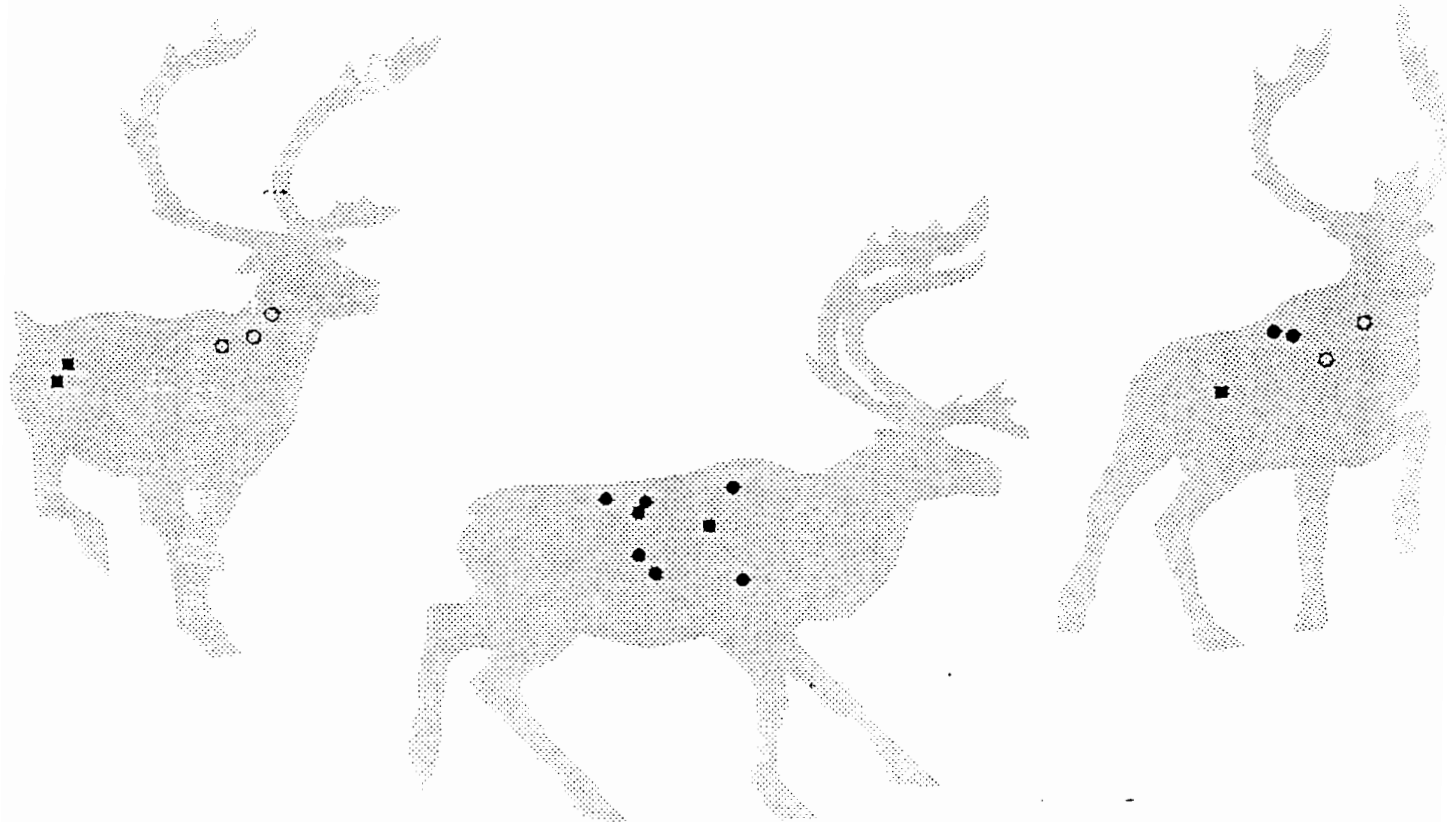


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The Late Glacial in  
north-west Europe:  
human adaptation and  
environmental change at  
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## 8 Subsistence strategies and economy in the Magdalenian of the Paris Basin, France

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### Abstract

Reindeer hunters' settlements of the Paris Basin are studied in the light of the distinction drawn by L R Binford between 'logistical collecting' and 'foraging' as hunter-gatherer subsistence strategies. Particular reference is made to the sites of Pincevent and Verberie. The settlements themselves, in their location and layout, as well as in the artefacts found there, offer evidence relating to the hunting strategies that were used. The authors also consider various kinds of archaeological evidence relating to the processing of the hunted reindeer. Other resources important to the Magdalenian population are briefly studied, notably flint and shells, which were obtained locally.

