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THE LITHIC ASSEMBLAGES OF PECH DE l'AZÉ IV (DORDOGNE, FRANCE)

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Abstract

The late François Bordes excavated the site of Pech de l'Azé IV from 1970 through 1977. The site produced a deep, rich sequence of Mousterian industries including Typical Mousterian, Mousterian of Acheulian Tradition, and the previously unknown Asinipodian along with a well preserved fauna. Though Pech de l'Azé IV, along with Pech I and II, is well known and has played an important role in our current understanding of Mousterian variability, it has not been fully analyzed or published. This article reviews what is currently known of the site and presents some preliminary results from a new project to finish the analysis and to subsequently publish the collections.

Introduction

Nearly every student of archaeology in the world has been taught about the so-called Bordes-Binford debate, which concerned the interpretation of Mousterian assemblage variability (Binford 1973, Binford and Binford 1966 and 1969; Bordes 1973; Bordes and de Sonneville-Bordes 1970; Dibble and Rolland 1992; Grayson and Cole 1998; Mellars 1965, 1969 and 1970; Rolland and Dibble 1990). In fact, what may be surprising to those not specializing in French Middle Paleolithic is that few of the sites that contributed data to that debate have ever been fully published. While new excavations continue, even at classic French Mousterian sites such as La Quina (Debénath and Jelinek1999) and Combe-Capelle (Dibble and Lenoir 1995), the need to study and publish existing collections excavated by previous researchers is especially acute, and there is considerable activity in this direction (Ashton *et al.* 1992; Callow and Cornford 1986; Singer *et al.* 1993).

Pech de l'Azé IV was excavated over twenty years ago by the eminent French prehistorian François Bordes. Not only was Bordes one of the major players in that debate, but he was also responsible for the development of the major frameworks used for organizing Mousterian assemblages (Bordes 1953, 1961 and 1981; Bordes and Bourgon 1951; Bourgon 1957; see Mellars 1996 and Sackett 1991). These frameworks, and indeed much of what we know about the Mousterian in France, are based on his excavations at Pech de l'Azé, Combe-Grenal, Corbiac, Roc de Combe, and others. Unfortunately, since his premature death in 1981, many of the sites that he excavated remain unpublished or published in only a preliminary reports. This is the case for Pech IV, which is the last site that he excavated in France. This is especially unfortunate since this site yielded a tremendous corpus of lithic and faunal material from a deeply stratified context.

Since 1996 the authors have been actively working on Bordes' collection of lithic material from Pech IV, which consists of about 90,000 artifacts provenienced in a 3-dimensional coordinate system. By the end of the summer of 1999 most of the work on the existing collection was finished and a new excavation at the site is planned to begin in 2000 to collect needed chronostratigraphic and paleoenvironmental data and to verify the integrity of the existing collection. This article presents an overview of the history of the site, the work on the existing collections that has been done so far, including a preliminary typological, technological, and metric analysis of the entire existing lithic collections, and the plan for future fieldwork.

Background to Pech IV

Pech de l'Azé IV is one of a cluster of four Lower and Middle Paleolithic sites located in the Perigord region of southwest France (fig. 1). They are situated some 50 meters above the floor of a small, usually dry, valley that runs into the Enéa, a small tributary of the Dordogne River (fig. 2). Pech de l'Azé I and II (fig. 3) are opposite entrances of a single tunnel-like cave that intersects a promontory in the limestone cliff. Pech de l'Azé III is a small cave in the same cliff located about 30 meters west of the opening of Pech II. Pech de l'Azé IV is a collapsed rock shelter roughly 80 meters east from the mouth of Pech I.

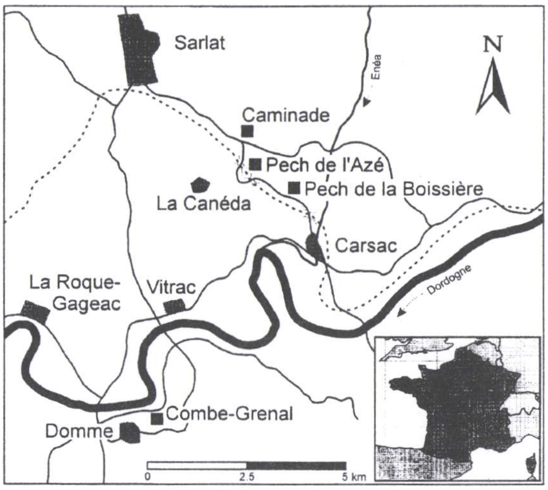

Figure 1. Map of the region south of Sarlat, France, with the location of Pech de l'Azé (adapted from Bordes 1972b). The dashed line represents the former railroad.

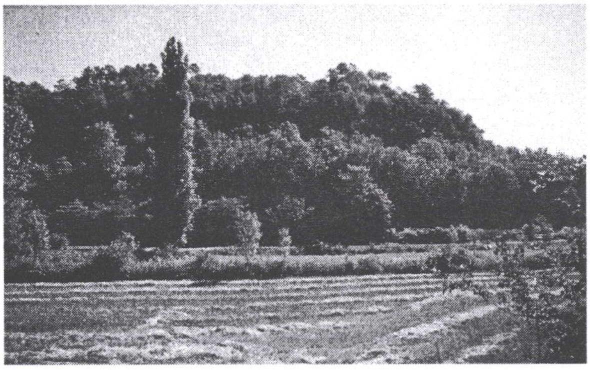

Figure 2. The hill of Pech de l'Azé, looking northeast. The Pech sites are situated about half way up the hill.

The history of research at Pech I extends back to virtually the beginning of the science of Paleolithic archaeology. Initially excavated early in the 19th century by Jouannet and later by the Abbé Audierne (Bordes 1954), "Pey de l'Azé", as it was then spelled, was one of the sites described by Lartet and Christy in their seminal article entitled "Cavernes du Périgord" published in 1864. Sometime during the 19th century most of the archaeological material within the cave (identified as the Pech Ia locality; Bordes 1954) itself was removed by pothunters, but in 1909, Peyrony discovered near the wall in front of the mouth a cranium of a child between the ages of five and six (Bordes 1954; Capitan and Peyrony 1909; Ferembach *et al.* 1970; Patte 1957). In 1929-30 Vaufrey (1933) excavated in the terrace outside of the entrance to the cave (Pech Ib) and identified the sequence as containing only Mousterian of Acheulian industry. Later, from 1948 until 1951, more excavations were carried out by F. Bordes (1954) in the same area. It is believed that the Pech I deposits date to the Wurm II (Laville *et al.* 1980).

Pech II was discovered by Bordes in 1948, thanks to the fact that some of the talus of this locale had been cut away in the construction of a rail line that runs parallel to the cliff at this point. He excavated there from 1949 to 1951 and then again from 1967-1969. Both outside the mouth of the cave (locality Pech IIb) and within the cave itself (Pech IIa), was an occupational sequence that began with the Meridional Acheulian, followed by a variety of mostly Typical Mousterian industries. Schwartz and Blackwell (1983) published two U-series dates from Pech II and two from Pech I, and Grün *et al.* (1991) published a series of ESR dates based on 29 teeth from Pech II. Both sets of dates give a consistent picture, though the ESR dates provide more detail. They indicate that Pech II was occupied between Oxygen Isotope Stages 6 and 3, with a break in the sequence between the lower layers 5-9 (Stage 6) and the upper layers 2-4, which seem to span from middle Stage 5 until Stage 3 (cf. Bordes and Bourgon 1950 and 1951, Laville *et al.* 1980; see also Grün *et al.* 1999).

Pech III, discovered in 1951, is a small cave that contained a sequence corresponding to the earlier part of the Pech II sequence (Bordes and Bourgon 1951).

Bordes discovered and first tested Pech de l'Azé IV in the spring of 1952 (Bordes 1954). In the following four years, 1953 to 1956, a dentist named Mortureux then excavated a larger trench, one by nine meters, into the site. He was stopped, however, by large blocks of roof fall and the demands of his practice. During the decades that followed, Bordes concentrated on Pech I and II, among other sites, and it was not until 1970 that he began excavating Pech de l'Azé IV. He spent eight field seasons there, from 1970 to 1977, and opened a total of 52 square meters (fig. 4). In the first year, Bordes expanded Mortureux's trench into the site making it approximately two meters wide and 11 meters long through the slope deposits in front of the limestone cliff. In the following years, he opened a rectangular grid of 7 by 6 meters against the cliff. Most of these squares were excavated to bedrock. At its maximum, against the cliff face, this meant a depth of roughly 7 meters below datum (or about 4.5 meters below surface), though a block of squares on the western side of the grid (C12-I13 and G14-H14) were only partially excavated leaving a series of steps; altogether he excavated just under 115 m^3. In terms of the investment of his time and amount of material

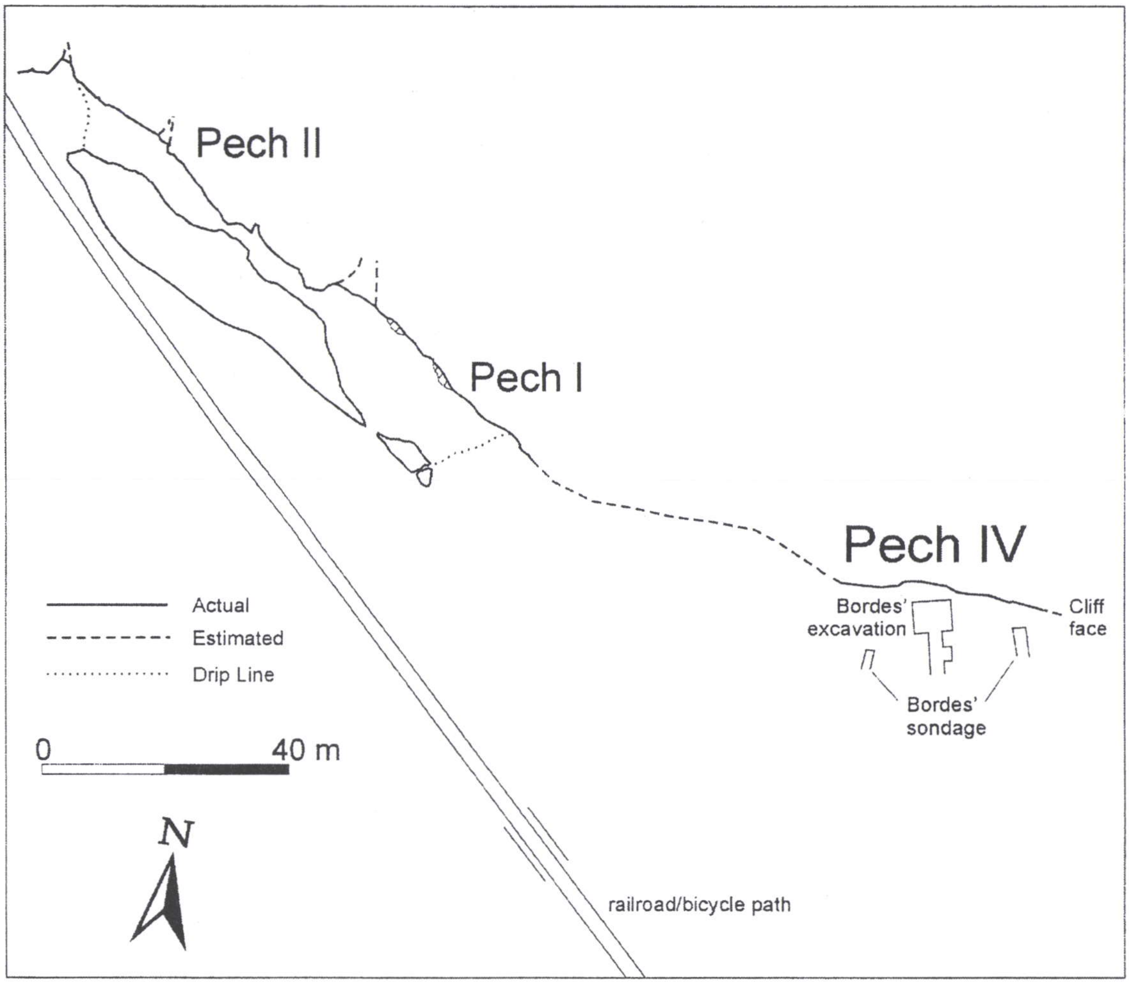

Figure 3. Map of the Pech de l'Azé sites, except Pech III. Base map prepared by authors with survey data; outline of interiors of Pech I and II caves taken from Bordes (1972b).

that he recovered, Pech IV represents the second largest excavation undertaken by Bordes during his career, second only to his work at Combe-Grenal.

A preliminary note describing the stratigraphy, lithic industries, and fauna of Pech IV was published in 1975, based on analysis of material recovered through the 1973 season. The Mousterian industries included several examples of Typical Mousterian, Mousterian of Acheulian Tradition, and new variant called the Asinipodian (Bordes 1975 and 1981). This latter industry is particular primarily for its very small Levallois cores and flakes, high incidence of truncated-facetted pieces, and for a fairly high percentage of Kombewa flakes.

