Food for Thought: Late Magdalenian chronology and faunal exploitation in the north-western Ardennes.

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THE FAUNAL ASSEMBLAGE FROM THE TROU DES NUTONS, FURFOOZ

INTRODUCTION

This chapter will discuss the faunal assemblage from the Trou des Nutons at Furfooz. As at Chaleux, the faunal material discussed comes from a layer named by Édouard Dupont as the *1er niveau ossifère* and at least part of this is believed to date to the Lateglacial due to the presence of Late Upper Palaeolithic (Magdalenian) artefacts. It will be argued, however, that the assemblage also contains a significant component of more recent faunal elements, and that Lateglacial material forms only a small part of this collection. As with chapter 3, each species will be discussed individually, but the general information about animal behaviour and/or ecology will not be repeated where it has been given in chapter 3. This chapter starts with a summary of previous research at the Trou des Nutons, followed by a more detailed discussion of the faunal assemblage. The final part of the chapter compares this assemblage with the Dupont collection from Chaleux and suggests possibilities for further research.

BACKGROUND

The River Lesse runs through the small commune of Furfooz towards its confluence with the Meuse some 5 km downstream. This lower section of the Lesse is marked by steep Carboniferous limestone cliffs on either side, riddled with caves and fissures. Dupont began his research on the Palaeolithic archaeology of Belgium by excavating the Trou des Nutons (50° 12' 45" North, 4° 57' 29" East) during the Autumn of 1864 (Dupont 1865c, 7). This is a single chambered, large and high vaulted cave, which faces south and today lies within the confines of the Furfooz National Park. Lateglacial archaeological findspots are abundant in this region.

The Trou des Nutons and Trou du Frontal are only two of the many caves and fissures in the Furfooz outcrop (Figure 4.1). Some of these caves, such as the Trou du

Grand Duc are devoid of any archaeological traces, whilst others have been important foci for human activity at various points in the past. Collections of human bones from the Abri de la Tranchée, Trou qui Fume, Trou du Frontal and the Trou de la Machoire (Dupont 1865c; Van de Poel 1978) indicate the use of these sites for human burials during later prehistory. At the Trou du Frontal use as an ossuary has been dated to the Neolithic (GrN-10179 4430 ± 30 BP; OxA-4196 4430 ± 80 BP; chapters 2 & 5).

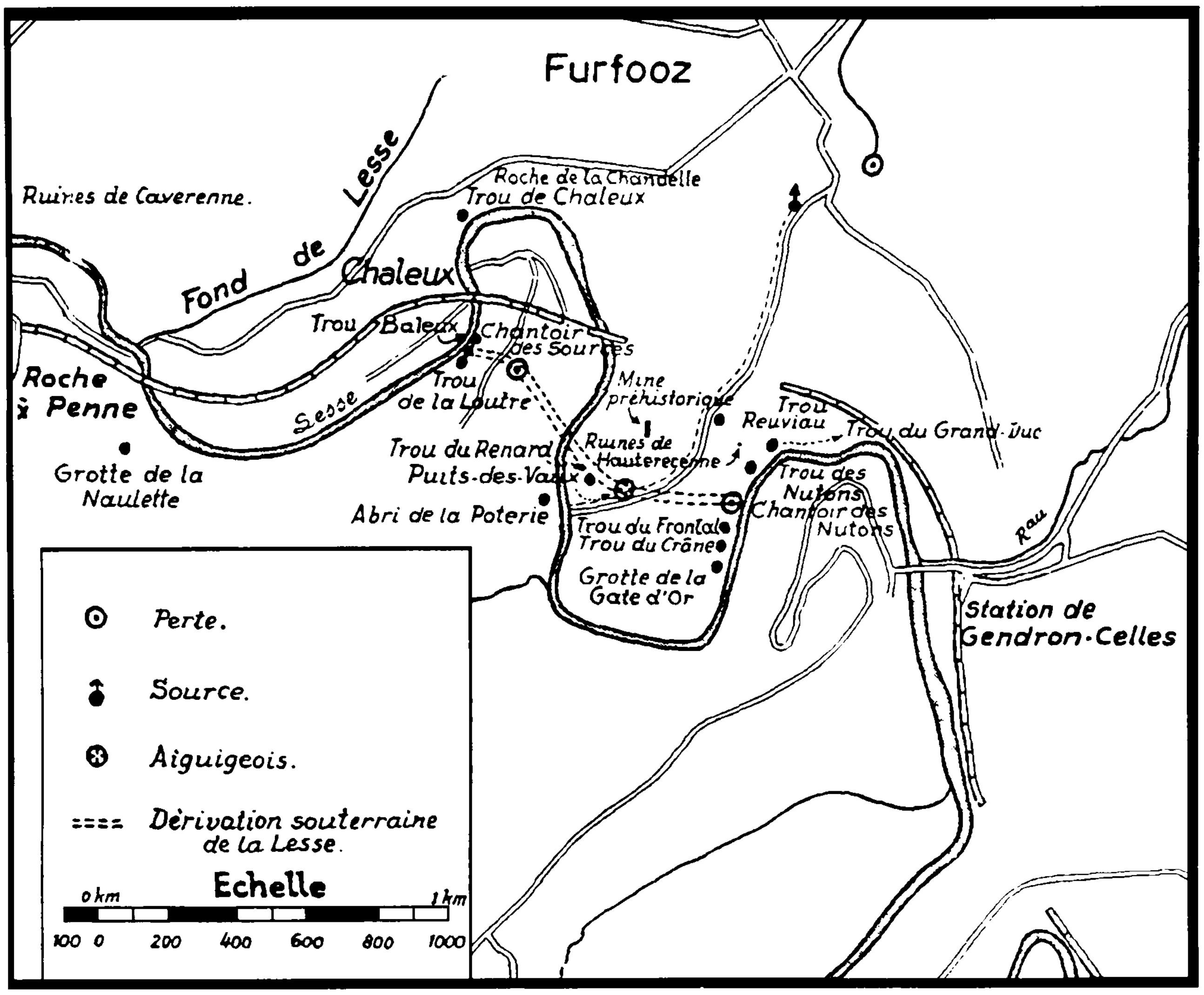

Figure 4.1: Location map of the caves at Furfooz and Chaleux. (after Van de Poel 1978).

Van Beneden, Dupont's collaborator, appears to have been the driving force behind the initial excavations at this site, although Dupont rapidly became the principal investigator. The initial presentation of work at Nutons was published under Van Beneden's name, with Dupont as co-author on one occassion (1864a & 1864b; Van Beneden & Dupont 1864). The archaeological and palaeontological collections from these excavations are held in the IRScNB in Brussels.

No notebooks or other form of site archive concerning the Trou des Nutons survive at the Institute. As was the case with Chaleux, if there were ever any notes relating to Dupont's (or indeed Van Beneden's) unpublished research on the collections, they are thought to have perished during the war years (A. Legube pers. comm.). The only indications of Dupont's thoughts on this material are once again preserved in the small labels which are kept alongside each bulk accession group. As with the Chaleux collection, the fauna was sorted by Dupont into species, and within each species sorted by anatomical element. Each bulk accession group is laid out on a folio sized plaster tray. In the case of the Trou des Nutons these are all dated *Novembre 1906*, and initialed by Dupont. The labels have been transcribed for reference in Appendix I.

It is unclear how complete recovery was of the faunal assemblage from the Trou des Nutons, or how subsequent preservation and conservation has effected the overall structure of the faunal collection. Unlike the Trou de Chaleux, no unidentifiable bone fragments could be found within the IRScNB stores. As the Trou des Nutons was the first site excavated during Dupont's explorations of the Belgian caves, it seems likely that his collecting policy for artefacts, fauna, etc. would have been determined during these formative few weeks. It is possible (although this is pure speculation) that, during this early work, he was not as meticulous as in subsequent excavation campaigns. Certainly the lack of any 'unidentifiable' material to species and/or element suggests that this particular collection may be a selective sample from the Trou des Nutons, rather than the apparently 'complete recovery' of the Chaleux excavation. It is also worth noting that a number of faunal specimens from the Trou des Nutons were misidentified, something which rarely arose with the fauna from Chaleux, also curated and studied by Dupont. As this was the first site excavated, it was perhaps also the first to undergo post-excavation study; Dupont may have been teaching himself the art of animal bone identification whilst working on this material and was consequently more prone to error than in subsequent years, although this cannot be conclusively demonstrated.

STRATIGRAPHY

Dupont (1865a, 837-838; Figure 4.2) observed a stratigraphic sequence at the Trou des Nutons from top to base as outlined below in italics, with my translations in plain text:

1. *Un épais dépôt d'argile jaune passant au loess à la partie supérieure. Ce dépôt renferme de nombreux fragments non roulés de calcaire, des morceaux de stalagmite et de stalagtite, etc. Il contenait aussi de nombreux ossements et débris de l'industrie humaine.* A thick deposit of yellow clay grading into loess in the uppermost parts. This deposit contains numerous unrolled limestone clasts, fragments of stalagmites and stalactites, etc. It also contained many bones and the remains of the human industry [archaeological assemblage].