### Introduction

As flint procurement strategy and transformation and use processes in the Magdalenian of the Paris Basin (MPB) have already been discussed at the recent Liège and Chancelade symposia, this paper will be mostly dedicated to hunting and food consumption strategies with some consideration of their relations with other procurement strategies.

For years, faunal assemblages were considered as being informative only of the last stages of food consumption. It is only recently, with the developments made in taphonomy and ethnoarchaeology, that it became clear that they also reflect the earlier stages of procurement strategies. All stages from hunting to food preparation are linked as parts of a *chaîne opératoire* chosen according to the external conditions and the goals looked for. Reconstructing some of these *chaînes opératoires* may be achieved by applying appropriate ethnoarchaeological models to the data.

### A model for studying reindeer hunting

Reindeer is the major game species in the MPB, illustrating once again the name given to the Magdalenian in the earliest days of prehistory *l'Age du Renne*. This species, which plays an important role in the Magdalenian economy, provides us with a special window on the organisation of prehistoric subsistence economy.

Binford (1980) proposes a very useful heuristic approach for studying the organisation of hunter/gatherer subsistence, stressing the contrast between foraging and logistical collecting. The

former is characterised by high residential mobility, encounter hunting and immediate consumption, while the latter is characterised by lower residential mobility, planned hunts of larger numbers of animals, and storage for long-term consumption.

Reindeer (*Rangifer tarandus*) can be hunted in a variety of ways (Burch 1972; Spiess 1979). One is the opportunistic encounter of single animals or small groups on their summer or winter ranges, such as any other territorial game. Another is the mass kill of larger numbers of animals during the spring or autumn migrations. Thus the availability of reindeer as a resource for hunters depends on how they position themselves in the landscape relative to the migration pattern of the reindeer herds. Further, the economic organisation of subsistence for the acquisition, processing and consumption of meat will be largely determined by that landscape position. For example, a group of hunter/gatherers such as the Netsilik Eskimo (Balıkcı 1970) on the northern tundra has access to herds during the summer. At that time, the herds are broken down into small bull or cow/calf bands which are widely dispersed so that hunter/prey encounters tend to be opportunistic and unpredictable over time and space.

An appropriate strategy for increasing the probability of encounter is the dispersal of hunters in small bands and individual hunts over a large territory, precluding larger scale cooperative hunting. The likelihood that all hunters from a given camp would be simultaneously successful is small, so that successive reciprocity in game sharing provides a buffer against variable success rates. Further, the quantity of game brought into a camp at any one time should be relatively small, and meat can be consumed immediately. The same

Table 8.1

Sites	Location	Faunal Quantity	remains Diversity	Lithic production	Spatial organisation	Hearth shape
Etiolles	valley	scarce	diversified	blades	central hearth	flat
Marsangy N19	valley	scarce	diversified	blades	central hearth	flat
Marsangy	valley	scarce	diversified	tools	asymmetric	flat
Pincevent	valley	abundant	reindeer	tools	asymmetric	hollow
Verberie	valley	abundant	reindeer	tools	asymmetric	hollow
Ville-St-Jacques	plateau	abundant	diversified	tools	?	?

patterns of game availability, and of acquisition and consumption, should also characterise human groups occupying the winter range of *Rangifer*.

Migration is not necessarily a fixed behaviour, but is rather a function of reindeer population density, which varies cyclically like that of many species inhabiting climates of severe seasonality (eg lemmings). Under very low densities, the herd will stay in the core area year-round (Hemmings 1971; Skoog 1968). Here also, exploitation patterns should resemble foraging.

