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Upper Pleistocene Prehistory in Portuguese Estremadura: Results of Preliminary Research

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The Upper Pleistocene prehistory of Portugal is among the least known of any area of Western Europe. Recent survey and excavations have revealed that southern Portuguese Estremadura may well be as rich in the full range of prehistoric sites as any part of Iberia. Numerous open and cave sites with intact cultural deposits have been located that range from the Mousterian through the early Neolithic. While the work is ongoing, there is now good evidence, in terms of absolute chronology and material remains, for both strong parallels with the rest of SW Europe and some markedly local cultural expressions.

Introduction

The prehistory of Iberia has received considerable attention in recent literature, either in its own right (e.g., Butzer 1986; Freeman 1991; Straus 1986, 1987, 1990, 1991a), or as part of broader views of European Upper Paleolithic development (Otte and Keeley 1990). In spite of some effort to include both Spain and Portugal (Straus 1991b), the truth is that almost all data pertaining to the Upper Pleistocene prehistory of Iberia in the English literature derives from Spain, for the most part from Cantabria along the northern coast and, to a lesser extent, the southern coast of the Spanish Levant.

The paucity of data from Portugal reflects both a true dearth of fieldwork in the early and mid-20th century (Zilhão in press a), and little tendency toward international publication of what work was done. In fact, between the 1930s and the 1950s, a number of Portuguese Upper Pleistocene sites were excavated under the aegis of the former Director of the National Museum of Archaeology and Ethnology (Heleno 1944, 1956), as well as by the Portuguese Geological Survey (e.g., Roche 1964; Roche et al. 1962; Roche and Trindade 1951).

Perhaps it was Roche's publications (e.g., 1951, 1964) above all that suggested Portugal was poor in Upper Pleistocene prehistory. The one exception was the Solutrean, first found in Portuguese Estremadura during the 19th century (Delgado 1867) but not recognized as such for almost 100 years (França, Roche, and Ferreira 1961). Since then, however, a number of publications on the Solutrean have appeared (Zbyszewski et al. 1977; Zilhão 1984, 1986, 1987a, 1990). Indeed, when one thinks of the Portuguese Upper Paleolithic it is usually of the Solutrean (Straus 1991b).

Even with the limited fieldwork done in Estremadura through the mid-1950s, it was nonetheless clear that the usual range of recognized Upper Paleolithic industries was present. Heleno's work (1944, 1956) at open sites, mainly in the vicinity of Rio Maior (FIG. 1), produced evidence for the Aurignacian, Upper Perigordian (Gravettian), Solutrean, and Magdalenian, although none of the excavated assemblages was described at all.

At about the same time, Henri Breuil, who spent much of World War II in Portugal, looked at old collections and undertook survey in various regions, recognizing the same

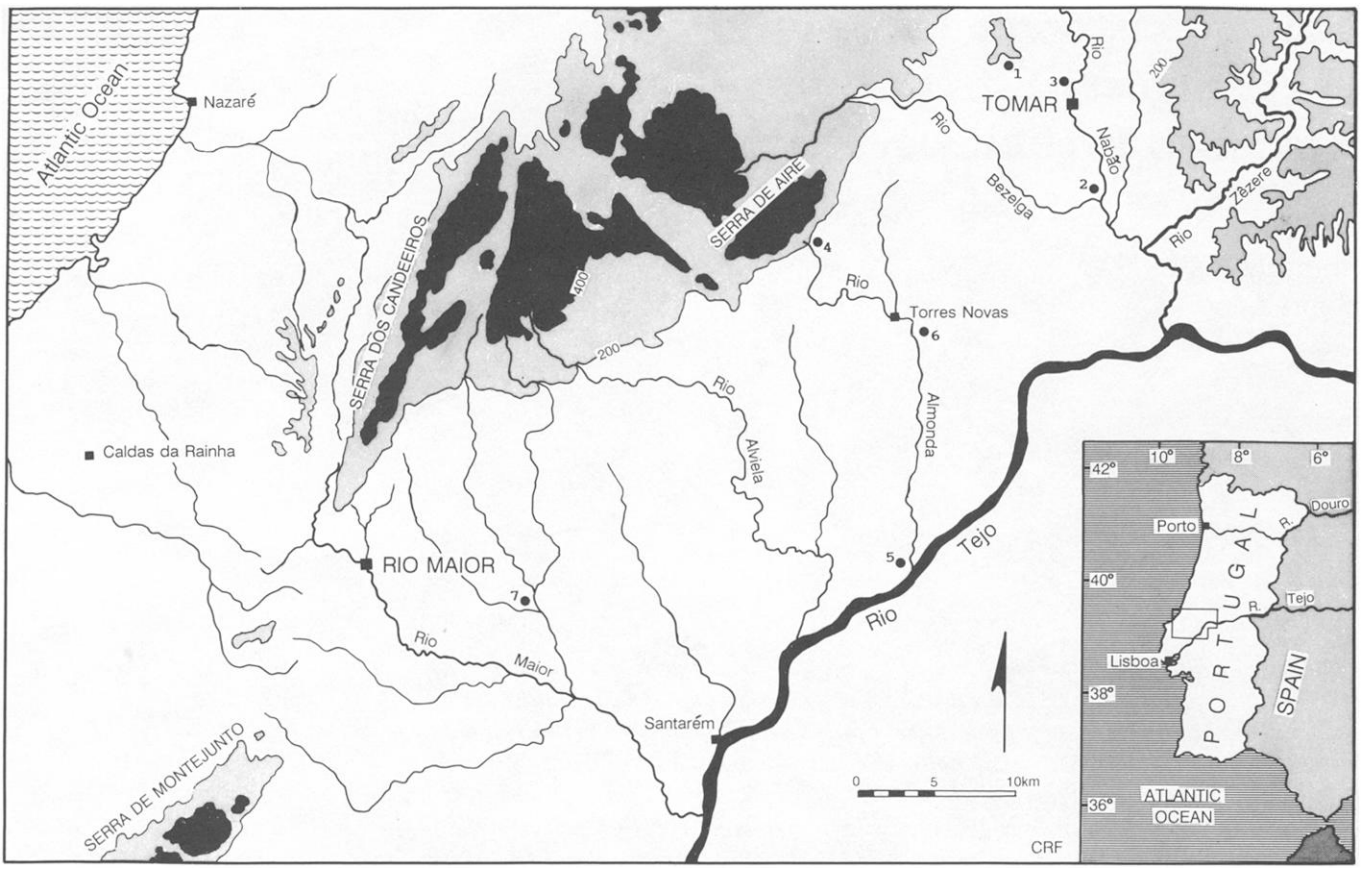


Figure 1. Map of the northern Tejo Basin in Portuguese Estremadura, showing the major towns, drainages, and sites outside the Rio Maior area. Key: 1, Gruta do Caldeirão; 2, Santa Cita; 3, Estrada do Prado; 4, Gruta do Almonda, lower, middle, and upper chambers; 5, Casal do Cepo; 6, Fonte Santa; 7, Passal and Olival de Arneiro. (See TABLE 1 for periods.)

Upper Paleolithic industries, and Middle and Lower Paleolithic manifestations as well (Breuil and Zbyszewski 1942, 1945). Middle Paleolithic sites, however, seemed to be extremely rare, in spite of the fact that isolated finds were common. Only a single surface Mousterian site has been reported in the Rio Maior area, at Quinta da Rosa (Zbyszewski et al. 1972); another, Estrada do Prado, was found in the Nabão Valley (Mateus 1984), while a single cave, Gruta Nova da Columbeira (Ferreira 1984), was reported to have Mousterian artifacts. In spite of surveys in numerous areas by Breuil and others from the 1930s to the present, the vast majority of Upper Pleistocene sites found were in Estremadura (FIG. 1).