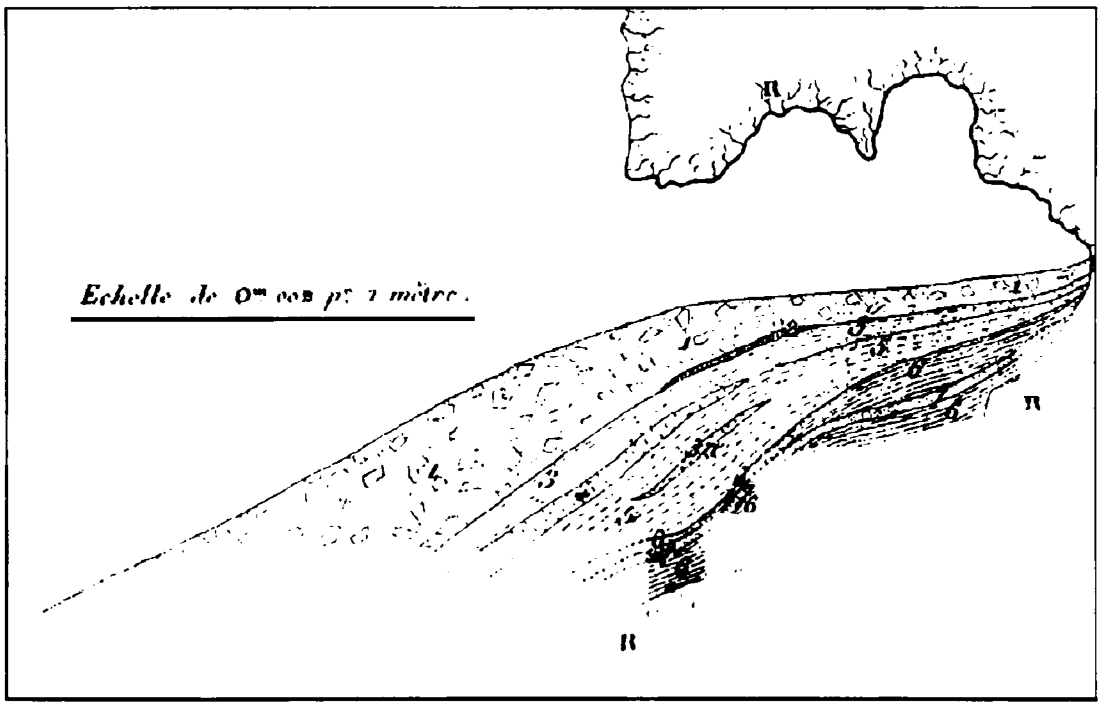

Figure 4.2: Section of the Trou des Nutons (after Dupont 1865a, planche II).

2. *Ces couches* [3-8] *étaient recouvertes sur une grande partie de leur étendue par une belle couche de stalagmite d'une complète homogénéité et d'une épaisseur moyenne de* 0^{m}, *30. Elle se formait sans doute pendant que l'homme du renne fabriquait ses silex dans le Trou de Chaleux.* These layers [3-8] were covered over a large part of their extent by a fine layer of stalagmite, which was completly homogenous and had an average thickness of 0.30 m. This was no doubt being formed whilst the Reindeer [Age] man

[Upper Palaeolithic inhabitants, see footnote 1 in chapter 3] was working his flints in the Trou de Chaleux.

3. *Argile jaune rougeâtre pure.* Pure clay, reddish-yellow in colour.
4. *Argile plastique grise (à l'entrée seulement).* Malleable grey clay, (only found at the entrance).
5. *Sables argileux bien stratifiés, contenant veines d'argile brunâtre, dont l'une offrait une couche de graviers comme à Chaleux. Ils ont présenté le débris d'un grand cerf.* Well stratified clayey sands, containing veins of brownish clay, one of which included a bed of gravel like that found at Chaleux. They yielded the remains of a large deer.
6. *Argile rouge sableuse stratifiée.* Stratified sandy red clay.
7. *Lit de sables stratifiés.* Bed of laminated sand.
8. *Argile rouge et jaune à râclure brillante.* Red and yellow clay, shiny when scraped.

The uppermost layer (1) is that from which the entire archaeological collection comes, and appears to be that subsequently termed the *1er niveau ossifère*, although no archival drawings were available to confirm this (unlike Chaleux - see chapter 3). The labels associated with this material, however, ascribe all material from the *1er niveau ossifère* as *âge du renne*.

There have been no subsequent excavations at the site, although during a visit to the cave, I observed a few areas which might contain remnant sediment up against the cave walls and limited further work in these areas might be worthwhile. The walls themselves were covered in moss, and I could not see any sediment or stalagmite adhering to these. Further excavations might go some way towards confirming the layer(s) from which the Lateglacial material originated within the stratigraphic sequence. As it is clear that later prehistoric/historic age material is also present within the collection attributed to the *1er niveau ossifère*, it is possible that Dupont's layer 1 could be further sub-divided.

ARCHAEOLOGY

The archaeological assemblage from the Trou des Nutons is by no means as rich as that from Chaleux. Dewez (1987, 191-193) describes a small assemblage (including debitage) of 157 pieces. Nevertheless the lithics, as well as the worked bone and antler, are unquestionably Magdalenian; they include characteristic backed bladelets, *becs*, bevelled based *sagaies*, and a reindeer antler with an engraving of a bison (Twiesselmann 1975). Incidentally, when turned through 180° this piece has more than a passing resemblance to a mammoth; see Dewez (1987, Figure 126; a tracing of which is given here as Figure 4.3).

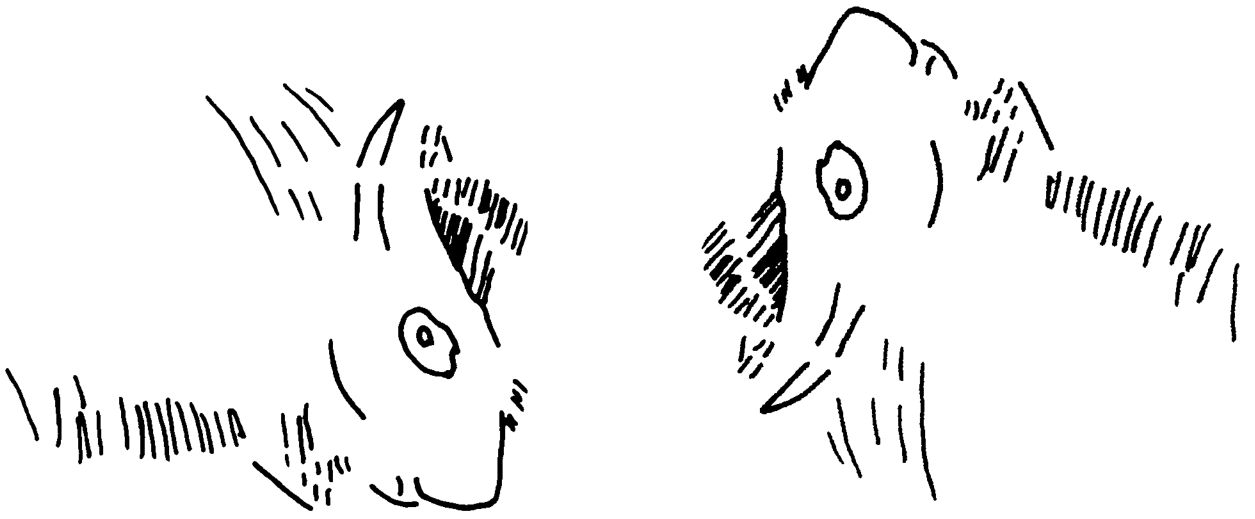

Figure 4.3: Engraved bison or mammoth from the Trou des Nutons - a palaeolithic joke ? (scale 3 : 2)

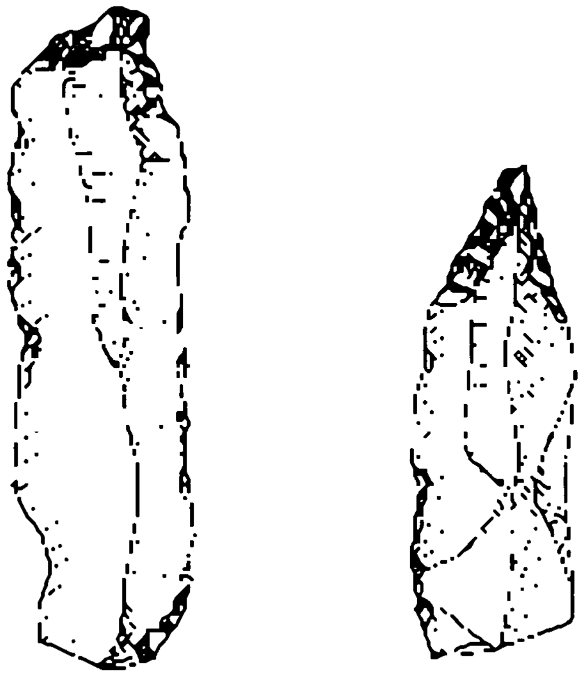

Figure 4.4: Supposed *zinken* illustrated by Dewez (1987, Figure 119).