Under increasing population density, reindeer migration distance will increase proportionately (Hemmings 1975). It is specifically the phenomenon of migration that offers hunters the opportunity for an additional pattern of exploitation. With a potential large quantity of a resource available at a predictable time and place, a suitable labour force can be organised to take advantage of it. In the autumn in particular, the herd is at its nutritional and weight peak, and can supply substantial quantities of a high-quality, fat-rich, storable resource for over-wintering. This pattern of logistical collecting can be illustrated by the Nunamiut Eskimos (Gubser 1965; Binford 1978).

This model, like all models, is oversimplified. It stresses polar extremes between patterns of exploitation of the same resource. In reality, the ethnographic cases are more complex than the model, with the acquisition of numerous different resources dictating a more complicated organisation of subsistence economy. We should expect archaeological cases to exhibit similar sorts of complexity. The model serves only as a guide to investigate the organisational mix of subsistence activities.

### Variability among the types of settlements of the MPB

The variability among the types of settlements of the MPB illustrates the complexity referred to above. The variations are not only concerned with the hunted game, but also with the location of the

sites, the type of flint industry, and the spatial organisation when it is known. We may propose three categories of settlements in the MPB (Table 8.1).

- 1 Settlements located near the river, with low quantities of a diverse fauna, intense knapping activities, flat hearths, and a symmetrical spatial organisation. Etiolles is the most representative site of this type. Most of the occupation units have a central flat hearth. Large numbers of blades are produced around and close to the hearths (Taborin 1984; Pigeot 1987; Olive 1988; Julien *et al* 1988; Audouze *et al* 1988). One of the units from the site of Marsangy with a technical rather than domestic function also conforms to this pattern. However the two other occupation units have an asymmetrical configuration with an emphasis on tool production. The faunal remains (reindeer, horse and deer) are scarce (Schmider 1984).
- 2 Settlements located near the river, with numerous reindeer remains, a high proportion of flint tools, hollow (*creuse*) hearths, and asymmetrical spatial organisation. Both Pincevent and Verberie fit this definition. The main hearths are located outside a hut or a windbreak. They are hollow, with or without a stone lining. Lithic production focuses on tool manufacture, with most blades being immediately retouched or used (Julien *et al* 1988; Audouze *et al* 1988; Audouze 1987a). Thousands of reindeer bone fragments are scattered in the toss areas (Audouze 1988; Enloe & David 1989). With a spatial organisation conforming to this pattern but with a diversified and scarce fauna, the occupation units of Marsangy seem to be intermediate between this type and the previous one (Schmider 1984).
- 3 Settlements located on the edge of the plateau, rich in remains of a diversified game, and where flint tools are extremely abundant. This type of site is less well known. Sites on the plateau have been much more damaged by ploughing than the sites in the valley covered with silt.

Only one settlement fully enters this category: Ville-Saint-Jacques, known from a few trial trenches. Here, thousands of tools and a rich fauna, including reindeer and horse plus bear, polecat and wolf have been uncovered (Brézillon 1971; Valentin 1988; Degros *et al* in prep).

Though there is no indication about the fauna, there exists at least one other site located on the edge of the plateau which is characterised by the extreme abundance of tools: les Gros-Monts in the woods of Beaugard above the Loing Valley (Schmider 1971; 1982). The lack of information concerning the fauna and the spatial organisation of other sites prevents us from including them in one or the other of the categories.

If the model completely fits the data — and this remains to be proven — sites with diversified game can be considered as summer and winter sites, and those with numerous reindeers as autumn sites. It is possible to find some more variability, though of a lesser degree, between the two sites corresponding to the category dedicated to reindeer hunting (Pincevent & Verberie). This indicates an adaptation to different conditions and goals.

## Reindeer hunting

Clearly, reindeer hunting in the MPB can be referred to as logistical collecting. Remains of dozens of reindeer are found in the different settlement units at Pincevent as at Verberie. The MNI (Minimum Number of Individuals) is 43 for Section 36, and 12 for Habitation 1 at Pincevent. A provisional MNI for level 1 at Verberie is 24.

