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From flakes to grooves: A technical shift in antlerworking during the last glacial maximum in southwest France

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ABSTRACT

The evolution of antlerworking technology in Paleolithic and Mesolithic Europe, especially the production of splinters, is usually described as a cumulative process. A progressive increase in blank standardization and productivity was prompted by the application of a key technical process, the groove and splinter technique (GST). The Badegoulian, however, appears as an interruption in this continuum. According to the original definition of this post-Solutrean, pre-Magdalenian archeological culture, one of its distinctive features is the absence of the GST and the manufacture of antler blanks by knapping only. However, this conception has been recently questioned, leading to an alternative hypothesis suggesting that both GST and knapping were used during the Badegoulian. In this article, we present new evidence from several sites in southwest France, which sheds new light on the issue of Badegoulian antlerworking and the transition with the subsequent Lower Magdalenian. Our study is based on two complementary methods: the technological analysis of antler assemblages well-dated to the Badegoulian (Le Cuzoul de Vers) or to the Lower Magdalenian (La Grotte des Scilles, Saint-Germain-la-Rivière), and the direct ^{14}C dating of specific antler artifacts from mixed or problematic contexts (Cap-Blanc, Reverdit and Lassac). The results firmly establish that, in southwest France, knapping is the only method used for the production of antler splinters during the Badegoulian, before ca. 20,500 cal BP (calibrated years before present), and that it is rapidly replaced by the GST at the beginning of the Lower Magdalenian, after ca. 20,500 cal BP. This technical shift is not linked to an influx of new human populations, environmental change or the supposed economic advantages of the GST. Instead, it must be understood as one of the expressions of a broader reconfiguration of the technical world that starts to take shape in the middle of the Last Glacial Maximum.

Introduction

Antlerworking appears in Europe as early as the beginning of the Upper Paleolithic (Knecht, 1993; Liolios, 2003; Tejero, 2010) and in the southwest of the continent (i.e., France, Spain and Portugal), it remains an integral part of the technical system until the end of the Mesolithic and beyond. Thus, contrary to northern Europe, which was depopulated during the Last Glacial Maximum (LGM), or to southeast Europe, which saw only a marginal use of antler material during a large part of the Upper Paleolithic, southwest Europe offers an uninterrupted record of antler technology used by hunter-gatherers for some 30 millennia. This makes it undoubtedly the longest and best documented technological sequence for this material in the world, and an exemplary case to study long-term technical evolutions in hunter-gatherer societies.

Reconstructions of long-term trends in antler technology among European Paleolithic-Mesolithic groups emphasize the key role of the groove and splinter technique (GST). This technique, or rather this combination of technical actions, involves scoring two parallel, longitudinal grooves through the outer tissue of the antler and then prying off the intervening portion (Clark, 1953; Clark and Thompson, 1953; Rigaud, 1972, 1984; Semenov, 1973; Averbouh, 2000; Goutas, 2009; etc.). The pieces extracted in this manner are elongated strips of compact antler that can then be used as blanks for the shaping of objects such as projectile points and wedges (although several names have been given to these blanks, including the French 'baguette,' in this article these blanks will be called 'splinters' in order to be consistent with the previous English-language literature). In Europe, the GST is present from the Early Gravettian (ca. 28 kyr BP [thousands of years before present]) onwards (Goutas, 2004). Compared with the earlier Aurignacian technology, where antler splinters were produced by splitting and cleavage (Knecht, 1993; Liolios, 2003, 2006; Tejero, 2010), the GST allows for a better predetermination and standardization of the

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dimensions of the blanks (Goutas, 2009; Tejero et al., 2012). Indeed, once introduced, the GST quickly becomes the exclusive technique for the manufacture of the dominant object in the antler kit and much-needed piece of hunting equipment: the projectile point. Later archeological cultures, such as the Middle and Upper Magdalenian (ca. 18–14 kyr cal BP [thousands of calibrated years before present]) or the Early Mesolithic (ca. 11–10.5 kyr cal BP), improved the use of the GST to its full productivity potential by extracting multiple parallel blanks from the same segment of antler (Clark and Thompson, 1953; Averbouh, 2000; Elliott and Milner, 2010). Thus, the technological history of the production of antler splinters in Paleolithic-Mesolithic Europe appears, in broad outline, as a cumulative process. A progressive increase in blank standardization and productivity was made possible by the application of the GST.

The Badegoulian archeological culture, however, appears as an interruption in this continuum. Formally defined in the years 1960–1980 by J. Allain (1989) after the pioneering work of A. Cheynier (1930, 1939), R. Delarue, E. Vignard and G. Vacher (Delarue and Vignard, 1958, 1960, 1963; Vignard and Vacher, 1965), the Badegoulian was identified mainly in France (Fig. 1), although similar assemblages might exist in Spain (Aura Tortosa, 2007) and in central Europe (Street and Terberger, 1999). It spans the gap between the end of the Solutrean ca. 23.5 kyr cal BP and the beginning of the Magdalenian ca. 20.5 kyr cal BP, thus taking place during the first half of the Last Glacial Maximum (LGM) (GS-2c: Ducasse, 2010; Banks et al., 2011), according to the definition of this climatic event by Lowe et al. (2008) or MARGO Project Members (2009).