Dewez (*op. cit.*, Figure 119) illustrates two flint artefacts which he terms *zinken*, reproduced here in Figure 4.4. The pieces in question do not however correspond fully with the description of true *zinken* given by J. Hahn in André Leroi-Gourhan's

Dictionnaire de la Préhistoire. The pronounced extremity defined by retouch does not, in either case, tend distinctly to one or other side. This distinctive lop-sidedness is an essential feature of *zinken.* Consequently neither of the Nutons pieces can be considered clear examples of this particular *fossile directeur,* although they would fit in well enough with the usual range of Magdalenian borers.

FAUNA

As Dewez observed (1987, 189), in combining all the species into the *1^er^ niveau ossifère*, rather than using a more precise stratigraphic control, Dupont mixed together Holocene and Pleistocene material. From the preceding description of the stratigraphy as observed by Dupont, it is clear that he was unable to subdivide his uppermost layer on stratigraphic grounds. Similarly, from Dupont's published accounts of the site (1865a, 1865c) it is apparent that this uppermost layer also contained pottery, arrowheads (it is unclear whether these were of stone or even metal) and bones of domestic goat (1865c, 9) alongside flints and fauna more characteristic of the Pleistocene (reindeer, elk, red deer, horse, aurochs and wolverine), although all of these species are also known to have occurred locally during the Holocene. It seems possible (and to my mind probable) that material of significantly different ages was not differentiated stratigraphically, because this was simply not possible using the geological and archaeological techniques available at the time. Even today in the Lesse valley, many caves have genuine Lateglacial archaeological and faunal assemblages mixed with later prehistoric and historic material within the same geological layer, and at a number of sites it has proved extremely difficult (and sometimes impossible) to differentiate the two on stratigraphic grounds (J-M. Leotard pers. comm.).

The composition of the faunal assemblage from the Trou des Nutons is far less varied than that from the Trou de Chaleux and the sometimes abundant presence of certain species e.g. *Capra* sp., *Sus scrofa*, *Capreolus capreolus* and *Meles meles* suggests that a significant part of this assemblage may be Holocene rather than Pleistocene in age. NISP and MNI counts alongside relative percentages derived from the NISP counts are given for each species in Table 4.1 below. Cut marks were noted in much lower proportion (3.51%)

to those from Chaleux (17.35%) and Dewez (1987, Figures 120 to 122) illustrates some of the cut bones as part of the worked bone collection.

Species	**NISP**	**MNI**	**% of ident. fauna**
Sus scrofa	457	30	21.11
Vulpes sp.	440	57	20.32
Rangifer tarandus	372	3	17.18
Ovis/Capra sp.	371	19	17.14
Bos sp.	176	8	08.13
Meles meles	74	7	03.42
Ursus arctos	63	2	02.91
Equus ferus	55	2	02.54
Lepus sp.	50	4	02.31
Cervus elaphus	42	2	01.94
Canis sp.	35	2	01.62
Felis sp.	14	3	00.65
Gulo gulo	6	2	00.28
Martes foina	6	2	00.28
Capreolus capreolus	2	1	00.09
Mustela sp.	2	1	00.09
Total	**2165**	▨	**100.01**

Table 4.1: NISP counts for all large mammal species from the Trou des Nutons, Furfooz.

Dating evidence

The radiocarbon dates from this site have already been discussed in some detail above (chapter 2). Briefly, there are a total of 3 radiocarbon dates from the Trou des Nutons. One of these is a conventional date taken from ‘cut bone splinters’ (Lv-1137 7720 ± 110 BP), although the precise contextual relationship between this sample and the Magdalenian archaeology which it purports to date is unclear. This date is clearly far more recent than expected from a late Magdalenian context and, given the apparent mixing of faunas of very different ages alongside the undocumented nature of the sample, cannot be regarded as a reliable date for a specific episode of human activity at the Trou des Nutons at any point in the past.

Further dating work was undertaken (using the AMS technique) during the course of this research, with the objectives of first pin-pointing Lateglacial human presence and secondly demonstrating that animal species of quite divergent ages were indeed present within the 1^{er} *niveau ossifère*. This was done by selecting two samples from this layer, one of which was believed to be Lateglacial, the other potentially much more recent. Both of these were bones showing distinct butchery traces (see Plates 2.2 & 2.3 above), to establish the link with human activity.

The first of these, a cut 2nd phalanx of *Equus ferus*, gave a date of 12630 ± 140 BP (OxA-4195). *Equus ferus* made up only a small proportion of the Nutons fauna (2.54%); however, this species represented over 60% of the Lateglacial fauna from the nearby Trou de Chaleux (chapter 3). The butchery marks on the specimen from the Trou des Nutons were closely similar to those observed on the *Equus ferus* phalanges from Chaleux, and given that a number of AMS dates on *Equus ferus* from the Trou de Chaleux had already given valuable information as the Lateglacial human presence in the Lesse valley, it seemed sensible to continue dating modified specimens of *Equus ferus* from potentially Lateglacial assemblages. The resulting date fell broadly in line with the dates obtained from Chaleux (and other Belgian Late Magdalenian findspots - see chapter 2); indeed these dates are within one Σ of each other, so that they are statistically inseparable.

The second, OxA-4194 2210 ± 80 BP, came from the modified navicular cuboid of a red deer. The date is clearly Iron Age/Roman, and gives a reliable indication of the age of at least some of the later prehistoric use of this site. Other later prehistoric dates from the Lesse valley, from supposedly Late Pleistocene contexts (see chapters 2 & 5), confirm that this region was occupied during much of later prehistory, although it is unclear whether human presence was continuous or not. There is no reason to suppose that later prehistoric use of the site was limited to the Iron Age/Roman period(s), but this cannot be conclusively demonstrated unless further radiocarbon work is undertaken on the collection.

Seasonality

The main attempt to date to obtain seasonality data from the Nutons assemblage is that by Aaron Stutz (1993). The problems associated with Stutz's work have already been discussed in detail in chapter 3, and are in the main part related to the inadvertent selection of faunal material which is likely to be Holocene rather than Pleistocene in age. The material studied by Stutz had already been transferred to Harvard by the time my study of the Nutons fauna commenced. Consequently I was not able to examine the specimens concerned directly.

Stutz's thesis identifies the material he studied from Nutons as 15 caprid teeth (13 adult and 2 juvenile), 4 reindeer molars and a lower P3 of red deer (Stutz's identifications have been included within the faunal tables presented in this chapter for the sake of completeness, although no detailed comments can be made about any of these, as they have not been directly observed). The resulting seasonality study of incremental banding in these teeth suggested that the caprids died throughout the winter, spring and summer; the reindeer suggested winter/early spring as well as summer exploitation; the red deer had died during the winter. However, it is very hard to demonstrate any direct link between the material Stutz studied, and the Lateglacial human occupation of the site (*cf.* chapter 3). Whilst the reindeer might indeed date to the Lateglacial, any direct contextual link between the specimens studied by Stutz and human activity has yet to be demonstrated. As for the caprids and the red deer, there is no clear evidence that these were even of Lateglacial age, and Stutz himself is no longer convinced that the caprids are *Capra ibex* rather than domestic goat (chapter 3).

Gordon (1988, 88) comments in passing that "150 cast bull [reindeer] antlers at Trou des Nouton [*sic*] (Furfooz) suggest fall hunts of a returning herd." This comment can only refer to the reindeer antler and antler fragments held in the IRScNB stores in Brussels. It may well be that adult male reindeer were present in and around the Lesse valley during part of the autumn during Dryas I and/or the Bölling Interstadial phase of the Lateglacial, the claim that 150 cast 'bull' antlers of reindeer constitute evidence for hunting *per se* seems rather doubtful. Only three possible cut and/or worked bones of reindeer were recorded from the Trou des Nutons, one of which was an antler fragment. In this particular instance the cut marks on the antler were dubious (see below) and are cuts rather than the remains of groove & splinter technique. Whether the antler accumulation at the site was due to human or other agencies remains open to debate.

Discussion of individual species

Order Perissodactyla

Family Equidae

Equus ferus - Horse

Unlike the Trou de Chaleux, horse is not predominant in the Trou des Nutons assemblage. However, it is clear that at least some (and possibly all) of the horse bones in this assemblage are Lateglacial in age. The one radiocarbon date from the site which does date to the Lateglacial (see above) falls within the Bölling Interstadial and comes from a cut 2nd phalanx of *Equus ferus*.