However, reindeer bones in quantity do not automatically reflect logistical collecting. This is evidenced at the site of Le Flageolet in the Dordogne (Rigaud 1982). In couche 5, an Upper Perigordian level, there is a predominance of reindeer in the fauna, which accounts for more than 95% of the identified specimens (Delpech 1975). Here the subsistence organisation seems to be more similar to that of foragers than to that of logistical collectors. Kills are distributed throughout the winter, when it would be difficult to find and kill a large number of reindeer at one time. The age distribution is dominated by prime adults, suggesting selection of individuals to be killed. At Le Flageolet although males are present, females appear to be more numerous, which is consistent with individual encounter hunting in the winter, due to their superior nutritional state after the rut. Element representation indicates a consumption location, with a heavy bias for meat and marrow utility. The removal of low utility (but usually well-preserved) parts from amongst parts of higher utility suggests deliberate body part selection or culling for transport. Cutmark locations are biased heavily in favour of skinning and disarticulation. There are no indications of planned logistical procurement in terms of hunting, processing or consumption. Although there is an

overwhelming predominance of a single species, that appears to be due to climatic factors controlling availability, rather than a planned mass kill of a target species (Enloe, in press).

Conversely, three features characterising reindeer hunting at Pincevent and Verberie, along with the great number of individuals killed, point toward a logistical hunting strategy: the season of the hunt, the proximity of the kill site(s), and the parts of the game brought back to camp.

The toothwear for the one and two year old individuals indicates that the kill took place during the autumn at both sites, within a few weeks and a little later at Verberie than at Pincevent. The large size of the kill and the season point towards a hunt related to the autumn migration (at least at Verberie) (David, in press).

Both camps are presumably located a short distance from the kill sites, since all elements of the animals can be found at the campsites: vertebrae, phalanges and sternum are particularly good indicators of this. However, Pincevent and Verberie exhibit an important difference in the pattern of remains (see below): whereas at Verberie vertebrae are very common, there is a notable deficiency of them at Pincevent (9% of the amount one could expect from an MNI of 43 in section 36, and less than 1% for Habitation 1). In the latter case, we may infer that the primary butchering activity did not take place *in situ* but at a nearby kill site where the vertebrae had presumably been discarded.

The age distribution curve at Pincevent indicates a bias toward adults as compared to a natural population curve (cf Le Flageolet). At Verberie, this bias does not seem to exist or is less important since there are also remains of fawns in levels 1 and 3.

The contrast between Le Flageolet and the two MPB sites suggests the differences between foraging and logistical collecting. Two factors may be involved, seasonal and chronological.

## Reindeer processing

### *Butchering activities*

A model for reindeer butchering derived from his studies on the Nunamiut has been provided by L Binford (1983, 170) and applies very clearly to the Verberie settlement (Audouze 1987a). The butchering activity area is defined by a circular space occupied by the animal and the hunter moving around it for dismembering purposes, and by the pattern of discarded elements surrounding this area. In archaeological terms, this activity is characterised by an empty space surrounded by bones, corresponding to primary refuse (Binford 1983, 169–72, fig 109). Some empty circular areas, similar to but smaller than the Nunamiut ones, can be found mid- distance between the two hearths of Verberie (Audouze 1987b). They are surrounded by