In addition to the expected claims for Upper Pleistocene industries, there were others that were unusual. The material from a Solutrean site excavated under Heleno's direction, Olival do Arneiro in Arruda dos Pisões, some 15 km SE of Rio Maior (FIG. 1), led to a claim for a direct "transitional" stage from Mousterian to Solutrean (Zbyszewski et al. 1977). A very few artifacts recovered from large scale excavations at a coastal cave site, Lapa da Raínha, were reported to belong to a "transitional" Mousterio/Aurignacian (Almeida et al. 1969).

Interest in Heleno's work resurfaced in the mid-1970s when a group of students under the acronym G.E.P.P. (Grupo para o Estudo do Paleolítico Português) tried to relocate and test his sites (Zilhão 1988a). Unfortunately, most had been either completely excavated or had been seriously disturbed by recent agricultural and building activities. Because of this, attention shifted to finding new sites.

In 1979, João Zilhão began a research project to identify and excavate new Upper Pleistocene stratigraphic sequences in cave deposits, coupled with a reevaluation of the old collections, particularly those from Heleno's sites. Of importance to Upper Paleolithic studies was the resulting long-term excavation (1979–1987) at the Gruta do Caldeirão in the Nabão Valley (FIG. 1), some 55 km

NE of Rio Maior (Zilhão 1987b, 1985, 1986, 1988a). This work provided the first series of Upper Pleistocene radiocarbon ages (Zilhão 1988b), evidence of substantial Solutrean and Magdalenian occupations, and indications of more ephemeral occupations from the earlier Upper Paleolithic.

Surveys in the Nabão and Almonda valleys (FIG. 1), which located relatively few sites, suggested that the greatest density of open Upper Paleolithic sites seemed to be in the vicinity of the upper Rio Maior Valley. Therefore, when work at Gruta do Caldeirão ended in 1988, attention was directed westward to both the Rio Maior area and a series of caves at the head of the Almonda River, near Torres Novas (FIG. 1).

Given the previous work in Estremadura and its published results, it seemed that not only were there a number of open Upper Paleolithic sites, but collections from them were in need of reevaluation as a first step in expanding knowledge of the Portuguese Upper Paleolithic. Therefore, detailed reevaluations were made of the sizable collections from Heleno's excavations (Zilhão 1984, 1985, 1988a, in press a). While individual site assemblages often were not what Heleno had thought them to be, by the time the reanalysis was completed by Zilhão and Marks, there was still good evidence for the presence of Aurignacian, Gravettian, Solutrean, and Magdalenian occupations. The "transitional" Mousterian to Solutrean at Olival do Arneiro, however, appeared to be simply a Solutrean assemblage with variable patination (Zilhão 1987a).

Since the collection from Lapa da Raínha was too small to evaluate, Marks undertook a brief excavation there. While most of the site had been removed, a small intact area produced a typical Solutrean *pointe à face plane* and a few other artifacts consistent with a highly ephemeral Solutrean occupation. No evidence was found for the Mousterian. Thus, the "exotic" assemblages, in fact, turned out to be mundane.

In order to investigate Estremaduran Upper Pleistocene prehistory in an organized fashion, two simultaneous but separate approaches were decided upon. The first, beginning in 1988, was a joint project shared between Marks and Zilhão, and funded by the National Science Foundation. The initial goal of this research was to establish an industrial chronostratigraphic sequence for the Upper Paleolithic of Portuguese Estremadura by the location, testing, and dating of as many open sites as possible within the five-year term of the grant.

The second strategy was to locate galleries with Upper Pleistocene sediments in the huge cave complex at Almonda: to find their collapsed entrances, confirm the presence of cultural materials, acquire datable materials, and prepare the galleries for future excavations. While the open sites are rich in charcoal, there is little or no bone preservation. Thus, faunal samples necessarily come from cave deposits. This second project is fully directed by Zilhão and supported by the local government of Torres Novas. In the rest of this paper, we describe the results, to date, of these cooperative efforts.

The Project Area

Portuguese Estremadura incorporates most of central Portugal. It is bounded on the north by the large Mondego River basin, on the south by the lower Tejo (Tagus) River basin, on the west by the Atlantic Ocean, and on the east by mountainous Precambrian terrane that rises to over 700 m asl. The work described here is being carried out in the southern half of Portuguese Estremadura, encompassing the region in and between the Rio Maior and the Nabão drainage basins (FIG. 1).

Physiographically, the project area is situated along the northern flanks of the Tejo Basin, bordered on the north by the central limestone massif, on the west by the coastal plain, and on the east by eroded Precambrian hills. The area drains toward the Tejo along short, steep streams, including the Rio Maior, the Alviela, the Almonda, and the Nabão (FIG. 1). The streams originate at springs in the limestone massif, then flow over easily eroded Pliocene, Miocene, and Pleistocene sediments.

In response to late Pleistocene eustacy, and especially the lowered base level of the Tejo, these tributary valleys were deeply incised during the glacial maximum; they have been aggrading through the Holocene (Zbyszewski 1946, 1958). In addition to climatic and eustatic factors, tectonics and karstic processes have been important, if poorly understood, agents in landscape change (Ribeiro, Lautensach, and Daveau 1987).

Two types of geologic terranes, the limestone massif, with elevations to more than 600 m, and the Neogene sedimentary complex are separated by an Eocene fault zone in the project area (Zbyszewski and Almeida 1960). The fault-controlled escarpment of the massif, along the Serra de Aire (FIG. 1), contains numerous springs and karstic caves, including ones with Paleolithic occupations, such as Gruta do Caldeirão and those at Almonda.

In contrast, the Neogene sedimentary complex has been largely shaped by fluvial processes and is mainly underlain by Miocene marls, clays, and sands. Near Rio Maior, Pliocene marls, diatomites, lignites, and clean quartz sands crop out along the upper valley. Deeply incised drainages, with interfluves of ca. 125–150 m elevation, mark the upper portion of this terrain. Open-air sites in this area are found on upland surfaces and on fluvial terraces, or in

