SPECIALIZED BLANK-DETACHMENT HAMMERS FROM THE EARLY UPPER PALAEOLITHIC[1]

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The subject of this paper is a very patterned class of tool that appears to be a specialized hammer used primarily for the detachment of blades and flakes from a flint core by direct, stone-on-stone percussion. The artifacts in question are part of the Châtelperronian (or initial Upper Palaeolithic) assemblage at the site of Les Tambourets in the Pyrenean foothills of southwestern France (slide 1). A program of collaborative research--involving Tulane University, the Quaternary Institute of the University of Bordeaux, and the Regional Directorate of Prehistoric Antiquities in Toulouse--has been ongoing since 1973 under the general direction of the senior author. Geochronologic data from the site suggest that the Châtelperronian occupation dates to between 33,000 and 34,000 years ago,

The *débitage* techniques used at Les Tambourets involved the production of both blades and flakes from small and inelegant versions of the familiar Upper Palaeolithic prismatic blade core (slide 2), often double-ended (slide 3), and with multifacetted striking platforms (slide 4). The Cretaceous flint most available in the region occurs in small nodules, frequently flawed; despite the fact that a blade-core model was used by the artificers, the most frequent *débitage* products--retouched or unretouched--are flakes. Many of the flakes

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have large, multifacetted striking platforms with prominent bulbs (slides 5 and 6); there is little doubt that the detachment technique was direct, stone-on-stone percussion.

Heavy, massive tools of the sort normally called "hammerstones" occur at Les Tambourets (slides 7 and 8), but they are rare (three complete specimens and one broken one were recovered), complete examples range in weight from 168 to 428 grams, with a mean of 271 grams. Protuberant ends of corners are heavily battered and pitted (slides 9 and 10), and this is the principal kind of modification to the original cobble.

The special hammers of interest in this report are more numerous in the Tambourets assemblage; the excavations produced a total of 5 complete and 7 fragmentary examples. They are considerably lighter and more gracile tools than the classic hammerstones (slide 11), ranging in weight from 87 to 126 grams, with a mean of 105 grams for the complete examples. The special hammers are also thinner for their length and width than the classic hammerstones,

The cobbles from which the special hammers are made have been modified, for use or by use, in three important ways. The photographs illustrating the modifications are, for the most part, photographs of plaster casts of the objects rather than of the objects themselves; we found that the casts, of uniform color and texture, produced more readily readable photographs than those of the cobbles. We are indebted to Dr. J. R. Watts, a New Orleans dentist, for his help in teaching us how to cast these objects.

The first major kind of modification, seen on all 12 examples, is deliberate grinding *before use* that has created one or more flattened facets at the narrow end or ends of the piece. These facets are oriented obliquely with respect to the long axis, and they are canted

with respect to the faces of the piece (slide 12). With such a tool lying flat on the table, the facets, if any, in the top right and bottom left corners are canted toward the upper face; those at the other two diagonal corners are canted toward the lower face (slides 13 and 14). Because of this canting, each facet intersects with one face of the cobble along what we may call a "high edge" and with the other face along a "low edge."

The second major kind of modification is use damage along the high edge of the ground facet; the damage occurs as small flakes removed from the face immediately below the high edge and originating from it (slides 15 and 16). The plane of these flake scars is generally very close to the plane of the face on which it appears, suggesting that the force that produced it was applied in much the same plane--that is to say, with the tool held in a nearly vertical position. There is also often small-scale crushing and contusion damage along much of the high edge (slide 17). Except for the high edge, the surface of the facet itself bears little or no wear damage (slide 18).

The third kind of modification--again, damage resulting from use--is heavy pitting wear occurring in concentrated zones on the faces of the cobbles (slide 19). The zones of pitting are often located asymmetrically on the face, just below the high edge of the bevelled facet (slides 20 and 21). This kind of wear does not appear on the surfaces of the facets.

Minor modifications--less frequent and less patterned--include transverse scratches and deep cuts on the long or lateral edges of the cobbles (slides 22 and 23), isolated pitting and linear scratching on the faces outside the heavily pitted zones (slide 24), and occasional cuts or scratches on the surface of the facets.

The nature of the modification to these tools suggested that their principal function might have been as special-purpose hammer-stones used for the detachment of blanks from cores once the preliminary stages of core preparation had been accomplished with heavier hammers. The specific hypotheses that were tested by replicative experimentation, carried out mainly by the junior author, were the following:

1. Flakes and blades generally similar to those found at Les Tambourets, particularly with respect to the characteristics of their striking platforms, could be produced using modern hammer-stones that were close replicas of the Tambourets objects in question.

2. If the platform of the core were struck with the high edge of the previously prepared facet on the replica hammer, and if the rectification of the platform/core-face junction between successful removals were accomplished using the face of the hammer, the kinds of modification on the replica would be similar to those found on the Tambourets objects.

