

ON THE TECHNOLOGY OF LATE AURIGNACIAN BURIN AND SCRAPER PRODUCTION, AND THE IMPORTANCE OF THE PAVILAND LITHIC ASSEMBLAGE AND THE *PAVILAND BURIN*

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ABSTRACT

Due to recent improvements in understanding of the lithic technology of the Early Upper Palaeolithic it is now clear that many classic Aurignacian ‘tools’ are in fact discarded cores from the regular production of bladelets. The complexity and standardisation of many of these core artefacts indicates that bladelet production techniques were designed to create bladelets of predetermined form. The Paviland burin — an artefact defined here and proposed as a bladelet core on the basis of similarities to another, contemporary artefact — is an important feature of the late Aurignacian of Britain and Belgium. Its geographical distribution may have implications for our understanding of the Aurignacian of northern Europe.

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INTRODUCTION

The aims of this paper are twofold. First, some aspects of the micro-lithic component of later Aurignacian lithic technology are explained, with particular regard to the late Aurignacian *burin busqué*. Over the past decade, technological research concerning the function of ubiquitous Aurignacian carinated ‘burin’ and ‘scraper’ tool forms has demonstrated beyond doubt that they functioned (at least primarily) as cores for the production of small and often retouched bladelets (Le Brun-Ricalens 2005). An understanding of the prevalence of micro-lithic technology in the Aurignacian — the first ‘true’ European Upper Palaeolithic entity — has obvious implications for understanding issues relating to methods of subsistence, the significance of technological stasis and change, and even the cognitive capacity of these early European *Homo sapiens*. The majority of this literature has hitherto been published in French, and generally it is only those studying the Aurignacian that are aware of it. I therefore provide a brief overview of this technology using mainly anglicised terminology, with some new speculations based upon my own experience of late Aurignacian assemblages.

Secondly, I explain a form of retouch found on a series of Aurignacian artefacts from the site of Goat’s Hole, Paviland³ (south Wales). Describing these artefacts in detail, I intend to demonstrate significant similarities with another Aurignacian bladelet-core artefact type. I argue that they should therefore be considered functionally comparable. Previously considered to be unique to Paviland, these artefacts are now known to be present in other late

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³ Goat’s Hole at Paviland is often referred to as “Paviland Cave” (Aldhouse-Green 2000: 1): here I refer to Goat’s Hole simply as ‘Paviland’.

Aurignacian assemblages. Their relative abundance in the north of northwestern Europe may have important spatial and/or chronological implications for understanding the human geography of this period. These implications are considered briefly in the concluding section (a more detailed discussion of these issues can be found in Dinnis in prep.).

AURIGNACIAN STONE ‘TOOLS’ AND COMPLEX BLADELET PRODUCTION

The Aurignacian (c. 37–28,000 BP) is Europe’s first ‘true’ Upper Palaeolithic entity, and is widely regarded as a reflection of the colonisation of Europe by its first *H. sapiens* populations (e.g. Jacobi & Pettitt 2000; Davies 2001; Conard & Bolus 2003; Mellars 2005; Stringer 2006). It is with the Aurignacian that elements of the ‘Upper Palaeolithic package’ of modern human behaviour first appear in Europe, such as an increased complexity in the use of lithic and osseous resources and the appearance of art, personal adornment and other symbolic material culture (Gamble 1986; Clottes 2003; Vanhaeren & d’Errico 2006).

Aurignacian lithic assemblages contain standardised and morphologically complex ‘carinated’ artefacts, or artefacts with an area of overlapping, curved removal scars. The typological classification of these artefacts is based upon widely acknowledged archaeological terms: when the removals forming the carinated area have been struck from the ventral surface to create a ‘scraper’ edge, the artefacts are classified thus (carinated scrapers, nosed scrapers etc.); and when these removals have been struck from the flat surface of a burin scar, they are classified as ‘burins’ (carinated burins, *burins busqués* etc.; e.g. Demars & Laurent 1992). Obviously, inherent within these classifications are suggestions as to the artefacts’ functions.

It is now not only demonstrable that many such Aurignacian carinated artefacts in fact functioned as cores for the production of bladelets, but also that this bladelet débitage was both predetermined and complex (e.g. Lucas 1997; Chiotti 2000, 2003; Hays & Lucas 2001; Le Brun-Ricalens *et al.* 2005, 2006; Flas *et al.* 2006; Pesesse & Michel 2006). Any technological assessment of the morphology of these discarded cores makes clear that the knapper was aiming to produce bladelets with very particular morphologies. It is precisely this intricate process of débitage that results in the complex and standardised core artefact ‘burin’ and ‘scraper’ forms.

This desire for standardisation in bladelet form can be seen in the production of common thick nosed scrapers (Figure 1). The preparation of the ‘nose’ — a protrusion on the ventral surface that serves as the platform for bladelet removals — is reminiscent of the modification that can be applied to larger blade cores with the intention of detaching regular blades of a predetermined width and cross-sectional morphology (personal observation). Technologically, these artefacts are therefore directly comparable micro-lithic versions of larger Upper Palaeolithic uni-polar blade cores.

A more complex example is the *burin busqué*; one of the most diagnostic artefacts of the Aurignacian and found in late Aurignacian assemblages throughout western Europe (Demars & Laurent 1992). Its diagnostic nature stems from a complex morphology, which in turn results from a standardised process of reduction (Figure 2). The final core artefact has a flat burin scar (indicated in Figure 2 by the single arrow) opposed by an overlapping series of convex (bladelet) removal scars (indicated by multiple arrows). Typologically, *burins busqués* are differentiated from other carinated burin forms by the presence of an area of retouch, or a retouched ‘stop-notch’, at the termination of the bladelet removal scars (on the left of the artefacts in Figure 2).