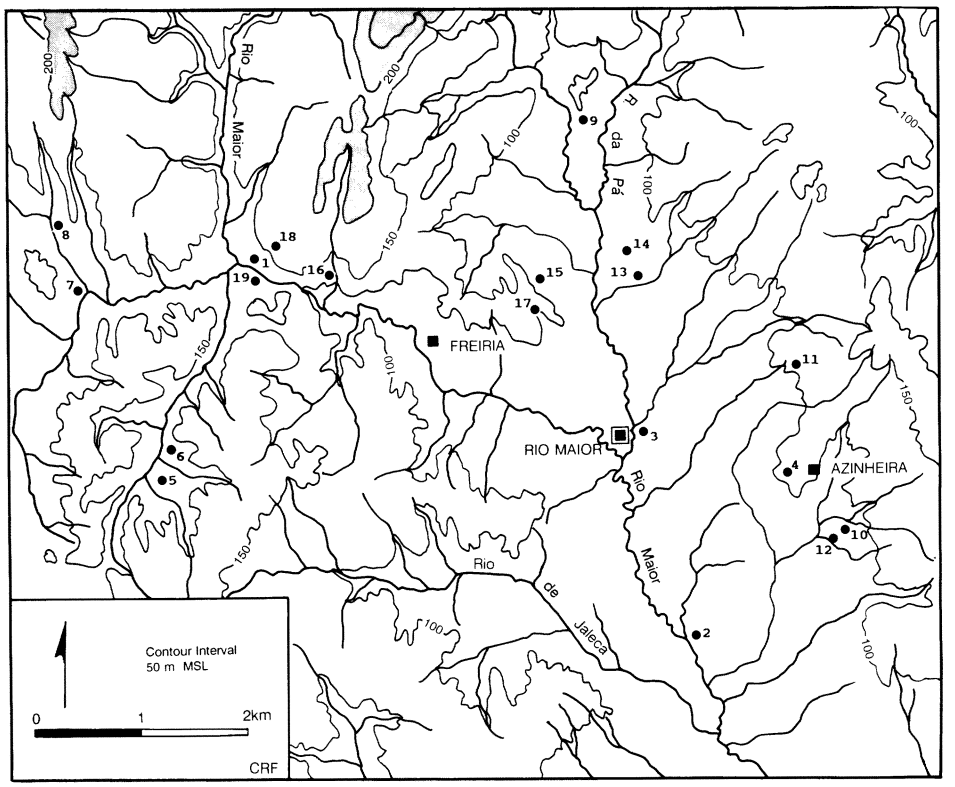


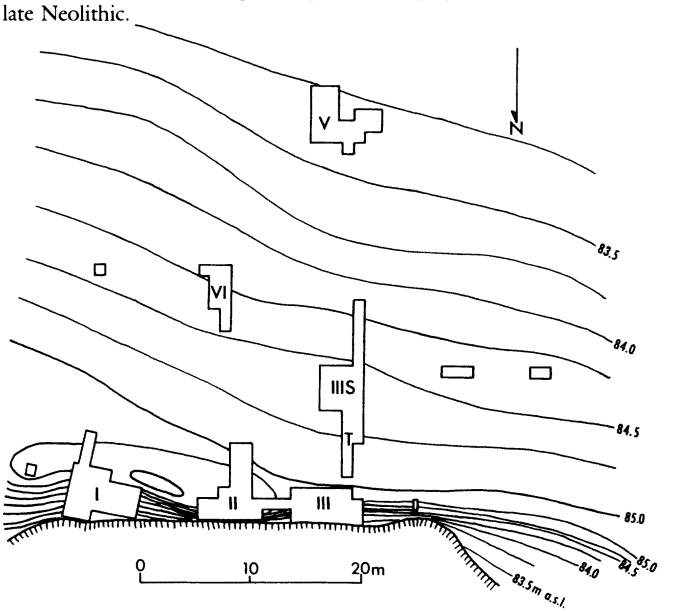
Figure 2. Detailed map of the upper Rio Maior Valley showing sites mentioned in the text. Key: 1, Ponte Alta; 2, Quinta da Rosa; 3, Gato Preto; 4, Vale de Porcos; 5, Vale Comprido and Vale Comprido barraca; 6, Vale Comprido 5; 7, Terra do Manuel; 8, Casal do Felipe; 9, Cabeço de Porto Marinho; 10, Estrada da Azinheira; 11, Ponto 104; 12, Picos and Tocas; 13, Olival da Carneira, Carneira, Carneira II, and Pinhal da Carneira; 14, Sancada; 15, Areeiro III; 16, Forno da Telha; 17, Areeiro I; 18, Bocas, north; 19, Bocas south. (See TABLE 1 for periods.)

situ in Pleistocene alluvium, colluvium, or eolian deposits.

Estremadura is ecologically balanced, in that Mediterranean species equal or slightly dominate Atlantic ones; from a phytoclimatic point of view, there is a markedly sub-Atlantic dominance to the north and east and sub-Mediterranean dominance to the south and SE (Albuquerque 1984). During the last glacial maximum, southward displacement of the polar front made the area transitional between the boreal and temperate zones (Ruddiman and McIntyre 1981; McIntyre and Kipp 1976; Zilhão 1987a), but climatic changes may have been less pronounced than in other parts of Iberia (Straus 1991b).

Not only did Estremadura have a complex mosaic of environmental niches, it contained flint among the highest quality found in all of Portugal. Given these favorable conditions, it is not surprising that so many large, artifactually rich Upper Pleistocene sites were found in the Rio Maior area where this material is most abundant.

Figure 3. Excavation areas at Cabeço de Porto Marinho, each of which revealed different stratigraphic sequences, ranging from Gravettian to late Neolithic.



Survey Results

Although the G.E.P.P. concluded that many of Heleno's sites had been destroyed subsequent to excavation, they represented a reasonable starting point for this survey. Almost at once, it was found that some materials remained intact at three of his sites: Vale Comprido, Terra do Manuel, and Carneira (FIG. 2), the former two appearing, based on the original collections, to be Gravettian and the latter Magdalenian (Zilhão 1988a). To build on this meager base, however, new sites had to be found. A local archaeologist, Carlos Pereira, showed us what has turned out to be the richest open-air Upper Pleistocene/early Holocene site complex found so far, Cabeço de Porto Marinho (CPM). Because of its multiple occupations over an area of ca. 1600 sq m (FIG. 3) and its possible jeopardy from development, the survey has been delayed in favor of excavations there. Even then, the overall number of sites so far located and relocated is impressive (TABLE 1) and

Table 1. List of sites in the project area of Portuguese Estremadura mentioned in the text. (See FIGS. 1 and 2 for site locations.)

Site	*Area*	*Period*	*New/old*	*Site type*
Gruta do Caldeirão	Nabao	M, S, Mg, N	Z	Cave
Santa Cita	Nabao	M	N	Open
Estrada do Prado	Nabao	M	Z	Open
Gruta do Almonda, upper chamber	Almonda	M	N	Cave
Gruta do Almonda, middle chamber	Almonda	M	N	Cave
Gruta do Almonda, lower chamber	Almonda	S	Z	Cave
Casal do Cepo	Almonda	S	N	Open
Fonte Santa	Almonda	G	N	Open
Passal	Pisoes	S	O	Open
Olival de Arneiro	Pisoes	S	O	Open
Ponte Alta	R. Maior	M	N	Cave?
Quinta da Rosa	R. Maior	M	O	Open
Gato Preto	R. Maior	A	N	Open
Vale de Porcos	R. Maior	A	O	Open
Vale Comprido	R. Maior	S	O	Open
Vale Comprido, barraca	R. Maior	G	O	Open
Vale Comprido 5	R. Maior	G	N/O	Open
Terra do Manuel	R. Maior	G	N/O	Open
Casal do Felipe	R. Maior	G	O	Open
Cabeço de Porto Marinho	R. Maior	G, Mg, E, N	N	Open
Estrada da Azinheira	R. Maior	G	N	Open
Ponto 104	R. Maior	G?	N	Open
Picos	R. Maior	G	N	Open
Tocas	R. Maior	G	N	Open
Olival da Carneira	R. Maior	S, Mg	N	Open
Carneira	R. Maior	Mg	O	Open
Carneira II	R. Maior	Mg	N	Open
Pinhal da Carneira	R. Maior	Mg	N	Open
Sancada	R. Maior	Mg	N	Open
Areeiro III	R. Maior	E	N	Open
Forno da Telha	R. Maior	Me	N	Open
Areeiro I	R. Maior	Mg	N	Open
Bocas, north	R. Maior	E, N	O	Open
Bocas, south	R. Maior	N	O	Open

Key: Period: M, Mousterian; A, Aurignacian; G, Gravettian; S, Solutrean; Mg, Magdalenian; E, Epipaleolithic; Me, Mesolithic; N, Neolithic.