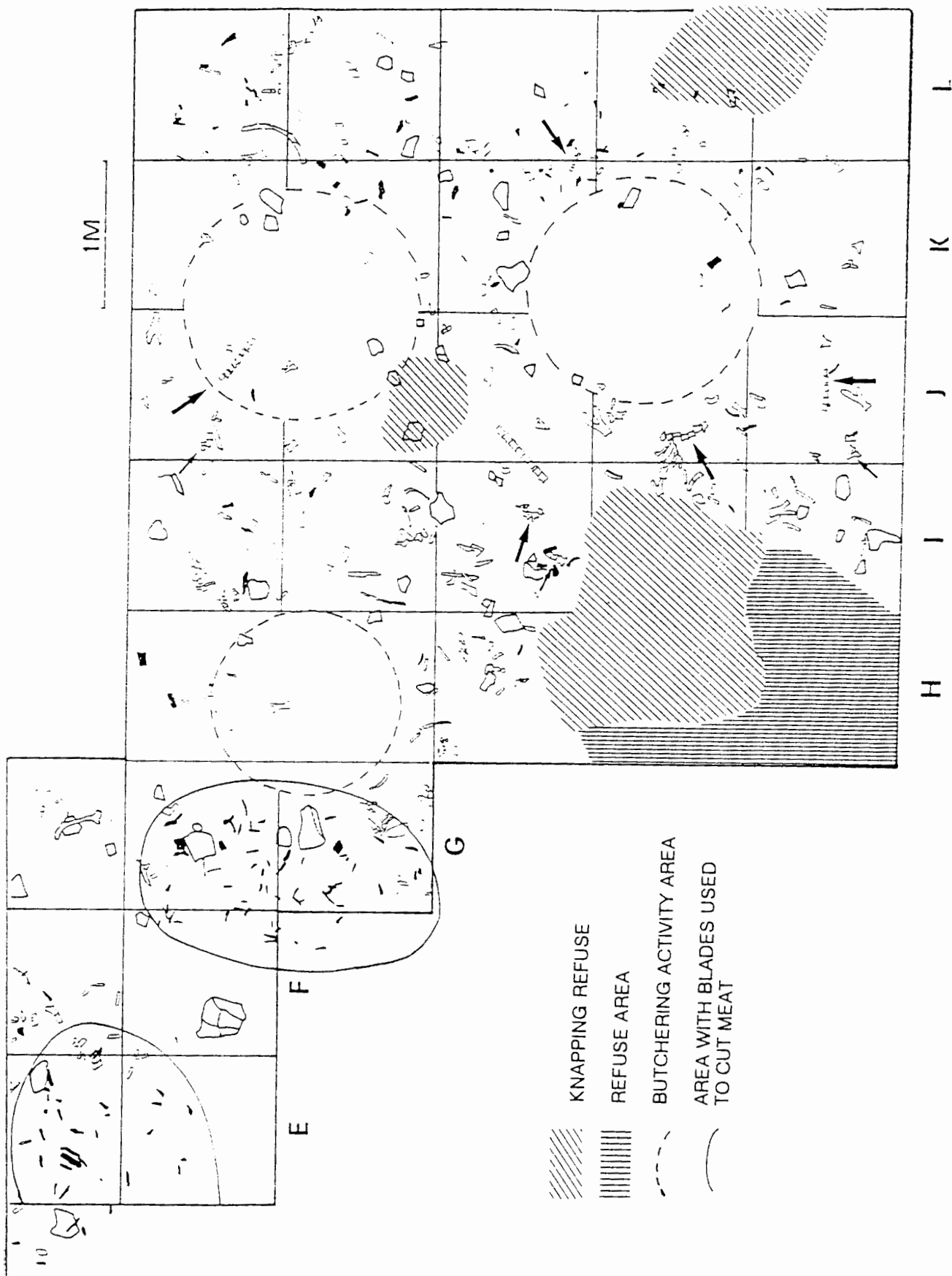


Figure 8.1 Butchering activity areas at Verberie. Empty circular spaces are surrounded by bones (mandible, ... sternum, coccyx, metacarpals and metatarsals).

characteristic faunal remains which were left on the spot because they are of little use in terms of either meat or marrow: articulated vertebrae, sternum and coccyx, tarsus and carpus. Other bones are removed to other parts of the camp or placed near the hearth depending on their meat value or marrow content (Fig 8.1). Such butchering areas have not been identified at Pincevent. Their absence is consistent with the lack of vertebrae and confirms the difference in strategy at Pincevent and Verberie.

In several cases at Verberie, ribs are broken close to their proximal end which is left in connection with the vertebrae. This technique finds parallels among the Nunamiut where ribs are removed in slabs (Binford 1978, 54–60; 1983, 142–7).

#### *Uses: consumption of meat and marrow*

At Pincevent, element representation indicates local consumption, particularly of meat and marrow (special selection or culling for transport?) Most cutmark locations on the bones in both sites are biased in favour of skinning and disarticulation. Cutmarks at Pincevent also indicate meat removal.