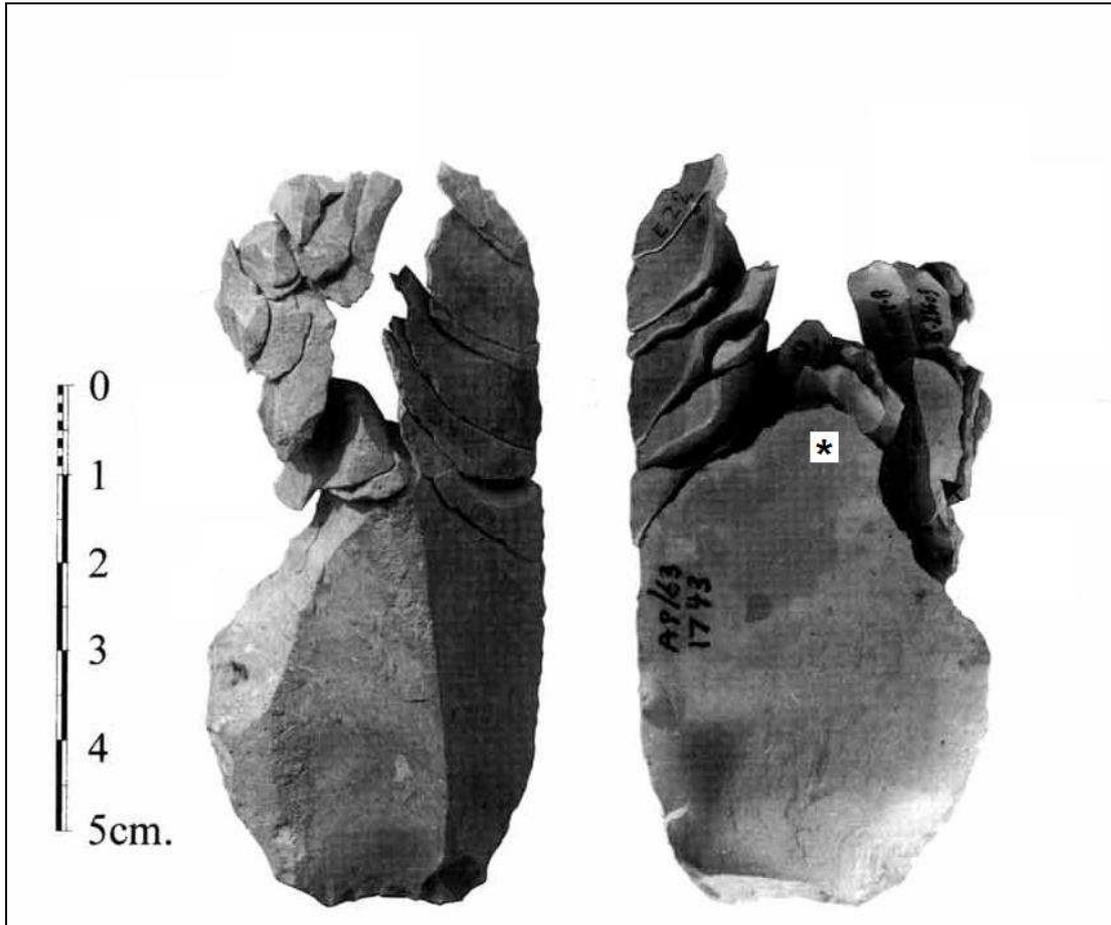


Figure 1: A refitted nosed scraper from Abri Pataud (Dordogne, France) level 8 (modified from Chiotti 2000: 258). The protrusion at the retouched edge (marked with an asterisk) serves as the area from which small, regular bladelets were detached. Note the refitted removals pictured on the right side in dorsal view (left in ventral view). These serve to modify the morphology of the core artefact in a way similar to alteration of larger uni-polar blade cores. Permission to reproduce figure given by R. Nespoulet and L. Chiotti.

The technological reduction of *burins busqués* can be considered as roughly analogous to nosed scrapers (Figure 1), but with the bladelet production process rotated 90 degrees around the long axis of the blank. Therefore, the flat burin scar serves as the platform for the detachment of bladelets, rather than the ventral surface, as in nosed scrapers. This burin scar platform can be renewed when required, as the process of detachment of bladelets renders the position/angle of the débitage surface problematic (Figure 3). Renewal of the platform in this way allows almost the entire blank to be worked for the production of bladelets. For *burins busqués*, the position of the stop-notch determines where on the length of the blank the bladelet removals will terminate, and therefore how long the detached bladelets will be (Figure 2). For nosed scraper forms a comparable notch is not necessary, as the bladelets terminate at the dorsal surface.

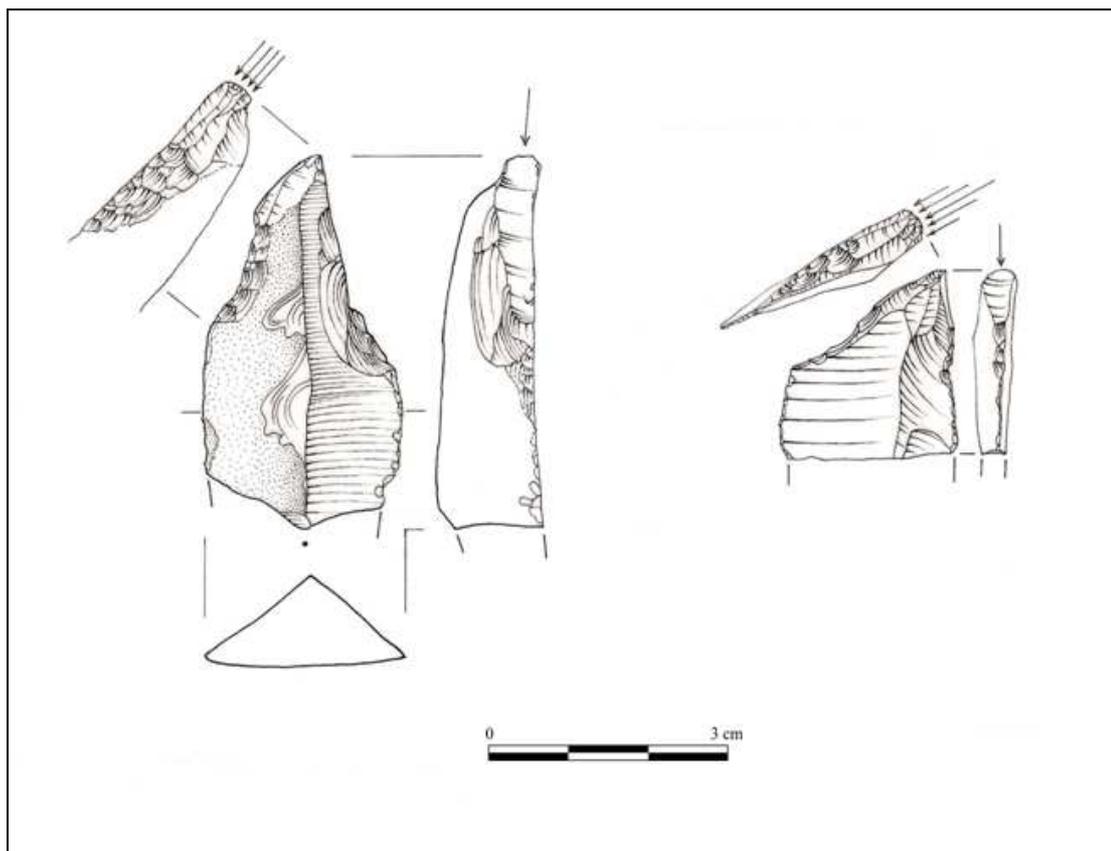


Figure 2: Burins busqués from: Ffynnon Beuno (north Wales; left) and Hoyle's Mouth (south Wales; right). On each artefact, the single arrow indicates the presence of a flat burin removal scar. Opposed to this is the bladelet débitage surface of the artefact (indicated by a group of arrows). At the termination point of these bladelet removals is an area of dorsal retouch known as a 'stop-notch'. Note the consistency of form of the two artefacts. Figures courtesy of A. David.

The blanks used for *burin busqué* bladelet production are broadly comparable in their thicknesses to the thickness of the protrusion or 'nose' in contemporary (i.e. late Aurignacian) nosed scrapers (personal observation), rendering the two methods technologically similar. Considering the aim behind their creation this makes sense, as both methods are being used to create similar micro-lithic artefacts. To allow the morphology of the detached bladelets to remain similar throughout the reduction process of a *burin busqué*, regular blades with a consistent thickness throughout their length are preferred. This is in contrast to nosed scraper forms, where thick flakes are favoured (see Lucas 1997; Dinnis in prep.)⁴.