N refers to sites located by the recent survey and O refers to sites found by Heleno. N/O refers to Heleno's sites which were relocated and found to have intact materials. Z refers to sites located or excavated by Zilhão prior to the inception of this project.

Figure 4. Profile of the east wall at Cabeço de Porto Marinho III, showing three occupation levels: 1) a late Magdalenian camp; 2) a late Gravettian camp; 3) a late Gravettian workshop. Profile height is 2.05 m.

confirms the abundance of Paleolithic sites in the Ribeira da Pá Valley, a small branch of the Rio Maior, as well as in the Rio Maior Valley itself (FIG. 2). A total of 45 separate occupations has been confirmed from our survey and the previous work of Heleno. Of those found by the survey, 18 are from the site complex of CPM alone. Of the recently located sites, three are later to post-Neolithic occupations, one early Neolithic, 12 that can be classified as Magdalenian, eight as Gravettian, one as Solutrean, and one as Aurignacian (TABLE 1). The technocomplex to which two others belong has not yet been determined.

Only a very few Middle Paleolithic artifacts have been seen in the survey area, but one possible site, Ponte Alta, has been located in the valley (FIG. 2). The rare occurrence of individual Middle Paleolithic artifacts, as well as sites, may be correlated with poor exposures and poor preservation of appropriate sediments, linked to the apparent post-Mousterian denudation of the surrounding hill slopes.

Only a single, seemingly very late Solutrean occupation, Olival da Carneira, has been uncovered near Carneira (FIG. 2). The paucity of Solutrean sites in the Rio Maior area is not readily explained by the Quaternary geology of the area. Alluvium in which the Aurignacian site of Gato Preto occurs can be mapped along terrace exposures. In places, this terrace is buried by extensive late Pleistocene eolian, colluvial,[1] or fluvial sands. Thus, Aurignacian or Mousterian sites may be difficult to detect. Yet sites in primary context, both older (Gravettian) and younger (Magdalenian) than the Solutrean have been located in these late Pleistocene sediments (FIG. 4). At present, therefore, Solutrean site distributions appear to have been constrained by factors different from those related to temporally adjacent cultures.

Given the presence of confirmed Solutrean occupations both a few kilometers west of the valley on a ridge at Vale Comprido (Zilhão 1988a), and somewhat further east of the valley (FIG. 1), at Olival do Arneiro and Passal (Zbyszewski et al. 1977)—all situated with immediate access to high-grade flint deposits—one explanation for the paucity of Solutrean sites in the valley might lie in a Solutrean preference for placing camps at localities adjacent to raw materials, as opposed to other resources, thus facilitating production of the characteristic bifacial foliates. This would fit well with the tendency at open Solutrean sites in Estremadura to include large numbers of such artifacts in various stages of manufacture (Zilhão 1984, 1986, 1987a, 1990). On the other hand, based on data from cave excavations, perhaps Solutrean sites were extensively affected by post-occupational erosion.

Farther to the east, outside the Rio Maior area, survey has been both less intensive and less successful. Santa Cita, an open-air Middle Paleolithic site, was located by Ferring in a ca. 7 m terrace of the Rio Nabão some 7 km south of Tomar (FIG. 1). Estrada do Prado, another open-air Middle Paleolithic site, was found at the northern edge of Tomar (FIG. 1). This site appears to be in an older alluvium, but geologic investigations have not yet been carried out.

In the upper Almonda River Valley, four occurrences of seemingly Upper Paleolithic materials were located as part of a survey undertaken by the Portuguese Park Authority, but testing at each failed to find any materials in situ. This area seems to have undergone considerable slope wash during the Holocene, minimizing the potential for locating preserved Late Pleistocene alluvial or colluvial sediments, a situation that may be common in most upper drainages in the region. Conversely, the lower chamber at

Almonda produced a small but unambiguous Solutrean assemblage (FIG. 1).

A single, Upper Paleolithic site, Fonte Santa, was located on the Ribeiro do Serradinho, a small tributary of the Almonda, just east of Torres Novas; and a Solutrean site, Casal do Cepo, has recently been located near the Tejo (FIG. 1). The former site is Gravettian of a type already known from Heleno's excavations at Casal do Felipe near Rio Maior (Zilhão in press a).

Thus, while intact Upper Pleistocene sites are present in the Nabão and Almonda valleys, and additional surveys will undoubtedly reveal more, site density near Torres Novas and Tomar now appears to be much lower than in and around the upper Rio Maior Valley.

Absolute Chronology

During the course of test excavations, materials were taken for radiocarbon, TL, and uranium series dating from as many contexts as possible. This is an ongoing process but a fair corpus of dates is now available.

The earliest dates are from two different galleries at Almonda Cave, both of which contain sediments with Mousterian artifacts. Artifacts associated with well-preserved faunal material have been recovered, and these include typical, ovoid Levallois flakes, as well as a few side-scrapers. Among the faunal material were a few equid teeth in sufficiently good condition to permit uranium series dating. The results indicate that one of the galleries may be placed ca. 70,000 b.p., while the other is considerably later, ca. 35,000 b.p. (McKinney, personal communication, 1991).

A series of TL samples was taken from the Aurignacian site of Gato Preto, two of which were statistically the same, averaging 38,100 ± 3900 b.p. (Bowman, personal communication, 1990). Given the normally high standard error for such ages, it indicates little not already known, although it would seem that the assemblage is likely to actually date at the more recent end of the two-sigma range; that is, somewhere around 30,000 b.p.

Although TL ages were acquired for younger sites as well, the vast majority also have radiocarbon ages, and it is these that are presented here (TABLE 2), since not all of the TL evaluations have been completed.

Two Gravettian occupations from CPM and one from Terra do Manuel have a total of six radiocarbon ages, five of which fall just after 23,500 b.p. and one at ca. 19,000 b.p., although the latter age is problematic (TABLE 2). The general consistency of these ages and the typological homogeneity of the associated assemblages suggest that the Gravettian sites so far dated belong to a single phase, characterized by backed and truncated bladelets, which is a common form in the late Gravettian of SW Europe (Zilhão in press b). The question of an earlier local Gravettian is, as yet, unresolved, although two Gravettian sites, Vale Comprido 5 and Vale Comprido barraca, have dif-

Table 2. Radiocarbon dates from the Rio Maior Area by site, occupation, and industry.

Site	*Occupation*	*Date BP*	*Lab. No.*	*Period*
CPM IIIs	upper	5,710±155	SMU-2477	Epi-Cardial
Areeiro III	1	8,570±130	ICEN-546	Epipaleolithic
Areeiro III	1	8,850±50	ICEN-494	Epipaleolithic
Areeiro III	2	8,380±90	ICEN-548	Epipaleolithic
Areeiro III	TVIb	8,860±80	ICEN-547	Epipaleolithic
CPM V	lower	9,100±160	ICEN-688	Epipaleolithic
CPM III, trench	middle	10,940±210	ICEN-690	Magdalenian
CPM III	upper	11,160±280	ICEN-545	Magdalenian
CPM I	upper	11,680±60	SMU-2011	Magdalenian
CPM IIIs	middle	11,810±110	ICEN-689	Magdalenian
CPM I	upper	12,220±110	ICEN-687	Magdalenian
CPM II	middle	15,410±195	SMU-2476	Magdalenian
CPM I	lower	15,820±400	ICEN-542	Magdalenian
CPM I	lower	16,340±420	SMU-2015	Magdalenian
CPM IIIs	lower	19,220±280	ICEN-691	?
CPM II	lower	19,030±440	ICEN-692	Gravettian
CPM III	lower	21,080±850	ICEN-541	Gravettian
Terra do Manuel	2S	21,770±210	ETH-6038	Gravettian
CPM III	lower	22,710±350	SMU-2475	Gravettian
CPM III	lower	23,050±750	ICEN-428	Gravettian
CPM III	middle	23,490±280	ICEN-423	Gravettian

ferent tool configurations, which may indicate that they belong to a different phase.