According to its original definition, one of the distinctive features of the Badegoulian is the absence of the GST. Indeed, the results of Allain's excavations in Fritsch shelter showed that in the Badegoulian levels, antler blanks were manufactured only by knapping (i.e., direct diffuse percussion: Allain et al., 1974). This technique was used to produce the same type of blanks that were made by GST in the earlier Gravettian and in the following Magdalenian: antler splinters mainly intended to be shaped by scraping them into projectile points (Rigaud, 2004). In this perspective, the Badegoulian would represent a very peculiar event in the evolution of Paleolithic techniques, the disappearance of a key technical element, the GST, prior to its reintroduction several millennia later. Thus, the Badegoulian technology would undermine a strictly cumulative scenario for the evolution of antlerworking.

However, this conception of the Badegoulian antlerworking has been questioned in recent years (Averbouh, 2006a). While some scholars maintained Allain's original views (Rigaud, 2004, 2007), others emphasized the discovery of antler artifacts with traces of GST in Badegoulian levels (Séronie-Vivien, 1995; Sacchi, 2003a). This led to an alternative hypothesis suggesting that both methods, GST and knapping, were used in parallel for the production of antler blanks during the Badegoulian (Castel and Chauvière, 2007). According to this hypothesis, the GST would have persisted in the early LGM.

In this article, we present a new set of evidence from several sites in southwest France, which shed a new light on the issue of Badegoulian antlerworking and the transition with the Lower Magdalenian. Our study is based on two complementary methods: the technological analysis of well-dated antler assemblages and the direct ^{14}C dating of specific antler artifacts from mixed or problematic contexts.

Historiography and analytical framework

From its very first identification, the archeological culture that would later be called the Badegoulian had been clearly separated from the preceding Solutrean (Capitan and Breuil, 1902). However, whereas its lithic industry was described by Breuil in depreciative terms (Breuil, 1937), the quality of its osseous equipment seemed to justify its characterization as the "very ancient step" of the subsequent Magdalenian culture (Peyrony, 1912; Breuil, 1937). In

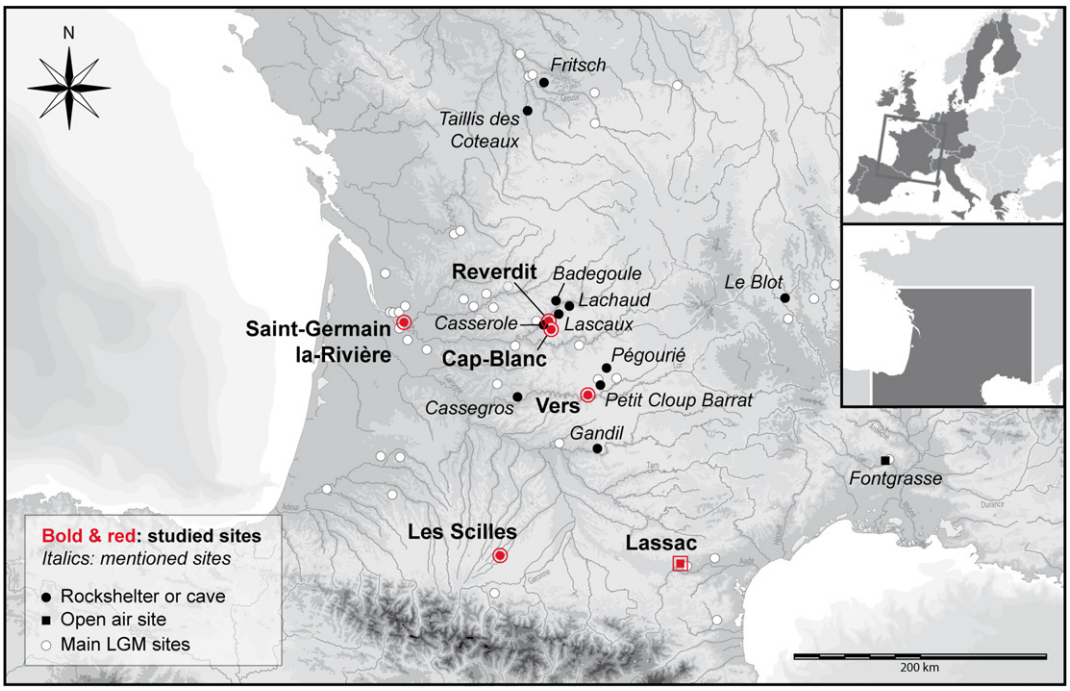

Figure 1. Distribution of the main LGM sites in southwest France, and location of the sites mentioned in the text (all pictures and illustrations in the article are from the authors unless otherwise stated).