Despite the fact that the Pech de l'Azé sites have not yet been fully published, the data they have supplied have played a critical role in the debate over the nature of the Mousterian. Indeed, these sites are part of the foundation of Mousterian systematics and our understanding of Mousterian assemblage variability.

The Current State of the Site and its Collections

Today the site is open but the exposed sections have all been covered by concrete walls and, as a result, appear to be in good condition. The collections, which consist of the numbered objects (lithics and fauna) and several hundred bags of small finds, are stored at the Institut de Préhistoire et de Géologie du Quaternaire , Université de Bordeaux I, in Talence, France.

When we began this project in 1996 the material was in various states of curation. First, a portion of it (approximately one-half) was washed, labeled (with square and identification number) and organized by Bordes into levels and typological classes. By and large this portion is in good condition, but our work has shown that there are problems in the way this material is organized. It is apparent, for instance, that some pieces have been placed in the wrong type box, and, more seriously, some drawers are labeled with an incorrect stratigraphic level. This is a serious issue since level is not marked on the individual pieces, thus the drawer labels and sometimes the original field notebooks are the only guide to the stratigraphic context. When plotted in three-dimensions, we found that in some cases entire drawers plotted at the wrong elevation, indicating that the drawer labels were incorrect (McPherron and Dibble 1998, see also http://www.pechiv.com).

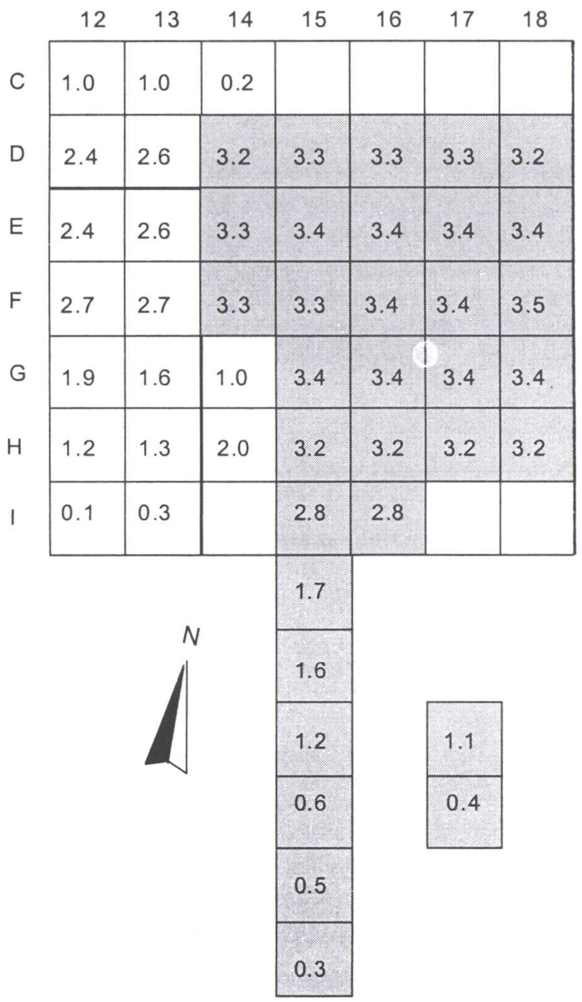

Figure 4. Map of the grid system used by Bordes and the squares excavated. The numbers in each square indicate the depth (in meters) of the deposits excavated below the surface; shaded squares excavated to bedrock.

For the material that had not been studied by Bordes, a portion was washed and labeled but was left unsorted either by level or category. The principal challenge with this material, which was never before analyzed, was to determine the stratigraphic level from which the material came (see below).

There was also a significant portion of both the stone and bone assemblage, primarily from the last two years of excavation, which was not washed. The principal issue with this material was the deterioration of the artifact labels. At the time of excavation, each artifact was wrapped in foil and the ID number for the piece was written in pencil on masking tape that was then wrapped around the foil. This system was never intended to be permanent, and with the passage of time the tape looses its adhesive properties and separates from the artifact. This had already happened with a small number of pieces (less than 50).

Fourth, the small finds, lithics and fauna together, are stored in plastic bags labeled by square (or portion of square) and a depth range. These bags and their contents have not yet been inventoried. By cross-checking the depth with the notebook data it is possible to associate these finds with the numbered artifacts and thereby assign the proper stratigraphic unit to them. It will be necessary to adequately rebag and label these artifacts at the time of their analysis.

All of the basic provenience data, drawings and notes are contained in field notes which, fortunately, have been kept together and in good condition by Mme. D. de Sonneville-Bordes at the Musée d'Aquitaine, Bordeaux. Altogether, there are some 2500 pages of field notes and various plan and sections views. Over the past four years we have entered all of the raw data contained in the field notebooks into a computer database. Thus, for each artifact these data consist of: square, id number, X (relative to west edge of square), Y (relative to south edge of square), and Z (relative to site datum) coordinates, a code indicating type of artifact (retouched tool, flake, core, tooth, etc.), sediment description as recorded by the excavator, Level assignment, excavator name and date of excavation. The coordinate data have been modified to correspond to a global grid system for the site as a whole relative to the original site datum (which was located on the cliff above the site).

In addition, both as a means of archiving the notebook information and to facilitate editing of the entered notebook data, each notebook page (a total of 2502 pages) was scanned and saved in a high-resolution format. This will facilitate the eventual publication of the notebooks on CD-ROM (or equivalent) format.

Altogether almost 92,000 lithic artifacts have been inventoried and analyzed. For complete flakes, tools, and cores a full set of descriptive and analytical observations were made, building on the system described in Dibble *et al.* (1995a; see also Dibble 1997; Debénath and Dibble 1993). These include detailed observations of technology, typology, morphology, and raw material. For non-complete lithic artifacts, a more restricted set of observations was made depending on the nature of the object. The goal of this initial analysis was to provide a basic typological and technological description of the industries along with basic data that would be of use for a wide variety of research purposes.

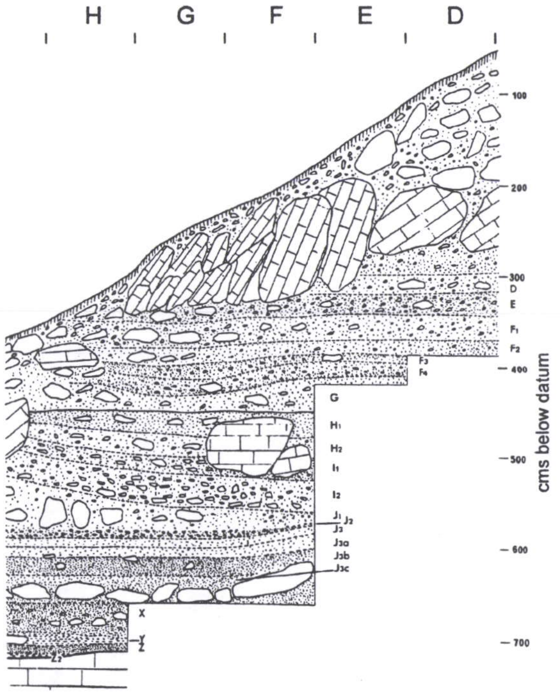

Figure 5. Partial sagittal section drawing by F. Bordes, in line between square rows 14-15.

The entry of both the notebook data and the analytical data for the lithic artifacts has resulted in the creation of a large computer database. A large part of our efforts have focused on the organization, "cleaning", and maintenance of this database. Some of the problems we faced were those inherent in any large database, but many were also due to the fact that this collection had not yet been systematically processed and adequately curated. Many problems, too, were simply the result of the fact that the material was excavated and processed before computers were in common use.

One issue that became apparent during our analysis is the fact that there is a relatively high number of duplicate ID numbers in the Pech IV collection. This is a problem that is much more serious in archaeological work than is commonly realized and, in fact, it only becomes apparent with computerized inventorying of the entire collection (which allows for quick and efficient verification of identification numbers). Artifact labeling is often considered a trivial aspect of archaeological fieldwork, but it is fundamentally important since the only way to link a particular object with the other data is through the identifying number written on the object itself. In our computer system, each time an artifact is picked up and analyzed, its identifying number is the first thing to be entered in the computer. The computer then checks to see that (a) the number is a valid number in the system; and (b) that it has not already been analyzed. In making these checks during the course of analysis of the Pech IV material, it became clear that there were a number of errors related to artifact labeling. To remedy this problem during our own field projects we have instituted a system of artifact labeling in which one person labels the artifact and a second person then reads the number from the artifact and verifies that it corresponds to the number on the tag. In this way, virtually all of the labeling errors have been eliminated. In the case of the Pech material, however, there is no way to correct for this problem after the fact. Since duplicate ID numbers make it impossible to relate additional data to a specific artifact, these cases have been removed (though not permanently deleted) from the main database.

Another problem noted in the Pech collections is that there is a tremendous amount of inter-excavator variability in the minimum sizes of numbered and provenienced artifacts. Quite literally, some enthusiastic excavators had a tendency to record and number lithic objects as small as 2 mm in maximum size, while most others would put such pieces in the small-finds bags. The issue is not that small artifacts are not important – clearly they are – but rather that there has to be consistency in terms of how different materials are collected and analyzed. Inter-excavator variability in terms of minimum size cutoffs can grossly affect a number of measures, including artifact densities, basic counts, artifact size calculations, and artifact class ratios. For this reason, all lithic artifacts less than 2.5 cm in maximum dimension were removed (though not permanently deleted) from the main database. This not only helps to minimize intra-excavator variability at Pech IV itself, but it also makes the remaining sample more comparable to other sites excavated with such controls.

Finally, it was necessary to determine the level from which each of the artifacts came. There were three sources of information regarding the proper level assignments of the excavated artifacts : Bordes' own assignments before his death (whereby artifacts were stored together and the level indicated on their container); notebook entries by the individual excavators indicating the level, and the artifacts' position in three-dimensional space. Only about one-half of the existing collection was actually assigned by Bordes into levels, and as described above, there are clear problems even with these. Such problems are relatively easy to spot and correct, thanks to ability to plot the points on the computer. On the other hand, it is clear that the current storage of the existing collection by level has serious errors and that use of the collection without verification with the notebook data would lead to significant problems of interpretation. By utilizing all of these sources of information the overwhelming bulk of the material has been assigned to their proper stratigraphic provenience. Note that in our discussion of this material, we use the term "layer" for the major geologically-defined beds, and "level" for the various subdivisions within them.

One of our goals is to publish this collection in digital format with the inclusion of digital photographs (see Dibble and McPherron 1996 and 1997). Toward this end we have taken over 8,000 digital photographs of the lithic artifacts in two resolutions - a reduced version that can be quickly accessed by a GIS program and a higher resolution for archival and analysis purposes. This will not only give other researchers an accurate visual appreciation for the collection, but will also provide a significant analytical capability as well (cf. McPherron 1991; McPherron and Dibble 1999).

More details concerning our efforts to organize and prepare this collection can be found at http://www.pechiv.com.

The Industrial Sequence

Layers X, Y, and Z (tables 1-3 and fig. 6).
At the base of the sequence, resting on bedrock, are three layers which Bordes called, from top to bottom, X, Y and Z. These layers consisted of multiple lenses which were sometimes difficult to distinguish from each other. Interestingly, these layers, and Level J3c immediately above, contained abundant traces of burning and hearths; in Layer Z, the burning appears directly on the bedrock and has left the limestone reddened and fire-cracked. In fact, our own analysis shows that roughly ten percent of the lithics from these layers exhibit evidence of burning. This raises an interesting question of why was there so much burning taking place at the site (a phenomenon that is known to occur at other nearby sites as well, including the base of the sequence at Combe Grenal) The exact nature of the burning at Pech IV and some explanation of why it does not occur with the same intensity throughout the sequence remain to be determined.

Bordes had originally considered the industries of these layers to be examples of Typical Mousterian, but our analysis of the complete series shows that all of them are much higher in scrapers than what was seen by Bordes, with "essential" Scraper Indices higher than 55. Most of the scrapers are single forms, followed by double and convergent types; transverse scrapers are rare. There is some Levallois (with average IL about 13 percent) and a relatively high degree of faceting. As with most of the Pech IV industries, the majority of the blanks exhibit uni-directional preparation, followed by sub-radial and radial. These various types of exterior scar patterns do not appear to be related to the degree of core reduction, as was the case with the Mousterian assemblage from Biache St.-Vaast (Dibble 1995). There are moderate degrees of both core reduction and tool production.

