Looking for names and missing the point. The case of the Portuguese "Aurignacian V" in the framework of definitions of the Aurignacian

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ABSTRACT Based on a study of the technological variability of lithic assemblages dating to the Terminal Gravettian, a period of the Portuguese Upper Paleolithic where carinated technology is dominant and chronologically parallel to the French "Aurignacian V", this paper exemplifies a way of defining a period based on more than typological criteria only. The variability of technological choices in assemblages dating to ca.21 500 BP is presented, following the *chaîne opératoire* concept, from a data set analyzed through attribute analysis and refitting. The combination of both methods results in a more complete view of the period's technological spectrum: while refitting provides a dynamic view of the production techniques but can only be applied to appropriate samples, attribute analysis can be applied to any assemblage, thus allowing the evaluation of technological variability at a wider scale.

Introduction

The title of this presentation might seem odd, especially within a volume where most of the contributions deal with the origins and definitions of the Aurignacian, and chronologically are mainly focused on the initial stages of the technocomplex. The definition of an archaeological period or technocomplex is, however, quite time independent, and stands as one of the problems that we as archaeologists face almost on a daily basis. Most of the ideas that will be presented here are the result and a summary of the work carried out on the scope of my doctoral dissertation (Almeida, 2000), where I dealt with definitional problems of a transition period — the Portuguese Terminal Gravettian — one of the periods of the Portuguese Upper Paleolithic where the lithic assemblages are dominated by carinated technology. Such dominance encounters clear parallels both in assemblage content and chronology, as we shall see below, with one of perhaps the most problematic assemblages in the history of archaeological thought — the Aurignacian V from Laugerie-Haute (France).

The purpose of this contribution is therefore to summarize the main aspects of the Portuguese Terminal Gravettian/Aurignacian V, and illustrate how the respective definition was carried out, having as a starting basis its technological variability.

Carinated elements: non diagnostic artifacts of the Portuguese Upper Paleolithic

One of the peculiarities of the Portuguese Upper Paleolithic is that some of the usual "diagnostic tools" of the Aurignacian are present in almost all assemblages, independent of

the complex to which they belong: carinated and thick-nosed elements are ubiquitous throughout most of the sequence, the Middle Solutrean being the single exception, and they even have their proportional peak during the Epipaleolithic (ca.8750 BP). Thus, the sole presence of carinated or thick-nosed elements is not sufficient to give an assemblage either a clear chronological or technocomplex positioning within the sequence. Fig. 1 shows the general distribution of thick scrapers and marginally retouched bladelets throughout the main technocomplexes presently recognized in the Upper Paleolithic of Portuguese Estremadura. While thick scrapers appear in almost all assemblages, they dominate in assemblages dated to the Terminal Gravettian/Aurignacian V and to the Epipaleolithic. Although in the Lowest Level of locus IIIs of the site of Cabeço de Porto Marinho (CPM) they are frequent, it is during the Epipaleolithic that bladelets with marginal retouch [designated by Bicho (1992) and Marks (Marks et al., 1994) as Dufour bladelets, and differentiated by Zilhão (1995, 1997), because their retouch is mostly direct and length <15 mm, as Areeiro bladelets] are most frequent. From the data in Fig. 1 it must therefore be concluded that the attribution of an assemblage from Central Portugal to the Aurignacian complex has to be grounded on more than simple typological criteria.

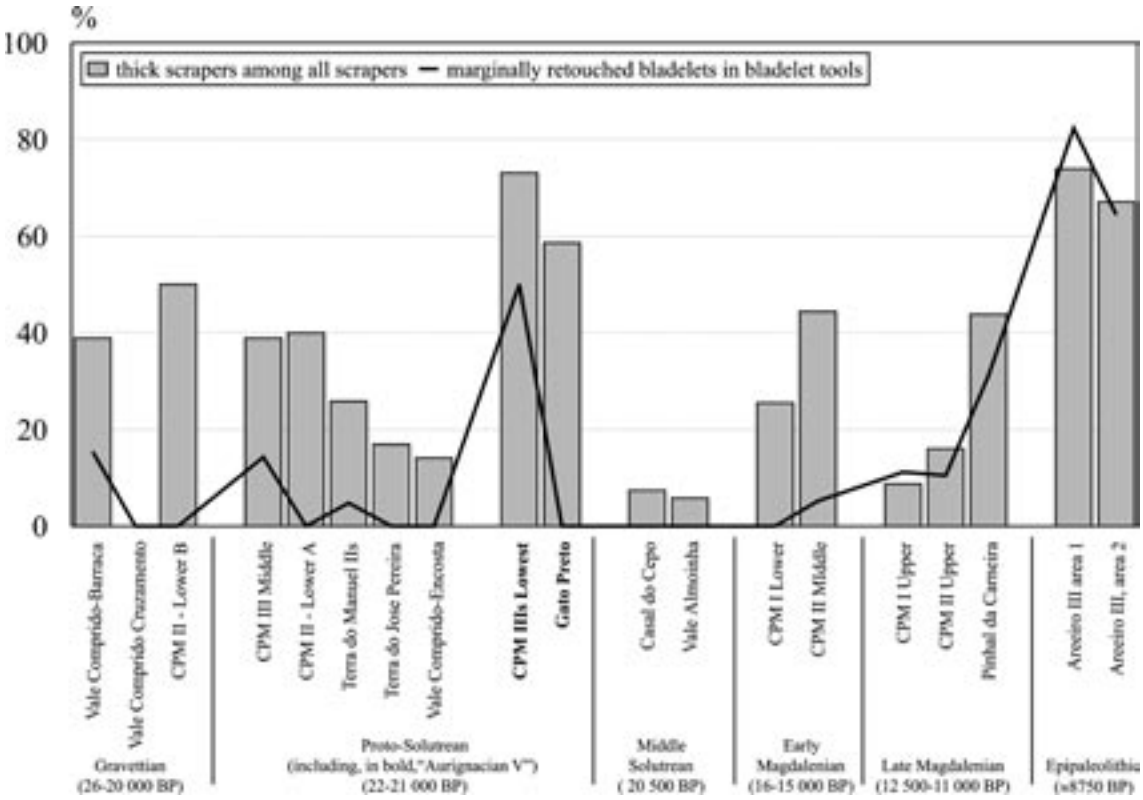

FIG. 1 – General tendencies in the presence of thick scrapers and marginally retouched bladelets in Portuguese Upper Paleolithic lithic assemblages (Zilhão, 1995, 1997; Marks and Almeida, 1996; Almeida, 2000).

Perhaps one of the most important contributions of the last two decades of research in Portugal has been the discovery and excavation of a cluster of sites the assemblages of which show typological patterns that easily could be considered as "Aurignacian", on the basis of their high percentages of thick "scrapers". Contrary to what one should expect at typical Aurignacian sites, however, these assemblages date to ca.21 500 BP, and lack Dufour bladelets, a type which, according to Zilhão (1995, 1997), is restricted in both of its subtypes — Dufour

and Roc-de-Combe — to Portuguese assemblages pre-dating 26 000 BP. That late date is at odds with the generally accepted upper chronological limit for the Aurignacian in Europe, ca.28-26 000 BP (Marks and Almeida, 1996). Instead of predating the Gravettian (and, thus, following the general chronological scheme of the European Upper Paleolithic), they are at the temporal transition from the Gravettian to the Solutrean, that is, in clear synchrony with the "Aurignacian V" of Laugerie-Haute.

The Aurignacian V: an old archaeological problem

Since its discovery, the Aurignacian V has been one of the most controversial "cultural entities" in French archaeology (Bordes, 1958; Bordes and Sonneville Bordes, 1958, 1960; Brézillon, 1969; Laville, 1975; Lumley, 1976; Laville et al., 1980; Sonneville-Bordes, 1982), as well as in Paleolithic research, in general. As Laville et al. (1980) correctly argued, one of the main reasons for the problem was that the Aurignacian V appeared at only one site, and had been defined mostly in terms of the absence of Gravettian or Perigordian characteristics.

