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The use of biface manufacturing flakes: Functional analysis of three Middle Palaeolithic assemblages from southwestern and northern France

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ABSTRACT

This paper presents a use-wear analysis of biface manufacturing flakes from three French Middle Palaeolithic sites: Jonzac, Fonseigner, and Saint-Amand-les-Eaux. Low and high power approaches combined with a morphometric analysis demonstrate these flakes, whether retouched or not, to have primarily been used to cut soft and soft to medium-hard materials. Whereas numerous pieces exhibit typical scar patterns referable to butchery activities, clear meat polishes are only evident on a handful of flakes from Jonzac together with less definitive examples from Saint-Amand. Several differences between these two sites can be seen in the morphology of prehensile areas on biface manufacturing flakes. Finally, factors, such as flake morphology, assemblage composition, site function, and cultural traditions that may have influenced the way these artefacts were used are also discussed.

1. Introduction

Bifaces and bifacial tools are commonly evoked in models of site function and mobility strategies despite the relative paucity of information concerning their possible use(s) and patterns of recycling and rejuvenation. Moreover, little attention has been paid to the possible integration of characteristic by-products of biface manufacture and maintenance in these models. This is especially surprising, as bifaces have been proposed on numerous occasions to represent transported core-tools in cases of increased residential mobility and limited access to suitable raw materials (e.g. Binford, 1978; Kelly, 1988; Torrence, 1989). Typical by-products of the various stages of biface production and maintenance have not, until now, been the focus of a specific use-wear analysis.

According to Newcomer (1971), biface manufacture passes through three stages – roughing-out, thinning and shaping, and finally, finishing – all of which produce thin, sharp flakes. Although manufacturing flakes are generally considered by-products, the presence of examples retouched into scrapers and, to a lesser extent, *raclettes,* in Middle Palaeolithic assemblages somewhat complicates this perspective. This feature has equally been documented from several Acheulean sites, including Barbas in south-western France (Boëda, 2001) and Soucy, south of the Paris Basin. The Early Middle Palaeolithic assemblage from La Cotte de Saint Brelade in Jersey (Britain) also includes long sharpening flakes, several detached from bifaces, which were equally retouched into scrapers (Callow, 1986). However, retouched manufacturing flakes have primarily been identified in Mousterian of Acheulean Tradition (MTA) assemblages from the final stages of the Middle Palaeolithic in south-western France (Geneste, 1985; Soressi, 2002; Faivre, 2003).

This modification of biface manufacturing flakes could indicate (1) the opportunistic re-use of by-products, (2) the anticipated use of flakes as part of a circular economy (recycling?) or (3) the integration of sought-after, predetermined endproducts in the toolkit, as suggested by Soressi (2002) and Faivre (2003). This possibility relies in part on the fact that scrapers recovered from Pech de l'Azé I (Dordogne) were made on the longest and most elongated manufacturing flakes, which were primarily associated with the initial shaping stage. The high number of shaping flakes and their general dimensions relative to bifaces recovered from the site suggested to Soressi (2002) that this stage had been intentionally prolonged to obtain the maximum number of suitable flakes.

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Similarly, Faivre (2003) concluded that bifaces were not only tools, but also cores for the production of flakes with predetermined morphologies.

Relatively little functional data are currently available concerning the possible uses of biface manufacturing flakes. The two studies of flake and edge morphology mentioned above both concluded that scrapers made on biface manufacturing flakes were probably highly specialised tools used to cut soft materials (Soressi, 2002; Faivre, 2003). Conversely, *raclettes*, whose cutting properties are limited by a continuous, abrupt retouch, were connected with scraping actions (Faivre, 2003). However, neither the scraping nor cutting hypotheses have been verified by use-wear analysis. Similarly, few experiments investigating the functional properties of manufacturing flakes have been published to date. G. Frison (1989) observed that, although efficient butchery tools, edges needed to be resharpened during the experimental butchery of an elephant, while Kantman (1970) comparison of edge damage produced during the use of unretouched flakes with that found on *raclettes* allowed several criteria for distinguishing the two.

Finally, and perhaps most importantly, very few use-wear analyses have been conducted to date. A preliminary study of *raclettes* from two Middle Palaeolithic sites in south-western France using a low power approach focused on distinguishing intentional retouch from edge damage produced by scraping bone or wood (Kantman, 1970), and a single lateral tranchet spall from the site of Abri du Musée (Dordogne) was recently interpreted by A. Coudenneau (2005) as having been used for cutting animal tissue. Material from three other Middle Palaeolithic or Acheulean sites with bifaces unfortunately produced no evidence of use-wear traces: Hoxne (Britain, Acheulean, Keeley, 1980), Zwolen (Poland, Middle Palaeolithic, Huel Jensen *in* Schild et al. (2000)), and Mesvin IV (Belgium, Middle Palaeolithic, Gysels and Cahen, 1981).