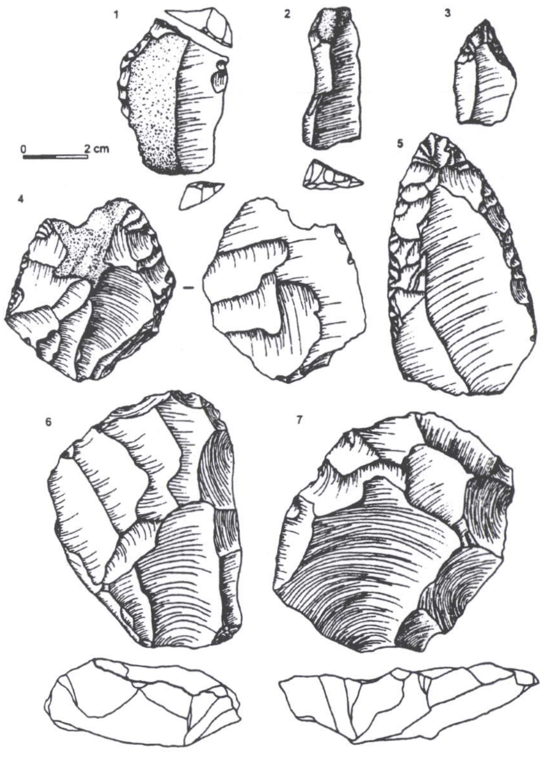

Figure 6. 1. denticulate; 2. truncation; 3. point; 4. truncated-faceted piece; 5. convergent scraper; 6. Levallois core; 7. Levallois core. All from Layer X except 7 (Layer Z).

The "Asinipodian" from levels J3a-J3c (tables 4-6 and fig. 7).
A layer of *éboulis*, likely representing an early partial collapse of the rockshelter, separates Layer X from the Layer J immediately above it. Bordes divided J into J1, J2 and J3 and further subdivided the latter into J3, J3a, J3b and J3c. All of these J levels are described as fairly pliable sand with rare *éboulis*, a rich lithic industry, fauna, and more traces of fire. In

terms of color, the top of the J3 levels is redder, then it becomes more gray and finally black towards its base. It is apparent from inspection of both frontal and sagittal plots of the material that these subdivisions are largely arbitrary, however.

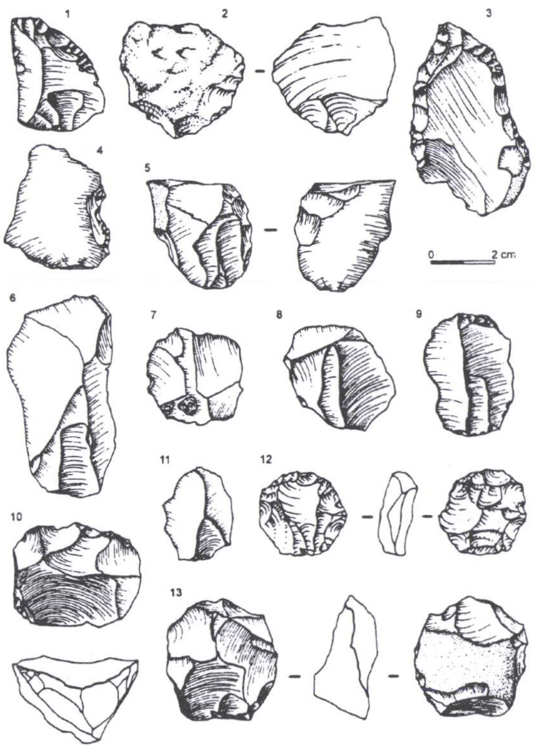

Figure 7. Artifacts from Levels J3a-J3c : 1. déjeté scraper (Level J3c); 2. Truncated-faceted piece (Level J3b); 3. convex convergent scraper (Level J3c); 4. notch (Level J3b); 5. Truncated-faceted piece; 6. Levallois flake (Level J3a); 7-9, 11. Levallois flakes (Level J3b); 10, 12, 13. cores (Level J3b).

Levels J3a-c were thought by Bordes to represent an entirely new facies of Mousterian, what he termed the "Asinipodian," and indeed, there are many features of these assemblages that stand out. Typologically, the industry resembles either a Denticulate Mousterian or a Typical Mousterian rich in denticulates, as there are more notches/denticulates than scrapers, and virtually all of the latter are single types. This suggests a relatively low degree of utilization of the assemblages, and this is borne out by the very low percentages of blanks to cores and of tools to flakes. One other type, however, is heavily represented in these layers, namely truncated-faceted pieces. This type was not recognized in Bordes' analysis (not being a part of his original type-list; see Debénath and Dibble 1993), and it is interesting to see how he tried to deal with their classification – calling them either cores, burins, truncations, or, most often, simply "miscellaneous" (fig. 8).

Now truncated-faceted pieces are known to occur in varying frequencies in Middle Paleolithic assemblages from all over the Old World.

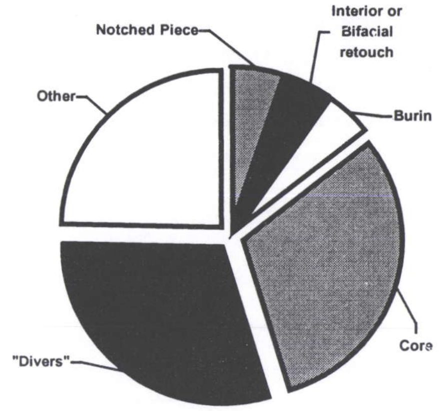

Figure 8. Breakdown of Bordes' original classification of truncated-faceted pieces.

Another characteristic feature of the Asinipodian, and one that was recognized by Bordes and confirmed through our analysis, is the very high percentages of Kombewa flakes and cores – the percentage of cores that are classified as Kombewa reaches a high of over 12 percent in Level J3a. What we have found however, is that truncated-faceted pieces and Kombewa cores may be part of the same strategy – two different sides of the same coin, as it were - given that truncated-faceted pieces are flakes with removals usually from the exterior face while Kombewa cores are flakes which, by definition, have removals from the interior face (i.e., removal of the bulb of percussion). In fact, there is a clear relationship in the occurrence of these two forms throughout the sequence (see fig. 9).

Another interesting aspect of these Asinipodian levels is the production of very small Levallois flakes, which again may be technologically related to both the truncated-faceted pieces and Kombewa cores. Bordes himself was struck by the extremely small size of these pieces – in fact, many are less than 2 cm in length. That they should be considered Levallois flakes and not the result of retouching bifaces or scrapers is first clear from the fact that bifaces are absent and scrapers are rare, but more telling is the presence of undeniable Levallois cores that are themselves extremely small : almost 10 percent of these are less than 3 cm in maximum length, and the lengths of the primary removal scar average less than 2 cm with a minimum of 1.4 cm. In other words, the flakes that were prepared and removed are smaller than what is commonly piece-provenienced according to modern excavation standards. Related to this emphasis on small flake production is the fact that many of these cores are made on flakes (it was also common in these layers to utilize a small knob of flint as a core, as in fig. 7:13), and, in fact, there is a whole continuum from small Levallois cores or Mousterian discs, truncated-faceted pieces, and Kombewa cores.

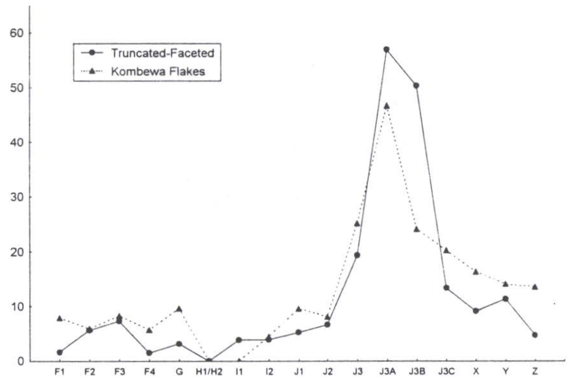

Figure 9. Relationship between percentages of truncated-faceted pieces and Kombewa flakes.

Although the average sizes of Asinipodian tools and flakes is more or less similar to what is seen throughout the Pech IV sequence, the small size of some of the Levallois flakes led Bordes (1975:298) to considered the term "Micromousterian" to describe this industry; he settled instead on Asinipodian (a Latin translation of Pech de l'Azé) to emphasize his belief that Pech de l'Azé IV was the only site where it is known to exist. In fact, however, some of these same elements do occur in other kinds of industries – the high percentage of truncated-faceting, for example, is well attested at the site of La Cotte de St. Brelade (Callow and Cornford 1986) and in the Zagros Mousterian. The latter includes a number of small, radially-prepared Levallois flakes and very small radial cores as well (Dibble 1984; Dibble and Holdaway 1993).

Finally, adding to the interest of this industry is the fact that such an emphasis on the production of small flakes does not seem to be simply a result of increased core reduction due to decreased raw material supplies. In this case, according to the models put forward earlier (Rolland and Dibble 1990), we would have probably seen increased tool production and tool reduction as well, but neither of these is apparent in the Asinipodian, which indicates that relatively little emphasis was placed on creating blanks and on retouching blanks into tools. Thus, despite the fact that some Levallois cores were either made from very small blanks or reduced to such diminutive sizes, some other factor besides intensity of utilization, perhaps some as yet unidentified functional need or even a style, may be responsible.

Levels J1-J3 (tables 7-9 and fig. 10).
Level J1, consisting of a light red-brown sands, contained large blocks of *éboulis* representing another partial collapse of the shelter. Level J2, immediately below, was described by Bordes as having been affected by cryoturbation with rounded limestone blocks and damaged flints in a sandy matrix. The effects of cryoturbation seemed to be more pronounced in the front of the site than in the rear.

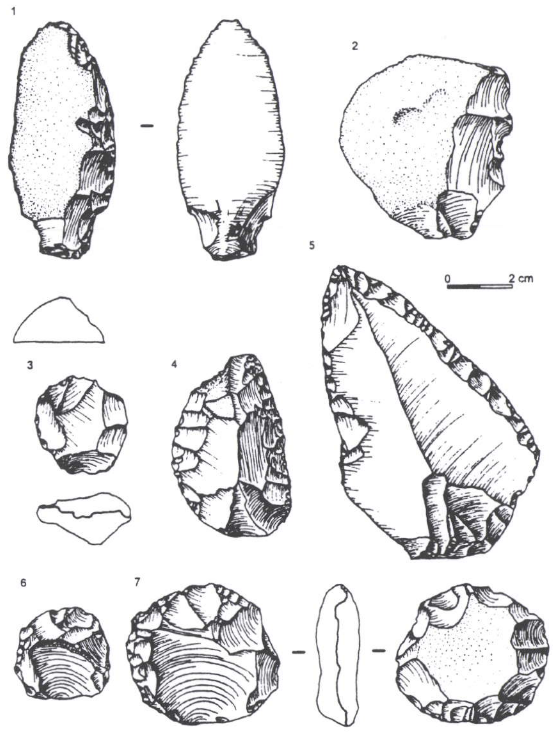

Figure 10. Artifacts from Levels J1-J3 : 1. stemmed scraper (Level J1); 2. Denticulate (Level J3); 3. Single surface core made on a knob of flint (Level J3); 4. Double convex scraper (Level J3); 5. point or convergent scraper (Level J2); 6. Levallois core (Level J2); 7. Levallois core (Level J1).

In some ways these assemblages begin a trajectory that continues through the I layer which follows. Thus, from the lowermost J3 level to the uppermost I1 level we see a more or less continuous increase in the proportion of scrapers relative to denticulates, a general decrease in truncated-faceted pieces, increasingly higher blank-to-core and tool-to-flake ratios, and decreasing Levallois and Kombewa techniques. In Levels J1 to J3 single scrapers predominate.

Consistent with the geological evidence of cryoturbation, these levels, and Level J2 in particular, do show more evidence of edge damage.

Levels I1 and I2 (tables 10-11 and fig. 11).
Within Layer I, the stratigraphic distinction between levels I1 and I2 is not marked. Level I2 is characterized by numerous small *éboulis* while I1 has fewer *éboulis* and fewer stone tools. Both levels are at times highly concretionated. What is clear, however, is the marked vertical separation between Layer I and both the underlying Layer J and the overlying Layer F. There is also a slope of these layers toward the cliff face.

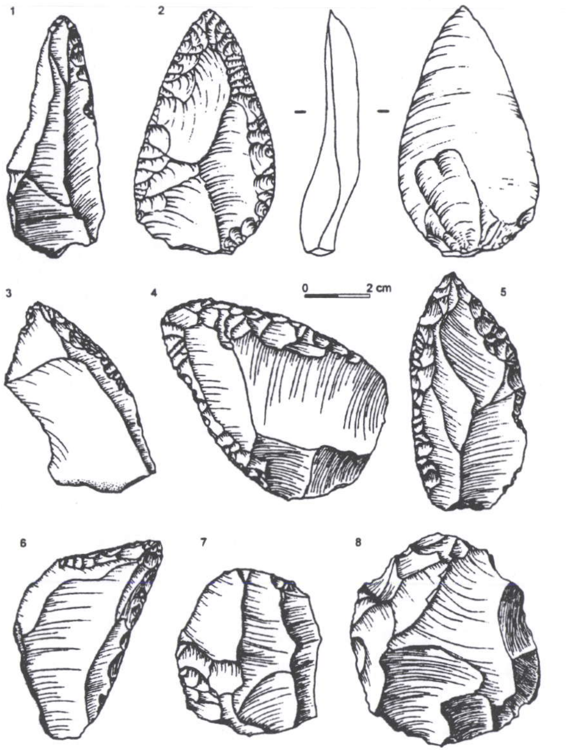

Figure 11. Level I2 : 1, 2, 5. Mousterian points; 3. single scraper; 4, 6. déjeté scrapers; 7, 8. Cores.