BPR data is presented in Table 4.3. The MNI count for horse is 2, and was obtained from proximal and distal humeri, complete metacarpals and patellae. Only certain parts of the horse skeleton are represented, although this is hardly surprising given that the NISP is 55. Almost all the anatomical elements recorded come from the limbs rather than the trunk (the sole exception being a right innominate, part of acc. N° 2544), and the butchery marks on these bones (found on 15 of the specimens) correspond with meat removal and disarticulation. There are striking similarities between the location and orientation of the butchery marks on these specimens and some of those already noted from Chaleux (see Figures 3.11, 3.12, 3.13 & 4.5). The marks found on the lower parts of the limbs (phalanges and metapodia) indicate disarticulation (Figures 4.5 & 4.6) but, unlike the horse extremities from Chaleux, there are no marks which could be correlated with tendon extraction. Given the presence of the butchery marks, it seems likely that these elements were introduced to the site as complete butchery units, consisting of the humerus, radius, ulna, carpals, metacarpals and phalanges for the fore limb, and femur (possibly only the broken distal end and shaft), patella, tibia, tarsals, metatarsals and phalanges for the hind limb. Elements of limbs from both sides of the horse are present, although the right forelimb is only represented by a single ulna. This BPR strongly suggests that only horse limbs were processed at Nutons, rather than other parts of the skeleton.

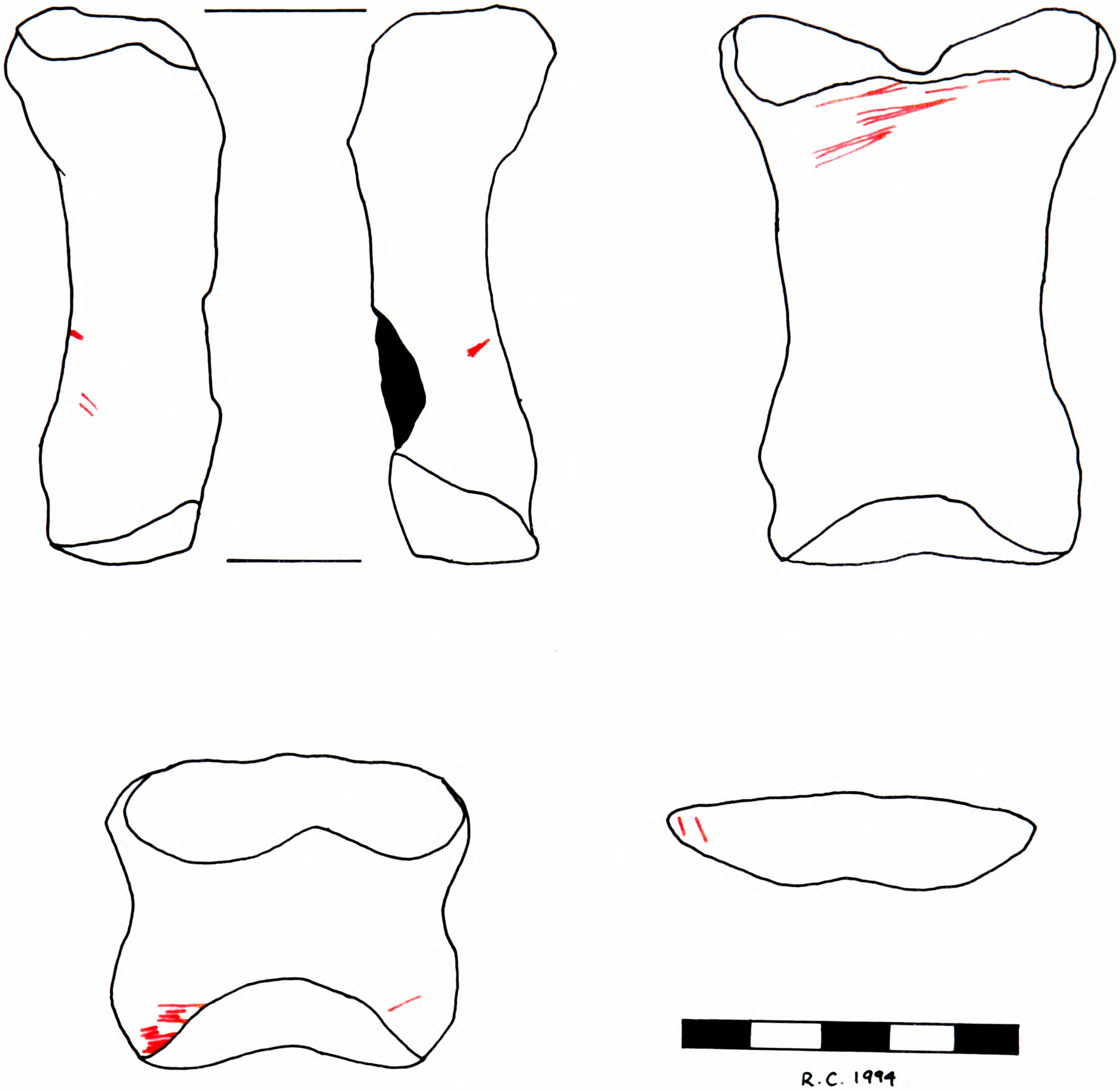

Figure 4.5: Cut *Equus ferus* 1st phalanx, 2nd phalanges and distal sesamoid from the Trou des Nutons. Scale in cm.

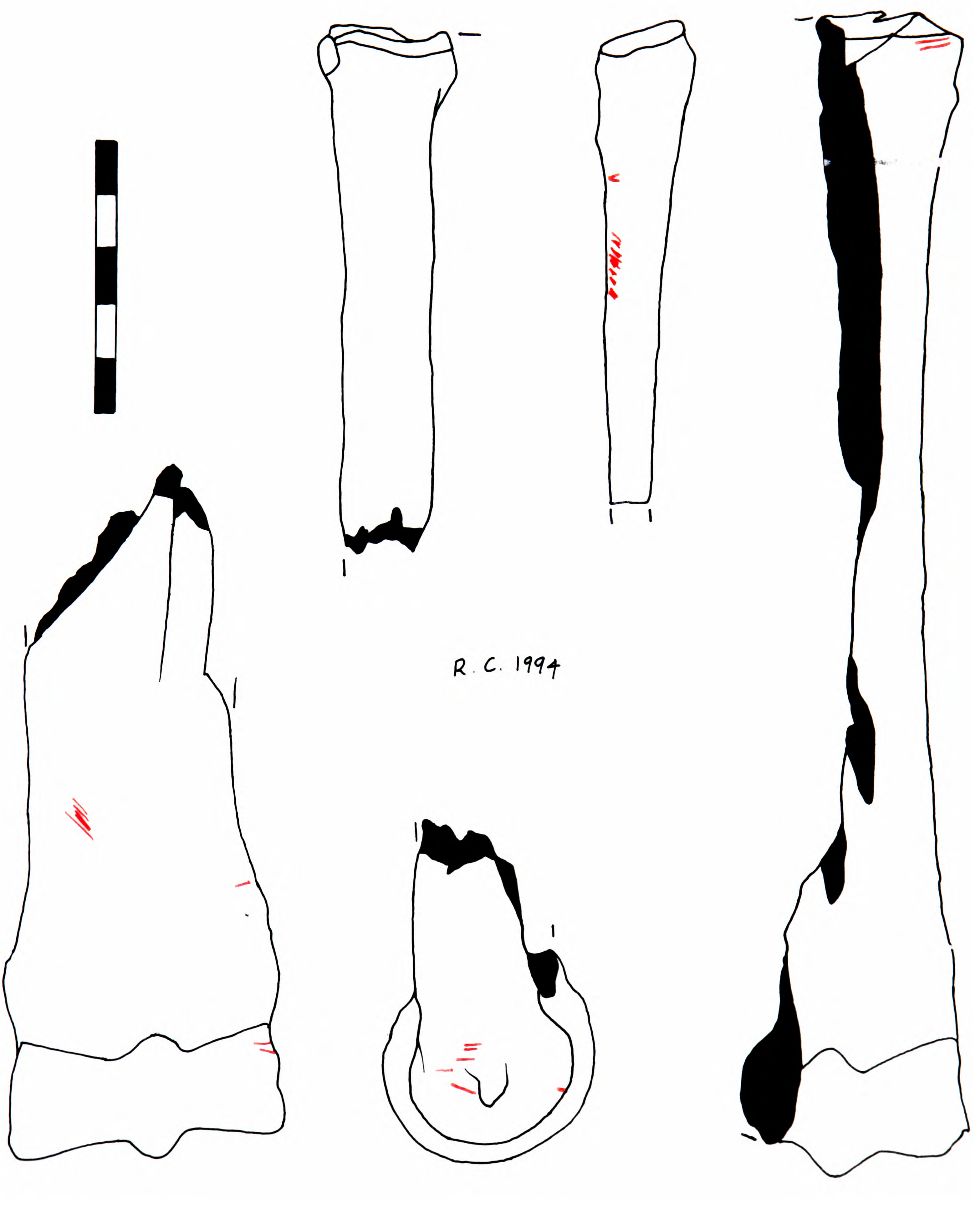

Figure 4.6: Modified metapodia of *Equus ferus* from the Trou des Nutons. Scale in cm.

