

EXPERIMENTAL ARCHAEOLOGY AND THE DENTICULATE MOUSTERIAN

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The following essay is a summary of preliminary experimental work carried out in connection with my doctoral research on the nature of the Denticulate Mousterian facies, which was presented to the postgraduate seminar of the Institute of Archaeology, UCL on October 24th 1990.

The problem with denticulates

There is little doubt that denticulated and notched tools exist at least in the Mousterian. They have been accorded a place in Bordes' *Typologie* (Bordes 1961, 35-36) as a specific tool type; they have been considered important enough in the Mousterian to be counted as a special index along with the Upper Palaeolithic, Mousterian, and Levallois groups, and, ultimately, Bordes saw fit (Bordes 1962, 44) to class assemblages with a predominance of these tools as a separate Mousterian variant: the Denticulate Mousterian. Regrettably, however, problems arose from the start with the improper identification of the Denticulate Mousterian on a very basic level. Typologists, including Bordes himself, attempted to follow the guidelines for recognising denticulates and notches as set forth in the *Typologie*, yet somehow the task proved difficult when too many questionable pieces appeared in an assemblage. Looking now at denticulate assemblages such as those from Combe Grenal, in the Dordogne, and Roc-en-Pail, located in Maine et Loire, in which the tools have been sorted by the excavators and left in boxes according to their typological category, one can see the confusion that must have plagued the typologist when faced with any piece of raw material bearing a wavy, irregular, or "toothed" edge. Some pieces do indeed bear secondary retouch which is purposeful and unmistakable as a form of modification by human hands, whether it was executed as resharpening or to create a notched piece for direct use. Other lithics are not so clearly deliberately modified. There always seems to be a percentage which bear questionable modification on the edge or that simply bear a rough, irregular edge which failed to merit classification into any other typological category and so were tossed in with the denticulates.

Perhaps part of the problem could be discussed in terms of the tendency to categorise a tool on the basis of morphological appearance as opposed to using one or more aspects of technology. Though arguments and great experimental efforts have been aimed at discussing the Levallois technique (Boeda 1986), hand axe production (such as Newcomer 1971), various Upper Palaeolithic knapping techniques (see Tixier 1980, or various issues of the *Flintknappers Exchange*), and the Quina retouch (Lenoir 1973), to name a few, not many technologists have wasted much time or flint on defining the making of a denticulate. Perhaps it is because, as lithic technologist Jacques Pellegrin (C.N.R.S. Meudon-Bellvue) said to me, "It is so simple to make a denticulate". Quite right too, since a denticulated piece, in its most common form, is merely a blank of almost any shape which has part of the negative of a very pronounced Hertzian cone on the working edge. If there is one such negative, the tool is a notch; if there is more than one it is a denticulate. In my

experience, the arcs of the cones do not even have to intersect, as long as they are on the same edge. Much less common in the Mousterian is a notch or denticulate whose notching has been formed by small continuous retouch instead of one heavy blow to the working edge.

In the course of my research I have become more and more inclined to refer to true denticulates as 'multiple notches'. However, one could be lost forever in a maze of terminology ; always searching for a better descriptive or functional term whereby to describe a certain secondarily modified blank. As Roger Jacobi once put it, "Call them what you want; denticulates, or flaked flakes, or whatever !" However, I must protest the use of one descriptive term: these tools are by no means functionally "saws" as Rust referred to some denticulates found at Jabrud, Syria (Rust 1950), at least not in the Middle Palaeolithic. Bordes quotes Rust's findings in his 1962 treatise on the Denticulate Mousterian, though it is debatable as to whether or not Rust's material was Middle Palaeolithic.

The experimental work

The goal of this particular experimental work was quite simple: because notches and denticulates found in the archaeological record often do not show signs of damage or attrition in the arc of the notching and are also sometimes very small tools, the aim was to decide in what manner these denticulates and notches might have been used. Two experiments were designed in hopes of commenting upon the efficiency of denticulates for working wood, and of understanding better how the tool might have been handled and held during use. I was also interested to test a method of working wood by first charring the outer layers of the wood before shaping it to a point.