In Bordes' own words (1975 : 298), the assemblages from I1 and I2 are, "*esthétiquement parlant, la plus belle [industrie] du site,*" and present a very different kind of industry from the underlying Asinipodian. Here scrapers are the dominant tool, Levallois production is moderate, and the flakes and tools have the largest dimensions of any in the Pech IV sequence. Among the scrapers, there are many more of the more reduced convergent and transverse types than in other assemblages of the site. Although the hiatus between the upper J levels and Layer I suggests some length of time between the deposition of these two units, the fact remains that it represents a extreme shift in terms of tool production relative to flake production and in terms of artifact dimension. Whether this relates to a change in raw material availability at the site (see Dibble, 1991), a significant change in the use of the site, or some other factor remains to be determined.

Levels H1/H2 and Layer G (tables 12-13 and fig. 12).
Levels H1 and H2, described as sandy with scatter *éboulis,* contained very few stone tools and so are combined in this analysis. Bordes classified them as Typical Mousterian. Likewise, Layer G was nearly sterile. Bordes felt that some of the tools identified from this layer more likely represent pockets of material derived the above Level F4 (see, for example, the partial biface from Layer G shown in fig. 12:1), though our own analysis of the full assemblage suggest closer affinities, both typologically and technologically, to the underlying Layer I.

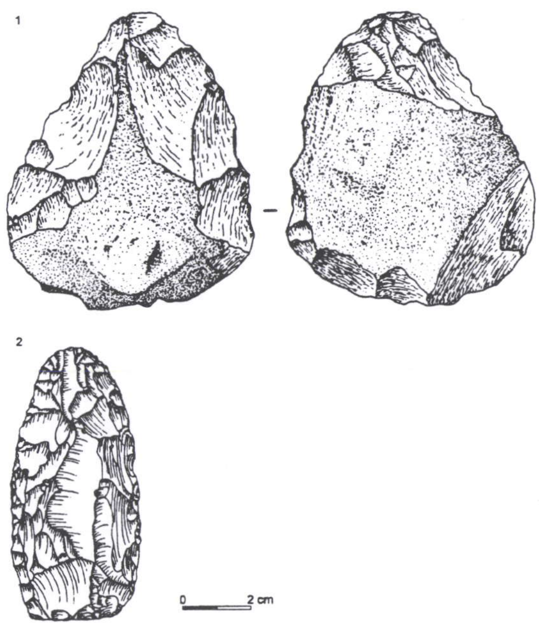

Figure 12. Layer G : 1. Biface; 2. convergent scraper.

Layer F (tables 14-17 and fig. 13).
Layer F, again more or less arbitrarily subdivided by Bordes into four levels, is the last substantial Mousterian deposit at Pech IV, though the industries, particularly level F4, are the richest at the site. Due primarily to the presence of a few bifaces in each of the F levels (the Biface Index reaches a maximum of only 3.9 in level F2), Bordes classified these industries as MTA with a switch from Type A in F4 to Type B in F2 and F1.

Levallois production drops considerably in these levels and is at its lowest for the entire sequence. Typologically, the F levels look somewhat like the J3a-c levels, except, of course, for the bifaces in the former and the elevated numbers of truncated-faceted pieces in the latter. Interestingly, there is a clear and steady increase in Upper Paleolithic types (especially backed knives). This is especially significant given that Bordes considered the MTA-B to be transitional to the Châtelperronian. A closer look at the technology and good dates for these levels may be of some importance in understanding the development of the Châtelperronian (Bordes 1958 and 1972a; Harrold 1983 and 1989; Pelegrin 1990), as there are virtually no sites published that have good sequences containing both MTA-A and MTA-B - the only other assemblages that Bordes characterized as being MTA-B are from Le Moustier (Level H), the *série lustrée* from Goderville, and Pech I (Couche 7) (Bordes 1984; Delporte and David 1965). There does not seem to be a concomitant increase in blade technology, but blade technologies are a well recognized aspect of Mousterian variability throughout its duration (Bar-Yosef and Kuhn 1999), and temporal developments of this technology and its relationship to the later Châtelperonnian remain unclear.

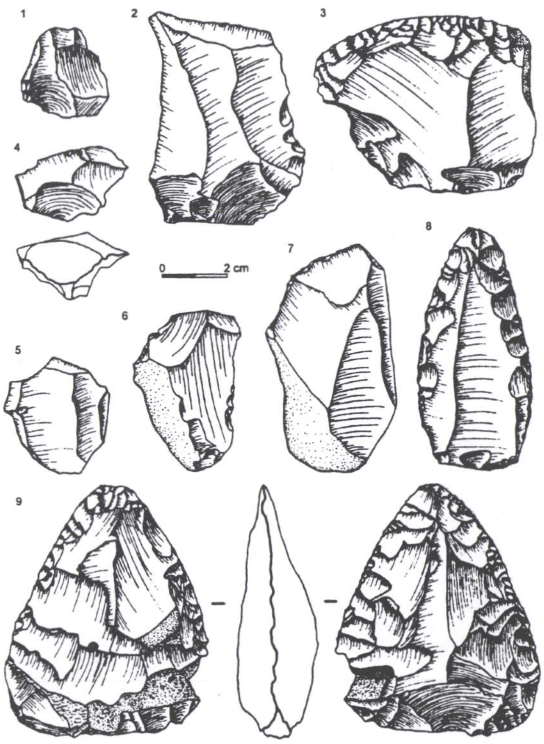

Figure 13. 1-2, 5. Levallois flakes; 3. Convex transverse scraper; 4. Core; 6-7. Backed knives; 8. convergent scraper; 9. Biface. All from Level F4 except 4 (Level F2).

Discussion

While analysis of these assemblage is still on-going, there are nevertheless a number of intriguing aspects of the collections that are already apparent. First, there is a great deal of variability in the lithic assemblages in terms of both typology and technology (fig. 14). Some of the assemblages are scraper rich, others are represented primarily by notches and denticulates; Levallois and bifacial technologies vary throughout the sequence; and in certain assemblages an otherwise relatively rare type, truncated-faceted pieces, assumes a dominant position. In fact, there is considerable patterning of these assemblages (see fig. 15) on the basis of only the two variables of Levallois and Scraper indices. Thus, the Asinipodian and the uppermost F layers are similar in having relatively low proportions of scrapers, though separate on the basis of a higher representation of Levallois in the former. The other assemblages are, in general, more scraper rich, but again display varying amounts of Levallois. What we have seen already, however, is that these latter industries vary considerably in terms of size and in other typological and technological details.

To a large extent, then, the Pech IV assemblages represent most of the principal axes of variability that were the foundation of the classic debate on Middle Paleolithic systematics. It is likely, therefore, that detailed analysis of this material in its proper chronostratigraphic and paleoclimatological situation and with a modern technological and typological perspective will shed important light on this area.

An interesting pattern observable in the Pech IV industrial sequence has to do with two measures of utilization of raw materials at the site. shows the changing tool-to-flake and blank-to-core ratios. These two measures mirror each other and, interestingly, changes in the tool to flake ratio tend to precede changes in the blank to core ratio. The almost cyclic fashion in which both ratios change throughout the sequence suggests, according to some models, that local raw material availability changes through the sequence, a suggestion which had been made earlier (Dibble 1991). Confirmation of this awaits further study on the raw materials and their sources. It is clear, however, that size (as represented in fig. 17 by weight), continues to be a significant – if not the most important – criterion for selection of flakes to be retouched (Dibble 1995; Roth and Dibble 1998).

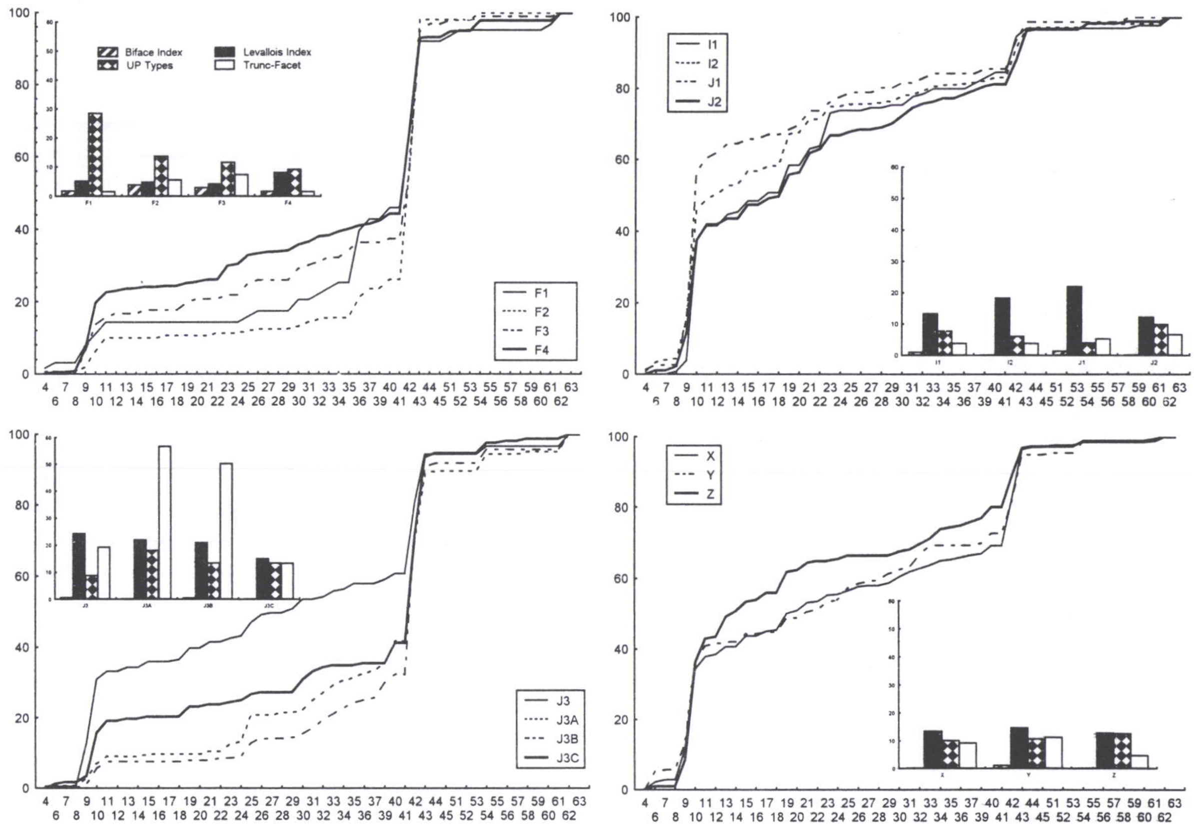

Figure 14. Typological and technological comparisons among the Pech IV assemblages.

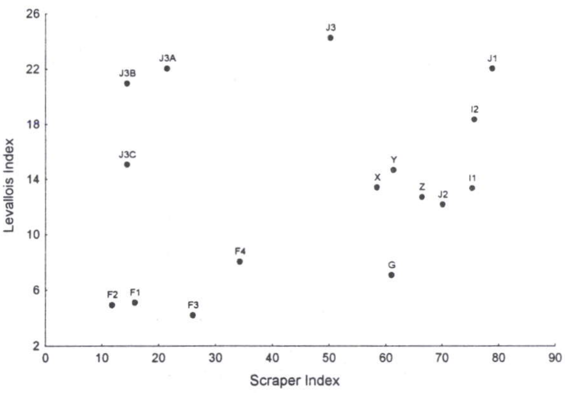

Figure 15. Distribution of assemblages based on values of Levallois Index and essential Scraper Index.

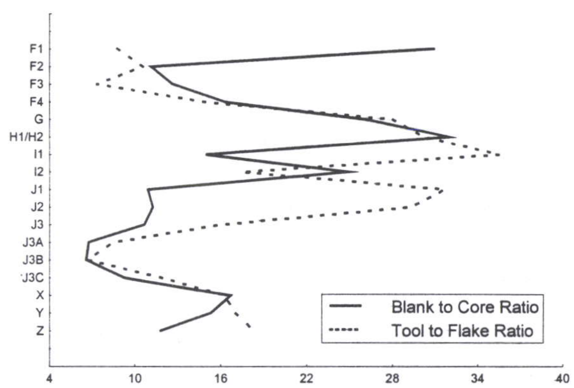

Figure 16. Blank-to-core and tool-to-flake ratios plotted against the stratigraphic sequence.