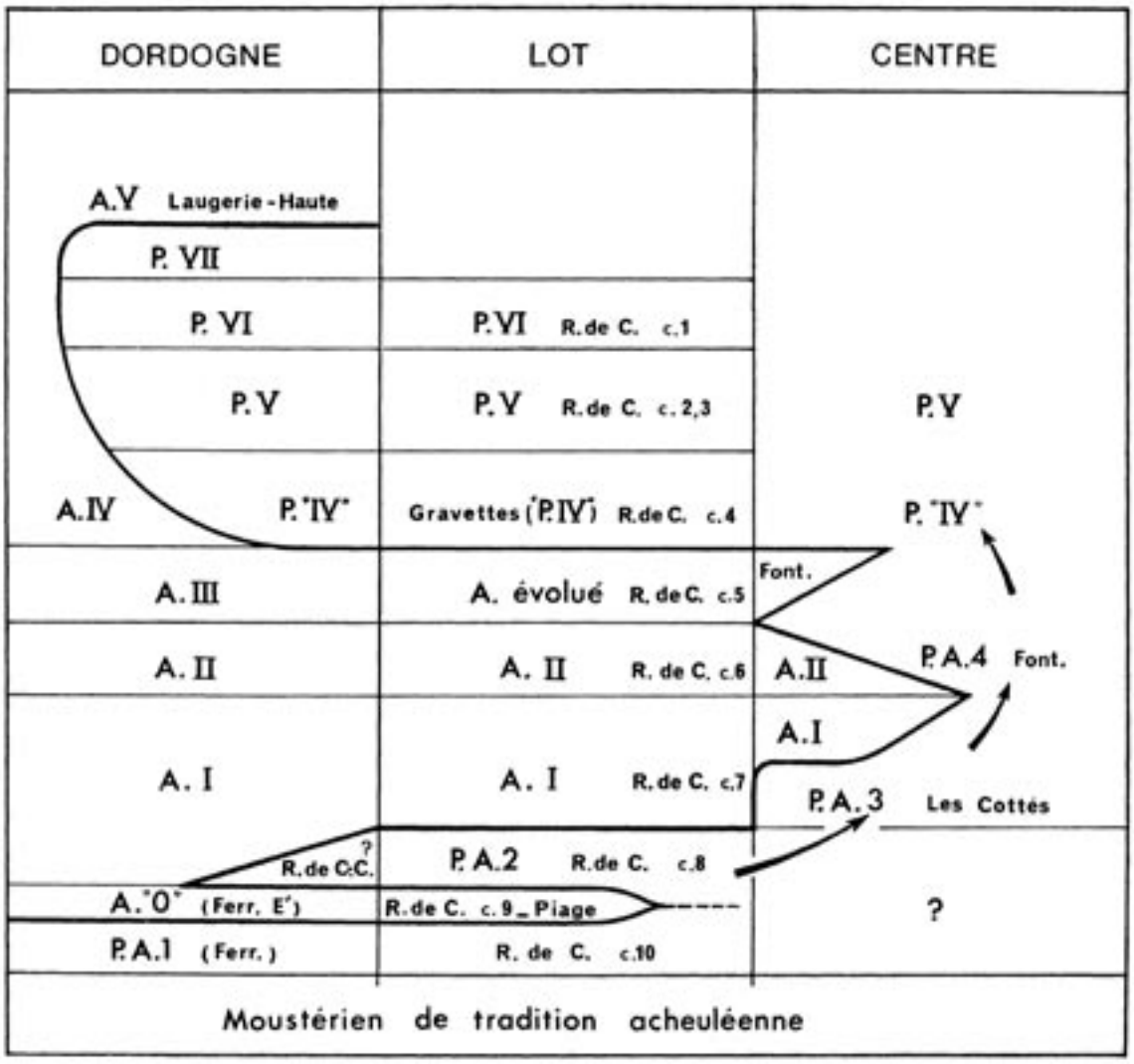

FIG. 2 – Typologically driven normative interpretation of the Laugerie-Haute Aurignacian V: the return of Aurignacian people to the Dordogne (Bordes, 1968).

The Aurignacian V at Laugerie-Haute shows some of the "typical" characteristics of the earlier stages of the Aurignacian complex, such as carinated and nosed burins and thick scrapers. It lacks, however, several characteristics of the same complex, namely the Dufour bladelets and the "typical" Aurignacian blades. Within the scraper class, there is a high percentage of denticulated endscrapers. Notches and denticulates are also numerous. This led the excavators to call this assemblage *Aurignacien denticulé*. The bone industry repertoire also seems to differ typologically from the earlier stages of the Aurignacian (Sonneville-Bordes, 1960; Leroy-Prost, 1975, 1978). In spite of all these apparent differences, early French investigators included this assemblage in the "Aurignacian tradition" (Peyrony, 1933; Peyrony and Peyrony, 1938). That several "Upper Perigordian" (Gravettian) levels and a "Proto-Magdalenian" level [(considered Gravettian/Perigordian VII by Bordes (Brézillon 1969)] separated the "typical" Aurignacian from this "Aurignacian V" at Laugerie-Haute was explained by the arrival of "Perigordian" people into the Périgord, which would have led the "Aurignacians" to leave the area until a later comeback represented by the Aurignacian V of Laugerie-Haute (Bordes, 1973; Lumley, 1976), as illustrated by the scheme in Fig. 2.

It must be said, however, that, not all French archaeologists accepted that the Aurignacian V of Laugerie-Haute was a continuation of the earlier stages of the Aurignacian complex. François Bordes (1973, p. 221) himself wrote: "Of course, the Aurignacian V at Laugerie--Haute is situated above a very evolved Perigordian, but while this Aurignacian V is more Aurignacian-like than anything else, its roots in the older Aurignacian are not clearly known". Later, Denise de Sonneville-Bordes (1982) reached the conclusion that the Aurignacian V could not be regarded as the final stage of the long Aurignacian sequence.

The fact that, until very recently, the Aurignacian V was a singular entity — one assemblage/one site — prevented researchers from clearly incorporating it into the general scheme of European Upper Paleolithic complexes. Recent discoveries, both in France and in Portugal, however, shed some new light into the Aurignacian V problem, especially when seen through a different perspective from the traditional and mostly typological point of view.

New data and new perspectives

In any science, archaeology included, one of the most profitable ways to solve theoretical problems and/or test hypotheses is to enlarge the scale of approach. That is, if a model seems to fit the data for a single case, and before any generalizations, that model needs to be tested against other, similar and appropriate, data sets. Thus, if a problem such as the Aurignacian V seems to have reached a dead-end, research scope needs to be enlarged, either by studying other sites with similar chronologies, artifact samples, or contexts, or by formulating different hypotheses, in order to explain the problem in hand. For a long time, the uniqueness of the Laugerie-Haute Aurignacian V was a strong obstacle to attempts to enlarge the scale of research. Thanks to the last two decades of research both in France and in Portugal, however, it is now possible to readdress the interpretation of the Aurignacian V. Two major developments occurred in this field: first, from a theoretical perspective, the adoption of alternative models to the traditional (normative/culture-historical) typological "school" and its consequent interpretations of the archaeological record; and, second, from the record itself, a set of new sites has been found, the assemblages of which clearly parallel the Laugerie-Haute Aurignacian V, both chronologically and typologically.

