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Ideas no longer written in antler

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ABSTRACT

In the course of the Upper Paleolithic, antler debitage techniques seem to have followed a linear evolution. The earliest one, fracturing by cleaving, appeared during the Aurignacian and is considered by some specialists to be ineffective. According to them, it was not until the invention of the groove and splinter technique during the Gravettian that antler debitage became efficient. Nonetheless, during the Solutrean, fracturing once again became the most common technique, but by splitting. Based on a study of 102 Solutrean pressure tools and experimentations, we reach the conclusion that splitting is a very effective technique that can produce blanks with the same qualities as those made by the groove and splinter technique. The splitting technique was nonetheless excluded in previous studies. We explore the reasons for this and the particularities of the different antler debitage techniques evidenced in the Western Upper Paleolithic.

Based on current knowledge, it is widely thought that prehistoric bone and antler working followed a linear evolution from simple to complex and from low to high skill levels. While the order of appearance of the various techniques cannot be disputed, the permanence of some of them, their role in technical systems, and their efficiency, can be reconsidered.

Antler debitage – or the production of blanks from antler – is a good illustration of these issues. From the Aurignacian period (ca. 39000–28000 BP) on, antler was widely used in Western Europe to manufacture tools and weapons. Studies of archaeological assemblages (Liolios, 1999; Tejero, 2010) have concluded that cleaving was the only technique used by Aurignacians. By analogy with wood working, this technique has been defined as a dislocation of material through the insertion of a thin edge into the fibrous structure (Liolios, 2002). Antler is not a very fissile material, however, and the results of unsuccessful experiments suggested that no procedure yet existed that was well adapted to antler working. The groove and splinter technique – consisting of prying out a long thin strip after cutting two deep parallel grooves on either side and into the soft tissue – appeared during the Gravettian (ca. 29000–20000 BP) and is considered by archaeologists to be the first technique that was well adapted to making tools from antler. Using this technique, it is possible to obtain regular blanks with predetermined dimensions (Goutas, 2009), which was not possible in experiments using the cleaving technique (Liolios, 1999; Tejero et al., 2012).

Based on this information, researchers have considered antler debitage by cleaving to be an archaic and poorly adapted technique. Prehistoric artisans nonetheless continued using it during the Gravettian, Solutrean (ca. 20000–18000 BP; Goutas, 2004; Agoudjil, 2005).

During Badegoulian period, antler debitage procedure is original (19000–17000 BP; Allain et al., 1975; Pétillon and Ducasse, 2012). It consists of flaking by direct percussion (ibid). This latter does not surprise some researchers, since the Badegoulian culture is already viewed as atypical due to the nature of its lithic debitage techniques. Direct percussion was nonetheless excluded from the analytical framework applied to Aurignacian assemblages because it was considered to be too imprecise and difficult to use with antler (Liolios, 1999). While it is true that when antler is still attached to the animal it is very strong and shock-resistant, because of its organic fraction, once it is detached, it dries, loses its collagen, and becomes less resistant. Moreover, direct percussion was the most common, and probably best controlled, technique used by prehistoric artisans. Preconceptions concerning direct percussion arise from the fact that this technique is poorly known outside of the domain of lithics.

In the context of a Ph.D. thesis, one of us (M. B.) has studied Solutrean assemblages in southwestern France. Solutrean culture

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develops over a short period during the Last Glacial Maximum. Solutrean groups are distributed in southwest Europe, in France and the Iberian Peninsula. They are distinguished by an original production of lithic foliaceous points. These points are not only exceptional by their shape but also because of the later stage of their processing which generally involves the pressure technique. However, pressure flaking tools, and Solutrean bone tools in general, are poorly known.

We studied assemblages from 4 major sites excavated in the early twentieth century: Laugerie-Haute, Badegoule, Fourneau du Diable (Dordogne) and Roc de Sers (Charente). The archaeological collections are preserved at the Musée d'Archéologie National (Saint-Germain-en-Laye, Yvelines, France) and the Musée Nationale de Préhistoire (Les Eyzies-de-Tayac, Dordogne, France). One of us (M. B.) has observed that antler tools of these assemblages were predominantly manufactured using the splitting technique – parting by stroking – in contrast to previous authors who assumed that the groove and splinter technique was predominant. In the Solutrean context, pressure flaking tools, of which we have made experimental examples in order to understand how they were manufactured, provide a good example of the use of the splitting technique.

1. Technical parameters and criteria of identification

1.1. Antler as a raw material

Antler is a heterogeneous material. Its morphology and structure vary depending on the species (Billamboz, 1979; Fig. 1). Reindeer (*Rangifer tarandus*) antler has a thick cortical tissue surrounding a spongy tissue with compact alveoli, while the Red Deer (*Cervus elaphus*) antler has a thinner cortical tissue surrounding a spongy tissue with open alveoli (Bouchud, 1966, 1974). The thickness of the compact tissue is an important parameter as this is the part from which tools are manufactured. The morphology and internal structure of antler also varies depending on the gender, age and diet of the animal (Bouchud, 1966; Billamboz, 1979). On a single antler, the proportion of cortical and spongy tissue varies depending on the anatomical part and the phase of development (Averbouh, 2000). Its physical properties can also vary. During its formation, antler is rather soft. Just before it is shed, it becomes hard due to its calcification (Provenzano, 2001). After it is shed, the collagen gradually decomposes and the antler becomes brittle. It can then be altered by weathering processes (Behrensmeyer, 1978).

1.2. Fracture plane

Fracturing produces a feature designated as the fracture plane. Based on the angle and texture of the fracture plane, it is possible to determine whether bone was dry or fresh when it was fractured (Villa and Mahieu, 1991). While antler and bone do not have the same morphology or structure, the criteria of identification appear to be identical for both materials. On fresh antler, the fracture plane is acute (less than 45°) and has a fibrous texture (Fig. 2a). On dry antler, the angle is close to 90° and the surface is rough (Liolios, 1999; Pétillon and Averbouh, 2012; Fig. 2b). The fracture plane of

Fig. 1. Morphology and structure of: a) reindeer antler, b) red deer antler.