Directions for Future Research at the site

While a lot more is now known of Pech IV from the existing collections and their supporting documentation, it is clear that there are enough outstanding questions that new excavations are required before the collection can be fully understood.

First, one of the more important questions is the date of the assemblages. Based partly on the faunal andlithic data, but largely on Laville's (1973) sedimentological studies, Bordes (1978) tentatively on Bordes tentative correlation of Pech IV and II layers, most of Pech IV (excluding Layer F) would date to between 87-54 kyr. Bordes argued that the F levels, all of which contain MTA industries, correlate with the as yet undated MTA layers of Pech I (cf. Bowman *et al.* 1982). Obviously, since there are both geological arguments (Texier 1990; Bertran and Texier 1995) and absolute dates from other nearby sites (e.g., Mellars 1988; Mellars and Grün 1991; Valladas *et al.* 1986) that challenge the original methodology on which the Pech de l'Azé correlations are based, there is a need to acquire absolute dates for Pech IV directly.

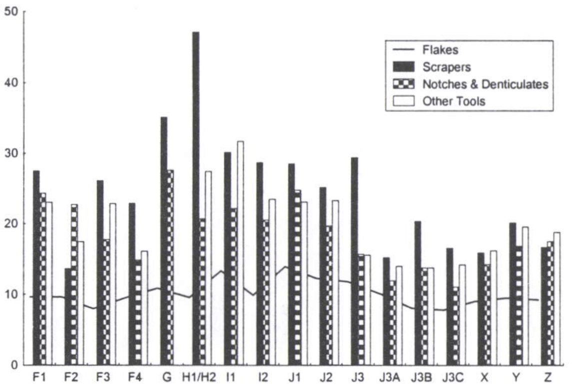

Figure 17. Average weights (gm) of various classes of lithic artifacts by level.

Second, full sedimentological and geophysical studies are essential to any interpretation of the lithic and faunal industries. Unfortunately, none of the sedimentological work done at Pech IV by Laville was published before his death and so all that is known of the stratigraphy is what we have presented here (based on only the first half of Bordes' excavation). This preliminary summary provides little concrete data relevant to a paleoclimatological reconstruction, and there is virtually no data on the formation of the site or on the basic integrity of the stratigraphy.

Third, it is undeniable that an assessment of site formation processes is an essential aspect of any excavation design (Dibble 1995; Dibble *et al.* 1997; Nash and Petraglia 1987; Goldberg *et al.* 1993; McPherron *et al.* 1996 and 1999; Roberts *et al.* 1997; Schick 1986), yet such an emphasis was not as developed in the years when Pech IV was originally excavated. There have been some concerns about the stratigraphy as defined by Bordes. Bordes himself stated that the distinction between some of the layers was not always clear, and he also noted some differences from the front of the shelter to the back. In Level J2, for instance, there was more evidence of cryoturbation in the front of the shelter than in the back, and Levels I1 and I2 were more concreted in the front. Examination of the artifact distributions also suggests some variability parallel to the cliff, with the F levels more concentrated in the western part of the site and possibly a higher concentration of the lower levels toward the east.

There are data that suggest that the basic integrity of the site is quite good and that relatively little post-depositional disturbance occurred. In regard to the stratigraphy itself, there are definite bands of higher artifact densities corresponding to Bordes' major layers, separated from one another by sterile or nearly sterile layers. This pattern can be gleaned from Bordes descriptions of the layers, but it is even more clear when the artifacts are plotted in three dimensional space (fig. 18). Such plots also show that the layers are not all horizontal, at least in sagittal view; some of them (e.g., Layer I) show a pronounced slope towards the rear of the shelter. In fact, the separation of the layers in both frontal and sagittal view is the clearest that the authors have ever seen in a Middle Paleolithic site. In addition, the lithic material analyzed thus far is extremely fresh and displays a relatively low percentage of edge-damage. There is also an abundance of very small lithic objects, both point-provenienced and in the small-finds bags, suggesting little winnowing out of material. Already some lithic refits have already been found, including one core and several conjoining flake removals from Level J3 that span 3 meters horizontally and less than 10 cm vertically. And finally, the presence of numerous features, especially possible hearths, also suggests little in the way of post-depositional disturbance.

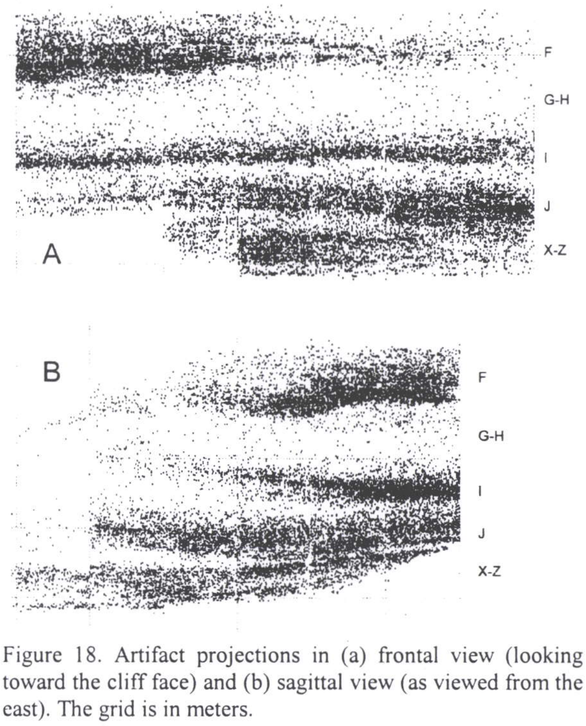

Figure 18. Artifact projections in (a) frontal view (looking toward the cliff face) and (b) sagittal view (as viewed from the east). The grid is in meters.

However, these preliminary conclusions must be verified with the collection of other relevant data. In addition to geological studies of site formation, we will also collect the same kinds of archaeological data that have been employed to this effect at other Paleolithic sites such as Combe-Capelle Bas (Dibble 1995; Kluskens 1995), La Quina (Chase *et al.* 1994), Cagny-l'Epinette (Dibble *et al.* 1997), and Fontéchevade (McPherron *et al.* 1996 and 1999) in order to obtain precise artifact orientations (Rick

1976; Kluskens 1995) and controlled samples of artifact size distributions (Petraglia *et al.* 1994; Roberts *et al.* 1997; Schick 1981).

The fourth reason for renewed work at the site is that it is essential to assess the nature and degree of possible excavator bias during recovery, which is an important issue in assessing the current collection. Experience with other collections has shown that, regardless of its curation, an existing collection may vary to a significant degree from what was actually in the ground (see Dibble and Lenoir 1995). Without verification through highly controlled sampling, it is impossible to know the degree to which bias was operating during Bordes' excavation and thus control for it in subsequent analyses. Based on the lithics examined thus far, it appears as though artifact recovery was quite good with few or no obvious biases, although it is clear that there was a high degree of inter-excavator variability. This means, however, that density analysis of small lithic fractions cannot be trusted and therefore new, controlled screened samples must be taken. The analysis of this kind of material is especially important in assessing post-depositional disturbance (see references above), identifying possible work areas, and in determining the degree of lithic reduction that was taking place at the site. With the fauna, it is harder to be sure if there were systematic biases operating, e.g., whether large and identifiable bones and teeth were being saved more regularly than smaller splinters, which can significantly alter the interpretation of the faunal assemblage (Bartram and Marean 1999; Stiner 1994). With a limited controlled excavation it will be possible to compare the composition of the newly excavated material with that existing in the collection in order to ascertain the degree and nature of excavator bias.

Thus, while Bordes' collection from Pech IV represents an extremely rich corpus of Middle Paleolithic lithic and faunal material, we know virtually nothing on the context of that material. Currently, there are no good dates for the site, no good description of the stratigraphic and paleoclimatological sequence, no data on site formation, and no way to assess the recovery techniques used by Bordes. Thus, limited fieldwork will be necessary in order to fill in those gaps and plans are underway to begin this work in the near future. Once that work is done, it is clear that the Pech IV material, in the context of a multi-disciplinary and international research program, will address several issues central to current Middle Paleolithic research and the nature of hominid behavior and adaptation at that time.

First of all, given the high degree of industrial variability present at the site, Pech IV has excellent potential to address issues concerning both the nature of Middle Paleolithic assemblage variability as well as some of the factors that may underlie that variability. Second, given the high degree of stratigraphic separation, the lack of obvious signs of disturbance, and abundant anthropogenic features such as hearths, the site should offer tremendous potential for intra-site spatial analyses. Third, the abundant faunal resources should shed important light on the nature of Middle Paleolithic subsistence strategies. Finally, the abundance of material representing all phases of the reduction sequence, the varying technologies, and the already demonstrated potential for lithic refits will help to clarify the nature of Middle Paleolithic technological variation and patterning. Of course, Pech IV will not, in itself, solve any of these problems. But it does represent a major corpus of new data and should make a significant contribution toward their resolution. With some of the unique characteristics in these industries, it is quite likely that it will even raise a few new issues.

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1	Typical Levallois flake	34
2	Atypical Levallois flake	50
3	Levallois point	2
5	Pseudo-Levallois point	1
6	Mousterian point	2
9	Straight single scraper	14
10	Convex single scraper	53
11	Concave single scraper	13
12	Double straight scraper	1
13	Double straight-convex scraper	11
14	Double straight-concave scraper	3
15	Double Convex scraper	5
16	Double Concave scraper	1
17	Double Concave-convex scraper	4
19	Convex convergent scraper	11
20	Concave convergent scraper	1
21	Dejete scraper	4
22	Straight transverse scraper	1
24	Concave transvers scraper	1
25	Scraper on interior	2
30	Typical endscraper	2
31	Atypical endscraper	1
32	Typical burin	3
33	Atypical burin	3
34	Typical perçoir	5
35	Atypical perçoir	1
36	Typical backed knife	1
37	Atypical backed knife	2
38	Naturally-backed knife	29
39	Raclette	2
40	Truncation	6
42	Notch	17
43	Denticulate	15
44	Bec burinante alterne	1
45	Retouch on interior	1
46-49	Abrupt/alternating retouch	56
50	Bifacial retouch	4
54	End-notched flake	3
61	Chopping-tool	1
62	Divers	1
64	Truncated-Faceted piece	9

Real Count:	368
Essential Count:	191
Complete and Proximal Flakes	659
Flake Fragments	319
Cores and Core Fragments	66
Shatter	277

	Real	*Essential*		
ILty	23,4			
IR:	34,0	65,4		
IAU	0,0	0,0	**IL**	12,7
I	23,4		**IF**	41,9
II	34,8	67,0	**IFs**	31,0
III	6,5	12,6	**Ilam**	21,8
IV	4,1	7,9	**IQ**	0,7

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**37,8**	**25,5**	**6,7**	**9,2**
S.D.	11,2	8,5	3,2	10,9
N	367	365	368	363
Scrapers				
Mean	**52,4**	**29,0**	**7,9**	**16,8**
S.D.	15,3	7,6	3,3	13,4
N	58	60	60	60
Notches/Denticulates				
Mean	**46,4**	**29,3**	**11,4**	**17,5**
S.D.	11,9	7,5	4,6	13,5
N	13	16	16	17
Other Tools				
Mean	**44,2**	**27,8**	**9,2**	**15,5**
S.D.	14,1	9,4	4,2	15,3
N	18	19	19	19
Cores				
Mean	**47,6**	**37,8**	**16,9**	**36,1**
S.D.	9,9	8,2	7,4	24,9
N	48	48	48	48

Table 1. Basic counts, indices and dimensions for Layer Z.