In France, an emergency excavation related to the construction of the new Museum of National Prehistory (Les Eyzies-de-Tayac) revealed a small rockshelter (the Abri Casserole) with

a complex stratigraphy of >3 m that contained fourteen archaeological layers (Aubry et al., 1995). Layers 10b to 8b represent the period spanning the Late Gravettian to the Early Solutrean, and show similar typological patterns to the Laugerie-Haute Aurignacian V. In Portugal, not one but, at least, five assemblages clearly parallel the French Aurignacian V: Gato Preto, CPM III S (lowest), CPM II (lower A)/CPM III (middle), Lapa do Anecrial (level 2), and Lagar Velho (level 6). Of these, the two assemblages from CPM and that from Gato Preto, open air sites, have yielded reasonably large artifact samples. Lapa do Anecrial, on the other hand, is an ephemerally occupied cave that, in spite of a smaller artifact sample, showed excellent post-depositional preservation, attested to by the spatial distribution of artifacts and by the high level of refitting success (Zilhão, 1995, 1997; Almeida, 1998, 2000, 2001, in press).

One important characteristic of Portuguese "Aurignacian V"-like assemblages is their close chronological proximity, if not overlap, with other Portuguese assemblages which have been attributed, both technologically and typologically, to the Late Gravettian (Zilhão, 1995, 1997). Fig. 3 shows some of the ^{14}C dates available for these assemblages. From its reading, another interpretive problem stands out: with such a small time gap between them, what are the relationships of the Aurignacian V assemblages with those from the Late Gravettian? What do the apparent typological differences between them mean? Do these typological differences have parallels in their respective technological patterns? Is there continuity between them, or are they the archaeological remnants of the replacement of one cultural system by another (read one population by another)? Also, previous work by Zilhão (1995, 1997) with these assemblages suggested two possible alternative chronological interpretations for the Portuguese "Aurignacian V" meant to characterize the transition from the Gravettian to the Solutrean in Portuguese Estremadura; they were designated as the Two-Phase Model and the Three-Phase Model. The first considered the "Aurignacian V"-like assemblages as representing a functional facies of a wider cultural complex, the "Proto-Solutrean" and, thus, not chronologically differentiated from other assemblages whose characteristics are less "Aurignacian V"-like. The second model placed "Aurignacian V" assemblages in a temporally intermediate stage between the Final Gravettian and the Proto-Solutrean, the latter being mainly characterized by the dominance of "Vale Comprido points" and by a decrease in the "Aurignacian" characteristics. In this case, thus, the "Aurignacian V" gains chronological meaning. My dissertation work involved the testing of these hypotheses, having as a basis the technological study of a set of Portuguese and French assemblages.

The aims of my dissertation project were essentially three: first, to define and clearly characterize the technological variability present in the lithic assemblages from the Portuguese "Aurignacian V"; second, to build a critical database for these industries, so that future sites or assemblages from this period could readily be identified as such, and not confounded with either Epipaleolithic or "real" Aurignacian ones (i.e., pre-dating 26 000 BP); and, third, to access the relationship between the Portuguese "Aurignacian V" and the Late Gravettian, through the technological study of assemblages from both complexes (Almeida, 2000).

It would be impossible in the framework of this paper to summarize the entire theoretical and methodological framework that served as a basis for my dissertation project. Nevertheless, I think that some of the ideas concerning the definition of the Portuguese Aurignacian V/ Terminal Gravettian and its relations with the previous Late Gravettian should be at least summarized, having in mind that this symposium deals essentially with definitional problems.

From the outset, I was conscious that a study having as a basis the technological variability of lithic assemblages from a certain period could at best represent a small contribution for its definition. Lithic artifacts are but a part, a very small part, of the archeological record.

In order to clearly evaluate the degree of variability of a period or technocomplex, to discern between continuity and disjunction between two archaeological periods, it would be preferable to compare several aspects of their past organizational properties that the archaeological record can provide: settlement data, subsistence data, and mobility data. To simply assume that a variable (stone tools) that usually represents a small percentage of the lithic assemblages can have ethnic relevance and, thus, be used to infer migratory events (movement of people), or diffusion (movement of ideas), is simple wishful thinking. In the realm of lithics, I think that if such arguments can be made, they cannot be grounded on simple comparisons of tool assemblages. That negates all the evolution that lithic studies have undergone since the Bordes-Binford debate.

My opinion on processes of cultural change, instead, is that, first, continuity should be considered the null hypothesis — it is more reasonable than to attribute any change to the entrance of a new group into a specific area; second, that hunter-gatherer systems are not static and, thus, have the capacity to adapt to very different circumstances; and, third, that the

diately preceding Final Gravettian. Surely, there exist typological differences between the two periods. In France, such typological changes were traditionally interpreted as a result of different people entering and exiting the Dordogne region, as shown in Fig. 2 (Bordes, 1968). In so doing, French researchers missed not only a large parcel of lithic technological variability, but also dismissed other types of data that seemed to show continuity between the "Aurignacian V" and the earlier Proto-Magdalenian, such as the bone assemblages (Leroi-Prost, 1975, 1978).

The evaluation of the relationships between the Terminal Gravettian and the Final Gravettian of Portugal was conducted differently. Although considering only lithic assemblages, I compared the two periods not only in their typologies, but in the whole technological spectrum, following essentially the *chaîne opératoire* approach. In doing so, I was able to compare the two periods more completely and, thus, I did not restrict my analysis to a simple aspect of their organization, such as tool patterns, which, moreover, could be extremely affected by functional variation and not as much cultural or traditional factors (e.g. Binford, 1983).

I further considered that apparent typological changes could be explained in the context of continuity processes (i.e., different choices undertaken by a same population), without necessarily invoking processes of migration and diffusion. Still, since diffusion and migration are processes which can have affected cultural change, they must, therefore, be evaluated in the archeological record. If either cultural continuity or disjunction (migration or diffusion) are to be detected, one essentially has to consider the more stable strategies of hunter-gatherers, especially through the detection of those involuntary and unconscious traits that Binford considered when criticizing Sackett's approach to style (Binford, 1989). The problem, thus, is how to differentiate those traits from others which are essentially functionally adaptive. In the specific case of lithic materials, it is considered that unconscious traits can be detected through the *chaîne opératoire* approach to lithic technology. Being a holistic approach to lithic systems, this method permits the detection of technological patterns which are, or may be, independent of typological constellations and, thus, are more stable.

Such patterns, from which the main units of analysis applied to the study of the Portuguese Aurignacian V/Terminal Gravettian were the reduction strategy and reduction sequence, are indicative, at least in part, of unconscious actions by prehistoric knappers. Contrary to simple typological studies, where only part of the assemblage (the tools) is studied, the *chaîne opératoire* methodology considers the totality of the lithic system: from the original core to the discarded tool, even including the apparently insignificant chip. It provides, thus, a much more dynamic view of prehistoric knapping. When this approach is combined with refitting and microwear, it is possible actually to monitor the actions of the original knappers, as well as to hypothesize about the possible actual functions of specific lithic implements (retouched or not).

The importance of applying a dynamic approach to past cultural traits is essential when dealing with processes of cultural change and, as a consequence, when dealing with the always difficult monitoring of cultural continuity or disjunction. This applies not only to lithic studies, but to all types of data available to the archeologist. Within the subsistence range, for example, it is perhaps reasonable to assume that, instead of studying changes or stability in species lists, one should try to cross-test such data with others that may be more unconscious in character, such as butchering practices, cutting techniques (as revealed by cutmark patterns), or specific strategies of processing subsistence items. The study of continuity, of migration or diffusion cannot take into consideration a single aspect of cultural adaptation, such as tool types. In the best of all possible worlds, one should be able to compare all aspects of past organization, from lithic systems to subsistence systems.