In addition to the consistency of bladelet width the regularity of *burin busqué* blank thickness provides, the standardisation of the *busqué* method also allows the easy creation of bladelets with even more particular morphologies.

Using the examples in Figure 2 as a guide, one intriguing feature of the morphology of *burins busqués* is the relationship between the retouch at their stop-notch and the positioning of their bladelet débitage surface. When positioned as in Figures 2 and 3, and like the examples in those figures, the vast majority of *burins busqués* have their flat burin removal to the right and their bladelet débitage surface to the left. Also, again like the examples in Figures 2 and 3, on

⁴ Of the seven major and minor assemblages I have viewed in Belgium and France this preference is clear. It is also apparent from a study of the limited amount of British Aurignacian material.



Figure 3: A refitted burin busqué from Abri Pataud (level 7). As bladelets are removed from the débitage surface of the busqué core, the position of the débitage surface/angle of detachment becomes problematic. A new burin removal renews the platform from which the bladelets are struck so that the process can continue. This process can then be repeated, hence the presence of multiple burin spalls in this example. In this figure, only the renewal burin spalls and the final (discarded) burin busqué are present; the detached bladelets are absent.

the majority of *burins busqués* the stop-notch is dorsally retouched. In contrast to this, in those fewer examples where the bladelet débitage surface is aligned to the right, many have

ventral or bifacial retouch forming their stop-notch. Table 1 demonstrates this pattern within a sample of 167 *burins busqués* from the large Aurignacian assemblages of Les Vachons (Charente, France), Abri Pataud (Dordogne, France) and Spy (Belgium).

<i>Position of stop-notch retouch</i>	<i>Alignment of bladelet débitage</i>			
	<i>Left (89%)</i>		<i>Right (11%)</i>	
<i>Dorsal</i>	145	98.0%	10	52.6%
<i>Ventral</i>	1	0.7%	5	26.3%
<i>Bifacial</i>	2	1.3%	4	21.1%
<i>Total</i>	148	100.0%	19	100.0%

Table 1: The relationship between the alignment of the bladelet débitage surface and the location of the stop-notch of 167 typical burins busqués from the large Aurignacian assemblages of Abri Pataud, Les Vachons and Spy. This sample includes: all material from Abri Pataud (including burins busqués deriving from the extension areas); the material from Les Vachons held at the Institut de Paléontologie Humaine (Paris) and the Musée National de Préhistoire (Les-Eyzies-de-Tayac, Dordogne); and the material from Spy held at the Institut Royal des Sciences Naturelles de Belgique and Musées Royaux d'Art et d'Histoire (Brussels), Musée Curtius (Liege) and Préhistosite de Ramioul. For Les Vachons and Spy, this material is the majority of their assemblages, roughly 85% and 90% respectively.

Explaining this pattern is difficult. Considering the percentages of those artefacts with left- and right-sided bladelet débitage surfaces in the sample in Table 1 (89% and 11% respectively), it is tempting to relate the pattern to handedness, with the reduction of each individual artefact following a rigid template predetermined from the outset. Indeed, Figure 3 shows that renewal of the (burin scar) platform always took place on the right hand margin, and therefore that the bladelet débitage surface was always aligned to the left throughout the life of the *burin busqué*. However, both experimental work and some (albeit rare) examples from late Aurignacian assemblages show that the alignment of the débitage surface can change throughout the reduction of the artefact. A new, *opposed* burin scar can be applied when successful bladelet removal from the previous one has become difficult, and the bladelet débitage surface is therefore switched to the opposite side.

Instead, given that we now know Aurignacian bladelet production was not simply an *ad hoc* process — as witnessed, for example, by the complexity and consistency of the *burin busqué* method — the reason for this pattern may lie in the desired morphology of the detached bladelets. If a basic template such as those examples in Figures 2 and 3 is presumed, with a bladelet débitage surface to the left and a dorsally retouched stop-notch, then the stop-notch not only acts to determine the length of the bladelet, but also its curvature. Distally, the bladelet removal will ‘dive’ into the retouched concavity of the stop-notch resulting in a consistent curvature, most pronounced distally, on the left margin of the bladelet. In addition, this termination also creates an anticlockwise twisting of the bladelet throughout its length. This feature of bladelets deriving from *burin busqué* cores seems to be intentional, and may relate to their use in composite tools (Hays & Lucas 2001). Figure 4 shows this marginal curvature and anticlockwise twisting in a sample of late Aurignacian bladelets struck from a *burin busqué* core from the site of Maisières Canal in Belgium. All *busqué* cores from Maisières Canal have a débitage surface aligned to the left and a dorsally retouched stop-notch.

If the morphology of bladelet débitage from a *burin busqué* core is the overriding concern of the knapper, then the pattern shown in Table 1 makes more sense. To achieve a curvature

such as can be seen in the bladelets in Figure 4 when the bladelet débitage surface is aligned to the right, the stop-notch would need to be bifacially or, preferably, ventrally retouched.

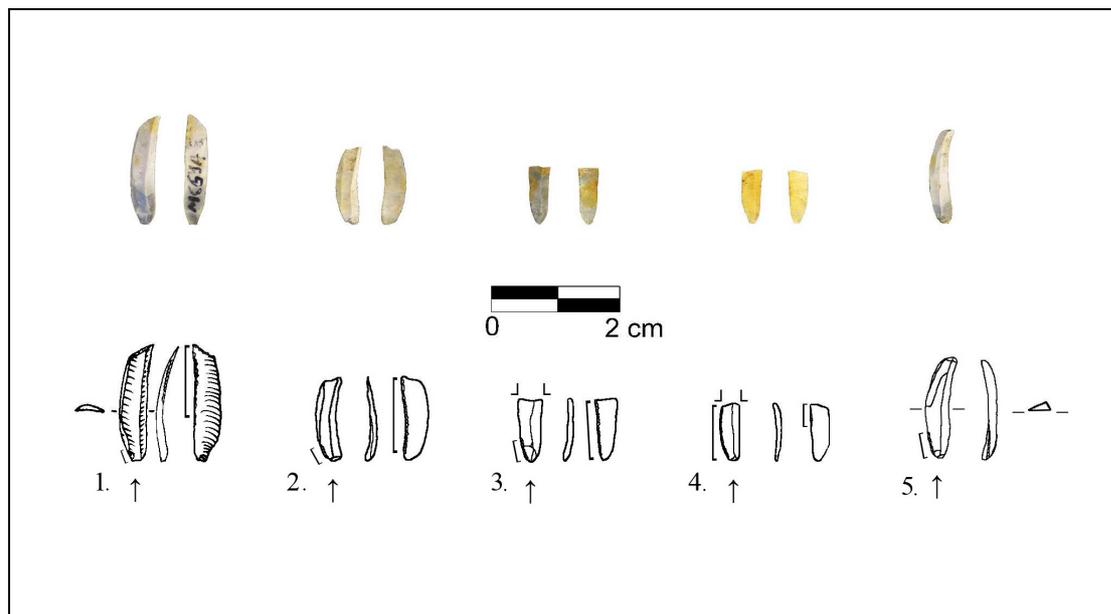


Figure 4: Late Aurignacian retouched Dufour bladelets (Roc-de-Combe subtype; 1–4) and Caminade bladelet (5) from the site of Maisières Canal, Belgium. All of these bladelets derive from a burin busqué core, and show a consistent curvature of their left margin. All also show an anticlockwise twisting through their length, visible most clearly in number 5. Also note the differences in cross-section and the position of retouch between the Dufour and Caminade bladelets (1 and 5). Figure courtesy of D. Flas.