1	Typical Levallois flake	51
2	Atypical Levalois flake	108
3	Levallois point	1
5	Pseudo-Levallois point	14
6	Mousterian point	9
7	Elongated Mousterian point	1
9	Straight single scraper	13
10	Convex single scraper	41
11	Concave single scraper	8
12	Double straight scraper	1
13	Double straight-convex scraper	1
15	Double Convex scraper	4
17	Double Concave-convex scraper	1
19	Convex convergent scraper	7
21	Dejete scraper	3
22	Straight transverse scraper	1
23	Convex transverse scraper	4
24	Concave transvers scraper	1
25	Scraper on interior	6
26	Abrupt scraper	2
27	Scraper w/ thinned back	1
28	Scraper w/ bifacial retouch	1
29	Alternate scraper	3
30	Typical endscraper	2
31	Atypical endscraper	1
32	Typical burin	6
33	Atypical burin	5
38	Naturally-backed knife	33
39	Raclette	1
40	Truncation	5
42	Notch	16
43	Denticulate	23
45	Retouch on interior	3
46-49	Abrupt/alternating retouch	37
50	Bifacial retouch	1
51	Tayac point	1
54	End-notched flake	6
61	Chopping-tool	1
62	Divers	1
64	Truncated-Faceted piece	20

Real Count:	424
Essential Count:	176
Complete and Proximal Flakes	969
Flake Fragments	434
Cores and Core Fragments	74
Shatter	283

	Real	*Essential*		
ILty	37,7			
IR:	23,1	55,7		
IAU	0,0	0,0	**IL**	14,7
I	37,7		**IF**	37,7
II	28,8	69,3	**IFs**	27,7
III	4,5	10,8	**Ilam**	20,5
IV	5,4	13,1	**IQ**	2,7

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**38,8**	**25,7**	**6,7**	**9,5**
S.D.	11,8	8,4	2,9	11,0
N	599	597	595	570
Scrapers				
Mean	**49,7**	**31,9**	**8,3**	**20,1**
S.D.	15,8	8,1	2,9	16,0
N	54	54	52	54
Notches/Denticulates				
Mean	**46,1**	**30,8**	**8,8**	**17,4**
S.D.	9,1	7,8	3,0	9,6
N	26	26	26	27
Other Tools				
Mean	**46,8**	**29,7**	**8,2**	**16,1**
S.D.	12,6	8,5	3,5	11,5
N	57	57	57	57
Cores				
Mean	**46,9**	**37,0**	**16,4**	**34,5**
S.D.	11,8	10,0	5,7	21,7
N	50	50	50	49

Table 2. Basic counts, indice and dimensions for Layer Y.

1	Typical Levallois flake	195
2	Atypical Levallois flake	343
3	Levallois point	8
4	Retouched Levallois point	2
5	Pseudo-Levallois point	22
6	Mousterian point	17
7	Elongated Mousterian point	5
8	Limace	1
9	Straight single scraper	74
10	Convex single scraper	198
11	Concave single scraper	31
12	Double straight scraper	5
13	Double straight-convex scraper	20
15	Double Convex scraper	26
17	Double Concave-convex scraper	11
18	Straight convergent scraper	3
19	Convex convergent scraper	41
20	Concave convergent scraper	7
21	Dejete scraper	20
22	Straight transverse scraper	3
23	Convex transverse scraper	15
24	Concave transvers scraper	2
25	Scraper on interior	9
26	Abrupt scraper	10
27	Scraper w/ thinned back	3
29	Alternate scraper	6
30	Typical endscraper	15
31	Atypical endscraper	12
32	Typical burin	8
33	Atypical burin	8
34	Typical perçoir	11
35	Atypical perçoir	3
36	Typical backed knife	5
37	Atypical backed knife	5
38	Naturally-backed knife	177
39	Raclette	4
40	Truncation	20
42	Notch	116
43	Denticulate	120
44	Bec burinante alterne	6
45	Retouch on interior	7
46-49	Abrupt/alternating retouch	620
50	Bifacial retouch	24
51	Tayac point	4
52	Notched triangle	1
54	End-notched flake	7
61	Chopping-tool	2
62	Divers	11
64	Truncated-Faceted piece	79

Real Count:	2263
Essential Count:	867
Complete and Proximal Flakes	4153
Flake Fragments	2271
Cores and Core Fragments	289
Shatter	1363

	Real	*Essential*		
ILty	24,2			
IR:	21,4	55,8		
IAU	0,0	0,0	**IL**	13,4
I	24,2		**IF**	42,8
II	23,4	61,0	**IFs**	32,0
III	3,8	10,0	**Ilam**	20,2
IV	5,3	13,8	**IQ**	2,1

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**38,1**	**24,7**	**7,0**	**9,0**
S.D.	10,8	7,3	3,1	8,6
N	2091	2075	2084	2080
Scrapers				
Mean	**48,6**	**29,6**	**8,0**	**16,0**
S.D.	14,3	7,7	2,8	12,2
N	231	231	232	231
Notches/Denticulates				
Mean	**40,2**	**27,8**	**9,2**	**14,4**
S.D.	11,7	8,7	3,2	10,8
N	111	111	111	111
Other Tools				
Mean	**43,2**	**28,3**	**9,2**	**15,5**
S.D.	12,5	7,9	3,5	12,3
N	153	152	153	156
Cores				
Mean	**43,1**	**34,2**	**15,0**	**27,1**
S.D.	9,8	8,5	5,8	23,2
N	214	213	213	214

Table 3. Basic counts, indices and dimensions for Layer X.

1	Typical Levallois flake	89
2	Atypical Levallois flake	92
5	Pseudo-Levallois point	11
6	Mousterian point	2
7	Elongated Mousterian point	1
9	Straight single scraper	3
10	Convex single scraper	21
11	Concave single scraper	6
13	Double straight-convex scraper	1
15	Double Convex scraper	1
19	Convex convergent scraper	5
21	Dejete scraper	1
23	Convex transverse scraper	1
24	Concave transvers scraper	1
25	Scraper on interior	3
26	Abrupt scraper	1
30	Typical endscraper	6
31	Atypical endscraper	4
32	Typical burin	2
33	Atypical burin	1
36	Typical backed knife	1
38	Naturally-backed knife	64
40	Truncation	10
42	Notch	52
43	Denticulate	38
44	Bec burinante alterne	2
45	Retouch on interior	7
46-49	Abrupt/alternating retouch	68
50	Bifacial retouch	1
54	End-notched flake	5
56	Rabot	1
58	Tanged tool	1
62	Divers	2
64	Truncated-Faceted piece	23

Real Count:	504
Essential Count:	172
Complete and Proximal Flakes	1145
Flake Fragments	545
Cores and Core Fragments	138
Shatter	288

	Real	*Essential*		
ILty	35,9			
IR:	8,7	25,6		
IAU	0,0	0,0	**IL**	15,1
I	35,9		**IF**	36,8
II	11,5	33,7	**IFs**	29,0
III	4,8	14,0	**Ilam**	14,1
IV	7,5	22,1	**IQ**	1,9

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**36,2**	**24,7**	**7,0**	**7,8**
S.D.	9,3	6,3	3,2	6,0
N	609	605	605	612
Scrapers				
Mean	**46,8**	**29,2**	**9,0**	**17,4**
S.D.	11,4	6,9	3,3	11,3
N	23	23	23	24
Notches/Denticulates				
Mean	**37,7**	**27,0**	**8,3**	**11,1**
S.D.	10,5	5,9	2,5	6,7
N	43	43	43	45
Other Tools				
Mean	**42,0**	**29,9**	**9,4**	**14,0**
S.D.	10,6	6,8	2,9	6,5
N	26	26	26	25
Cores				
Mean	**40,9**	**31,5**	**13,7**	**21,0**
S.D.	10,1	7,2	4,7	13,0
N	81	81	81	81

Table 4. Basic counts, indices and dimensions for Layer J3C.

1	Typical Levallois flake	342
2	Atypical Levallois flake	397
3	Levallois point	3
5	Pseudo-Levallois point	16
9	Straight single scraper	3
10	Convex single scraper	14
11	Concave single scraper	6
19	Convex convergent scraper	1
22	Straight transverse scraper	2
24	Concave transvers scraper	1
25	Scraper on interior	12
26	Abrupt scraper	4
29	Alternate scraper	1
30	Typical endscraper	3
31	Atypical endscraper	5
32	Typical burin	7
33	Atypical burin	5
34	Typical perçoir	5
35	Atypical perçoir	5
36	Typical backed knife	2
37	Atypical backed knife	2
38	Naturally-backed knife	113
39	Raclette	13
40	Truncation	7
42	Notch	120
43	Denticulate	58
44	Bec burinante alterne	3
45	Retouch on interior	18
46-49	Abrupt/alternating retouch	161
50	Bifacial retouch	4
54	End-notched flake	12
62	Divers	13
64	Truncated-Faceted piece	153

Real Count:	1358
Essential Count:	304
Complete and Proximal Flakes	3441
Flake Fragments	1404
Cores and Core Fragments	558
Shatter	1163

	Real	*Essential*		
ILty	54,6			
IR:	3,2	14,5		
IAU	0,0	0,0	**IL**	21,0
I	54,6		**IF**	39,1
II	4,4	19,7	**IFs**	28,9
III	3,0	13,5	**Ilam**	15,0
IV	4,3	19,1	**IQ**	2,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**36,9**	**25,2**	**6,8**	**8,0**
S.D.	9,9	6,9	3,0	6,6
N	1823	1809	1824	1806
Scrapers				
Mean	**44,8**	**33,2**	**9,4**	**20,4**
S.D.	12,2	12,8	2,8	27,6
N	17	17	17	17
Notches/Denticulates				
Mean	**43,1**	**29,8**	**8,5**	**13,2**
S.D.	9,6	8,1	2,8	6,5
N	64	63	64	64
Other Tools				
Mean	**39,4**	**29,0**	**9,1**	**13,2**
S.D.	8,4	6,1	2,9	6,6
N	62	61	62	63
Cores				
Mean	**39,2**	**31,1**	**13,3**	**20,0**
S.D.	8,6	7,2	4,8	20,6
N	350	349	348	350

Table 5. Basic counts, indices and dimensions for Layer J3B.

1	Typical Levallois flake	188
2	Atypical Levallois flake	232
3	Levallois point	2
5	Pseudo-Levallois point	14
6	Mousterian point	1
9	Straight single scraper	3
10	Convex single scraper	6
11	Concave single scraper	3
15	Double Convex scraper	1
21	Dejete scraper	1
23	Convex transverse scraper	3
24	Concave transvers scraper	1
25	Scraper on interior	11
28	Scraper w/ bifacial retouch	1
30	Typical endscraper	1
31	Atypical endscraper	4
32	Typical burin	3
33	Atypical burin	3
34	Typical perçoir	2
35	Atypical perçoir	1
36	Typical backed knife	2
37	Atypical backed knife	1
38	Naturally-backed knife	71
39	Raclette	3
40	Truncation	9
42	Notch	40
43	Denticulate	28
44	Bec burinante alterne	1
45	Retouch on interior	12
46-49	Abrupt/alternating retouch	50
54	End-notched flake	7
58	Tanged tool	1
62	Divers	7
64	Truncated-Faceted piece	82

Real Count:	713
Essential Count:	144
Complete and Proximal Flakes	1622
Flake Fragments	612
Cores and Core Fragments	260
Shatter	400

	Real	*Essential*		
ILty	59,2			
IR:	4,2	20,8		
IAU	0,0	0,0	**IL**	22,0
I	59,2		**IF**	40,6
II	6,3	31,3	**IFs**	30,7
III	3,6	18,1	**Ilam**	16,4
IV	3,9	19,4	**IQ**	0,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**39,4**	**26,8**	**7,0**	**10,1**
S.D.	12,4	8,6	3,1	11,7
N	964	955	964	961
Scrapers				
Mean	**42,6**	**31,3**	**9,7**	**15,2**
S.D.	11,3	6,7	4,7	8,9
N	17	17	17	17
Notches/Denticulates				
Mean	**40,1**	**25,4**	**9,4**	**11,9**
S.D.	12,6	6,6	4,6	7,6
N	29	29	29	32
Other Tools				
Mean	**41,3**	**29,8**	**8,6**	**13,6**
S.D.	10,8	6,9	2,8	7,4
N	46	46	46	46
Cores				
Mean	**41,7**	**33,0**	**14,1**	**26,1**
S.D.	11,1	7,1	6,3	30,1
N	177	177	176	177

Table 6. Basic counts, indices and dimensions for Layer J3A.

1	Typical Levallois flake	116
2	Atypical Levallois flake	193
3	Levallois point	2
4	Retouched Levallois point	1
5	Pseudo-Levallois point	17
9	Straight single scraper	22
10	Convex single scraper	33
11	Concave single scraper	4
13	Double straight-convex scraper	2
15	Double Convex scraper	3
18	Straight convergent scraper	1
19	Convex convergent scraper	6
21	Dejete scraper	3
23	Convex transverse scraper	2
24	Concave transvers scraper	1
25	Scraper on interior	7
26	Abrupt scraper	4
27	Scraper w/ thinned back	1
29	Alternate scraper	2
30	Typical endscraper	5
32	Typical burin	1
33	Atypical burin	3
34	Typical perçoir	1
35	Atypical perçoir	3
38	Naturally-backed knife	64
39	Raclette	2
40	Truncation	3
42	Notch	36
43	Denticulate	25
45	Retouch on interior	12
46-49	Abrupt/alternating retouch	58
54	End-notched flake	4
62	Divers	6
64	Truncated-Faceted piece	35

Real Count:	643
Essential Count:	181
Complete and Proximal Flakes	1079
Flake Fragments	395
Cores and Core Fragments	117
Shatter	264

	Real	*Essential*		
ILty	48,5			
IR:	14,2	50,3		
IAU	0,0	0,0	**IL**	24,3
I	48,5		**IF**	43,6
II	16,8	59,7	**IFs**	34,0
III	2,5	8,8	**Ilam**	17,7
IV	3,9	13,8	**IQ**	11,6

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**40,1**	**27,4**	**7,2**	**11,8**
S.D.	13,6	9,4	3,6	13,1
N	667	664	669	670
Scrapers				
Mean	**55,8**	**36,3**	**10,8**	**29,6**
S.D.	16,2	9,4	4,0	20,1
N	68	68	68	68
Notches/Denticulates				
Mean	**43,7**	**29,4**	**8,1**	**15,4**
S.D.	14,0	8,5	4,1	13,4
N	36	36	36	36
Other Tools				
Mean	**46,4**	**28,9**	**9,6**	**16,1**
S.D.	11,9	6,5	4,3	9,5
N	38	38	38	38
Cores				
Mean	**43,6**	**33,6**	**15,3**	**30,9**
S.D.	11,5	8,6	7,0	29,4
N	78	78	78	78

Table 7. Basic counts, indices and dimensions for Layer J3.