A large number of radiocarbon dates have been obtained from occupations that are Magdalenian or Epipaleolithic (TABLE 2). The oldest of these come from CPM I and II and indicate the presence of recognizable Magdalenian in Estremadura by ca. 16,000 b.p. Magdalenian occupations continue until ca. 11,500 b.p., after which a series of Epipaleolithic occupations have been found: the latest, Areeiro III, is firmly dated to ca. 8500 b.p. (TABLE 2). The hiatus within the Magdalenian dates is probably more apparent than real, since a number of stratigraphically intermediate occupations are just now being dated.

Lithic Industries

Since the major Upper Paleolithic "cultures" mentioned above represent, at best, technocomplexes that transcended "cultures" in the ethnographic sense (Clarke 1968: 330), a great deal of locally-generated technological and typological variability must be expected across the total geographic and temporal distribution of each. For instance, while the Gravettian, *sensu lato,* is recognized from Central Europe to Iberia, there is no assumption that the Portuguese Gravettian dated to 23,000 b.p. was a final manifestation of a direct, western migration of Gravettians out of Central Europe begun some 7000 years earlier (Otte 1990). Rather, it was more likely the result of a combination of diffusion from the rest of sw Europe and of local developments. This applies to all the recognized technocomplexes in Estremadura, aside from the Aurignacian, which must have been intrusive, since there is no evidence for a Mousterian/Aurignacian developmental transition in sw Europe.

As time and space differences lessen, however, there is often a tendency to suggest direct generic connections between industries that are either "contemporaneous" or geographically adjacent. While such concepts may be justified and are certainly hypotheses worth testing, the smaller the geographic area and the tighter the temporal grouping, the more likely that true historical relationships will be found.

In the case of the new materials from Portugal, the distances to other "contemporaneous" assemblages are considerable, even as the crow flies: ca. 550 km to Cantabrian Spain and almost 800 km to the Dordogne. Thus, direct comparisons with Cantabrian or French industries must be considered preliminary and of limited utility until the range of technological and typological variability for each industry in Portuguese Estremadura has been defined, and those elements of apparent local development separated from possibly intrusive ones. This, of course, will require a large number of sites and assemblages before a significant range of variability is even definable; at present, however, there are sufficient data available to present a preliminary picture of the various technocomplexes in Estremadura that have been sampled by our project.

Aurignacian

This is the least known technocomplex, there being only two confirmed assemblages: one from Heleno's excavations at Vale de Porcos (Zilhão 1988a) and that from Gato Preto. The latter site produced a small assemblage technologically dominated by the production of thick flakes (only 6 blades were recovered among more than 400 pieces of debitage). Retouched tools are mostly carinated and thick-nosed scrapers; but while some bladelets resulting from carinated tool production are present, none had been made into a Dufour bladelet—the small, twisted bladelets with inverse retouch characteristic of many Aurignacian assemblages. Other tools include small numbers of carinated burins, notched and/or denticulated flakes, and simple retouched pieces. Neither Aurignacian retouched pieces nor strangled pieces (with opposed concave notches) were found. In spite of being within a kilometer of a good source of flint cobbles, just under 20% of the tools and 65% of the cores were made on quartz or quartzite (Marks, Shokler, and Zilhão 1991).

The other Aurignacian assemblage, from Vale de Porcos, is a biased sample. Non-flint materials may have been discarded during excavation, and a considerable amount of debitage was thrown out after the assemblage was deposited in the National Museum. It appears, however, that all retouched tools were kept, and were studied by Zilhão (1988a). This tool assemblage is markedly different from that at Gato Preto; it is dominated by carinated and atypical busqued burins, with few carinated and thick scrapers. Like Gato Preto, however, it has almost no Aurignacian retouched blades or strangled pieces.

Given that neither site is closely dated, and that the assemblages are either quite small (Gato Preto produced only 98 retouched tools) or somewhat selective, it is not likely that more can be said about these relative to the wider Aurignacian technocomplex than that Vale de Porcos is probably late (Zilhão 1988a), and that Gato Preto may represent no more than a functionally specific locus of almost any period within the Aurignacian. Given the extreme distance of Estremadura relative to the westward spread of the Aurignacian out of Central Europe (Harrold 1989), it is likely that Gato Preto, too, is temporally late.

Gravettian

To date, the survey has shown that Gravettian sites are among the most numerous of any period. Although some of these are still under excavation, and the full ranges of temporal, technological, and typological variability remain unknown, it has been possible to postulate three groups of Gravettian assemblages which may represent either facies, phases, or a combination of both (Zilhão in press b). Apart from the perceived variability, all these Gravettian assemblages share a tendency toward blade/bladelet production, a clear (if not always marked) backed tool element, and an absence of any bifacial flaking technology. At the same time, the presently-known Gravettian assemblages lack Font Robert points and Raysse burins, and only a few Noailles burins have been found (Zilhão in press b), all of which are important in various facies of the French late Gravettian (Rigaud 1988).

The first group of Gravettian assemblages comes from occupations at Terra do Manuel, the lower level of CPM II, and the middle and lower levels of CPM III. Each of these has been radiometrically dated to somewhat after 23,000 b.p., aligning them temporally with the late Gravettian of Iberia (Straus 1990). This group is characterized by a good blade/bladelet technology, in which bladelets dominate. Quartz, rock crystal, and quartzite cores and tools are common (Marks, Shokler, and Zilhão 1991). Typologically, scrapers are much more numerous than burins, and the backed elements are dominated by simple and truncated backed bladelets. These traits are quite consistent with the late Gravettian of sw Europe (Otte 1990).

The second group of assemblages, homogeneous technologically but not typologically, consists of those from Casal do Felipe and Fonte Santa (Zilhão in press b). The assemblages from Tocas and Picos are technologically very similar but, since both sites have only been tested, the samples are still small. None of these sites has been dated and, therefore, this group's position relative to the first is unknown, either absolutely or relatively. Technologically, all assemblages are characterized by an extremely fine blade/bladelet technology, rather evenly balanced between bladelets and small, slender blades. Both typically have lipped or punctiform platforms with fine abrasion and diffuse bulbs of percussion, and there is no true distinction between the "blades" and "bladelets" in terms of size range. Unlike the first group, non-flint materials were rarely used for either core reduction or in tool production.

Typologically, Casal do Felipe and Fonte Santa are dominated by blade/bladelets which are usually symmetrically pointed by semi-steep to steep retouch. Only a very few of these show basal modification, and true backing is rare, not only on these pointed blade/bladelets but also on other tools. Simple scrapers are common, while burins are extremely rare. The second group of assemblages, those from Tocas and Picos, lacks the pointed blade/bladelets and, judging from admittedly small samples, is characterized by burins on truncations made on very slender, fine blade/bladelets with only a few endscrapers in association. Although much more needs to be done at these sites, it is possible that they represent functionally specific loci and, therefore, a settlement system based on differential seasonal and/or microenvironmental exploitation. Given that Casal do Felipe and Fonte Santa are at opposite ends of the project area, it is possible that they indicate a reasonably large area of exploitation.