Of course, this does not explain all of the data presented, and it is therefore a somewhat speculative observation. In reality, Aurignacian lithic assemblages contain a variety of these bladelet-core artefacts, and the specific nature of the detached bladelet débitage will be variable depending upon a number of factors relating to raw material availability/exploitation and the blanks utilised. At Abri Pataud, the occupations represented by level 7 (lower and upper) and level 6 show that the same groups were using both the nosed scraper and *burin busqué* methods, as well as more expedient technologies, to create their bladelets (personal observation). This variation in reduction leads to variation in detached bladelet morphology. It is only with further research, including studies related to the impact of handedness on this technology and a deeper understanding of the function of the bladelets themselves, that this and similar issues can be addressed.

Irrespective of the cause of the pattern illustrated in Table 1, the preceding discussion, at the very least, hints at an extremely high level of intention on behalf of the Aurignacian knapper when approaching bladelet production. Another example demonstrates this to be the case. It is now apparent that different cores, or rather different stages of the reduction of one core-type, did serve to intentionally achieve different bladelet types. A relatively recently described retouched bladelet type, the Caminade bladelet, has been identified in the southern French late Aurignacian Caminade assemblage, and subsequently in the collection from nearby Roc de Combe (Bordes & Lenoble 2002). It has now also been identified in the assemblage from Maisières Canal in Belgium (Flas *et al.* 2006). This bladelet is struck from a *burin busqué* core, specifically at the ventral corner of the flat burin facet (i.e. encompassing both the ventral surface and the main bladelet débitage area). The result on the core is a ventrally

visible scar, and due to the bladelet deriving in part from the ventral surface it has a distinctively thick triangular or trapezoidal cross-section. These bladelet types have delicate dorsal retouch down one margin of the bladelet (Bordes & Lenoble 2002; Figure 4).

The importance of the identification of these particular bladelets lies in their difference from another more common bladelet type also deriving from *burins busqués*: the Roc de Combe subtype of Dufour bladelets (Demars & Laurent 1992; Bordes & Lenoble 2002; Figure 4). Unlike Caminade bladelet blanks, the preferred blank for this bladelet type is struck from the main débitage area of the burin. They are therefore comparably flatter than Caminade bladelets in their cross-section. These blanks are then subjected to a similarly fine retouching, but unlike Caminade bladelets this is applied either ventrally or bifacially. The same core artefact is therefore being used to create morphologically different bladelet blanks, and differential retouching suggests that this was an intentional strategy designed to create two very different end products. It would seem that ‘any bladelet’ would not suffice.

The above discussion has centred on *burins busqués*, but other late Aurignacian core artefact types show a similarly complex reduction strategy. To give one further example, a recent technological study of another artefact — the Vachons burin — demonstrates a strategy of reduction aimed at producing morphologically very particular bladelets (Pesesse & Michel 2006). As with *burins busqués*, bladelets are detached from the flat scar of a burin removal. However, unlike the *busqué* method, this scar undergoes significant preparation before the desired bladelet can be detached (Figure 5). A series of ventral removals are applied to shape the blank and to predetermine the morphology of the subsequent bladelet removal, in a way not incomparable to the lateral removals seen in nosed scraper reduction (compare Figures 1 & 5). More specifically, this reduction serves to thin the core, to isolate an area of the platform and to regulate the core artefact’s scar pattern, allowing the detachment of a final bladelet removal that is consistently long, thin and relatively flat (*ibid.*).

The picture that emerges from this cursory examination of Aurignacian lithic technology is one of a marked complexity of reduction intended to produce extremely deliberate and standardised bladelet forms. With this in mind, it is important to reassess one of the more intriguing aspects of the British Aurignacian.

THE IMPORTANCE OF THE PAVILAND AURIGNACIAN

The presence of *burins busqués* at three Welsh findspots (Hoyle’s Mouth, Paviland and Ffynnon Beuno: Figure 2) confirms both a late Aurignacian presence in the western part of Britain, and that bladelet production was being carried out. The Aurignacian of Britain represents one or more temporally limited occupations that are technologically and chronologically comparable only to the later Aurignacian of the continent. It is possible that this occupation is confined to Dansgaard/Oeschger Interstadial 7 in the climatic records of the North Atlantic (see Dinnis in prep.). In comparison to continental regions with their often palimpsest Aurignacian assemblages (e.g. see Flas *et al.* in prep.), this temporally discrete occupation means that Aurignacian material in Britain is limited. Of the small number of British Aurignacian findspots, the Paviland collection contains the vast majority of diagnostically Aurignacian lithic artefacts (48 artefacts out of a total of 54; Dinnis in prep.).