1	Typical Levallois flake	36
2	Atypical Levallois flake	57
3	Levallois point	1
5	Pseudo-Levallois point	4
6	Mousterian point	2
8	Limace	2
9	Straight single scraper	17
10	Convex single scraper	47
11	Concave single scraper	8
13	Double straight-convex scraper	3
15	Double Convex scraper	7
17	Double Concave-convex scraper	3
18	Straight convergent scraper	1
19	Convex convergent scraper	11
20	Concave convergent scraper	1
21	Dejete scraper	10
22	Straight transverse scraper	2
23	Convex transverse scraper	7
25	Scraper on interior	2
26	Abrupt scraper	1
28	Scraper w/ bifacial retouch	1
29	Alternate scraper	2
30	Typical endscraper	4
31	Atypical endscraper	4
32	Typical burin	2
33	Atypical burin	1
34	Typical perçoir	2
36	Typical backed knife	2
37	Atypical backed knife	2
38	Naturally-backed knife	17
39	Raclette	2
40	Truncation	1
42	Notch	12
43	Denticulate	15
44	Bec burinante alterne	1
46-49	Abrupt/alternating retouch	194
54	End-notched flake	3
58	Tanged tool	1
62	Divers	2
64	Truncated-Faceted piece	12

Real Count:	490
Essential Count:	181
Complete and Proximal Flakes	576
Flake Fragments	250
Cores and Core Fragments	66
Shatter	144

	Real	*Essential*		
ILty	19,2			
IR:	25,1	68,0		
IAU	0,0	0,0	**IL**	12,2
I	19,2		**IF**	38,6
II	26,7	72,4	**IFs**	32,0
III	3,7	9,9	**Ilam**	19,0
IV	3,1	8,3	**IQ**	19,5

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**39,3**	**26,7**	**7,8**	**12,2**
S.D.	12,0	8,4	3,6	12,3
N	358	356	356	354
Scrapers				
Mean	**55,3**	**31,6**	**9,8**	**25,2**
S.D.	16,4	8,4	4,1	25,1
N	86	86	87	89
Notches/Denticulates				
Mean	**45,4**	**30,7**	**10,6**	**19,7**
S.D.	14,1	13,7	6,3	18,9
N	14	15	15	15
Other Tools				
Mean	**47,3**	**31,1**	**9,4**	**18,5**
S.D.	13,0	7,3	4,9	16,6
N	39	40	40	40
Cores				
Mean	**47,8**	**37,9**	**18,5**	**53,6**
S.D.	14,2	10,5	8,9	53,7
N	51	51	51	51

Table 8. Basic counts, indices and dimensions for Layer J2.

1	Typical Levallois flake	17
2	Atypical Levallois flake	18
3	Levallois point	1
4	Retouched Levallois point	1
5	Pseudo-Levallois point	2
6	Mousterian point	1
9	Straight single scraper	10
10	Convex single scraper	31
11	Concave single scraper	3
12	Double straight scraper	1
13	Double straight-convex scraper	2
15	Double Convex scraper	1
17	Double Concave-convex scraper	1
19	Convex convergent scraper	1
20	Concave convergent scraper	1
21	Dejete scraper	3
23	Convex transverse scraper	2
24	Concave transvers scraper	1
25	Scraper on interior	1
28	Scraper w/ bifacial retouch	1
30	Typical endscraper	1
32	Typical burin	1
33	Atypical burin	1
38	Naturally-backed knife	18
39	Raclette	1
42	Notch	6
43	Denticulate	4
46-49	Abrupt/alternating retouch	48
50	Bifacial retouch	4
45	Retouch on interior	2
58	Tanged tool	1
64	Truncated-Faceted piece	4

Real Count:	186
Essential Count:	76
Complete and Proximal Flakes	224
Flake Fragments	71
Cores and Core Fragments	27
Shatter	41

	Real	*Essential*		
ILty	19,9			
IR:	31,7	77,6		
IAU	0,0	0,0	**IL**	22,0
I	19,9		**IF**	45,7
II	33,3	81,6	**IFs**	35,6
III	1,6	3,9	**Ilam**	24,6
IV	2,2	5,3	**IQ**	6,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**43,1**	**28,2**	**7,7**	**13,9**
S.D.	13,2	8,8	3,9	14,9
N	150	152	151	149
Scrapers				
Mean	**58,0**	**35,9**	**9,5**	**28,5**
S.D.	12,9	10,2	3,6	18,3
N	43	43	43	43
Notches/Denticulates				
Mean	**49,5**	**33,3**	**10,7**	**24,8**
S.D.	14,4	4,7	2,1	10,8
N	5	5	5	4
Other Tools				
Mean	**48,2**	**32,6**	**9,6**	**20,6**
S.D.	11,9	8,8	3,6	11,0
N	12	12	12	13
Cores				
Mean	**52,1**	**41,7**	**17,2**	**52,6**
S.D.	15,1	10,8	6,0	41,4
N	20	20	20	20

Table 9. Basic counts, indices and dimensions for Layer J1.

1	Typical Levallois flake	240
2	Atypical Levallois flake	388
3	Levallois point	5
4	Retouched Levallois point	7
5	Pseudo-Levallois point	25
6	Mousterian point	24
7	Elongated Mousterian point	6
8	Limace	3
9	Straight single scraper	103
10	Convex single scraper	280
11	Concave single scraper	28
12	Double straight scraper	13
13	Double straight-convex scraper	19
14	Double straight-concave scraper	5
15	Double Convex scraper	34
16	Double Concave scraper	1
17	Double Concave-convex scraper	12
18	Straight convergent scraper	2
19	Convex convergent scraper	81
20	Concave convergent scraper	4
21	Dejete scraper	33
22	Straight transverse scraper	2
23	Convex transverse scraper	32
24	Concave transvers scraper	1
25	Scraper on interior	4
26	Abrupt scraper	2
27	Scraper w/ thinned back	1
28	Scraper w/ bifacial retouch	2
29	Alternate scraper	5
30	Typical endscraper	12
31	Atypical endscraper	5
32	Typical burin	9
33	Atypical burin	11
34	Typical perçoir	4
35	Atypical perçoir	1
36	Typical backed knife	2
37	Atypical backed knife	3
38	Naturally-backed knife	234
39	Raclette	6
40	Truncation	8
42	Notch	73
43	Denticulate	53
44	Bec burinante alterne	3
45	Retouch on interior	10
46-49	Abrupt/alternating retouch	162
50	Bifacial retouch	7
54	End-notched flake	8
61	Chopping-tool	1
62	Divers	17
64	Truncated-Faceted piece	36

Real Count:	1991
Essential Count:	920
Complete and Proximal Flakes	4373
Flake Fragments	1489
Cores and Core Fragments	206
Shatter	568

	Real	*Essential*		
ILty	32,1			
IR:	33,4	72,2		
IAU	0,0	0,0	**IL**	18,4
I	32,1		**IF**	45,2
II	36,3	78,5	**IFs**	35,5
III	2,8	6,0	**Ilam**	26,9
IV	2,7	5,8	**IQ**	5,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**40,5**	**25,5**	**6,6**	**9,9**
S.D.	12,3	8,0	3,3	14,5
N	2964	2950	2954	2953
Scrapers				
Mean	**61,2**	**35,4**	**9,1**	**28,6**
S.D.	15,1	10,1	4,1	23,1
N	402	403	403	401
Notches/Denticulates				
Mean	**48,7**	**31,5**	**9,3**	**20,4**
S.D.	14,0	9,5	4,8	17,1
N	64	65	65	65
Other Tools				
Mean	**55,9**	**30,8**	**8,6**	**21,1**
S.D.	16,2	9,3	3,8	17,6
N	152	153	153	153
Cores				
Mean	**52,5**	**39,8**	**19,4**	**55,5**
S.D.	12,1	8,9	8,0	59,8
N	151	151	151	151

Table 10. Basic counts, indices and dimensions for Layer I2.

1	Typical Levallois flake	16
2	Atypical Levallois flake	21
5	Pseudo-Levallois point	2
8	Limace	1
9	Straight single scraper	4
10	Convex single scraper	44
11	Concave single scraper	5
13	Double straight-convex scraper	4
14	Double straight-concave scraper	1
15	Double Convex scraper	4
17	Double Concave-convex scraper	3
19	Convex convergent scraper	10
21	Dejete scraper	6
22	Straight transverse scraper	1
23	Convex transverse scraper	12
24	Concave transvers scraper	1
27	Scraper w/ thinned back	1
29	Alternate scraper	1
31	Atypical endscraper	3
32	Typical burin	1
33	Atypical burin	2
37	Atypical backed knife	2
38	Naturally-backed knife	10
39	Raclette	2
40	Truncation	2
42	Notch	13
43	Denticulate	3
45	Retouch on interior	2
46-49	Abrupt/alternating retouch	32
59	Chopper	1
62	Divers	3
64	Truncated-Faceted piece	5

Real Count:	213
Essential Count:	130
Complete and Proximal Flakes	276
Flake Fragments	125
Cores and Core Fragments	25
Shatter	104

	Real	*Essential*		
ILty	17,4			
IR:	45,5	74,6		
IAU	0,0	0,0	**IL**	13,4
I	17,4		**IF**	33,1
II	46,9	76,9	**IFs**	25,6
III	4,7	7,7	**Ilam**	18,6
IV	1,4	2,3	**IQ**	5,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**38,6**	**27,4**	**7,6**	**13,3**
S.D.	11,8	10,7	4,8	20,1
N	169	167	167	169
Scrapers				
Mean	**54,9**	**35,9**	**11,0**	**30,2**
S.D.	13,9	10,0	4,6	22,3
N	60	60	60	60
Notches/Denticulates				
Mean	**44,4**	**34,2**	**9,5**	**22,1**
S.D.	18,1	9,1	4,0	16,5
N	7	7	7	7
Other Tools				
Mean	**52,7**	**35,6**	**9,8**	**29,2**
S.D.	14,8	15,5	4,0	22,4
N	15	15	15	15
Cores				
Mean	**53,5**	**40,8**	**21,0**	**61,4**
S.D.	15,5	10,8	9,9	49,9
N	14	14	14	14

Table 11. Basic counts, indices and dimensions for Layer I1.

1	Typical Levallois flake	3
2	Atypical Levallois flake	4
3	Levallois point	2
5	Pseudo-Levallois point	2
9	Straight single scraper	1
10	Convex single scraper	13
13	Double straight-convex scraper	1
18	Straight convergent scraper	1
19	Convex convergent scraper	1
21	Dejete scraper	3
22	Straight transverse scraper	1
23	Convex transverse scraper	1
27	Scraper w/ thinned back	1
30	Typical endscraper	1
34	Typical perçoir	1
38	Naturally-backed knife	3
42	Notch	3
43	Denticulate	2
46-49	Abrupt/alternating retouch	4

Real Count:	48
Essential Count:	30
Complete and Proximal Flakes	172
Flake Fragments	70
Cores and Core Fragments	7
Shatter	61

	Real	*Essential*		
ILty	18,8			
IR:	47,9	76,7		
IAU	0,0	0,0	**IL**	5,7
I	18,8		**IF**	28,7
II	52,1	83,3	**IFs**	24,5
III	4,2	6,7	**Ilam**	15,0
IV	4,2	6,7	**IQ**	30,9

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**35,5**	**25,0**	**6,4**	**9,5**
S.D.	11,0	9,0	3,4	13,0
N	132	132	132	128
Scrapers				
Mean	**54,6**	**41,6**	**13,3**	**47,1**
S.D.	15,5	12,4	4,9	43,3
N	30	27	30	30
Notches/Denticulates				
Mean	**46,4**	**29,6**	**13,9**	**20,7**
S.D.	9,5	4,7	6,1	9,0
N	7	7	7	7
Other Tools				
Mean	**48,0**	**31,0**	**10,9**	**23,0**
S.D.	9,0	9,6	4,2	12,2
N	7	7	7	7
Cores				
Mean	**49,2**	**44,2**	**21,9**	**68,0**
S.D.	19,0	10,3	6,0	49,9
N	5	5	5	5

Table 12. Basic counts, indices and dimensions for Layers H1 + H2.