I have already speculated that Dupont did not exercise the same levels of recovery which he practised at the Trou de Chaleux, particularly since there seem to be no bone fragments from the Trou des Nutons, unlike the vast quantity preserved from Chaleux. However, inspection of the tables of BPR data for other species from the Trou des Nutons indicates that various parts of the trunk of other large mammal species were kept by Dupont. This suggests that the recovery and preservation of the equid material from the Trou des Nutons, like that for other species found during his various excavations in the Lesse valley, would not have been selective and consequently that the equid BPR data is a true reflection of what was actually recovered on site, rather than just a selection of pieces which Dupont and his team considered to be identifiable. Gnaw marks were also noted on a few of the horse bones (Plate 4.1), although in the main part these were on elements which also showed traces of butchery marks. In none of these cases was it possible to establish whether the human or carnivore induced damage came first, it is assumed here that the horse elements came to the site as a direct result of predation rather than having been scavenged from natural deaths and predator-kill sites.

This apparent selection of horse limbs by the Lateglacial hunter-gatherers, and the processing activities which are indicated, parallel some of those already discussed from Chaleux. There is, however, no indication of tendon extraction from the phalanges; only disarticulation is indicated. Longitudinal splitting of first phalanges (which seemed to have followed on disarticulation at Chaleux) was also noted on 2 of the specimens from Nutons, and it is thought that this was probably one reason for the disarticulation of this part of the limb.

Other butchery marks noted correspond mainly to areas rich in meat on the upper limbs. Longitudinal splitting of metapodials was noted in addition to the longitudinal splitting of phalanges, again giving a striking parallel with Chaleux. Some of these are illustrated in Figures 4.5 & 4.6. Again it seems most likely that this activity relates to marrow extraction and processing.

Plate 4.1: Gnawed humerus of *Equus ferus* from the Trou des Nutons. Scale in mm and inches.

Order Artiodactyla

Family Cervidae

Rangifer tarandus - Reindeer

Although among the most abundant species identified at the Trou des Nutons (NISP = 372), much of the NISP count is accounted for by antlers (which are grown and shed on an annual basis). The reindeer is an integral part of the Late Pleistocene fauna of north-western Europe, and although survivals of this species have been identified into the early Holocene in north-western Europe (Clutton Brock & Burleigh 1983; OxA-802 9670 ± 110 BP on a shed antler of *Rangifer tarandus* from Aveline's Hole, Burrington, UK in Gowlett *et al.* 1986; Lawson & Bonsall 1986a & b), it seems most likely that this species was present at the Trou des Nutons during the late Pleistocene and therefore forms part of the Lateglacial fauna. This could doubtless be confirmed by radiocarbon dating, but no clearly identifiable reindeer specimens with unquestionable cut marks were noted within the collections, and so this particular species was excluded from the range of possible dating samples from the Trou des Nutons. There is also some degree of distortion of this species' significance, as the vast majority of the specimens come from antler fragments. No complete antlers were observed but, where antler bases were present, these came almost exclusively from juveniles or females, and were almost all shed. The presence of relatively high numbers of reindeer antler in archaeological deposits in the south-east of Belgium has been interpreted as evidence for the gathering of this raw material resource by humans (*cf.* Bellier & Cattelain 1986a & 1986b; J.-M. Leotard pers. comm.). However, the value of juvenile and female antlers to humans has already been brought into question, as they are a poor raw material for working (see chapter 2). It should be noted that a small amount of worked reindeer antler is present in the IRScNB archaeological collection from the Trou des Nutons (Dewez 1987, Figure 122 N° 24 & Figure 126), one of which at least appears to come from the beam of an adult male antler (Dewez *ibid.*, Figure 126), however very few adult male antlers were noted. It seems possible that the almost complete dominance of female and juvenile antlers may be due to the Lesse Valley and parts of the Ardennes having been an area where cow-juvenile bands congregated seasonally during the Lateglacial.

Out of the 313 antlers and antler fragments within the faunal collection, only one was noted as possibly worked, although this specimen did not show any signs of groove and splinter technique (easily the commonest method used in antler working during the Upper Palaeolithic in western Europe). Instead, the only traces visible were three striations on the antler surface which may have been cuts. A part of the methodology for differentiating cut marks from other forms of bone damage is their location and orientation (see chapter 1) and I found it very hard to see any function these three marks may have played in processing a reindeer carcass or parts thereof. They were single marks, and not repeated, so the possibility that they could have been part of an engraving did not seem very strong. Another factor was that the antler surface was so poorly preserved that it was difficult to identify these marks unquestionably as cuts, even with the use of a microscope. Consequently I cannot be sure that they do in fact represent working. In the few cases where antler bases were preserved, they came from shed antlers, and no pedicals attached to cranial fragments were noted. Again this suggests that the majority of the antlers resulted from a 'natural' discard, rather than a deliberate collection. Gordon (1988) has suggested that these were shed, and presumably accumulated, during the Autumn (see above).

Leaving aside the antlers, only 55 bones were present. BPR data is given for these in Table 4.4. The MNI calculation of 3 is based on the presence of 3 atlas and 3 axis vertebrae. The variety of skeletal elements is fairly diverse, and there does not seem to be any unambiguous evidence for complete limbs being present. The only cut mark noted on these bones was one on a metatarsal shaft fragment, which most likely came from a reindeer. As at Chaleux, there is little evidence for this species being of any great economic significance to the Palaeolithic residents at the site, and although the only Upper Palaeolithic artefacts from the site are Magdalenian, it is not certain that the reindeer bones themselves date to the Bölling Interstadial, which appears to correspond with Magdalenian presence in Belgium. It is quite conceivable that parts of reindeer carcasses could have been brought to the cave by a number of predators, only some of which are visible within the faunal assemblage. Accordingly there is little if any direct evidence to link the reindeer in this assemblage with human activity.

***Cervus elaphus* - Red Deer.**

Dupont gave an MNI of 7 for red deer - 2 adults and 5 juveniles (Appendix I). However, my own calculations can only obtain an MNI of 2. An added complication is found in the problem outlined above; that some specimens of red deer were mistaken for bovids by Dupont. We have already seen that at least two of the specimens which he had identified as *Bos* were in fact red deer; I have also noted that further work would be needed to confirm that other specimens identified by Dupont as *Bos* sp. are indeed bovid rather than cervid. The MNI must accordingly be regarded as provisional, as must the BPR information for *Cervus elaphus* presented in Table 4.5.

The AMS date taken from a cut red deer left navicular cuboid dates that particular specimen to the Iron Age/Roman period(s). It is unclear whether this species was also present during the Lateglacial and earlier post-glacial. Red deer have been noted from numerous north-western European sites during the Postglacial, including Star Carr (Clark, 1954), in Britain and Bedburg-Königshoven (Street, 1991) in Germany. They are also recorded from numerous reliable Lateglacial contexts and form an integral part of the large mammal fauna from Gough's Cave at Cheddar (Currant 1986, 1991): similarly they have been identified by Turner (1991) at Andernach-Martinsberg (in both Magdalenian and Federmesser assemblages), Gönnersdorf, Missenheim II, Urbar and Niederbieber, all in the Neuweid basin. A few specimens of red deer have been noted at the late Magdalenian site of Marsangy by Poplin (n.d.), although these are poorly preserved. Indeed the preservation of animal bone is generally so poor in the Lateglacial sites from the Paris basin that it is currently unclear whether any red deer material has been recovered from either Pincevent or Etiolles.

It is quite possible that red deer were present within the Trou des Nutons during the Lateglacial, and that at least some of the specimens with butchery marks date to that period.

The cut marks noted only seem to relate to one activity, disarticulation. This is also the case with the red deer specimen dated to the Roman/Iron Age: the marks on this navicular cuboid (part of Acc. N° 3217) circle the anterior and medial aspects of this bone, and relate to the severance of the capsule which surrounds the tarsal joint (see Plate 2.3).

Capreolus capreolus - Roe Deer

Only two specimens of *Capreolus capreolus* were noted in the Nutons collection. Neither of these (a left innominate and metatarsal shaft) was cut. Given the range of species of significantly divergent ages combined within the *1er niveau ossifère*, there is no reason why either of these specimens should be assumed to be of Pleistocene age or to have been incorporated within the *1er niveau ossifère* through human agency. Roe deer is relatively abundant throughout the Holocene of north-western Europe, and although it is possible that this species also occurred during Interstadial phases of the Lateglacial, there is no reason to assume that these specimens date to the Bölling in preference to any other time between the present and the last Ice Age. As these specimens show no trace of human modification, and are not clearly of Pleistocene age, they will not be discussed further here.

Family Bovidae

Bos sp. - Aurochs, Bison and Domestic Cattle

Dupont identified what he believed to be at least two species of bovid at the Trou des Nutons: *Bos primigenius minor* and *Bos primigenius major*. However, as discussed above in chapter 3, it is now known that there is significant sexual dimorphism within *Bos primigenius*: rather than identifying two different species of large and small Aurochsen, Dupont was in fact separating male from female.

There is an added complication, in that Dupont did not allow for the possibility of more recent domesticates within the *1er niveau ossifère*. Consequently the possibility that many of the smaller bovids could be *Bos taurus* rather than *Bos primigenius* does not appear to have been considered. Much of the bovid material was fragmentary, and much was also juvenile. Both of these features make the distinction of *Bos primigenius* from

Bos taurus difficult, especially as few diagnostic elements (e.g. complete horn cores) were present. A further complication is that some specimens which were identified as *Bos primigenius* are in fact not bovid at all, but instead belong to a large cervid - *Cervus elaphus*.