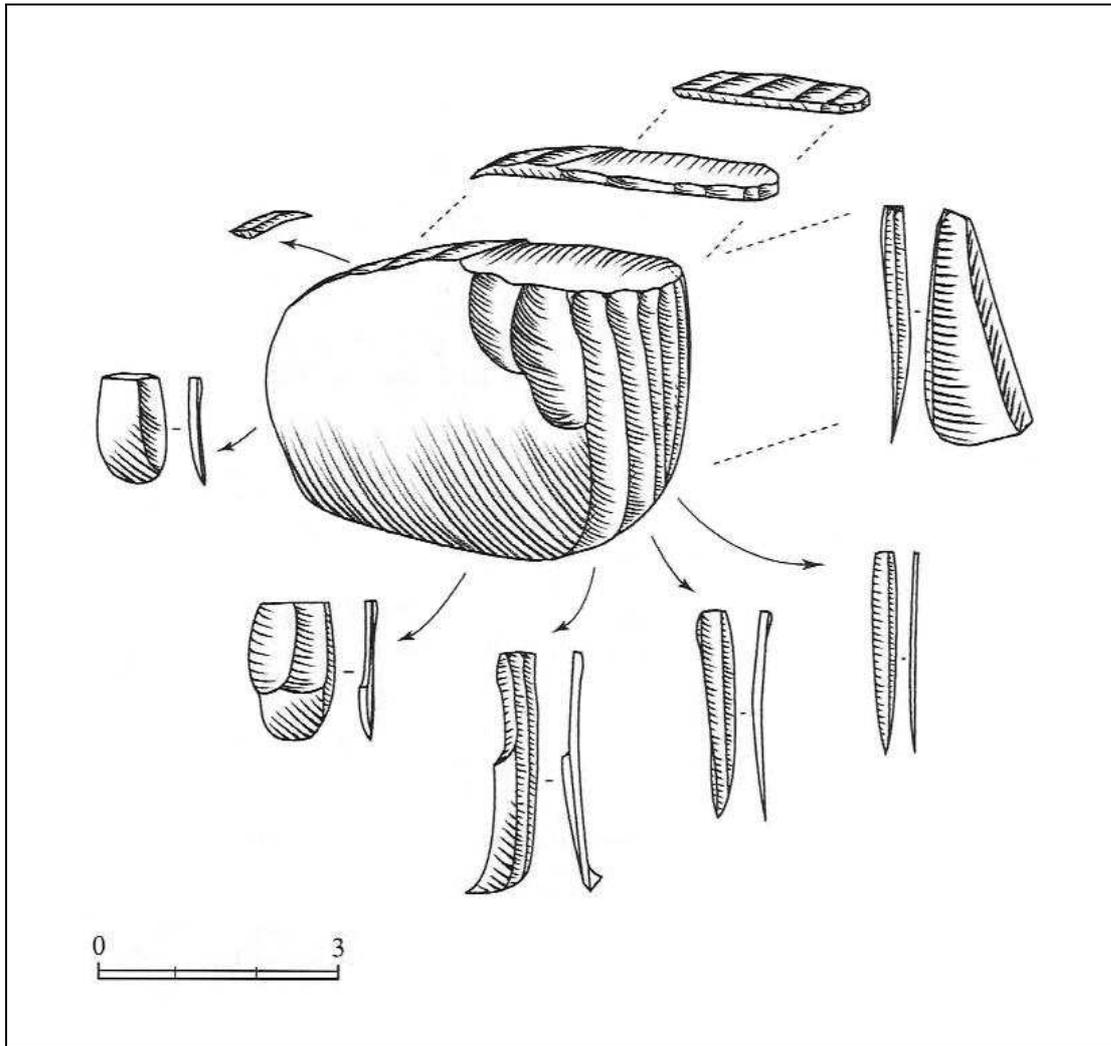


Figure 5: Schematic diagram of the reduction of a thick flake using the late Aurignacian Vachons burin technique. The platform from which the bladelet will be produced is formed by a burin removal (top). A series of initial ventral removals (bottom and bottom left) are made in order to regulate the shape and scar pattern of the blank, and therefore the precise morphology of the desired end product: a long, thin, regular bladelet (bottom right). Figure modified from Pesesse & Michel 2006: 150. Permission to use figure given by D. Pesesse.

In addition to many of those artefact types found across the western European late Aurignacian, the Paviland collection contains artefacts displaying a complex series of ventrally visible removals (Figure 6). The striking nature and possible uniqueness of this retouch has been commented on previously (Sollas 1913: 347; Garrod 1926: 56; Swainston 2000: 109–110). It is my belief that 22 of 25 inversely retouched artefacts in the Paviland collection have clear technological similarities with *burins busqués* (detailed below) and I argue here they should therefore be considered technologically comparable⁵.

Despite these similarities, these artefacts also show a consistent and, I would argue, significant technological difference from *burins busqués*. I therefore classify them here as ‘Paviland burins’. Stephanie Swainston (2000: 110) correctly noted the difficulty inherent in

⁵ Such similarity between the artefacts from Paviland and *burins busqués* has been noted previously; handwriting believed to be that of the Abbé Henri Breuil or of William Sollas (E. Walker personal communication; Swainston & Brookes 2000: 33) has marked many of these artefacts with “burin busqué” (personal observation).

the typological classification of these artefacts, given the scraper/burin location of their retouch. I refer to them as Paviland *burins* to emphasise what I believe to be their technological similarity to the *burin busqué*.

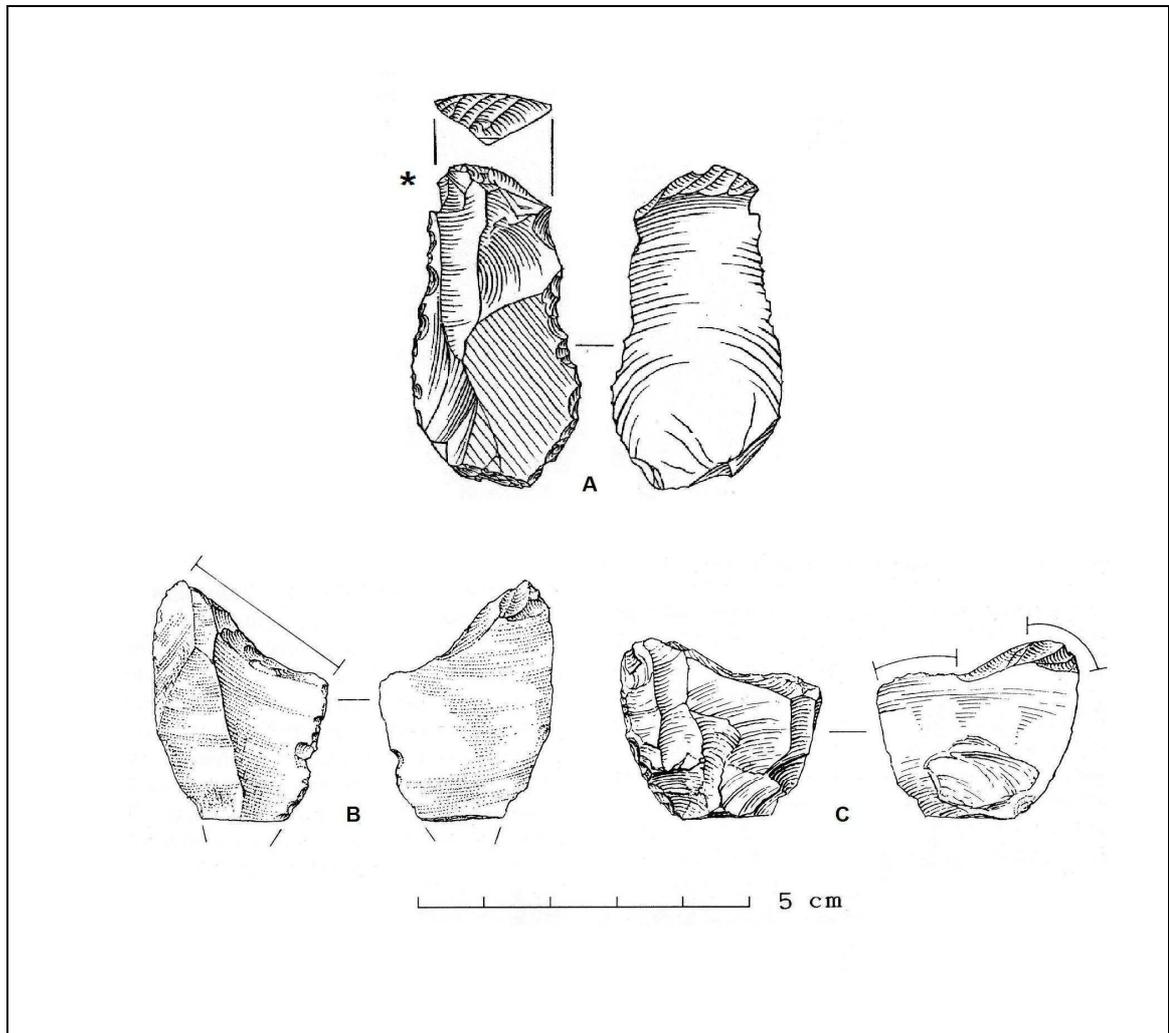


Figure 6: Three Paviland burins from Paviland. Note the consistent positioning of the ventrally visible bladelet débitage surface. The bladelet removals have been struck from an area on the left of the dorsal surface, obliquely across the width and thickness of the blank. Note the presence of multiple, overlapping burin removal scars on Artefact A (top) at the area marked with an asterisk. This suggests that the area from which the ventrally visible ‘bladelet’ removals have been struck has been renewed throughout the life of the artefact. This renewal is likely to be technologically comparable to the renewal of the burin busqué seen in Figure 3. Also note the presence of dorsal retouch, morphologically comparable to the retouch of a burin busqué stop-notch, on Artefact B. Artefact A: illustration courtesy of R. Jacobi; Artefacts B and C: from Swainston (2000: 110) and permission to reproduce illustrations given by J. Wallis.