In the wider scope of my doctoral research I have suggested that there remain essentially two kinds of denticulates once one has eliminated all other questionable pieces such as accidental, broken, cryoturbated or naturally damaged lithics : 1) true denticulates or multiple notches, and 2.) denticulates which have taken on this morphological form merely as a result of resharpening. The resharpening process need not necessarily have been on the edge of a scraper, but could have been any tool or blank which had suffered attrition and which for reasons of necessity had to be resharpened. There is some evidence to suggest that this was practised with Quina scrapers either to resharpen the edge, or in fact to obtain the Quina retouch more easily (see Lenoir 1973, Meignen 1988). The tool may or may not have been used for other purposes in its notched form after it was no longer possible to restore the scraping edge and use it as a scraper. That is all that I will say in regard to this category of denticulates made by resharpening because these ideas are well published and discussed by Lenoir (*B.S.P.F.* 1973), Meignen (Liege 1988), Verjux (Liege 1988), Dibble (*JFA* 1984) and others.

Here, I am experimenting with notches and multiple notches which were made expressly for use as such.

Two sets of simple experiments were carried out: one at the rock shelter Abri Romani, located near Capelladas, Cataluña (Spain), and the other in Cambridge. Wood was chosen as the raw material to work for several reasons. It has often been said that denticulates were used for woodworking. Many people, from microwear analysts to François Bordes to Australian Aborigines

have made this claim and although the statement has virtually become axiomatic, no one seems to know who originated the suggestion or why. A much better reason for my choosing wood as the raw material to be worked using notched pieces was that wooden objects are known even as far back as the Lower Palaeolithic, and so are notches. More importantly, shaped wooden artifacts have been recovered in the late Mousterian levels from the recent excavations at Abri Romani (Castro-Curell and Carbonell-Roura, in press). Among the few formal tools found in conjunction with these objects were denticulates.

The Abri-Romani experiments

Local flint was used to knap four or five denticulates with at least two usable notches each, but rarely more than three, as is typically the case for archaeological pieces, though in fact the knapper (Prof. Eudald Carbonell) made them that way unconsciously. There was no significant difference between the completed tools and I found myself choosing the denticulate which had the most attractive color of flint. This was not something I deliberated more than half a second, it is just that, all things being equal, I picked up the tool bearing a bright reddish cast with grey swirls, decided I liked it and two seconds later went to work.

The idea of charring wood before shaping it is not original to me and has been tried by other experimental archaeologists (Crabtree and Davis 1968, 426-428). It certainly makes the shaping of a very bulky or hard piece of wood more feasible. At Abri Romani, I had originally planned to work both charred wood and also unaltered wood, but ended up working only charred wood due to time constraints.

Woodworking experiments were also carried out at the same time by Ethel Allue of the University of Barcelona, Tarragona Campus, and will be written up by her elsewhere. The wood chosen by Allue was juniper simply because the wooden artifacts found on the site were determined to have been made from juniper hardwood. For my experiment at Abri Romani, a pine branch approximately 1.5cm in diameter and 65cm in length was sharpened to a point using a method whereby the end to be shaped was charred, then the burned layers were scraped off with one of the experimental tools. This process was repeated as often as necessary, eventually resulting in the formation of a sharp point. Pine was chosen as the raw material to be worked because it occurred in abundance around the rock shelter.

The end of the stick to be shaped was put in the fire for about 15 seconds. When removed it was rubbed in the soft powdery limestone on the floor of the rock shelter to cool the burned end. The warm charcoal was then easily scraped off. My Cataluñan colleague plunged her wood into water in order to speed up the cooling process. However, my preference was to rub the tip on the ground since I found that the charcoal was easily whittled off as a fine black dust. When plunged into water, the carbon became sticky as it was whittled down.

Sometimes the end of the stick was put into the fire (which was built on a travertine block) just long enough to produce a small flame on the working end. Then the stick was removed from the fire, pointed towards the ground, and rotated to control the flame in shaping the end. The whole use of charring was

very much a matter of judgement and assessment by eye since there came a time when too much charring would actually destroy the shaping already accomplished, rather than help. It was necessary to stop charring and whittle the wood directly when the final sharp point was actually made.

In less than fifteen minutes a sharply pointed stick had been produced. When the carbon dust was washed away from the single denticulate used to shape this point, and the denticulate was examined, there was no sign of visible macro-damage. No other flakes or tools were used in any part of the operation: just this one denticulate.

The Cambridge experiment

The same experiment was repeated again in Cambridge except that this time two hardwood dowels measuring approximately 2.5cm in diameter and 160cm in length were used as the raw material to be worked. Hardwood was selected since most of the known artifacts of wood recovered from paleolithic sites are of the hardwood family such as yew, pine and juniper. The dowels were somewhat harder to work than natural wood, because they had been milled, rather than merely being cut from a tree or collected from the ground.