The third group consists of the assemblages from Vale Comprido 5 and Vale Comprido barraca. Technologically, it is quite distinct from Casal do Felipe and Fonte Santa. Blades exhibit almost no platform abrasion that removes overhang and irregularities from the striking platform and, in doing so, facilitates the production of thin blades and bladelets. Its absence here is consistent with the production of large blades with sizable platforms. Typologically, burins on truncation (FIG. 5: 1, 2) are most common, far outnumbering flake scrapers (FIG. 5: 3), dihedral burins (FIG. 5: 4), backed or truncated tools (FIG. 5: 5), endscrapers on blades (FIG. 5: 6), and even multiple burins on truncations (FIG. 5: 7). Since both of these sites are at sources of flint, it is not surprising that other raw materials were seldom used. Again, the dating of these assemblages is not fixed, although a single TL age from Vale Comprido 5 provided a temporal range, at two sigmas, from 23,500 b.p. to 32,300 b.p. (Bowman, personal communication, 1991). Although this hardly pins down its age, it might suggest that this group is older than the first group, dated to after 23,000 b.p. An additional two sites are even less easy to deal with. One, Estrada da Azinheira, may be the largest Gravettian site in the Rio Maior area, covering an area of about 1600 sq m, but recent burning of the surface has heavily damaged the vast majority of artifacts. The other site, Ponto 104, appears to be a primary quarry and, while the technology is strongly Gravettian-like, the absence of retouched tools makes it difficult to characterize.

A single level from CPM IIIs, occurring stratigraphically between a Gravettian and a Magdalenian level, is producing an assemblage that is neither obviously Gravettian nor Solutrean but has been dated to just prior to 19,000 b.p. (TABLE 2). The tool assemblage is balanced between endscrapers and burins (both ca. 22%), has numerous notched pieces, denticulates, and retouched flakes but very few backed tools (3.8%). The scrapers are particularly striking in that over 70% are carinated or thick-

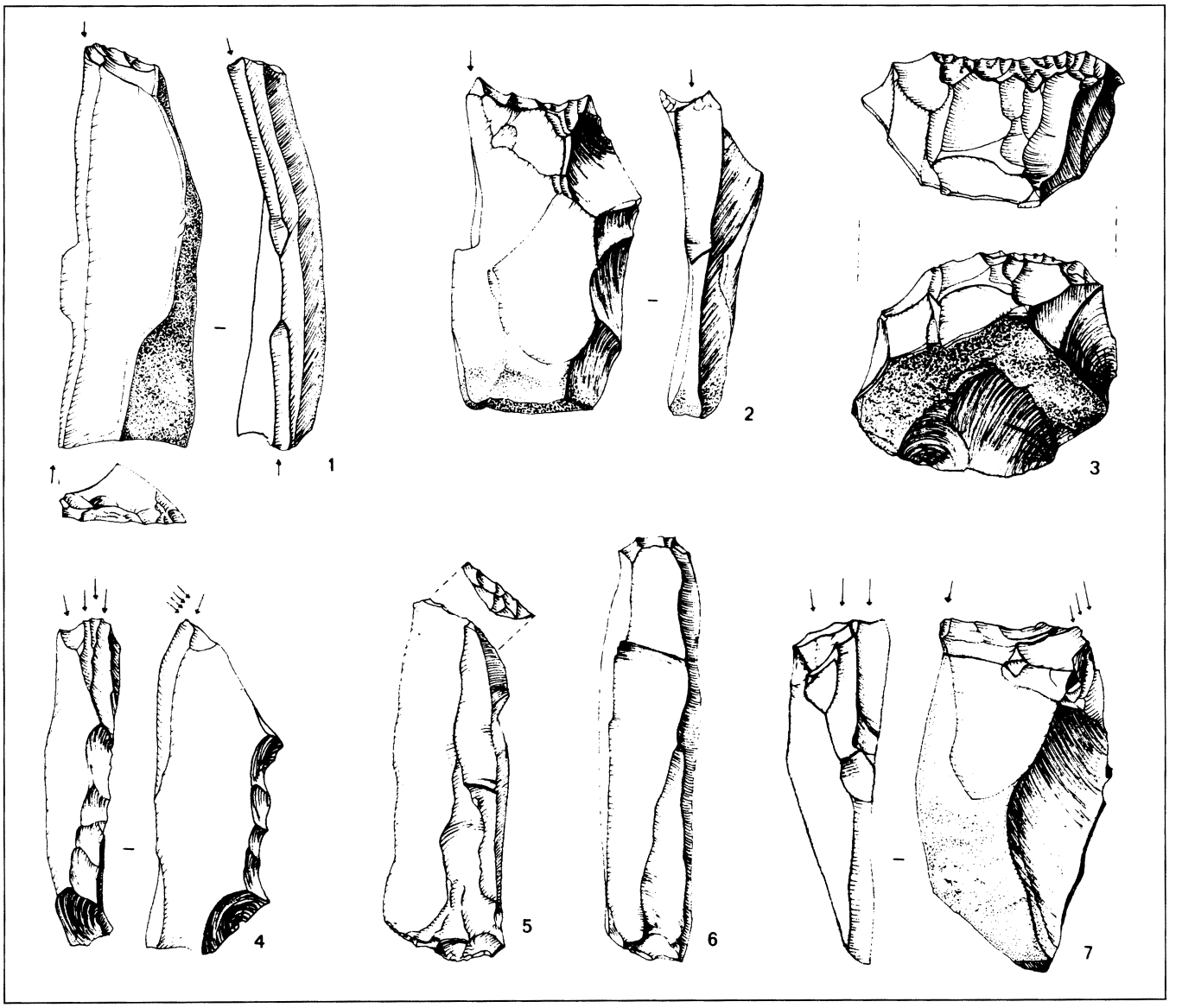


Figure 5. Artifacts from the Gravettian site of Vale Comprido: 1–2, 7) burins on retouched truncation; 3) atypical carinated scraper; 4) dihedral burin; 5) truncated blade; 6) endscraper on blade. Number 1 is 58 mm long.

nosed/shouldered and almost 40% are made on quartz or quartzite. While its affiliations are still unclear, this assemblage might be comparable to Aurignacian V in sw France (Rigaud 1988).

Magdalenian

As much as in any of the technocomplexes described above, there is considerable temporal, technological, and typological variability in the known assemblages. Again, a number of sites are in the process of excavation and their lithic assemblages have not yet been studied in detail, but some patterns are evident. Given the temporal range, from ca. 16,000 b.p. to 11,000 b.p., it is perhaps best to describe local Magdalenian variability chronologically.