1	Typical Levallois flake	8
2	Atypical Levallois flake	10
5	Pseudo-Levallois point	2
6	Mousterian point	1
9	Straight single scraper	12
10	Convex single scraper	19
11	Concave single scraper	2
15	Double Convex scraper	2
18	Straight convergent scraper	1
19	Convex convergent scraper	2
21	Dejete scraper	1
22	Straight transverse scraper	3
23	Convex transverse scraper	11
25	Scraper on interior	2
27	Scraper w/ thinned back	2
30	Typical endscraper	1
31	Atypical endscraper	1
38	Naturally-backed knife	10
42	Notch	15
43	Denticulate	12
46-49	Abrupt/alternating retouch	14
51	Tayac point	1
54	End-notched flake	2
59	Chopper	2
64	Truncated-Faceted piece	3

Real Count:	139
Essential Count:	95
Complete and Proximal Flakes	246
Flake Fragments	68
Cores and Core Fragments	12
Shatter	64

	Real	*Essential*		
ILty	12,9			
IR:	41,0	60,0		
IAU	0,0	0,0	**IL**	7,1
I	12,9		**IF**	30,3
II	43,2	63,2	**IFs**	19,9
III	1,4	2,1	**Ilam**	18,4
IV	8,6	12,6	**IQ**	16,9

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**36,4**	**24,1**	**6,9**	**10,9**
S.D.	13,7	9,3	5,2	27,4
N	165	165	165	165
Scrapers				
Mean	**50,4**	**39,3**	**11,3**	**35,1**
S.D.	14,0	13,0	4,6	31,1
N	38	36	36	38
Notches/Denticulates				
Mean	**43,4**	**29,8**	**13,5**	**27,6**
S.D.	13,7	9,2	7,5	30,0
N	19	17	17	19
Other Tools				
Mean	**56,3**	**28,1**	**11,0**	**26,5**
S.D.	6,4	0,0	2,5	7,8
N	2	1	2	2
Cores				
Mean	**57,9**	**42,8**	**22,1**	**82,7**
S.D.	16,0	11,6	9,9	89,6
N	10	10	10	10

Table 13. Basic counts, indices and dimensions for Layer G.

1	Typical Levallois flake	137
2	Atypical Levallois flake	185
3	Levallois point	5
5	Pseudo-Levallois point	65
6	Mousterian point	4
8	Limace	1
9	Straight single scraper	42
10	Convex single scraper	86
11	Concave single scraper	19
12	Double straight scraper	3
13	Double straight-convex scraper	4
14	Double straight-concave scraper	1
15	Double Convex scraper	3
17	Double Concave-convex scraper	2
19	Convex convergent scraper	5
20	Concave convergent scraper	2
21	Dejete scraper	4
22	Straight transverse scraper	1
23	Convex transverse scraper	25
24	Concave transvers scraper	3
25	Scraper on interior	17
26	Abrupt scraper	3
27	Scraper w/ thinned back	3
28	Scraper w/ bifacial retouch	1
29	Alternate scraper	2
30	Typical endscraper	11
31	Atypical endscraper	5
32	Typical burin	10
33	Atypical burin	2
34	Typical perçoir	7
35	Atypical perçoir	5
36	Typical backed knife	6
37	Atypical backed knife	3
38	Naturally-backed knife	87
39	Raclette	6
40	Truncation	13
42	Notch	153
43	Denticulate	175
44	Bec burinante alterne	2
45	Retouch on interior	11
46-49	Abrupt/alternating retouch	192
51	Tayac point	10
52	Notched triangle	2
54	End-notched flake	19
62	Divers	14
64	Truncated-Faceted piece	10

Real Count:	1356
Essential Count:	674
Complete and Proximal Flakes	3466
Flake Fragments	809
Cores and Core Fragments	244
Shatter	599

	Real	*Essential*		
ILty	24,1			
IR:	16,7	33,5		
IAU	0,0	0,0	**IL**	8,0
I	24,1		**IF**	28,0
II	21,8	43,9	**IFs**	17,2
III	4,6	9,2	**Ilam**	14,4
IV	12,9	26,0	**IQ**	11,2

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**35,9**	**25,4**	**7,3**	**9,5**
S.D.	10,5	8,1	3,4	9,7
N	2749	2737	2751	2740
Scrapers				
Mean	**45,0**	**31,4**	**10,3**	**23,2**
S.D.	**16,5**	**11,1**	**4,7**	**25,3**
N	223	219	217	222
Notches/Denticulates				
Mean	**39,3**	**28,2**	**10,4**	**14,9**
S.D.	10,1	7,6	5,7	11,1
N	280	264	269	284
Other Tools				
Mean	**40,0**	**27,7**	**8,9**	**16,2**
S.D.	12,0	9,6	4,4	18,0
N	72	72	73	72
Cores				
Mean	**49,4**	**38,9**	**21,5**	**58,2**
S.D.	13,6	11,4	9,7	77,7
N	157	157	157	157

Table 14. Basic counts, indices and dimensions for Layer F4.

1	Typical Levallois flake	23
2	Atypical Levallois flake	33
5	Pseudo-Levallois point	11
9	Straight single scraper	6
10	Convex single scraper	7
11	Concave single scraper	2
12	Double straight scraper	1
15	Double Convex scraper	1
19	Convex convergent scraper	2
20	Concave convergent scraper	1
23	Convex transverse scraper	1
25	Scraper on interior	3
26	Abrupt scraper	1
30	Typical endscraper	3
31	Atypical endscraper	1
32	Typical burin	1
33	Atypical burin	1
35	Atypical perçoir	2
36	Typical backed knife	2
38	Naturally-backed knife	43
40	Truncation	1
42	Notch	18
43	Denticulate	37
44	Bec burinante alterne	2
45	Retouch on interior	4
46-49	Abrupt/alternating retouch	32
51	Tayac point	1
54	End-notched flake	1
62	Divers	1
64	Truncated-Faceted piece	7

Real Count:	242
Essential Count:	96
Complete and Proximal Flakes	909
Flake Fragments	208
Cores and Core Fragments	77
Shatter	163

	Real	*Essential*		
ILty	23,1			
IR:	10,3	26,0		
IAU	0,0	0,0	**IL**	4,2
I	23,1		**IF**	25,1
II	14,9	37,5	**IFs**	12,9
III	4,5	11,5	**Ilam**	16,0
IV	15,3	38,5	**IQ**	0,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**33,9**	**23,0**	**7,4**	**7,9**
S.D.	9,0	6,7	3,1	7,6
N	698	698	699	693
Scrapers				
Mean	**47,5**	**32,2**	**10,9**	**26,1**
S.D.	9,2	10,2	5,2	26,1
N	10	9	10	10
Notches/Denticulates				
Mean	**40,8**	**27,8**	**11,7**	**18,3**
S.D.	10,2	7,7	5,3	15,6
N	28	27	28	28
Other Tools				
Mean	**39,9**	**30,3**	**12,1**	**21,9**
S.D.	13,9	6,5	5,5	24,9
N	13	13	13	13
Cores				
Mean	**46,5**	**35,2**	**21,8**	**42,7**
S.D.	12,6	8,6	8,2	31,5
N	46	46	46	46

Table 15. Basic counts, indices and dimensions for Layer F3.

1	Typical Levallois flake	9
2	Atypical Levallois flake	44
3	Levallois point	1
4	Retouched Levallois point	1
5	Pseudo-Levallois point	42
9	Straight single scraper	2
10	Convex single scraper	7
11	Concave single scraper	6
17	Double Concave-convex scraper	1
22	Straight transverse scraper	1
25	Scraper on interior	1
26	Abrupt scraper	1
30	Typical endscraper	1
31	Atypical endscraper	2
32	Typical burin	1
33	Atypical burin	1
36	Typical backed knife	9
37	Atypical backed knife	4
38	Naturally-backed knife	55
40	Truncation	4
42	Notch	50
43	Denticulate	65
45	Retouch on interior	5
46-49	Abrupt/alternating retouch	37
54	End-notched flake	3
64	Truncated-Faceted piece	9

Real Count:	353
Essential Count:	160
Complete and Proximal Flakes	1171
Flake Fragments	253
Cores and Core Fragments	116
Shatter	211

	Real	*Essential*		
ILty	15,6			
IR:	5,4	11,9		
IAU	0,0	0,1	**IL**	4,9
I	15,6		**IF**	25,4
II	17,3	38,1	**IFs**	13,1
III	6,2	13,8	**Ilam**	17,7
IV	18,4	40,6	**IQ**	0,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**34,7**	**23,5**	**7,9**	**9,6**
S.D.	10,0	7,7	3,5	11,2
N	950	948	949	950
Scrapers				
Mean	**41,9**	**26,6**	**10,5**	**13,6**
S.D.	10,5	8,1	2,4	9,7
N	11	11	11	11
Notches/Denticulates				
Mean	**43,9**	**30,3**	**11,0**	**23,1**
S.D.	13,9	10,0	3,9	27,0
N	60	60	60	60
Other Tools				
Mean	**43,9**	**31,2**	**11,0**	**17,6**
S.D.	10,9	8,0	3,8	13,9
N	28	28	28	27
Cores				
Mean	**46,2**	**35,6**	**23,4**	**54,4**
S.D.	11,8	10,1	8,8	53,9
N	89	89	89	88

Table 16. Basic counts, indices and dimensions for Layer F2.

1	Typical Levallois flake	9
2	Atypical Levallois flake	20
3	Levallois point	1
4	Retouched Levallois point	1
5	Pseudo-Levallois point	10
6	Mousterian point	1
9	Straight single scraper	3
10	Convex single scraper	2
11	Concave single scraper	2
25	Scraper on interior	1
26	Abrupt scraper	1
30	Typical endscraper	2
32	Typical burin	1
33	Atypical burin	1
34	Typical perçoir	1
36	Typical backed knife	9
37	Atypical backed knife	2
38	Naturally-backed knife	33
40	Truncation	2
42	Notch	13
43	Denticulate	16
45	Retouch on interior	2
46-49	Abrupt/alternating retouch	19
51	Tayac point	1
52	Notched triangle	1
61	Chopping-tool	1
62	Divers	2
64	Truncated-Faceted piece	1

Real Count:	157
Essential Count:	63
Complete and Proximal Flakes	625
Flake Fragments	121
Cores and Core Fragments	22
Shatter	122

	Real	*Essential*		
ILty	19,75			
IR:	5,73	14,29		
IAU	0,07	0,17	**IL**	5,1
I	19,75		**IF**	26,3
II	12,74	31,75	**IFs**	13,4
III	11,46	28,57	**Ilam**	16,2
IV	10,19	25,40	**IQ**	0,0

	Length	**Width**	**Thickness**	**Weight**
Flakes				
Mean	**34,7**	**24,2**	**7,6**	**9,6**
S.D.	10,1	7,5	3,4	10,9
N	510	508	508	507
Scrapers				
Mean	**56,6**	**34,0**	**15,0**	**27,5**
S.D.	15,6	6,1	11,6	13,6
N	6	6	6	6
Notches/Denticulates				
Mean	**45,1**	**29,4**	**12,1**	**24,3**
S.D.	15,4	10,7	2,7	19,0
N	18	18	18	18
Other Tools				
Mean	**50,1**	**29,4**	**11,3**	**23,5**
S.D.	15,9	9,2	4,6	19,9
N	21	21	21	21
Cores				
Mean	**51,0**	**40,4**	**25,5**	**78,5**
S.D.	13,8	11,5	10,7	68,2
N	13	13	13	13

Table 17. Basic counts, indices and dimensions for Layer F1.

	Pech I		Pech II		Pech IV	
Climatic Phase	Level	Industry	Level	Industry	Level	Industry
Würm II, Perigord III-VIII	7	MTA(A)			F1	MTA(B)
	6	MTA(A)			F2	MTA(B)
Würm II, Perigord II	5	MTA(A-B)			F3	MTA(A-B)
Würm II, Perigord I	4	MTA(A)			F4	MTA(A)
	3					
Würm I, Perigord IX			2A-2C	Mousterian	G	Mousterian
Würm I, Perigord VIII			2D	Mousterian	H1-H2	Typical
Würm I, Perigord VII			2E-2F	Typical	I1-I2	Typical
Würm I, Perigord V-VI			2G	Mousterian	J1-J2	Typical
			2G' (top)	Mousterian		
Würm I, Perigord IV			2G' (base)	Mousterian	J3	Typical
					J3a-c	Asinipodian
Würm I, Perigord III			3	Typical		
Würm I, Perigord II			4A	Typical	X	Typical
			4B	Denticulate		
			4C	Typical		
Würm I, Perigord I			4D	Typical	Y	Typical
			4E	Typical	Z	Typical

Table 18. Stratigraphic correlations of Mousterian Assemblages from Pech I, II and IV. From Bordes (1978).