Confusions between small bovids and larger cervids, especially *Bos primigenius* and *Cervus elaphus*, are relatively common and an easy mistake to make. Biometrically both species fall within the same range. This has clearly happened in other well-studied collections, where numerous specimens have been variously identified as aurochs, elk and red deer by different researchers (*cf.* Legge & Rowley-Conwy 1988).

During the course of study, two specimens from the Trou des Nutons were re-identified as red deer rather than aurochs - a 1st phalanx and a left navicular cuboid. The navicular cuboid was subsequently selected as a radiocarbon sample, and was dated to the local Roman/Iron Age (OxA-4194 2210 ± 80 BP). The actual age of the bovid material remains unclear, although it should be noted that many of the specimens with butchery traces appear to have been cut with metal rather than flint tools. This suggests that at least some of the bovids are later prehistoric/historic in date rather than Lateglacial, very much in line with the situation regarding the suids and caprids discussed above. At the time of writing I have yet to confirm, or indeed be convinced, that any of the bovid material from the Trou des Nutons is certainly of Pleistocene age. There was no material within this collection which showed distinctive signs of belonging to either *Ovibos moschatus* or *Bison bojanus*. The possibility of there being Lateglacial musk oxen or bison from this site is consequently ruled out.

Pressures of time limited the amount of verification work that could be undertaken on this material, and I can only state that I strongly suspect that a significant proportion of the material identified by Dupont as *Bos primigenius* is in fact cervid. This is clearly one area for further research. The NISP count given in Table 4.1 above should accordingly be regarded as provisional until such time as the species identifications can be confidently verified.

The ovi-caprids - ibex, chamois, goat and sheep

A search through this part of the Trou des Nutons collection for any specimens which could be unequivocally identified as chamois or ibex rather than domestic sheep and/or goat failed to reveal any diagnostic specimens. Previous researchers (including Dupont) have separated these specimens into at least three species: *Rupicapra rupicapra*, *Capra ibex* and *Capra egragrus* (wild goat, an ancestral form to domestic goat). However, I found no good evidence on which to differentiate this part of the collection into two or three (or more) species. No specimens of sheep (*Ovis aries*) were recognised. Many of these bones have cut marks, so it is clear that at least some ovi-caprid carcasses were processed by humans. However, many of the butchery marks appeared to have been made by metal rather than stone tools. This evidence, combined with the suspicion that the collection might contain a large proportion of domesticates, led to the regrettable but inevitable conclusion that no characteristic Pleistocene ovi-caprids could be identified within the collection, or separated from material much more recent in origin. This being the case it is not felt appropriate to consider this part of the collection in great detail. However, as with the *Suidae* above, I have included detailed BPR information, in the hope that this will be of use for other researchers working on the later prehistoric/historic faunas from the Lesse valley caves.

Family Suidae

Sus scrofa - Wild Boar and Domestic Pig

Sus scrofa is the most abundant species at the Trou des Nutons (NISP = 457, MNI = 30). However, in view the problems of stratigraphic differentiation outlined above, and bearing in mind the discussion in chapter 2 relating to the dating of specimens of *Sus scrofa* from the Trou de Chaleux, I have yet to be convinced that any specimens of this species are part of the local Lateglacial megafauna rather than more recent in origin.

BPR data has been presented for the *Suidae* from the Trou des Nutons in Table 4.7. A significant proportion of this material was juvenile or neo-natal, including a number of the teeth. These should prove a useful dataset for anyone interested in seasonality and age-structure work on this species, even without a definite link to human presence during the Pleistocene. Table 4.7 shows only 20 specimens of *Sus scrofa* with any trace of butchery marks, which all appear to have been made with metal rather than stone tools indicating that the exploitation of the *Suidae* at this site post-dates the stone age.

Order Carnivora

Family Ursidae

Ursus sp. - Brown Bear

Parts of at least two bear skeletons, one adult and one juvenile, were found at the Trou des Nutons. BPR information is given in Table 4.8. The adult is the most complete, whilst the juvenile is represented by an unfused thoracic vertebra and four unfused cervical vertebrae. Butchery marks were observed on only one bone (Figure 4.7), a cut right astragalus (part of bulk acc N° 2555). BPR does not indicate selection for either parts of the limbs or the trunk, although there are elements missing which are potentially robust enough to survive within a cave sediment (e.g. distal humeri and distal tibiae). The presence of an almost complete cranium suggests that taphonomic conditions were not too harsh at the site, as this element is one of those most prone to accidental breakage. It appears articulating bones from the same limb were recovered, although whether these were originally found articulated is unknown. Certainly within the collection at least one paw of the adult can be convincingly re-constructed.

Bear and humans are rarely found in true association during the Pleistocene. I have already discussed in some detail the problems surrounded the claimed cave bear cults of eastern and south-eastern Europe (chapter 3). However, what is clear is that humans do appear to have come into contact with bears in the Lesse valley. As at Chaleux, the presence of skeletal elements which appear to have come from the same individual and can be re-articulated demonstrate that at least parts of one adult were found in the cave. It is unfortunate that no records exist as to whether any of these elements were articulated when found. The presence of cut marks on a single astragalus suggests the (at least partial) disarticulation of the adult's ankle, although to what final end is unclear. I have already

Figure 4.7: Cut *Ursus arctos* right astragalus, part of 2555. Scale in cm.

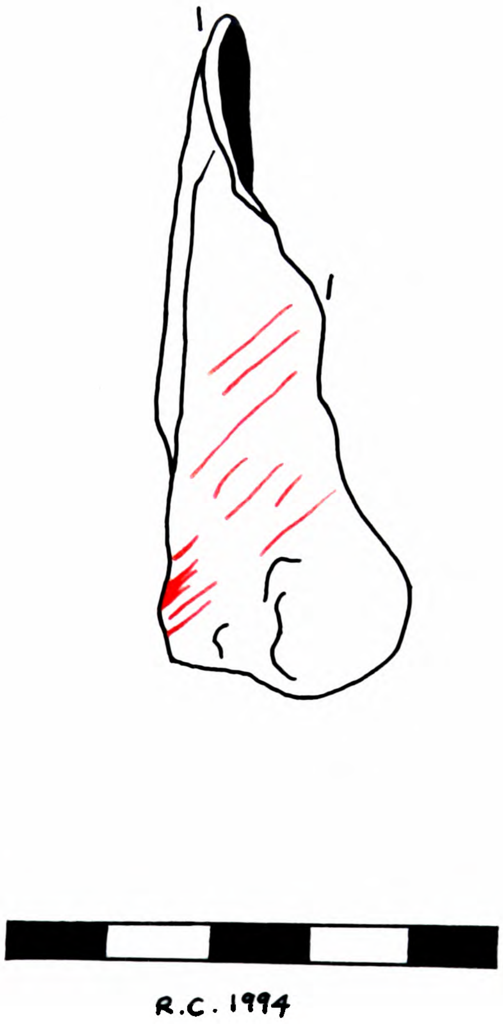

Figure 4.8: Cut *Canis* sp. distal right humerus, part of 2555. Scale in cm.

noted that bears retain a high level of fat, and that this fat, alongside their meat and marrow reserves, may have made them potentially attractive prey. No hunting lesions were observed on any of the bear bones, or indeed any of the large mammal bones within the Trou des Nutons assemblage. Consequently there is no unambiguous evidence for bear hunting. Given the information presented in chapter 3 about the potential dangers and problems of bear hunting, it seems most likely that the Trou des Nutons adult bear was found recently dead or taken unawares. As at Chaleux, the explanation that the bear bones in the collection came from a hibernating bear is preferred here, although whether this particular episode can actually be linked to the Magdalenian occupation of the site is an open question, especially as the local presence/absence of bears during the Holocene is an under-researched topic.

Family Canidae

Canis sp. - Wolf and Domestic Dog

It was not possible to differentiate wolf from dog in the Trou des Nutons material as none of the 35 bones were complete enough for a clear comparison. A distal humerus of wolf or dog was the only cut canid bone (Figure 4.8). The marks themselves correlate with both meat removal and disarticulation. However, it is an open question as to whether this specimen (and indeed any of the canid bones in the collection) were of Pleistocene or Holocene age.

Vulpes sp. - Arctic Fox and Red Fox

Although this is one of the commonest species found at the Trou des Nutons, only three of the fox bones were cut. An MNI count of 57 was obtained, using right mandibles. BPR data is presented in Table 4.9. The next highest MNI count was 27 (right distal tibiae); overall, the MNI numbers fluctuate quite dramatically between 1 and 57, suggesting that certain body parts are far more common than others. This is born out by the %MNI figures, which indicate a relatively high proportion (greater than 25%MNI) of mandibles, distal humeri, proximal radii, ulnae, compared with the rest of the elements.