The replicative experimentation began with obtaining water-rolled cobbles similar in size, shape, and weight to the Tambourets artifacts (a less than simple task in stoneless New Orleans!). The cobbles chosen ranged in weight from 109 to 199 grams, with a mean of 151 grams. Oblique, canted facets were created on the ends of the cobbles by hand-grinding on a flat slab of industrial carborundum (slide 25). Because of the resistance caused by friction, the hand-held cobble may rock and wobble a bit during grinding, resulting in a facet that is not planar, but slightly curved. Several of the prehistoric artifacts have just this sort of curved facet that tends to wrap down the lateral edge of the cobble (slide 26). Also, when hand and arm fatigue dictate an interruption in grinding, the grinding may be resumed at an angle that

is, quite unintentionally, different from the original one. The result, two or more parallel facets in slightly different planes, is again a feature observed on at least one of the prehistoric artifacts.

The most interesting information to result from our grinding of replica hammers was the realization that all the Tambourets artifacts are apparently tools used by right-handed people. In order to hold and use the hammer in the way dictated by the test, right- and left-handed versions must be mirror images of each other. On replica hammers used by the senior author (slide 27), a right-hander, the facet in the top right corner position cants toward the upper surface, as on all the Tambourets hammers. On hammers used by the left-handed junior author (slide 28), this facet must cant toward the lower surface.

Although we had trouble obtaining sufficient quantities of flint or chert that is similar in its flaking qualities to the flint used at Les Tambourets, and although some questions left unanswered by the replicative experiment result from this difficulty, we were nevertheless successful in testing our replicative hammers on a small series of cores.

The hammer was held in a nearly upright position--that is to say that the end-to-end long axis of the cobble was close to being parallel to the bulbar axis of the flake being detached. The object was to contact the striking platform of the core with a portion of the high edge of that facet that is proximal to the user. A normal follow-through swinging blow was used to deliver the percussive force. We found that for rectification of the platform/core-face junction between detachments, the most comfortable rotation of the cobble in the hand--accomplished without thinking about it--brought that face of the cobble that had

been pointed toward the core during detachment into position for use in removing overhangs and salients.

The flakes and blades removed using our replica hammers were broadly similar to the Tambourets *débitage* products when we had similar raw material to work with. Comparisons of our experimental flakes with those from Les Tambourets are dealt with in more detail in a version of this paper now being prepared for publication. We can say here, in brief summary, that the striking platforms of our flakes were often large, as shown in these photographs of one of our refitted cores (slides 29, 30, and 31). Approximately half the platforms are multifacetted, which is true also of the prehistoric flakes. Our experimental flakes were Not significantly different in mean length from the Tambourets flakes, but they were on average about 5 mm. narrower and about 2 mm. thinner. In sum, our experimental products are not identical to the Tambourets flakes, but they are quite similar.

The damage to the replica hammers was also very similar to the damage observed on the prehistoric artifacts. Small flakes originating from the high edge of the facet were removed from the face immediately below that edge (slide 32). The entire high edge was usually damaged by crushing and pitting (slide 33). Some linear grooves on the surfaces of the facets resulted from well-remembered misdirected blows (slide 34). The rectification work resulted in a concentrated area of pitting and some short scratching on the face just below the high edge of the facet, located asymmetrically, just as on the prehistoric artifacts (Slide 35). Our technique of using the replicas did not, however, produce transverse scratches or deep cuts on the lateral edges.

The result of the replicative experiment was to confirm in a *general* way our two working hypotheses. Artifacts like those from Les Tambourets can be used in the fashion indicated to detach flakes and blades like those found at Les Tambourets, and the replica hammers will have essentially the same pattern of use damage found on the prehistoric hammers. We noted that after the working to exhaustion of two or three cores, the facet of our replica hammer used for the purpose was itself sufficiently damaged by flaking from the high edge to be itself exhausted and nonfunctional, a hammer with its full complement of 4 facets might, then, be used for the working of no more than 8 to 12 cores, which seems to us to be a rather small number. However, the raw material differences that plagued us and our less than Palaeolithic skill may make such calculations fruitless. The Tambourets artifacts were quite probably used in the way we suggest, but there are still some aspects of their use that we do not understand.

Regardless of the extent to which our interpretation is correct, it is, we believe, worth bringing to the attention of the profession the existence of these patterned (if quite simple) *ground-stone* tools in an early Upper Palaeolithic context. If we are essentially correct about the use of these artifacts, it seems that the grinding was the simplest way to reduce the thickness of the end of the cobble and thus to minimize the area of contact between the hammer and the striking platform of the core. We may be seeing here an early step along the road that led to the far more sophisticated punch technique later in the Upper Palaeolithic.

Finally, we have not been successful in finding reports of similar objects in the literature of the Upper Palaeolithic. Hammerstones have, of course, been generally neglected. Wolfgang Taute's classic study of stone and bone retouching tools, published in 1965,

illustrates a few objects from the Epipalaeolithic and Mesolithic that might be similar, but this is far from certain, we would very much welcome any relevant comparative information.