Behavioural implications of the re-use and modification of biface manufacturing flakes implies investigating their general function in the overall assemblage. This requires (1) determining whether unretouched by-products of biface production were used, (2) identifying the materials worked, the tasks performed, and the function of these pieces within the overall assemblage, and (3) possible criteria influencing their selection for use. Building on previous research on Middle Palaeolithic bifaces from south-western France (Claud, 2008), this paper presents the first detailed functional analysis of biface manufacturing flakes using examples from two sites in this region alongside another assemblage rich in this artefact class from northern France.

2. Material and methods

2.1. Assemblages and sample analysed

Three Mousterian of Acheulean Tradition (MTA) assemblages from south-western and northern France were included in the study. Chez-Pinaud is a rock shelter located near Jonzac in the Charente-Maritime. Excavated initially by J. Airvaux and M. Soressi in 1998, 1999 and 2003, and then between 2004 and 2007 by a team led by J. Jaubert, J.-J. Hublin, M. Soressi and S. McPherron, the material considered here comes from an MTA level dated to 39 ± 3 ka by thermoluminescence (Richter et al., 2013). Evidence for on-site biface manufacture and flake production is associated with a faunal assemblage characterised by the processing of bovid and horse carcasses (Jaubert et al., 2008). In total, 48 bifaces were recovered during the various excavations. Manufactured on flakes using a method typical of the MTA, the initial reduction stages produced a series of convex negatives followed by a less invasive retouch with a soft hammer creating two convergent cutting edges (~50°) and a thin point (Soressi, 2002; Claud, 2008). Several examples were ultimately modified by one or several notches or an irregular retouch with a hard or soft hammer (Claud, 2008; Jaubert et al., 2008). Often cordiform with plano-convex cross-sections, these artefacts were made on both local and non-local raw materials (47 on flint and one on a fine-grained quartzite-sandstone). A little more than 300 manufacturing flakes were recovered from the site during the most recent excavations, including 19 that were retouched into scrapers (Table 1).

Table 1
Number of total analysed manufacturing flakes, frequencies of use-wear traces, and artefact preservation by site.

	Jonzac	Fonseigner	Saint-Amand-les-Eaux	Total
Manufacturing flakes studied	309 (19 scrapers)	43 (1 scraper)	24 (12 scrapers)	376 (32 scrapers)
Flakes with use-wear traces	34 (5 scrapers)	0	19 (11 scrapers)	53 (16 scrapers)
%	*11*	*0*	*79*	*14*
Preservation	Medium to good	Good	Medium	

The site of Fonseigner is located at the base of a cliff in the Dordogne region and dated by thermoluminescence to 50.2 ± 5.3 ka (Valladas et al., 1987). Excavated and studied by J.-M. Geneste (1985), as at Jonzac there is evidence for the on-site production of both bifaces and flakes; however, no faunal remains were preserved. In total, the site produced six bifaces and 43 manufacturing flakes, one of which was subsequently retouched into a scraper. As at Jonzac, bifaces were produced on flakes using a soft hammer, with several modified by notches or irregular retouch before discard. All of these sub-triangular or oval bifaces have plano-convex cross-sections and were made on local raw materials.

The third site, Mont-des-Bruyères, is located near Saint-Amand-les-Eaux in northern France. This open-air site excavated by P. Feray (Inrap) in 2008 produced a single level containing more than 11,000 lithics, including evidence for bifacial shaping and finishing but no clear indication of flake production. The assemblage is associated with a single OSL date of 49.2 ± 3.3 ka and comprises 82 bifaces. Although not yet studied technologically, several different morphologies can nonetheless be identified (i.e., cordiform, triangular, backed, and oval) and evidence for a tranchet blow is visible on 17 examples. Of the 4911 manufacturing flakes, 147 were retouched into scrapers.

While all the manufacturing flakes from Jonzac and Fonseigner were studied, only a portion of the substantial lithic material recovered from Saint-Amand-les-Eaux was analysed, including about 300 manufacturing flakes selected by Ph. Feray for use-wear analysis as they were either retouched or exhibited visible use damage. Following an initial selection with a stereomicroscope, a subset of 24 manufacturing flakes, 12 of which were retouched into scrapers, was retained for analysis using both low and high power. The sample comprised a total of 376 manufacturing flakes, 32 of which were retouched into scrapers (Table 1), complemented by a representative sample (not presented here) of each assemblage (unretouched flakes, denticulates, scrapers, notches, bifaces, etc.), increasing the overall analysed sample to 647 artefacts.

2.2. Technological and morphometric data

The identification of biface manufacturing flakes was based on criteria provided by Newcomer (1971), Wenban-Smith (1989), Pelegrin (2000), Soriano (2000), Soressi (2002), and Faivre (2003). They primarily concern the characteristics of the proximal part of