This indicates a selection bias in favour of these elements, although it is unclear whether this selection took place during the period in which sediment was being accumulated in the *1^er^ niveau ossifère*, or whether it was due to taphonomic factors, or is merely the result of sample selection by Dupont and his workmen. As these elements are amongst the most robust parts of a fox skeleton, I feel a combination of at least the latter two possibilities is likely.

Dupont identified two species of fox at the Trou des Nutons, red fox and arctic fox; the distinction appears to have been made on the basis of size. Given the problem of the time-trangressive nature of the *1er niveau ossifère* at Nutons, it is perhaps over-ambitious to identify specimens as belonging to different species solely on size critera, when size may also have varied significantly within one or both species through time. The detailed problems of differentiating these two species have already been discussed in chapter 3. I myself have made no attempt yet to separate these bones into *Vulpes vulpes* and *Alopex lagopus* although, given that mandibles form a significant part of the fox remains from the assemblage (25.68%), it is likely that the slight differences between the two species' dentitions should be straightforward to recognise. This is one area for possible further work.

Foxes may have been a valuable fur-bearing resource during the Lateglacial, and the exploitation of a number of the large mammals in this way at both the Trou des Nutons and the Trou de Chaleux has been discussed in some detail. The foxes from the Trou des Nutons must be added to the list of animals potentially trapped for their fur. Exploitation of animals solely for their pelts is often difficult to recognise, because skinning may leave few, if any, marks on bones. Only three bones of fox had cut marks, and all of these (a left mandible and two distal right humeri) corresponded with meat removal rather than skinning or disarticulation. Unfortunately, as noted in relation to so many of the other species discussed from the Trou des Nutons, it remains an open question as to whether any of the foxes date from the Late Pleistocene, and how many, if any, were actually hunted/trapped by the Magdalenian inhabitants of the Lesse valley. It is quite possible that fox dens were located at the site at various times, and that many of the fox bones from the

1^{er} niveau ossifère came to be part of the faunal assemblage by purely 'natural' means. Foxes are also predators, and may themselves be responsible for the accumulation of other parts of the faunal assemblage.

Family Mustelidae

Gulo gulo - Wolverine/Glutton

A very small number of bones (6) of wolverine (*Gulo gulo*) were recovered. These were a partial left maxilla, a canine tooth, a distal right humerus, a proximal right femur, and two distal left tibiae giving an MNI count of 2. None of these showed any clear evidence of human modification, although a single ambiguous mark on the femur fragment was noted as a possible cut.

It is difficult to decide whther these specimens are Lateglacial or more recent. As was observed in chapter 3 whilst discussing this particular species, finds of wolverine are rare, although this species has been observed in both Lateglacial and Postglacial contexts in north-western Europe, and was potentially a very useful mammal for human exploitation because of the qualities of its pelt. Wolverines are in the most part solitary animals and prefer to avoid humans and human settlements. The possibility of the trapping of wolverines for their fur and meat during the north-western European Lateglacial has already been discussed in relation to the Trou de Chaleux; there is no direct evidence for this activity at the Trou des Nutons, and the date of these specimens is unclear, simply because of the lack of evidence. Ideally the dating of specimens of *Gulo gulo* could be a component of further AMS work; however, without a direct link with human activity, this would be a hard case to justify. Alongside other potential areas for further AMS work, this aspect has been left aside until such time as private funding for the work becomes available.

Meles meles - Badger

Although they only account for 3.42% of the Nutons assemblage, it is interesting to note that a number of the badger specimens (5) from this site show distinctive butchery traces. It has already been commented that we know very little about the temporal distribution of *Meles meles* through earlier prehistory, and indeed its presence is usually interpreted as an indication of later prehistoric contamination. As we have already noted several times, the assemblage from the Trou des Nutons undoubtedly contains components which are relatively recent in origin. However, it has also been established that there is a significant quantity of Lateglacial material within the assemblage. There is no compelling reason to exclude the badgers from the list of potentially Lateglacial species. Once again, this problem might be resolved by further dating work.

During the course of research, it was noted that 5 of the badger bones showed distinct butchery marks (Figure 4.9): these all came from bulk Acc. N° 2557, and are a right ulna, two left humeri, a right femur and a distal left femur. These all have longitudinal cuts/scrapes which correspond with meat removal rather than skinning. Given the uncertainties about age, we are clearly in no position to argue that badger was of any dietary significance for hunter-gatherers during the Lateglacial. Badger exploitation was also noted at Chaleux (its age again unclear; chapter 3), where longitudinal cuts indicating meat removal are again the sole evidence. It is worth noting that the badger bones from the Early Mesolithic site of Star Carr (held in the Natural History Museum in London) also show clear signs of butchery, although in this case the longitudinal cuts are absent, and instead the only marks visible relate to skinning. In none of these cases is it certain that the badger remains are contemporary with the Late Upper Palaeolithic or Mesolithic occupations but we should not overlook the possibility that badger and other mustelids were exploited for fur and meat during those periods.

Mustela sp. - The Martens

Whilst it is tempting to interpret the presence of two small mustelid bones, which Dupont identified as *Mustela erminea* (stoat) and *Mustela putorius* (western polecat), as evidence for the Lateglacial trapping of fur bearing mammals, this is not possible on the basis of the data available. The identification of two specimens - a cranium and a tibia - is Dupont's, and unfortunately time restrictions did not permit verification. Neither show any butchery marks, and consequently their presence in the *1^er^ niveau ossifère* could be due to a

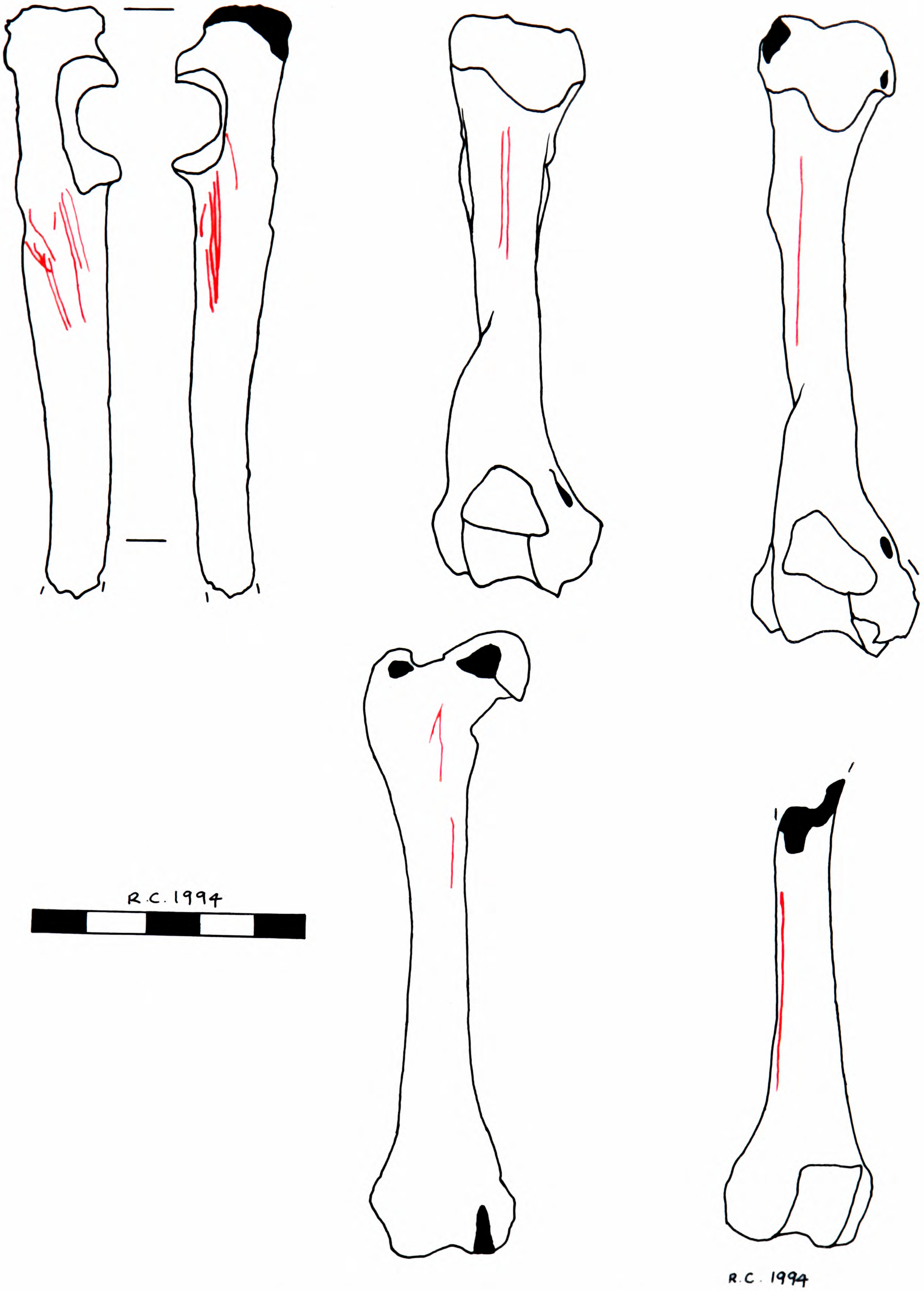

Figure 4.9: Cut *Meles meles* bones from the Trou des Nutons. **Scale in cm.**

range of taphonomic agencies, of which trapping by Lateglacial hunters-gatherers is merely one.