Until recently, this complex retouch was thought to be unique to the Aurignacian of Paviland (Swainston 2000: 109–111). Within Britain, a Paviland burin is now also known from the Aurignacian of Kent’s Cavern. In addition, four Paviland burins are now known from the Belgian Aurignacian collection from Spy and a further 13 from the Belgian assemblage from Trou Magrite (Dinnis in prep.; see also Flas *et al.* in prep.). Published accounts indicate their presence in another two assemblages, one thought to be late Aurignacian (Le Piage, southern France; Bordes 2005) and another currently ascribed to the early Magdalenian (Thèmes,

northern France; Brou & Le Brun-Ricalens 2006). These are discussed below when a brief consideration of the geographical and potential temporal ranges of Paviland burins is made.

Figure 6 shows three Paviland burins from the Paviland collection. Two examples from Spy are shown in Figure 7. The following description uses these artefacts as a guide. As no refitted Paviland burin-type bladelet débitage is known, the technological description here is based upon the morphology of the discarded core artefacts alone. Given the nature of the collections within which Paviland burins have been identified, it is likely that only new excavation, or new discoveries of these artefacts in existing assemblages, will be able to confirm the presumption here: that, like *burins busqués*, Paviland burins are also bladelet core artefacts.

Paviland burins

Technological description

With regard to similarities with the *burin busqué*, the most obvious is the preparation of the platform from which the removals that form the carinated area have been struck. Situated dorsally to the left on the artefacts in Figure 6(A) and Figure 7(A & B) are flat ‘burin’ scars. Of the 40 examples of Paviland burin studied, 23 have the remnants of these removals. In all cases these flat scars are aligned towards the dorsal surface and on the left of the blank, i.e. the opposite side to the majority of *burins busqués*. The presence of overlapping burin removals on the artefact in Figure 6(A) indicates that, as seen in refitted examples of *burin busqué* at Abri Pataud (e.g. Figure 5), this area has been renewed throughout the life history of the artefact.

In all cases, whether flat burin scars are present or not, this area on the left of the dorsal surface has been used as the platform for the detachment of ‘bladelet’ removals. These removals are aimed obliquely across the width and thickness of the artefact and towards the ventral surface, where they terminate. It can be presumed that when the morphology of the dorsal surface is favourable for the desired bladelet removals, no flat burin removal has been required for their successful detachment.

Clearly visible in one artefact in Figure 6 (Artefact B) is an area of dorsal retouch on the right side of the worked area. Swainston (2000: 110) noted this retouch on several of the examples from Paviland, and, rather presciently, compared it to the retouched stop-notch found on *burins busqués*. Retouch in this area is present on 23 of the 40 artefacts studied (in 22 cases dorsal and in one case bifacial). As no refitted Paviland burins are available for study, their precise reduction sequence is uncertain. However, one artefact from Trou Magrite⁶ — not classified here as a Paviland burin — bridges the technological gap between Paviland burin and *burin busqué* forms. Clearly a *burin busqué*, the final removal has been deliberately aimed towards the ventral surface of the blank, in a style reminiscent of Paviland burins. It is therefore possible that the Paviland burin represents a technique designed to prolong the use of *burins busqués*, although this does not easily explain the differential left/right alignment of these respective forms (see ‘*Inferred bladelet morphology*’ below).

⁶ Artefact marked “T. Magrite 617” and held in the collection at Préhistosite de Ramioul. The artefact is figured in Otte (1979: 128, fig. 36:7).

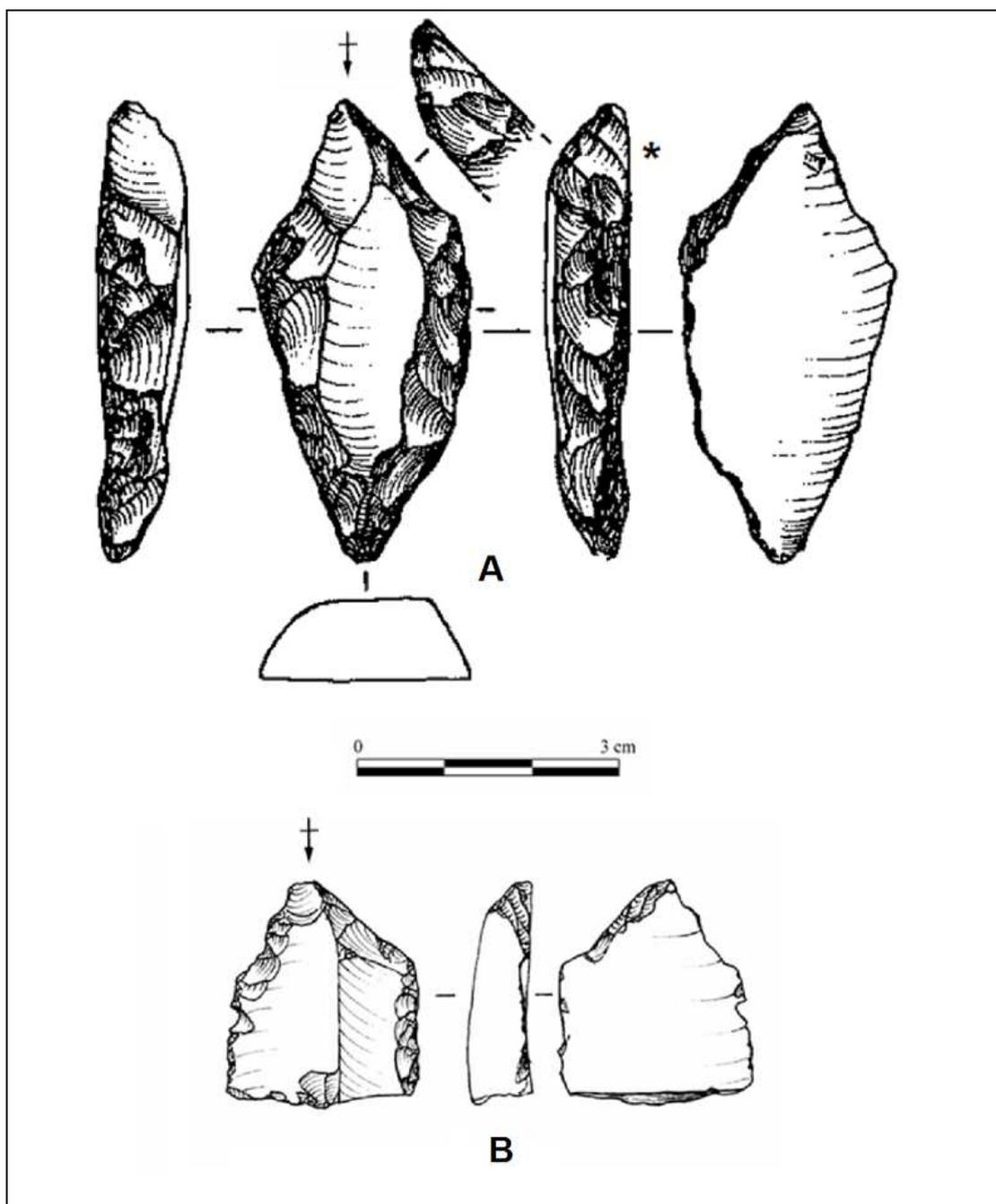


Figure 7: Two Paviland burins from Spy. Figures courtesy of A.-M. Wittek (ADIA). On artefact A (top) the asterisk is positioned at the termination point of the bladelet removals. As can be seen on the two bladelet scars visible, the termination of the removals at the ventral surface is offset. This would have resulted in the detached bladelets having a pronounced curvature on their left margin.