The earliest Magdalenian is known only from the lower level of CPM I, and from the middle level of CPM II, both of which have been dated between ca. 16,000 b.p. and 15,500 b.p. (TABLE 2). The first assemblage, while still small, can be preliminarily characterized as having relatively few blade/bladelet tools, numbers of notched and denticulated flakes, more scrapers than burins, a fair number of backed microliths, and virtually no raclettes—those

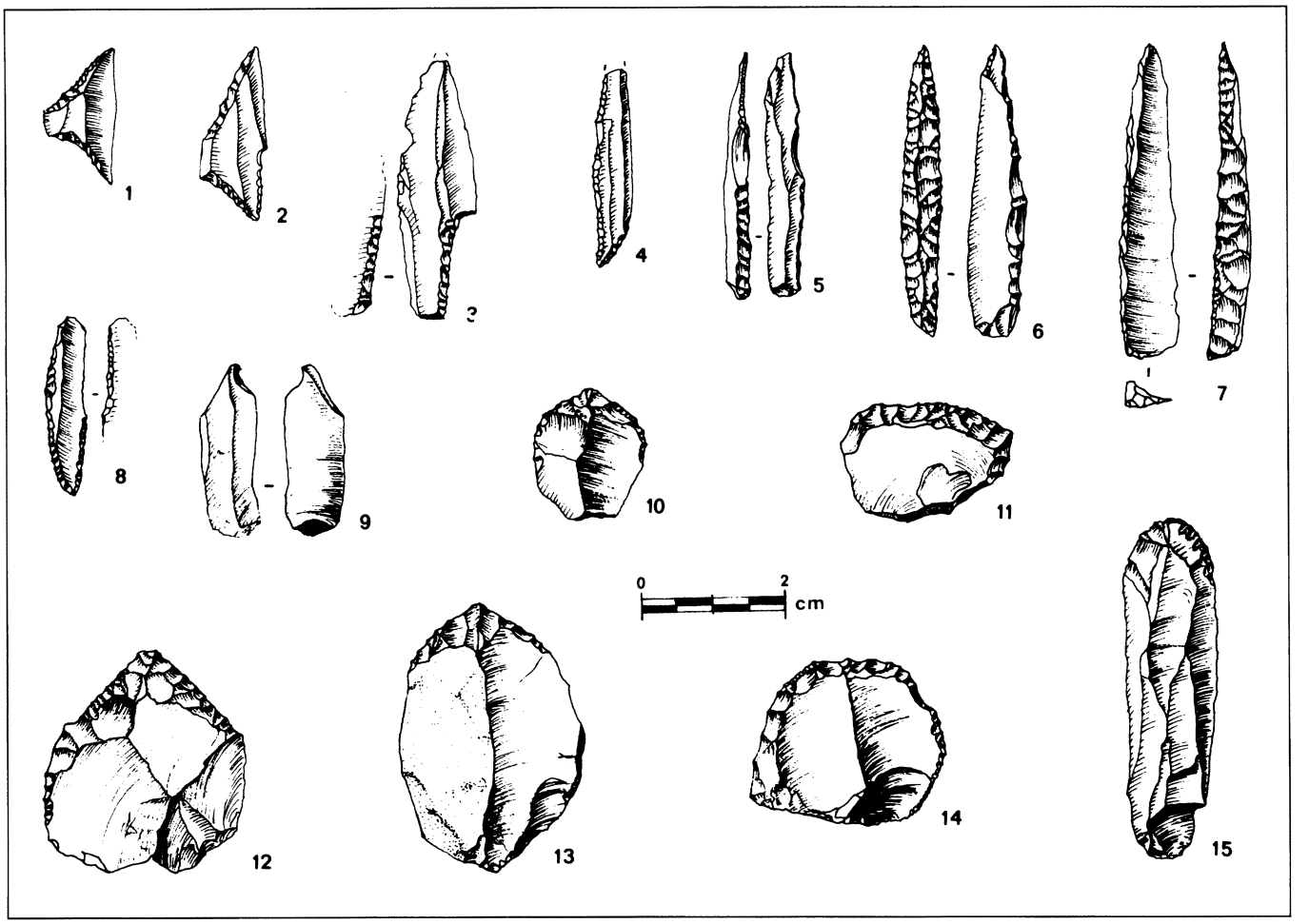


Figure 6. Artifacts from the primarily Magdalenian site of Carneira: 1–2) trapezes; 3) shouldered point from late Solutrean occupation; 4–8) various forms of backed bladelets; 9) microburin; 10, 12–13) ogival scrapers; 11, 14) thumbnail scrapers; 15) simple endscraper on blade.

thin, steeply retouched flakes that are so common in the early French Magdalenian (TABLE 3). While flint dominates the assemblage, quartz and quartzites are still common for both cores and less formal tools (Bicho in press a). Somewhat similar assemblages are now being recovered from two levels of CPM VI and one from CPM IIIs, as well as from the sites of Areeiro I and Sancada, indicating that local, early Magdalenian occupation was quite intensive and exhibits considerable typological diversity (TABLE 3).

Between 12,000 b.p. and 11,000 b.p., the assemblages from the upper level of CPM III, and the middle level of CPM IIIs, as well as others dated to this period, suggest some general changes from the earlier assemblages, although flake production remains dominant, with bladelet technology varying from assemblage to assemblage. While data are still preliminary (TABLE 3), the quantity of geometrics remains trivial (FIG. 6: 1–2); there appears to be a proportional increase in blade and bladelet tools within the assemblages (FIG. 6: 4–8); a minor microburin technique appears (FIG. 6: 9); and endscrapers (FIG. 6: 10–15) are almost three times as prevalent as burins. For the first time, thin-nosed and ogival forms are very numerous, if not dominant. Notched and denticulated tools are less common, while backed tools increase in importance (TABLE 3). In addition, the use of non-flint raw materials drops sharply (Marks, Shokler, and Zilhão 1991; Bicho in press b).

Given the temporal spread of the dated Magdalenian occupations, and the number of still undated assemblages, it is far from clear whether technological and typological variability is correlated mostly with time differences or with distinctive activity components. It is probable that variability reflects a complex interplay of several factors,

and only when most assemblages are dated and extensive area excavations are undertaken will it be possible to sort out what was actually involved, although an assemblage such as that from Pinhal da Carneira cannot be seriated with the others (TABLE 3), regardless of its age.

Compared with other areas of Western Europe, the known local Magdalenian lacks that facies of the French Magdalenian characterized by large numbers of raclettes (Bosselin and Djindjian 1988), as well as the long-blade-oriented technology of the northern French and German Magdalenian (Audouze 1987; Weniger 1989). In fact, one clearly local aspect of the Portuguese Magdalenian is the relative paucity of blade/bladelet tools (TABLE 3) and the great rarity of long, true blades, compared with industries from sites in the rest of SW Europe.

Epipaleolithic

The transition from the terminal Magdalenian/Azilian to the Epipaleolithic occurs sometime just after 10,000 b.p. in northern Iberia (Straus 1990). The earliest Epipaleolithic so far dated in Portugal is at CPM V, lower level (TABLE 2), which technologically looks rather Magdalenian, with a strong flake technology and with a typological pattern very similar to the later Magdalenian (TABLE 3). Perhaps the only real differences lie in an increase in the geometrics, which still are poorly represented overall, and in a marked increase in the proportional importance of bladelet and blade tools (TABLE 3). Among the latter, backed and truncated bladelets are numerous, and Sauveterre points, first seen in the late Magdalenian, are more common.

By ca. 8500 b.p. the local Epipaleolithic takes on a rather novel character. This is seen best at Areeiro III, a large site on the western slope of the valley (FIG. 2), where the assemblages are heavily dominated by the production of small, twisted bladelets resulting from carinated tool/core reduction. While carinated scrapers do play a role in all local, late Upper Paleolithic assemblages (TABLE 3), the percentage of them at Areeiro III approaches that from the Aurignacian site of Gato Preto. Unlike Gato Preto, however, there are also large numbers of Dufour bladelets, mainly produced on the twisted by-products of carinated tool/core production. Aside from these carinated elements, burins are moderately represented and are almost all of dihedral form. Denticulates and notched pieces are common, and backed bladelets and geometrics very rare (TABLE 3). Another site in the Rio Maior Valley, Forno da Telha (FIG. 2), located by Heleno, contains a variety of geometrics, suggesting a later date than Areeiro III.

