part by the state of conservation, which usually does not allow traceological analysis (Beyries, 1990; Marquez et al., 2001). At Terra Amata, bifaces lack sufficient conservation for analysis at high magnification, particularly because of an alteration patina on the artifact surface (Keeley, 1980; Levi-Sala, 1989; Unger-Hamilton, 1989). In order to have functional data on these bifaces, we propose an analysis based on their technical and morphological attributes, associated with a specific experimental programme and a low magnification use-wear study (Tringham et al., 1974; Odell, 1981; Prost, 1989).

2. Bifaces from Terra Amata

The open-air site of Terra Amata is located at the bottom of the Mont Boron slopes, near the Mediterranean Sea, on the present-day townland of Nice (France) (Fig. 1). The Quaternary deposits correspond to phases of marine transgression and regression and contain two stratigraphic complexes bearing the remains of human occupations. These complexes C1a and C1b are correlated to MIS 11

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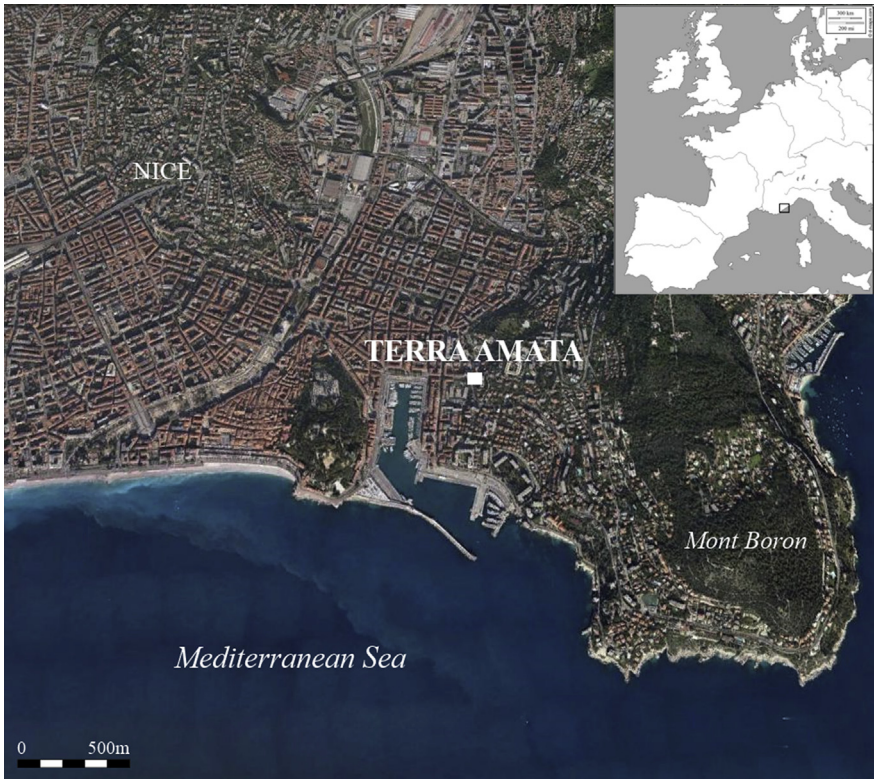

Fig. 1. Location of Terra Amata.

and 10 (Lumley de et al., 2009). They have yielded faunal remains, namely red deer, wild boar and elephant remains, related to hunting activities (Lumley de et al., 2011), as well as one of the earliest hearths in Europe.

The lithics are in flint and limestone with a dichotomy between the large tools (pebble tools, picks, cleavers, and bifaces) on limestone pebbles and the flint which is used for debitage. Thirteen bifaces were found at Terra Amata, including ten in stratigraphic context. They account for about 0.05% of the total lithic material and are better represented in the upper barrier beach (CLs) where they total 0.12% of the material. The proportion of bifaces varies between 0.5% and 0.9% (data in Lumley de et al., 2015) in relation to the total number of tools (pebble tools, picks, cleavers, bifaces and flake tools). Bifacial shaping was thus a marginal component of overall tool production at Terra Amata.

All the bifaces are produced on limestone pebbles from the alluviums of the Paillon River (Lumley de et al., 2015). Seven are in marly limestone, two in cornstone limestone and four in silicified limestone. On all the bifaces, the base is cortical and has not been shaped. The shaping technique is generally lateral, with sequences of alternating shaping. Lastly, all the bifaces were made with a hard hammerstone, and although the use of a soft mineral hammer is probable, it has not been confirmed.

3. Structural analysis and functional hypothesis

The structural analysis consists in relating the technical and morphological spheres in order to discern the intention of the knapper. The tool is defined as a system and can be divided into three sub-systems made up of transformative part, transmission of energy part and prehensile and receptive of energy part (Lepot, 1993; Boëda, 1997, 2013) (Fig. 2). The analysis of the structure of the tool leads to the identification of zones with homogeneous technical and morphological attributes. Through the morphological

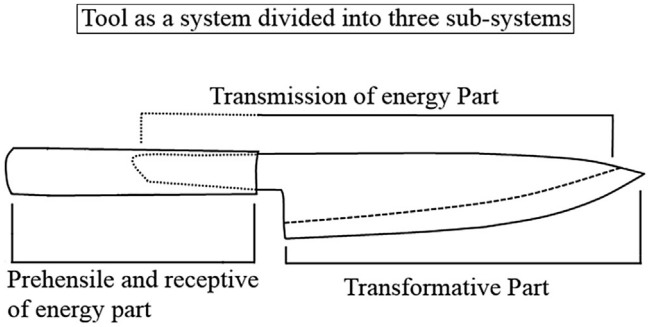

Fig. 2. Example of systemic decomposition of the tool, applied to a modern knife.

analysis of these zones, their position on the piece and their position in relation to each other, it is possible to define the type of contact (transformative, prehensile, and receptive). Diverse functional hypotheses can then be advanced for tools analyzed in this way based on actualist and ethnographic comparisons (Leroi-Gourhan, 1943; Hayden, 1977; Boucard, 2006). This approach has already been adapted and applied to sets of bifaces of the European middle Pleistocene (Brenet, 1996; Soriano, 2000; Boëda, 2001).

The structural analysis of the bifaces from Terra Amata concerns 10 pieces, as the three biface fragments (two bases and a point) could not be analyzed with this method. For each biface, a single unit of transformative contact (UCT) was identified, which tends to show that these pieces were perceived as biface-tools and not as structures with multiple functional potential (like the biface tools defined by Boëda et al., 1990 and Nicoud, 2013 in particular). Three structural groups were identified; the most represented with seven pieces is the group of bifaces with a UCT on the transversal working edge. Two bifaces present a thick and robust worked point at the distal end. Lastly, one biface presents an edge-point type UCT, characterized by a long regular cutting edge associated with a