With this in mind, it is interesting to note the prominence of these artefacts at Paviland and at Trou Magrite, sites where locally available raw materials are coarse (Swainston 2000; Miller 2001), and therefore likely to be unsuitable for the successful production of small, regular bladelets. At both of these sites, Paviland burins are abundant⁷. The retouched stop-notch seen on some examples may therefore perform a similar function to those found on *burins busqués*,

⁷ 22 of 48 Aurignacian artefacts from Paviland; 13 of 68 Aurignacian artefacts from Trou Magrite (see Dinnis in prep. for details of the collections studied and criteria for acceptance of material as Aurignacian).

or may in fact be a remnant of a former (*burin busqué*) bladelet production.

Inferred bladelet morphology

One important difference from *burins busqués* is the alignment of the bladelet débitage surface. As already noted, the vast majority of *burins busqués* have the burin scar platform from which bladelets are struck aligned to the right (when positioned as in Figures 2 & 3). The opposite is true of Paviland burins; in all examples studied the removals have been struck from the left side of the artefact (Figures 6 & 7). With regard to the discussion above, this alignment may be related to the desired morphology of the bladelet débitage.

As outlined, the technological template of the majority of *burins busqués* allows the detached bladelet to have a pronounced curvature on the left hand side (Figure 4). Through necessity the morphology of bladelets detached from Paviland burin cores must be determined from the final artefact alone, but this morphology indicates that the main curvature of detached bladelets will likewise occur on the left. On *burin busqué* cores this is due to the removal diving into the retouched stop-notch: on Paviland burin cores this is a result of the offset termination of the removals at the ventral surface (Figures 6(A) & 7(A)). In addition, the scars on the débitage surfaces of Paviland burins indicate that detached bladelets would have had an anti-clockwise twisting through their length. Likewise this results from their offset termination at the ventral surface. Again, this is also a feature of bladelets deriving from *burin busqué* cores (Figure 4). The morphology of bladelets deriving from Paviland burin cores would therefore bear strong similarities to those from *burin busqué* cores, and it is the opposite alignment of the bladelet débitage surface that allows this.

If the final removal scars of Paviland burins are a good indicator of the morphology of the detached bladelets, one potential difference from bladelets from *burin busqué* cores is their length. Figure 8 shows the length of bladelets from *busqué* and Paviland burins, using the length of the longest removal scar on the débitage surface as a proxy for the length of the bladelet detached. While bladelets from Paviland burin cores would lie within the range seen in late Aurignacian *burin busqué* bladelet production, they cluster at the lower end of this range. Given that we know so little about these artefacts it is difficult to speculate as to what, if any, significance this carries.

AURIGNACIAN PAVILAND BURINS AND THE POTENTIAL IMPORTANCE OF THEIR GEOGRAPHICAL DISTRIBUTION

As described, Paviland burins are now known to exist in two Aurignacian assemblages from Britain (Paviland and Kent's Cavern) and two Aurignacian assemblages from Belgium (Spy and Trou Magrite).

Despite an almost complete absence of this artefact type in the literature relating to large southern French Aurignacian sites, several artefacts from the site of Le Piage (Lot), described by J.-G. Bordes as “[burins busqués]’ de type special” (Bordes 2005: 143), approach the form of Paviland burins. These artefacts are believed by Bordes to be a part of a later Aurignacian contamination of a largely early Aurignacian assemblage (*ibid.*). It is possible that they exist in other southern French Aurignacian assemblages, but their absence from the literature certainly suggests that, if so, they are rare in comparison to other artefact forms. They are certainly absent from the large southern French sites of Abri Pataud and Les Vachons, both of which have yielded material from multiple Aurignacian occupations, and

the smaller western French site of Gohaud (personal observation).

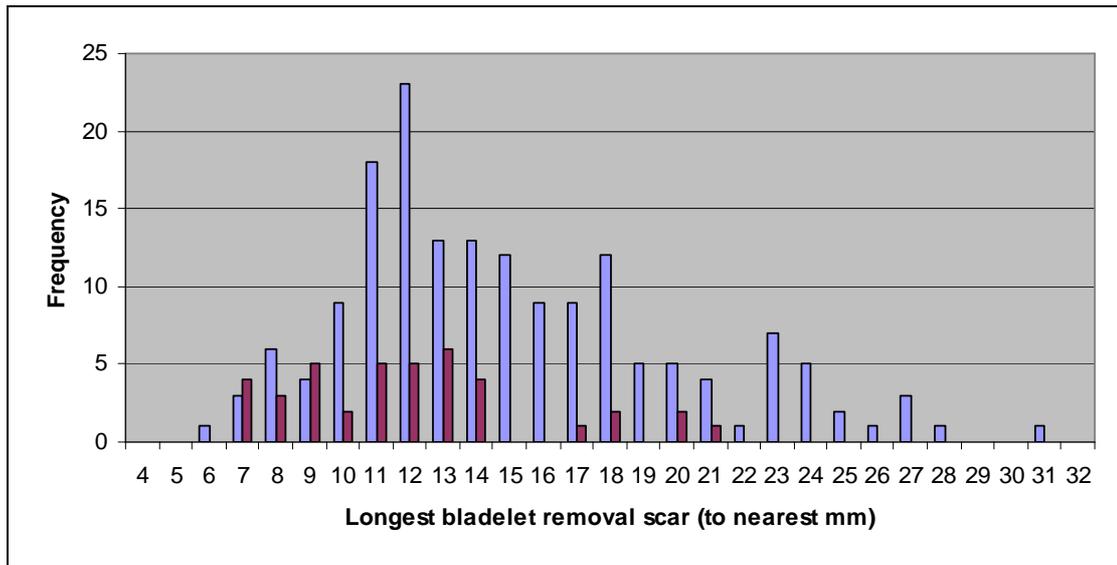


Figure 8: Length of bladelets inferred from the longest removal scar of the sample of 167 burins busqués detailed in Table 1 (light grey) and 40 Paviland burins (dark grey). See text for detail.

As described above, 17 of the 40 Aurignacian Paviland burins studied do not have a flat burin removal applied to form the platform from which bladelets are detached. Instead, the bladelets have been struck directly from the dorsal surface. This latter bladelet débitage process, also apparent from the illustration of one of the artefacts from Le Piage (Bordes 2005: 143), is technologically relatively simple. It is therefore probable that it cannot be considered a secure indicator of the Aurignacian.