The scope of my dissertation, for instance, was merely the study of lithic technological and typological change at the end of the Estremaduran Gravettian. Previous work had shown that there were typological differences between the Final Gravettian and the Proto-Solutrean (or Terminal Gravettian as we prefer to designate it) (Zilhão, 1995, 1997). Zilhão had also advanced the hypothesis that such typological changes were not accompanied by major technological ones. Through the combined analysis of attribute based technological analysis and refitting, that hypothesis was tested in the framework of my dissertation project.

If no major technological changes were detected, if the differences of Final Gravettian and Terminal Gravettian were of degree and not of kind, if both periods presented similar or common reduction strategies of blank production, independent of typological differences, then it would be considered that the continuity hypothesis should be the most parsimonious. If, on the contrary, the technological patterns from both periods differed in a high degree, then the disjunction hypothesis would be considerably strengthened, and therefore grounded on a more solid basis than simple comparison of typological patterns.

Since it was considered necessary to analyze as completely as possible the lithic strategies, independent of context, special care was taken in the choice of assemblages for study. Taking into consideration that functional variables could affect the contents of several contemporaneous sites, it was decided to select a sample which included different type sites: a base camp (CPM III, middle level), a temporary open air camp (Gato Preto), and an ephemeral cave occupation (Lapa do Anecrial). All the sites resulted from modern excavations and, thus, sampling biases were avoided. This was of particular importance, since in old excavations most of the non-flint materials were discarded (and, thus, quartz is much less represented in those assemblages), as were also the smaller lithic elements, like bladelets and chips.

The study of the technological variability of Terminal Gravettian assemblages (i.e., the definition of which reduction strategies were applied to lithic raw-materials) was performed through a combination of attribute analysis and refitting. These data were then compared with the general lithic patterns of the Final Gravettian, so that the existent models for the transition between the Final and Terminal Gravettian could be tested. Both a continuity model and a disjunction model were tested on the basis of technological characteristics. The goal was to assess if the differences between the Final and the Terminal Gravettian were of kind, and not of degree. What precisely does this mean? It was assumed that disjunction processes, such as migration or diffusion, would affect the general technological patterns of lithic assemblages, independent of typological variation. Following the *chaîne opératoire* approach, the main technological variables that were studied were: raw-material selection and exploitation, core preforming and preparation techniques, and blank production strategies (core reduction strategies). If large differences in these variables were to be found in the comparison between the two periods (both qualitatively and quantitatively) then the disjunction model would adapt more parsimoniously to the data. If, on the contrary, raw-material selection strategies, core preforming and reduction strategies were identical in both periods, then the continuity model would be the one which best fitted the data.

The raw-material variable was studied both through quantitative analysis (percentages of flint and non-flint materials in the assemblages) but also quantitatively: by analyzing if different reduction strategies were applied to different raw-materials. Core preparatory techniques were studied through the analysis of both platform preparation and maintenance techniques, as well as through the evaluation of the presence of the crest technique. In the specific case of reduction strategies for blank production, a set of different reduction strategies was defined and tested in both periods, with the goal of assessing the existence of qualitative differences. In addition, possible differences were studied quantitatively, i.e., as to the extent to

which each reduction strategy defined was used, or dominant, in each studied period. If the study of variability in reduction strategy resulted in patterns indicating quantitative but not qualitative differences, then the interpretation would consider a change of degree, not kind, and thus, a sequence which fitted a continuity model. On the contrary, if there were major qualitative differences between the two periods (drastic raw-material selection changes, different preparatory patterns, and different reduction strategies) then the disjunction hypothesis would be considered as that which best fitted the data.

Table 1 summarizes the expectations of the two models for the comparative analysis of the technological patterns of the Final Gravettian and Terminal Gravettian in Portuguese Estremadura. Since typological variability was regarded as mainly affected by functional variability, it was considered as having little relevance in the evaluation of the two models. Although a comparison of the transported/curated tool kits between the two periods could also provide some information concerning continuity or disjunction processes, such an analysis was not conducted. And refitting was only performed on Terminal Gravettian assemblages.

TABLE 1

Two interpretive models for the Final to Terminal Gravettian transition in Portuguese Estremadura: expectations on technological patterns (Almeida, 2000).

Continuity Model	*Disjunction Model*
Raw Material Selection: Even if there are quantitative differences on the use percentages of different raw materials, the variability of different raw materials exploited should be similar.	*Raw Material Selection*: Differences in raw material exploitation can be expected. These can be monitored not only in quantitative differences in the use of different raw materials, but also in the use of different sources, at east during the initial period of contact/ migratory events.
Core Preparation and Maintenance Procedures: They should be similar between the two periods.	*Core Preparation and Maintenance Procedures*: They are expected to be different between the two periods, even if the blank types or tools are similar.
Reduction Strategies: Even if there are differences in quantitative representation of specific reduction strategies, the fan of technological variability should be similar between the two periods. That is, no different reduction strategies should be found between the two periods.	*Reduction Strategies*: Although it is possible that some Reduction Strategies might be common between the two periods, some qualitative differences are expected. That is, different reduction strategies should be found in the two periods, with no overlapping.

Technological patterns of Portuguese Terminal Gravettian lithic industries

The study of the assemblages from Lapa do Anecrial, Gato Preto and Cabeço de Porto Marinho (Almeida, 2000) allowed the definition, in a set of criteria, of the general technological patterns and variability of the Portuguese Terminal Gravettian/Aurignacian V. Although some of those criteria, when in isolation, may not be exclusive of the period (many of them are, in fact, common in almost all Portuguese Upper Paleolithic assemblages) it is their association that defines the technological particularities of assemblages dating to ca.21 500 BP in Portuguese Estremadura. The way to distinguish these assemblages, in the absence of direct dating, rests on the association of a multiple set of criteria, from raw-material preferences to lithic reduction strategies (in the strict sense of blank production) and use and discard of tools. Both attribute analysis and refitting were taken into consideration. If the attribute analysis resulted in an average view of the assemblages, refitting results provided more particularistic views at a smaller scale that were enlarged by applying the method to several assemblages in the same region.

Raw material economy: the case for a high frequency of quartz exploitation

One of the most striking characteristics of the Portuguese Terminal Gravettian is a high percentage of quartz use. With overall percentages sometimes as high as 40% of the total assemblage (as at Gato Preto), these assemblages show an extreme pattern, when compared with other Upper Paleolithic complexes from Estremadura. Although there are periods where quartz was intensively used as a raw material, such as the Early Magdalenian or even the Epipaleolithic, it is in the Terminal Gravettian that the presence of quartz reaches its highest peak (Zilhão, 1997), as shown in Figs. 4-6. It must be said, however, that the Terminal Gravettian seems to be in clear continuity with earlier Final Gravettian assemblages, where quartz was already used, but not to such a predominant degree (Zilhão, 1995, 1997).