The primary use made of reindeer was, of course, nutritional. The autumn hunts indicated by the dental eruption sequences at Pincevent and Verberie would be designed to exploit the prey in its best condition of the entire year. The summer forage would have fattened up the herd to its maximum annual weight, and even more importantly, to its highest fat content. Both meat and marrow are important for the diets of reindeer hunters. Speth and Spielmann's arguments (1983) about the desirability of fat in the diet are particularly pertinent for cold climate hunter/gatherers in the winter. The fat in marrow can supply twice as many calories per gram as protein can, and can allow efficient metabolism of the protein from meat. There are no whole bones in the faunal assemblages from Pincevent or Verberie. There are abundant impact fractures, systematically placed to open the medullary cavities for the extraction of marrow.

Meat consumption patterns appear to be more complex at Pincevent (Enloe & David 1989). Refitting of fragmented bones, of articulations, and of left-right bisymmetrical pairs can reconstruct portions of scattered individuals. Distribution of portions of individual carcasses indicate food sharing between domestic units. The right forelimb of one individual is associated with the debris from hearth V-105, while the left forelimb is associated with that of hearth T-112 (Fig 8.2a). Eight other individuals were also shared between these two hearths. Examination of the distribution of left and right pairs of hindlimb elements emphasises the amount of interaction between V-105 and T-112, but also includes hearth L-115 in limited interaction

with both of them (Fig 8.2b). Distribution of metacarpal pairs gives an even clearer insight into the complexity of food sharing. While the upper portions of forelimbs which could be matched generally indicate partitioning or sharing of carcasses, the non-meaty lower portions of the forelimbs can be generally paired together beside the same hearth, suggesting that meat rather than marrow was moving between domestic units (Fig 8.2c). As Gubser (1965, 82) noted for the Nunamiut, 'A gift should be a good piece of meat, with fat on it if possible'.

#### *Preservation for storage*

Although no cache has yet been found, some data about the reindeer ribs may indicate storage processing. In both sites there exists a very marked deficiency in ribs against the MNI. However, at Verberie, the proximal ends of rib bones are comparatively numerous in the assemblage (around 30% of the preserved ribs), indicating that distal ends may have been deliberately taken away (unless they were completely destroyed). This fact, taken with the abundance of cutmarks left by meat removal, may be an indication of the processing of meat for storage (Fig 8.3).

#### *Other uses*

Reindeer not only provides meat and fat but also bones and hide which are intensively used for tools, ornaments, clothing and the construction of dwellings. Hide working is evidenced through microwear analysis (Keeley 1983, and in Audouze *et al* 1981; Plisson 1985; 1987; Symens 1986; Moss 1983). It is an important activity at Pincevent performed on both fresh and dry hide with a wide variety of tools (Plisson 1985), but is less notable at Verberie where Keeley found more traces of use on fresh hide than dry hide (perhaps indicating the first stages of the process).

Antler and bone working are known by the presence of some working debris: baguette (splinter) extraction from antlers, broken sagaies and needles. We also have some evidence of bone-working and hafting through microwear analysis (Keeley 1987).

#### **Other nutritional resources**

Though hunter-gatherers may rely solely on meat resources for short periods, they usually use complementary resources which provide other nutritional components. The lack of palaeobotanical remains deprive us of any indication on plant-food collecting. The only indirect data come from microwear analysis, which shows that less than 4% of the Verberie tools have been used for working