Neolithic and Later

During the last two field seasons, four different ceramic occupations were uncovered: one each at CPM II, CPM IIIs, CPM V, and CPM VI. Only that from CPM IIIs has produced a sufficient sample up to this time to permit certain identification. Based on the ceramics (FIG. 7), as well as on a radiocarbon age of ca. 5700 b.p., the occupation is early Neolithic (Epi-Cardial). Although the full extent of the site is unknown, present evidence indicates an area of no less than 200 sq m, with sub-areas having fireplaces, daub concentrations, and secondary (redeposited) trash disposal. While this is neither the earliest Portuguese Neolithic known, nor the only open site known in the immediate area (Heleno found Neolithic sites on

Table 3. Magdalenian and Epipaleolithic assemblages: selected typological and technological indices (percentages of categories among all tools).

Indices	*CPM I lower*	*CPM VI lower*	*Pinhalda Carneira*	*CPM IIIs middle*	*CPM III upper*	*CPM V lower*	*AR III 1*	*AR III 2*
Endscraper	22.9	31.1	9.0	27.7	21.8	32.5	22.8	20.2
Carinated scrapers among all endscrapers	27.3	15.5	50.0	16.7	8.8	7.7	45.7	66.2
Burin	10.6	8.4	40.0	12.2	10.3	8.8	22.3	10.0
Notch/denticulate	27.1	33.3	14.0	20.9	20.7	18.8	25.7	30.0
Backed tool	11.5	3.0	13.5	16.8	16.5	21.3	3.7	6.0
Geometric	0.5	0.1	0.0	0.3	1.9	3.1	0.1	–
Blade/bladelet tool	15.1	8.4	23.5	25.6	23.8	31.9	6.9	18.5
Sample Size	192	167	200	368	261	160	202	351

CPM I (lower), CPM VI (lower), Pinhal da Carneira, CPM IIIs (middle), and CPM III (upper) are all Magdalenian. CPM V (lower), Areeiro III (1), and Areeiro III (2) are Epipaleolithic. All the indices are based upon preliminary typologies and samples acquired through the 1990 field season, except for CPM VI (lower) which was sampled in 1991.

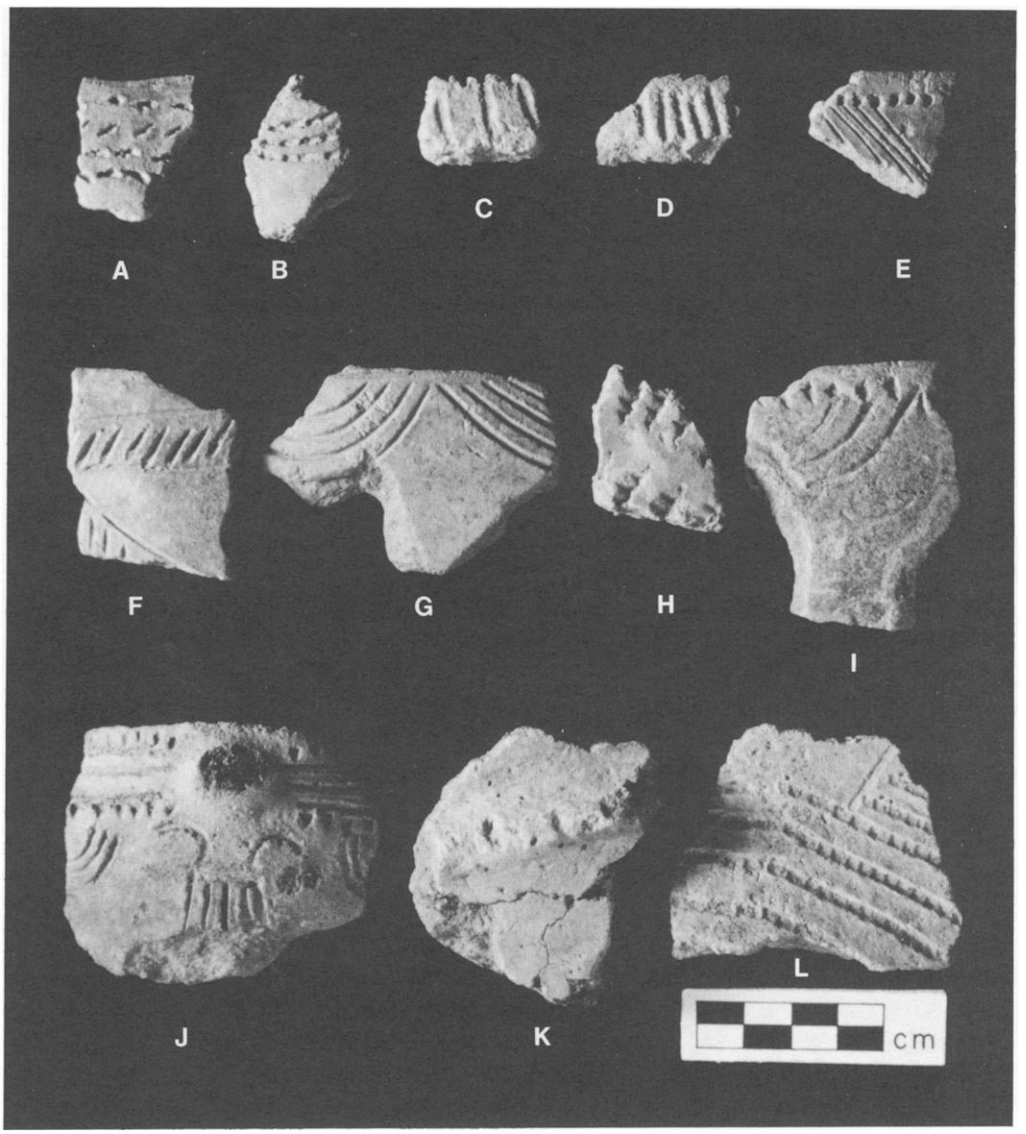


Figure 7. Epi-Cardial and later ceramics from Cabeço de Porto Marinho IIIs, upper level: A–B, L) non-Cardial impressed; C–D) incised and roughly milled rim sherds; E–G, I–J) incised; H) typical Cardial impressed sherd; K) lug handle with impressions.

either side of the Rio Maior Valley at Bocas: FIG. 2), such sites are still rare. Fine charcoal preservation indicates that carbonized seeds may be present in the Neolithic level at CPM IIIs.

The other ceramic occupations at CPM appear to be late, judging from the mainly undecorated sherds; and, while no dates are yet available, charcoal samples are abundant. Of particular note is that the component at CPM VI has numerous sickle blades with developed sheen, which are rare in the Neolithic deposits at CPM and might suggest a shift in the importance of cultivated cereals after the Neolithic.

Conclusions

The fieldwork undertaken in Portuguese Estremadura since 1989 has established that the area, and particularly that around the upper Rio Maior Valley, is extremely rich in open Upper Paleolithic sites. While Epipaleolithic and Neolithic open sites are less common, they are nonetheless present in some number.

Although Portuguese Estremadura lies on the extreme western periphery of Europe, separated from the "classic" centers of Upper Pleistocene development of Cantabrian Spain and sw France by both significant distance and

rough terrain, the vast majority of Upper Paleolithic sites so far known fit comfortably within the major technocomplexes defined for those areas. On the other hand, there are some indications that there were, in fact, some peculiarly local developments, such as the Gravettian facies of Fonte Santa and Casal do Felipe and the Epipaleolithic at Areeiro III. Additional sites, radiometric dates, and a larger geographic coverage within Estremadura will all help to clarify relationships with the more "typical" Upper Paleolithic of Western Europe.

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