In addition to Le Piage, published accounts of the assemblage from the northern French site of Thèmes (Yonne) contain an illustration of an artefact that appears to be one such Paviland burin (see Le Brun-Ricalens & Brou 2003: 78, fig. 10). The site was previously tentatively ascribed to the Aurignacian but is now considered to be early or middle Magdalenian (Brou & Le Brun-Ricalens 2006). If the early Magdalenian attribution of Thèmes is correct then convergence of artefact form is a key issue. Future analysis of old collections in the north of Europe with regard to the identification of Paviland burins must therefore be carried out with caution.

A full assessment of the Aurignacian attribution of Paviland burins from Paviland, Kent's Cavern, Spy and Trou Magrite can be found in Dinnis (in prep.). With regard to the two sites yielding the greatest number of Paviland burins (Paviland and Trou Magrite), these certainly appear to be Early Upper Palaeolithic in age. Radiocarbon determinations from material from the Sollas collection (from which Paviland burins also derive) are overwhelmingly pre-last glacial maximum. Furthermore, those determinations on non-humanly modified fauna (and therefore the material least likely to have been treated with organic-based preservatives) provide results of *c.* 31–29,000 BP (Swainston & Brookes 2000: 45). This age is entirely consistent with a late Aurignacian attribution for the associated artefacts. Given current understanding of British Upper Palaeolithic occupation and hiatus, the material from Paviland is unlikely to be contemporary with the early/middle Magdalenian age postulated for Thèmes; it appears that reoccupation of Britain after the last glacial maximum did not occur until the Lateglacial interstadial, contemporary with later phases of the continental Magdalenian (see

Pettitt 2008). With regard to Trou Magrite, the association of a Paviland burin/typical *burin busqué* multiple artefact⁸ indicates the late Aurignacian age of the former.

The prevalence of these artefacts in the Aurignacian of Britain and Belgium in comparison to southern France suggests that their distribution may have significance with regard to the human geography of the hitherto relatively poorly understood Aurignacian of northern Europe. In palaeogeographical terms, this region was potentially important for late Pleistocene hunter-gatherer groups. As recently emphasised by Stringer (2006), the now submerged Channel River would have been an extremely important feature of the physical geography of Pleistocene Europe. Its role as a physical barrier may explain what appears to be an early Aurignacian presence in Belgium and possibly also northern France, with no contemporary occupation of Britain (Dinnis *in press*; see also Flas *et al.* in prep.). Large river systems would certainly have been important to Aurignacian populations, either as routes through the landscape (*sensu* Davies 2001) or as areas where a diverse range of animal, plant and lithic resources could readily be found (see Ashton *et al.* 2006). Given the location of Paviland burins, it is tempting to relate them to a late Aurignacian occupation focussed around the Channel River and its tributaries (see Dinnis in prep.). If this is the case, these artefacts may be present in less well published northern French assemblages, as well as in other Belgian, British and northern German assemblages.

Importantly, in addition to restricted geographical ranges, southern French sites with long sequences of multiple Aurignacian occupations (e.g. La Ferrassie, Abri Pataud) indicate that Aurignacian burin bladelet core techniques also occupy a limited period of Aurignacian time. The appearance of the late Aurignacian *burin busqué* can be seen particularly clearly at Abri Pataud, first occurring in the late Aurignacian level 8, but with only one single typical example present in that assemblage (personal observation). The later level 7 contains 74 typical examples, with more from the problematic extension area also likely to derive from this level (see Dinnis in prep.). The *burin busqué* technique continues into level 6. The Vachons burin appears to have an even more limited lifespan, appearing only in the very latest levels of well understood southern French sequences (Pesesse & Michel 2006).

Although speculative given the nature of the assemblages containing Paviland burins, a similarly restricted age for this artefact is plausible. Given the similarities of the *busqué* and Paviland burin techniques, and apparent similarities in their bladelet débitage, it is likely that they are contemporary. Paviland burins may therefore be similarly confined to the late Aurignacian. However, whether, like the *burin busqué* technique, the Paviland burin technique persisted throughout the late Aurignacian, or was confined to a more limited period, is currently impossible to establish.

Above I suggested that the Paviland burin technique may relate to the final stages of a more standard *burin busqué* reduction. At present, this is unknown. What is clear is that this technique is geographically bounded and is therefore not simply the artefact of an obvious response to a paucity of good quality material. All Aurignacian assemblages so far studied by myself demonstrate that *burins busqués* have been worked until they are exhausted, with various methods used to prolong their life as useable cores (see Dinnis in prep. for a full discussion). To give one example, the open air site of Gohaud at the mouth of the Loire has yielded 21 typical *burins busqués* (personal observation). The site is distant from major sources of good quality flint, and the majority of material worked is drift flint. Several *burins*

⁸ “T. Magrite 7555” held in the collection at Préhistosite de Ramioul.

busqués from the site have a series of extremely small removals applied to the proximal part of the flat burin scar, at the apex of this scar (the platform) and the proximal part of the débitage surface. In some cases, a bladelet removal has been taken after this modification (personal observation; see figures in Allard 1978). The most likely reason for this modification is to prolong the life of the artefact after the angle of the platform has become unfavourable and the artefact too small to create a new burin scar platform. However, this method was not universally used. Different (broadly contemporary) Aurignacian groups were using different technological procedures to prolong the life of their *burins busqués*. Even if Paviland burins do represent such a method, they are nevertheless culturally informative. The use of the Paviland burin technique therefore has significant importance for understanding the human geography of the Aurignacian of northern Europe.

CONCLUSIONS

It is now known that the primary function of many Aurignacian lithic artefacts was the production of small and regular bladelets. Particularly in the late Aurignacian with the utilisation of the *busqué* and Vachons burin techniques, these core artefact forms display a complexity and standardisation that is demonstrable of a high degree of intention and precision of behalf of the knapper. Their regularity stems from a desire to create a consistency of bladelet form, possibly for their use as part of composite projectile technology.

The most notable feature of the Aurignacian assemblage from Goat's Hole, Paviland — in terms of numbers of artefacts the only British Aurignacian collection that can be referred to as an 'assemblage' — is a series of artefacts with ventrally visible removals. These artefacts bear strong similarities to, but also important technological differences from, the late Aurignacian *burin busqué*. I define them here as *Paviland burins*. In comparison to the *burin busqué* these artefacts are presently poorly understood, and their function as bladelet cores is presumed from their morphology alone. It is likely that this technological explanation for their form can only be confirmed (or, indeed, refuted) with further discoveries. Further discoveries will also be required to confirm the assertion that, like the *burin busqué*, these artefacts are confined to the late Aurignacian only.

Previously thought to be unique to Paviland, Paviland burins are now known to be an important feature of the Aurignacian of Belgium and Britain. Given that the Paviland burin technique is likely to be culturally bounded, this geographical range is indicative of close cultural affinity between these two regions. In palaeogeographical terms, this cultural affinity may be linked to movement in and around the now submerged Channel River valley. It is therefore possible that Paviland burins may be present in other Aurignacian assemblages, most likely in the north of Europe. It is hoped that further work will be able to identify the precise geographical and temporal boundaries of this technique, shedding light on the initial occupation of the north of Europe by our own species.

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