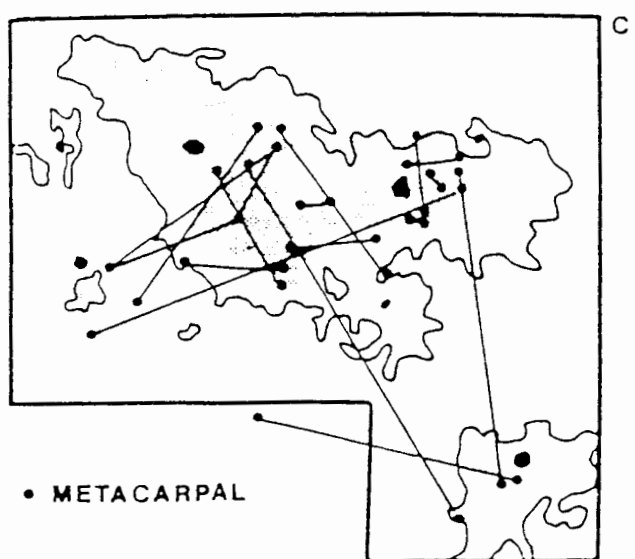
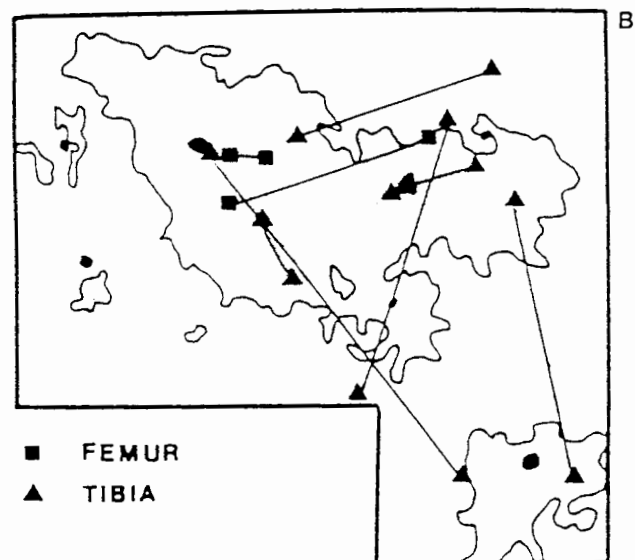
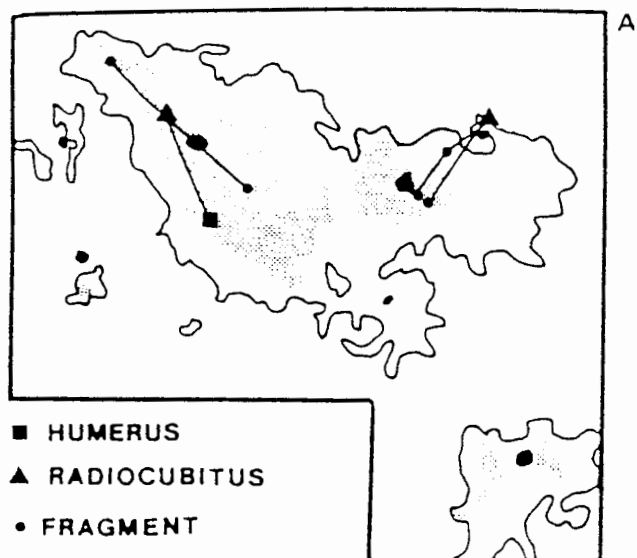
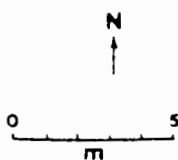


Figure 8.2 Food sharing at Pincevent: A) the right forelimb of a reindeer individual is associated with the debris of hearth V-105, while the left forelimb is associated with that of hearth T-112; B) left and right pairs of hindlimb elements are shared between hearths V-105 and T-112 but also, to a limited extent, with hearth L-115; C) the distribution of metacarpal pairs suggests another kind of distribution: the metacarpals are paired together beside the same hearth.