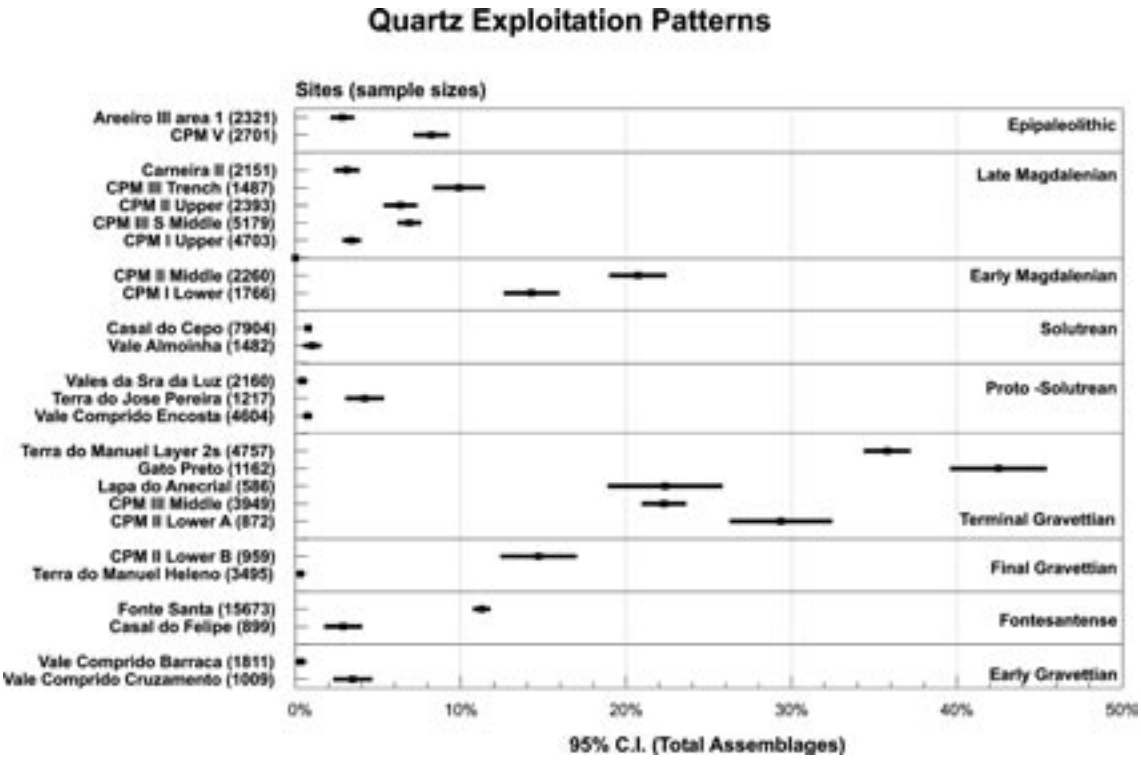

FIG. 4 – The exploitation of quartz in the Upper Paleolithic of Portuguese Estremadura. 95% confidence interval of total assemblages (Bicho, 1992; Marks and Almeida, 1996; Zilhão, 1997; Almeida, 2000).

The explanation of such a preference for quartz is clearly not to be related to an absence of good flint. The studied assemblages clearly contradict such an idea. It is generally agreed that Estremadura as a whole is the main flint source of Portugal. Although flint has been said to be ubiquitous in Estremadura, there are several small areas where good flint sources are at least 8-15 km away. Although essentially considered as within the "local" scale, such distances were long enough to affect the general raw material preferences in periods of the Upper Paleolithic other than the Terminal Gravettian. In such cases, as one goes further away from good flint sources, the percentages of non-siliceous raw materials increase considerably in the assemblages. Thacker (1996) has clearly shown this pattern for the Rio Maior area. The technological patterns of the assemblages which fit such a distance-related pattern show usually the use of quartz and quartzite for expedient flake production, whereas flint remains mostly used for elongated blanks and "formal" tools.

What makes the Terminal Gravettian so different? The distance to flint sources is not a determining factor of the choice of raw materials for exploitation. The site of CPM, for instance, with its multiple levels spanning from Final Gravettian to the Epipaleolithic (at least) is a good example of how the Terminal Gravettian is unique in what concerns the (ab)use of quartz. It is reasonable to assume that the distances of CPM to the major flint sources of the Rio Maior area (Azinheira and Vale Comprido) did not change drastically during the Upper Paleolithic. If such was the case, the differences in the percentage of quartz use in the various moments of the CPM sequence cannot be tied directly to distance to raw material. Fig. 5 shows the general trends of quartz use in the CPM sequence. Although data on prismatic bladelet cores are missing for the Early Magdalenian (CPM I, lower level, and CPM II, middle level), Upper Magdalenian (CPM IIIs, middle level, and CPM IIIt, upper level) and Final Magdalenian/Epipaleolithic (CPM V) (Bicho, 1992), the patterns relating to total assemblage, cores, tools, blades and bladelets show how the Terminal Gravettian (CPM III, middle level, and CPM II, top of lower level) stands out as the period where quartz was more intensively exploited.

Although the Final Gravettian (represented in Fig. 5 by CPM II, base of lower level) already featured a relatively high use of quartz, it is in the subsequent period that almost all the indicators increase to a degree never seen before or after in the Upper Paleolithic of Portuguese Estremadura, both in quantity and technological variability. While throughout the CPM sequence quartz blades are always rare, all the other classes represented concur in showing how quartz was almost as important as flint during the Terminal Gravettian/Aurignacian V. This becomes particularly evident in the indicators related to bladelet production: the bladelets themselves, and the prismatic bladelet cores. Not only was the Terminal Gravettian the period of the Upper Paleolithic where more quartz bladelets were produced (Fig. 6), but it is also the case that such production proceeded through reduction strategies which were virtually identical to those applied to flint (at least when quartz presented good knapping qualities). Gato Preto is another paradigmatic case of how high quartz use is not related to distance to flint sources: less than 1 km away from one of the major flint sources of Portuguese Estremadura (Azinheira), this site presents the highest exploitation of quartz of all the Upper Paleolithic assemblages in the Rio Maior area.

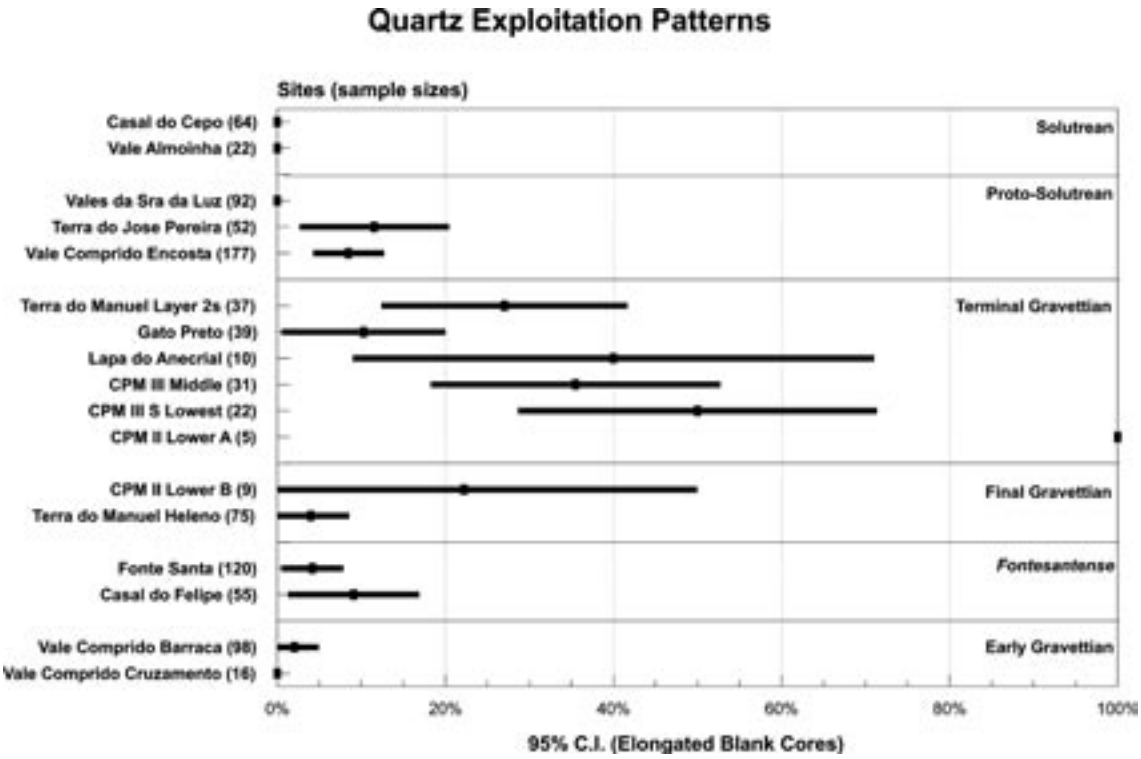

FIG. 6 – The exploitation of quartz in the early Upper Paleolithic of Portuguese Estremadura. 95% confidence interval of cores for elongated blanks (Bicho, 1992; Marks and Almeida, 1996; Zilhão, 1997; Almeida, 2000).