While the fire was building up to a reasonable blaze, the non-charred dowel was worked. About 8 or 9 denticulates were knapped (by the author) from Brandon flint. Most of the blanks were cortical flakes, something which is also true of many denticulates found in the archaeological record. Nearly all of the blanks had to be blunted along the edge opposite the working edge as their edges were razor sharp and pressure could not be properly applied to work the dowel otherwise.

I gripped the stick in my left hand and drew the denticulate towards me along the surface of the stick. Usually my feet were thrown over the long end of the stick to steady it. The denticulate was held with the dorsal surface facing up and the ventral surface facing down against the fingers and against the wood surface. The notch was never placed at a 90 degree angle to the stick in the manner of a spokeshave which would have necessitated the notch fitting the stick, or vice versa, to be effective. None of the denticulates had more than three usable notches on the edge and it was the notch furthest from the worker's body which was used first. The other notches could be used but with increasing difficulty as this often involved shifting the tool in the hand to a more awkward angle.

Only one notch was used at a time and the peaks or "teeth" formed by the intersection of two notches were never employed in a gouging or combing manner. Only one part of the arc of a notch generally bore the brunt of the work at any given time because of the manner in which the denticulate was held against the wood.

After much time, effort and damage to the hands and sense of humour, I had not succeeded in shaping the stick to a point. Several times it was necessary to change denticulates when my hand grew tired of holding a certain blank. Then I might switch to using raw unmodified flakes in a planing motion. These flakes suffered a very fast rate of attrition and felt very dull to the touch after short use. However, when the denticulates were washed, there appeared to be surprisingly little macro-damage for the amount of effort that had been put into the whittling.

I eventually gave up trying to put a point on the first hardwood dowel and started with the second one, using the charring method described for Abri Romani. As before, the working end of the stick was placed in the fire, removed, cooled in the dirt, and shaved down, the process being repeated until a blunt cone had been whittled out at the end. Finally, the charring was no longer useful and the point of the spear was whittled directly into the raw wood. This milled hardwood dowel certainly took more effort to char and whittle than the smaller pine branch from Abri Romani. However, working the wood in this manner was still a great improvement over working the unaltered wooden dowel.

Observations

Several qualifying statements need to be made at this point. These and any other archaeological experiments are carried out merely to suggest a range of possible behaviour or a different way of doing things. They do not prove anything. Though denticulates and notches seem to provide more control when working wood than a raw flake or even a scraper might, there is no evidence to show that they were used exclusively for the working of wood. Furthermore, though I found that it simplifies the shaping of a hardwood object to use fire during the whittling of the wood, this does not mean that the Palaeolithic craftsmen did not simply work natural, unaltered wood.

Having made the disclaimers, here are the possibilities. The denticulate would probably be justifiably referred to as a multiple notch since it is generally only one notch at a time which is in use during the actual whittling process. Holding the denticulate with the dorsal face upwards and the ventral surface against the wood, and then drawing the denticulate towards one's body helps provide a certain amount of control. At the end of the procedure one would be holding the finished point of the spear towards oneself. By contrast, I found that holding the stick braced under one arm and whittling "old timer's style" away from the body sacrifices much control in the shaping process. It is important to remember that one is not working cherry or balsa wood which would be more simple to work in this manner, but rather a more stubborn hardwood. On the same subject of control, the notch and denticulate hold their position well on the wood just by the nature of the concavity of a notch and the two "teeth" which act to hold the notch in place. Raw flakes and convex scrapers were also tried, but again it was at the sacrifice of a certain amount of control over the whittling process.

The process of charring and whittling away the carbon dust leaves one's tools with very little damage at the end of the day. It must also be noted that working the uncharred wood left a certain amount of macro-damage on some pieces, but the notches overall seem to be very durable tools. This observation, coupled with the possibility that at least some percentage of denticulates may be the by-products of resharpening, may account for the fact that one does not find much macro-damage on archaeological notches and denticulates.

Final note

As mentioned above, this report was originally delivered as a seminar to the postgraduates of the Institute of Archaeology, London, consequently, more

detailed quantitative information has been omitted for the sake of readability. A more detailed and systematic account of this and other experimental work on the Denticulate Mousterian, will be available upon completion of my Cambridge doctoral thesis.

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