○ FINDS CONCENTRATION  
● HEARTH  
■ HIGH DENSITY

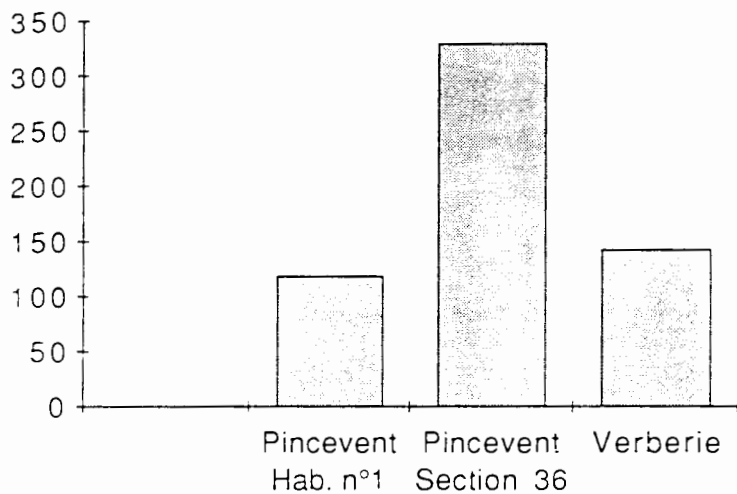


A

	n fragments	MNI	expected length in cm	observed length in cm	% observed / expected	proximal frag. / total
Pincevent Hab. n°1	120	12	1500		26,8	
Pincevent Section 36	331	43	4965		24,4	
Verberie	144	20	3000	636	20,2	36/144=25%

B

n fragments



C

observed / expected cumulative length of ribs in %

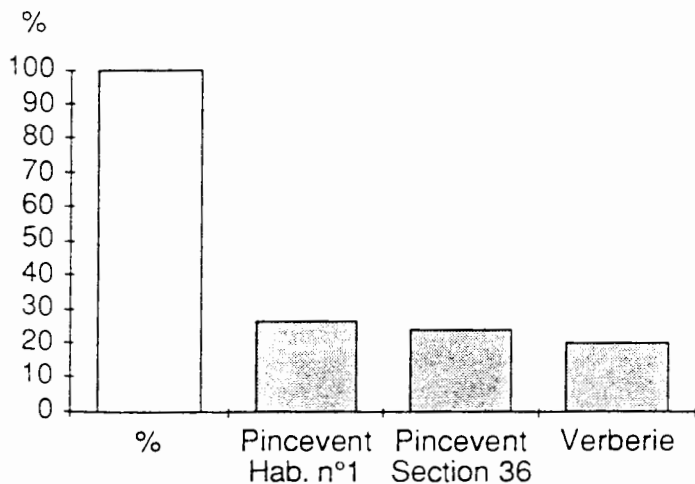


Figure 8.3 Comparative data on rib fragments from Pincevent (Habitation 1 and Section 36) and Verberie: A) MNI and observations on the expected and observed lengths of rib fragments; B) number of rib fragments. C) percentage of remaining ribs. The cumulative total is preferred to the number of fragments because it avoids the effects of fragmentation. Proximal fragments are scarce at Pincevent while they amount to 24% at Verberie.

wood or cutting plants. This is suggestive of an ancillary role for plant foods, but does not take into account the collecting of plants, grains or berries by hand.

At both sites preservation of bone is so good that we may infer from the absence of fish remains that no fishing took place.

Some rodent bones have been found at Pincevent and Verberie. A recent study by P Méniel has identified all Verberie rodent bones as belonging to a ground squirrel (*Spermophilus*). These faunal remains belong to six individuals in the upper level and seven individuals in level 2. This ground squirrel lives in large groups, is easy to hunt with sticks and provides excellent fat at the end of the summer. Its fur can also be used.

### Relations between hunting and the collection of other resources

Flint was, after food, an essential resource and its procurement was organised as an embedded strategy during reindeer hunting in the MPB. In the Paris Basin, chalk and limestone beds have been exposed by the cutting of river valleys, in which excellent to standard flint material can be recovered. Thus, valley bottoms have not only been chosen as favoured hunting grounds along the reindeer migration routes, but also as places for collecting flint material. The preferred locations are intersections between the migration trail and valleys rich in flint. The fact that Pincevent has only low quality local flint, although an excellent source exists within a 30 km radius of the site, indicates the priority given by the Magdalenians here was to hunting. The excellent quality of flint and the exceptional size of nodules at Etiolles, associated with a relative scarcity of game, indicates a reverse priority (Audouze *et al* 1988).

Though many resources, not all of them related to subsistence, must have been essential to the everyday and social life of the Magdalenians, the only other known resource consists of shells for pendants and beads. Most of them are local and all come from the Paris Basin (Y Taborin, pers comm, and in press). Thus the territory indicated by all known resources collected by the Magdalenians of the Paris Basin seems to be restricted to a rather limited area in the centre of the Paris Basin where excellent flint from the Cretaceous and Eocene beds is available in all valleys (Audouze in press).

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