Lapa do Anecrial, the first archaeological site where refitting procedures clearly demonstrated that carinated elements served as bladelet cores (Zilhão, 1995, 1997; Almeida, 1998, 2000, 2001, in press) is perhaps the best example of how the use of quartz was not a result of distance to flint sources. Distance to any flint or quartz source was more than 8 km, yet quartz represents 22% of the total assemblage. Plus, as the refitting work demonstrated, most of the elongated blanks exported from the site at abandonment were quartz bladelets. The technological patterns of flint and quartz are identical. Lapa do Anecrial shows, thus, that quartz was considered a raw material as good as flint and essential to the technological necessities of the Terminal Gravettian people. The transportation of quartz cobbles for more than 8 km contradicts the idea that quartz exploitation was only local (read on-site).

When compared to flint, quartz is generally regarded as an inferior raw material. As we have seen, that didn't seem to have affected the choices of the human communities which exploited Portuguese Estremadura during the period concerned. We must emphasize, however, that the "high use of quartz" can hide some variability within this type of raw material. The quartz exploited in the studied assemblages varied from poor quality milky quartz to excellent rock crystal. In most of the cases, however, crystal quartz was rarely used, the vast majority of the assemblages showing the use of variable quality milky quartz, generally collected in the shape of cobbles. The heterogeneity in the quality of the exploited quartz naturally affected the reduction strategies used in the various assemblages.

This is the reason why, at Gato Preto, where most of the exploited quartz was of poor knapping quality, most products were flakes; all good quality quartz blocks, however, were exploited as prismatic bladelet cores. At CPM, on the other hand, most of the quartz showed qualities which made possible an intensive production of bladelets essentially through prismatic strategies. Lapa do Anecrial, due to its excellent post-depositional conditions, is the

most significant case of how the differences of quality in the available quartz affected the reduction strategies: of the four cobbles knapped at the site, three were of very good quality translucent milky quartz, and another of poor knapping qualities. Table 2 presents the differences in exploitation in each of the quartz cobbles from Anecrial. The three good quality volumes (QZ 1, QZ 2 and QZ 4) show not only a higher degree of reduction, as indicated by their high core to cobble ratio, and by the percentage of the initial block that was knapped (here calculated in weight), but also a wider variability in reduction strategies, most of them applied in order to produce bladelets. Block QZ 3, however, due to its inferior quality, presents essentially different patterns: less technological variability, no bladelet production, and soon aborted exploitation (64% of the cobble remained unworked at abandonment). While for the other three volumes there is evidence that either the core or blanks extracted from it were exported from the site, all products from block QZ 3 were abandoned there.

TABLE 2

Quartz exploitation in Lapa do Anecrial.

Block	*Raw Material Description*	*Core/ Cobble*	*Number of refitted*	*Reduction St*	*Mainly*	*Degree of Exploitation*

material testing at the source. Lapa do Anecrial is the only case where such raw material testing at the source was detected with certainty. All the four blocks show, when refitted, scars of one or two very thin cortical flakes that were not recovered at the site. On the other hand, this pattern is perfectly justifiable, taking into consideration that the cave is at least 8 km away from any gravel deposit, and has no quartz in its vicinity. A similar pattern was present, for example, at CPM, where most of the flint blocks from the source of Azinheira (3 km away) showed a higher degree of selection than sites nearer to the source (Zilhão, 1995, 1997). Thus, whenever quartz was immediately available, the cobbles were brought in complete, testing being done directly at the site, in the process of exploitation. If the exploited cores were still considered useful, they could still be exported at abandonment, showing thus a curation pattern similar to flint. When quartz cobbles had to be transported for longer distances, raw material testing was done immediately at the source.

At a wider scale, other assemblages dating to the same period but not studied in this dissertation seem to agree with the pattern presented here, especially if from recent excavations. Thus, overall, quartz seems to have been a raw-material of choice during the Terminal Gravettian, not a second-rate material for expedient technologies, as was the case in other Upper Paleolithic complexes of Estremadura. This is particularly evident in the comparative study of reduction strategies used for quartz and flint, which are virtually identical whenever quartz was of good quality. Under Perlès's (1992) approach, the Estremaduran Terminal Gravettian could be singled out as an example of the importance of group traditions affecting raw material choices: the strength of tradition may be manifested by a pronounced and recurring preference for a particular raw-material which cannot be explained by either technical or economic considerations.

The importance of quartz during the Portuguese Terminal Gravettian, however, should not overshadow the fact that flint continued to be always used in high proportions. The flint acquisition and transportation patterns from the studied assemblages show that this type of raw-material was transported essentially in four shapes: as whole cortical cobbles; as preformed cores; as unretouched blanks; and as finished tools. In the three studied sites the four types of transport have been detected, but in variable proportions. At Gato Preto, a temporary camp less than 1 km away from a major flint source, the assemblage was dominated by whole cobbles whose testing was performed directly at the site. At CPM and Lapa do Anecrial, are located further away from raw-material sources, the imported items in the assemblages are whole cobbles, preformed cores, unretouched blanks and finished tools in comparable proportions.

The evidence for importation of preformed cores and unretouched blanks of flint at base camps (CPM) and temporary camps (Gato Preto and Anecrial) suggests that, although not yet found, there may have been specialized workshop sites during the Terminal Gravettian. Since quartz was mostly transported unmodified, such Terminal Gravettian workshops should differ from camp sites in a lower degree of quartz exploitation and in flint assemblages showing a balance between testing, decortification and preforming stages, with very few tools and abandoned cores. Such a relative lack of cores in hypothetical Terminal Gravettian workshops would differentiate them from workshop sites of other periods; as seen at Quinta do Sanguinhal, an earlier Gravettian workshop in the Rio Maior region, most exported items were blanks, and almost all exploited cores were left at the site. Future survey work may provide the data required for the testing of this hypothesis.

Terminal Gravettian reduction strategies

The combined application of attribute analysis and refitting to the studied assemblages provided data of importance for the definition of technological criteria for the identification of Terminal Gravettian assemblages. As mentioned before, such assemblages present a dual preference for flint and quartz. Contrary to other periods, when quartz was exploited as a second choice for expedient technologies related to flake production, in the Terminal Gravettian quartz was exploited through the same strategies that were applied to flint. When quartz cobbles presented knapping qualities as good as flint, bladelet production was attempted, following the dominant reduction strategies of this period. These were the prismatic unidirectional (on single platform, or applied sequentially in multiple platforms), the carinated, and the thick-nosed. The equivalence between quartz and flint thus applies not only to the intended endproducts and reduction strategies but also to the intermediate stages of the *chaîne opératoire*, from platform preparation to blank curation.

The main differences between testing of flint and quartz derive from the states in which the different materials entered the studied sites. At Gato Preto, where both raw materials were for the most part collected in the immediate vicinity, testing was performed directly at the site. At CPM, quartz was immediately available, but the flint source was at least 3 km away. This difference resulted in that quartz seems to have been tested at the site, whereas various flint nodules were tested at the source. Actually, some of the CPM flint cores underwent all their decortification off site, thus being imported as core preforms. At Lapa do Anecrial, a site more than 8 km distant to any flint or quartz source, off-site testing was the rule: all reconstructed quartz cores show evidence for testing at the source, and flint items were small cortical nodules, core preforms, blanks ready to be exploited, or finished tools. The overall testing patterns are consistent with a rational system characterized by a rather intense degree of anticipation (Table 3).

TABLE 3

Terminal Gravettian lithic testing and transport patterns.

	Sites near flint and quartz sources	*Sites distant from flint sources but where quartz was immediat*	*Sites which were distant from both flint and quartz sources*

ing the debitage surface, and of generally thick, cortical flakes creating flat (unfacetted) platforms. Carinated and thick-nosed flint cores, when set up on cortical or partly cortical flake blanks, decortification was limited to the production area (debitage surface). In the specific case of thick-nosed cores, such decortification was made alongside the initial "nose", or during maintenance procedures, the remainder of the block remaining unmodified. In flint and quartz materials, the crest technique of core preforming was extremely rare. At CPM, crested elements represented 0,32% of the total debitage, and that is the highest value recorded in this study.

The preparation of the striking platforms of flint cores was limited to the creation of unfacetted platforms; in prismatic cores this was done through the removal of core tablets, and in carinated cores the striking platforms were the ventral surfaces of the original flakes and, thus, naturally unfacetted. The low frequency of facetted and abraded platforms, as well as of lipping, suggests that, during the Terminal Gravettian, little investment was put into platform preparation, and that, probably, most of the reduction was carried out with direct percussion, often with hard hammers. The assemblage from layer 6 of Lagar Velho (Almeida et al., 2002), however, showed a significantly higher percentage of abraded platforms, suggesting that preparation was very variable in this period.

Quartz cores showed patterns of decortification similar to those of flint. There is, however, a difference in platform preparation in flake cores. Whereas, with flint, decortification included the creation of flat platforms in most flake cores, with quartz decortification of flake cores is limited to the debitage surfaces, the platforms remaining cortical. This pattern is particularly evident at Gato Preto, where quartz reduction strategies were rather simple (single platform prismatic, informal, or discoidal), and associated with poor quality raw-material. Whenever quartz bladelets were produced, more care was taken in the preparation of platforms, namely by the removal of thin, cortical core tablets; this pattern was detected in all three Terminal Gravettian sites studied.

Reduction strategies used with flint were mostly prismatic and carinated, and mainly aiming at the production of elongated blanks. Among these, bladelets were certainly the principal intended products. Whereas at Anecrial and Gato Preto carinated and thick-nosed reduction dominates the assemblages, at CPM those strategies are less represented; most CPM bladelets were extracted from prismatic cores. CPM also stands out as the only studied site where the production of blades was significant. A significant part of these blades, however, was produced in the scope of bladelet core preforming and initial phases of debitage.

Independently of the studied assemblage, prismatic reduction was predominantly unidirectional, with abandoned cores showing single platforms, or multiple platforms, sequentially used, as shown in all cases where refitting could be applied. Terminal Gravettian multiple platform cores thus indicate an intensive exploitation of cores through consecutive unidirectional prismatic strategies. Bidirectional reduction was extremely rare during the period.

Flint bladelets were also produced through an alternative, or complementary, reduction strategy: the exploitation of carinated and thick-nosed cores. These artifacts, traditionally considered as tools, were in fact cores, at least in the Terminal Gravettian. The results achieved, combining attribute analysis, refitting, and a microwear case-study, clearly allow us to state that the vast majority of carinated and thick-nosed "scrapers" in these assemblages were bladelet cores, not tools in a functional sense. These cores resulted from the re-exploitation of thick flakes produced through different reduction strategies. While at Anecrial and CPM most of the thick blanks for carinated reduction were produced from prismatic cores, at Gato Preto the majority of flakes were produced through informal strategies. The significant representation of carinated and thick-nosed bladelet cores is the characteristic which gives the Terminal Gravettian its "Aurignacian V" typological resemblance. The Portuguese data show

that the later designation is erroneous, since these assemblages are essentially Gravettian in nature (Zilhão, 1995, 1997; Zilhão et al., 1999; Almeida, 2000, in press).

Although the Terminal Gravettian is not the only period where carinated cores are frequent in the Portuguese Upper Paleolithic, it is, perhaps, the only period where this type of reduction was applied intensively both to initial flakes (mostly cortical) and to non-cortical flakes. Furthermore, several of the reconstructions from Gato Preto and Anecrial indicate an intentional reduction of raw-material blocks in order to create flakes or volumes whose dimensions where more convenient for carinated and thick-nosed reduction. Such an intense re-exploitation of almost all the thick blanks resulted, in all assemblages, in blocks with high core to cobble ratios. If at CPM only two cases were detected (mainly because refitting was not systematic), at Gato Preto and Anecrial the core to cobble ratios in some of the flint blocks were sometimes as high as 6:1! The presence of high core to cobble ratios, thus, seems to be a defining characteristic of the Portuguese Terminal Gravettian. Comparative refitting studies (at the assemblages from Quinta do Sanguinhal and Quartel dos Bombeiros) indicate that, during both earlier stages of the Gravettian and during the Epipaleolithic, blocks with high core to cobble ratios are uncommon, when they exist, the application of carinated type reductions is limited to initial cortical flakes.

As mentioned above, the Terminal Gravettian stands out in the Portuguese Upper Paleolithic sequence as the period when quartz was exploited in higher frequencies. But quartz was important also in qualitative terms: it was exploited through the exact same strategies applied to flint, and with the same goals, that is, the production of bladelets using prismatic and carinated reduction strategies. The equivalence between quartz and flint reductions is particularly evident at CPM and Lapa do Anecrial, where prismatic bladelet cores of quartz are quite frequent and, at the second site, associated with carinated and thick-nosed bladelet cores. At Gato Preto, however, quartz bladelet production was much less common, as a result of the generally poorer knapping qualities of available quartz. It is in this regard significant that the small sample of prismatic pieces among the quartz cores from this site is in a variety of much better knapping qualities than the vast majority of the sample, composed mostly of informal and discoidal cores.

As with flint, whenever quartz was good enough, prismatic strategies were applied in conjunction with carinated and thick-nosed technologies. At Lapa do Anecrial this is particularly evident, resulting in equally high core to cobble ratios; in one instance, a single quartz block yielded at least nine cores (Table 2)! During the Terminal Gravettian, thus, quartz, besides being expediently exploited for flakes as normal throughout the Portuguese Upper Paleolithic, was of major importance in the production of bladelets. With very rare exceptions, carinated, thick-nosed and prismatic reduction sequences are unidirectional in nature (even if applied from multiple platforms) as with flint.

Quartzite was the raw-material least represented in the studied assemblages, and displays reduced variation in reduction strategies. All artifacts suggest an expedient production of flakes (very rarely retouched), through chopper/chopping-tool strategies, and parallel, non-prismatic strategies.

The Aurignacian V: a non-existent archaeological entity in Portugal

Some of the technological and typological patterns of the Terminal Gravettian are not exclusive of the period. There are, however, some characteristics which stand out as unique, or, at least, as much more frequent. I believe that, in future research, differentiation between

the Terminal Gravettian and other "Aurignacian"-like lithic assemblages may be achieved through a combination of several definition criteria:

- A high percentage of quartz exploitation.
- Exploitation of quartz for both flake and bladelet production, through prismatic or carinated strategies.
- High core to cobble ratios (a pattern only possible to detect through refitting or minimal nodule analysis).
- Similar reduction strategies applied to both flint and quartz.
- Minimal preparation of striking platforms
- "Formal tool" samples where carinated and thick-nosed forms are present or dominant, but where the blanks extracted (bladelets) are rarely retouched and, when that is the case, mostly exhibit marginal retouch.

The intended products of Terminal Gravettian core reduction were, for the most part, bladelets. Even at sites where blades occur, such as at Cabeço de Porto Marinho, they result from the initial phases of bladelet production and core preforming. The most common reduction strategies during the Terminal Gravettian were, in both quartz and flint, of unidirectional character. Whenever refitting permitted detailed analysis of the chronology of multiple platform prismatic cores, they were always sequential, not alternate. Two main reduction strategies were used for bladelet production: prismatic, and carinated/thick-nosed. Whereas the first resulted in typical prismatic cores, the second resulted in artifacts that would fit the "scraper" class in a traditional typology. Both experimental knapping, refitting and microwear data indicate (Almeida, 2000, in press), however, that most of the carinated and thick-nosed elements from the Terminal Gravettian were exclusively bladelet cores. The dominance of such types in the tool "samples" gives a general "Aurignacian" character to the assemblages, but has no direct functional significance.

Although carinated and thick-nosed elements were not tools in a strict sense, their presence in traditional type-lists can be indirectly useful: they reflect the importance of carinated/thick-nosed reduction in the framework of bladelet production strategies. Thus, assemblages rich in carinated and thick-nosed "scrapers" should not be considered as assemblages where a great part of the activities implied scraping actions carried out on organic materials. On the contrary, they should be considered as assemblages where especial importance was given to the production of lithic barbs. Unlike other periods in the Portuguese Upper Paleolithic, the blanks for carinated reduction show a wide variability of forms: from cortical flakes, derived from phases of decortification, to thick core tablets and thick byproducts of prismatic core exploitation. In some cases, the production of such flakes was simply obtained by informal strategies, a pattern particularly evident at Gato Preto. Such an intense re-exploitation of thick flakes as carinated and thick-nosed bladelet cores resulted, in all studied assemblages, in high core to cobble ratios: for each initial block of raw-material, several cores were obtained.

Almost all the above criteria were already present, although in a somewhat smaller degree, in Portuguese assemblages dating to the Final Gravettian, the main differences between the two periods being essentially typological in character. Even within the typological spectrum, differences are limited to the presence, during the Final Gravettian, of blades with "Proto-Magdalenian" retouch (knives), and backed bladelets (generally truncated or bi-truncated). If backing seems to disappear during the Terminal Gravettian (although some such artifacts were still found at CPM III, middle level), marginally retouched

bladelets (whose blanks result clearly from carinated reduction) are clearly present in the Final Gravettian.

In sum, the typological differences between the Final Gravettian and the Terminal Gravettian in Portuguese Estremadura are not accompanied by major technological changes. The technological differences between the two periods are not as much of kind as they are of degree. The data clearly suggest continuity in all the variables which were considered relevant. On raw-material selection patterns, the range of raw materials was the same, although in the Terminal Gravettian quartz was more intensively exploited. On core preparation and maintenance procedures, all the variability found during the Terminal Gravettian was already present in Portuguese Estremadura during the Final Gravettian. Finally, in reduction strategies, the only visible changes are a decrease in bidirectional and an increase in carinated/thick-nosed methods. All reduction strategies detected in the Terminal Gravettian were already known to Final Gravettian inhabitants of Portuguese Estremadura. The pattern thus suggests that the Terminal Gravettian, even in spite of its "Aurignacian"-like typological structure, was in clear technological continuity with the Final Gravettian.

The proposed technological continuity between the Final Gravettian, whose absolute dates center around 22 000 BP, and the Terminal Gravettian, whose dates cluster at 21 500 BP, needs further testing, namely by the discovery and analysis of stratified sites where both periods are superimposed. For the moment, and having in mind that the Portuguese "Aurignacian V"-like assemblages (both typologically and chronologically) seem to be in clear technological continuity with the Final Gravettian, use of the term "Aurignacian" in their characterization should be abandoned in favor of Terminal Gravettian.

Back to old problems

Reassessment of the Aurignacian V from Laugerie-Haute (Almeida, 2000), combined with recent data from the rockshelter of Casserole (Aubry et al., 1995) indicates that similar developments took place at the scale of southwestern France and Iberia as a whole (Zilhão et al., 1999). Perhaps if the excavators from Laugerie-Haute had not limited their studies and their characterization to the typological analysis of the lithic industries, the problem of the Aurignacian V would have been solved long ago, as Christiane Leroi-Prost had already suggested, back in 1975:

> "*Il semble, en effet, y avoir très peu de différences entre l'industrie osseuse de l'Aurignacien V et celle du Protomagdalénien. Et, si l'abondance des grattoirs carénés et à museau, auxquels s'associent quelques burins busqués typiques, ne permet guère de discuter le caractère aurignacien de cet outillage (Sonneville-Bordes 1960, p. 64), il n'en va pas de même pour l'industrie osseuse*" (Leroy-Prost, 1975, p. 123).

Later, the same author reinforced this idea:

> "*Si, d'après l'avis des spécialistes, l'industrie lithique de Laugerie-Haute ouest, couche D, et de Laugerie-Haute est, couche 33, présente bien les caractères d'un Aurignacien terminal, par contre il nous semble que l'industrie osseuse ne justifie pas vraiment ce rattachement. Elle nous paraît monter une filiation très nette avec l'outillage osseux protomagdalénien, mais ne révèle aucune tradition aurignacienne.*"(Leroy-Prost, 1978, p. 289).

These arguments were, unfortunately, almost ignored. The apparent contradiction between a discontinuity in lithic tool samples from the Proto-Magdalenian and the "Aurignacian V" and the continuity between their bone industries clearly demanded further investigation. Instead, French researchers opted to avoid the problem, either by completing ignoring the "Aurignacian V", or by considering it a *mélange*. A close analysis of the Laugerie-Haute East materials suggests that the supposed *mélange* took place after excavation, in the lab, when François Bordes, Denise de Sonneville-Bordes, and P. Smith, not without a small typological bias, decided to remove all the carinated elements, which "could only be Aurignacian", from the Proto-Magdalenian (Layer 36) and Early Solutrean (Layer 31) levels and group them together with the materials from the Aurignacian V level (Layer 33). No wonder that the Aurignacian V lithic assemblage seemed so different from the Proto-Magdalenian: all the "Aurignacian"-like artifacts from the latter were "exported" into the former! This operation implied not only the mixing of samples which, as the Portuguese data and the Casserole rock shelter (less than 1 km away from Laugerie) show, were complete, and originally not "mixed", but also a questionable re-drawing of the published stratigraphic sections (Zilhão et al., 1999; Almeida, 2000).

If in France and Portugal, the final stages of the Gravettian seem to have followed, in general, a similar technological and typological sequence, the lack of sites representing the period prevent us from clearly characterizing the same transition in Spain. Still, the scarce available data suggests a similar process: at El Pendo, Bernaldo de Quirós (1982a, 1982b) interprets layers III and IV as representing the "Aurignacian V", based on typological and stratigraphic criteria. Below those two layers there is another (layer V) rich in truncated backed bladelets, which, as mentioned above, characterize the Final Gravettian/Proto-Magdalenian.

A complete reanalysis of "Aurignacian"-like sites in southwest Europe whose dates are seemingly late is thus essential (Sacchi, 1986; Sacchi et al., 1996). Such late dates should not be a priori rejected but, instead, serve as a stimulus for a more complete technological study of those industries. It may well be that the dates are wrong, but it may also be the case that the "Aurignacian" aspects of those assemblages in fact mask their true "Gravettian" age.

The definition of an archaeological period or technocomplex is a hard task, which involves a clear evaluation of its internal variability. The methodological approaches to such an endeavor are not unidirectional and preferably should in fact be multidirectional: as multidirectional as were the prehistoric behaviors we study. Giving names to assemblages may seem easy, since we tend to do it quite often. But the easier the way we go about definitions, the higher the risk of... missing the point.

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