Family Felidae

Felis sp. - Wild Cat, Lynx and Domestic Cat

14 felid bones were identified from the Trou des Nutons assemblage, none of which were cut. The MNI count for this group was 3, based on the presence of two complete right humeri, alongside a distal humerus from the same side. It was not possible to determine whether this material was from wild cat, domestic cat or lynx (the most likely candidates), although the size and robustness of the bones indicated wild cat rather than lynx or domestic cat. Similarly, it is unknown whether this material dates to the Lateglacial or, like much of the Trou des Nutons assemblage, is more recent. No felids were recorded in the fauna from the *1er niveau ossifère* at Chaleux, although a large number of felids were noted in the fauna from the Grotte de Remouchamps; again it has not been established whether any of the Remouchamps felids are Lateglacial. As none of the specimens showed any traces of modification, a detailed discussion of this material is not appropriate here.

However, it should be noted that the presence of a felid during the Lateglacial cannot be wholly ruled out. The remains of at least one large lynx (Currant *et al.* 1989, 133; originally described as "large lynx or leopard", but now firmly identified as lynx - Currant 1991) have been identified within the Lateglacial fauna from Gough's Cave, and the bones show cut marks from skinning; the femur has been dated to 12650 ± 120 BP (OxA-3411; Hedges *et al.* 1994). Similarly another lynx fossil with skinning marks, this time from Aveline's Hole, Burringdon Combe, (a modified ulna) has also been identified,although attempts at AMS dating this specimen failed during chemical preparation (R.M. Jacobi & R. Housley pers. comm.). As yet Lateglacial lynx and/or wild cat has not been convincingly identified from any uncontaminated Lateglacial context in Belgium or the surrounding area, but such felids could certainly have been part of the local large mammal fauna during the Late Pleistocene.

The Avian fauna

As at Chaleux, Dupont recovered and identified various bird bones at Nutons. These remains are currently held in the IRScNB stores (Acc. N° 2604). Whilst no attempt was made to study this material directly, I noted his species identifications in the hope that they may be of use to other researchers (Table 4.2). The same problems that affect the large mammal assemblage also apply to the avian material. The true age and temporal span of this material is unclear, and given the problems of stratigraphy, it is possible that this collection may have accumulated intermittently over at least 10,000 years.

Dupont's identification	Modern equivalent/translation
Columba palumbis	*Columba palumbis* (woodpigeon)
Pica caudata	*Pica* sp. (magpie)
Tetrao albus	*Lagopus* sp. (grouse)
Tetrao tetrix	*Lyrarus tetrix* (black grouse)
Lagopus albus	*Lagopus mutus* (ptarmigan)
Turdus pilaris	*Turdus pilaris* (fieldfare)
Turdus viscivorus	*Turdus viscivorus* (mistle thrush)
Perdix cinera	*Alectoris rufa* (red-legged partridge)
Anas boschas	*Anas platyrhynchos* (mallard)
Anas blancharii	*Anas* sp. (duck)

Table 4.2: Identifications of the avian fauna from the Trou des Nutons, Furfooz.

CONCLUSIONS

From the preceeding discussion, it is clear that the greatest problem presented by the fauna from the *1er niveau ossifère* at the Trou des Nutons is the temporal spread of its components. It seems only too likely that a large proportion of the fauna recovered from this layer does not date to the Bölling Interstadial. Arguments have been put forward which suggest that many of the species are much more characteristic of the Holocene, and that 'modern' domesticates, including sheep and goat, are present in high proportions.

It has also been suggested, however, that there is a recognisable Lateglacial component within this assemblage. This has been identified using three parallel strands of evidence. The first involves the known presence and absence of species during the Late Pleistocene. There is nothing in either the archaeology or the faunal assemblage to suggest that any of the material recovered from the *1er niveau ossifère* pre-dates the Lateglacial. All available indications suggests that material was definitely being incorporated within the *1er niveau ossifère* by the start of the Bölling Interstadial phase of the Lateglacial.

Radiocarbon dating at this site has supported the suggestion that the material from the *1er niveau ossifère* spans a considerable time range; indeed, it has been demonstrated that at least some of it is of Lateglacial age, and that a part of it is clearly much more recent. The use of the AMS technique (see chapter 2) has permitted a new level of precision in the dating of archaeological activity at a number of Belgian Lateglacial sites by the selection of individual bones with butchery marks, including the Trou des Nutons. But it cannot be used very often, or applied to the solution of minor problems of passing interest, simply because of its prohibitive cost. The most unsatisfactory aspect of the Nutons fauna is simply not knowing whether certain crucial specimens are of Lateglacial age, and having no clear path for establishing the actual age (short of dating each individual specimen).

The butchery evidence observed from this site suggests some striking parallels with that discussed from the Trou de Chaleux (chapter 3). Although far less numerous in the Nutons assemblage, horse appears to have again been of economic significance to the Lateglacial hunter-gatherers at this site. Amongst the butchery information noted on the horse bones are a range of features which seem to recur consistently, and parallel some of those already noted from Chaleux, e.g. the longitudinal splitting of long bones and the extraction of tendons. Meat removal is also apparent along most of the meat bearing elements of horse.

The character of the Trou des Nutons assemblage is thus rather different from that of Chaleux. The assemblage is approximately two thirds the size of that from Chaleux, and much of that is dominated by later domesticates. Leaving those aside, the faunal count is significantly reduced, and even that remains questionable as to the date (and temporal spread) of a number of other species (red deer, fox, badger, etc.). Butchery traces have been observed and discussed on many of these specimens, but whether these are the result of the Magdalenian use of the site or some later occupation event is in the end simply not known.

There are also interesting components of this assemblage, which were found at the Trou de Chaleux. The presence of *Felis* sp. has already been commented upon, and the possibility that part or all of these specimens come from Lateglacial felids cannot be totally ruled out. One specimen of *Canis* sp. also showed cut marks. Again, it would be interesting to test by AMS dating whether this specimen (Figure 4.8) was Lateglacial or more recent.

From my own point of view, this assemblage proved something of a disappointment, and it would be wrong to pretend otherwise: it lacked much of the detail of the Chaleux collection I had studied during the previous year. Nevertheless, the fauna from the Trou des Nutons may be quite significant for researchers working on the later prehistoric/historic periods (most probably both Iron Age and Roman). The high number of mandibles of domesticates including sheep, goat and pig may yield valuable information about both the seasonality and population structure of these mammals in and around Furfooz during these periods. The collection is, however, of only marginal relevance for studies of the Belgian Lateglacial fauna, and the best that can be said is that it does not in any way oppose the conclusions reached at Chaleux, and perhaps can be seen to add a little confirmatory evidence.

In the next chapter the fauna from the nearby Trou du Frontal will be discussed. This cave is also located within the Furfooz National Park, was excavated by Dupont during the last Century, and was selected for study as it might yield further details of Magdalenian animal exploitation strategies in the Lesse valley.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0	0			
maxilla	0	0	0	0	0	0	0	0	0.00	00.00
mandible	0	0	0	0	0	0	0	0	0.00	00.00
teeth			0	0	0	0	0			
hyoid			0	0	0	0	0	0	0.00	00.00
atlas			0	0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	0	1	0	1	0	0	1	1	0.50	33.33
sacrum			0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0	0.00	00.00
whole humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	2	0	0	2	0	0	2	2	1.00	66.67
humerus shaft	0	0	0	0	0	0	0			
d. humerus	2	0	0	2	0	0	2	2	1.00	66.67
whole radius	0	0	0	0	0	0	0	0	0.00	00.00
p. radius	1	0	0	1	0	0	1	1	0.50	33.33
radius shaft	1	0	0	1	0	0	1			
d. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	1	1	0	2	0	1	2	1	1.00	66.67
carpals	1	0	0	1	0	0	1		0.07	04.76
whole MC	2	0	0	2	0	1	2	2	0.00	00.00
p. MC	0	0	0	0	0	0	0	0	0.00	00.00
d. MC			0	0	0	0	0		0.00	00.00
acc. MC	0	0	1	1	0	1	1		0.25	16.67
whole femur	0	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	0	0	0	0	0	0	0	0.00	00.00
femur shaft	1	2	0	3	0	1	3			
d. femur	1	0	0	1	0	1	1	1	0.50	33.33
patella	2	0	0	2	0	0	2	2	1.00	66.67
whole tibia	0	0	0	0	0	0	0	0	0.00	00.00
p. tibia	1	0	0	1	0	0	1	1	0.50	33.33
tibia shaft	1	1	0	1	1	0	2			
d. tibia	1	1	0	2	0	0	2	1	1.00	66.67
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	3	3	0	6	0	0	6		0.50	33.33
whole MT	1	1	0	2	0	2	2	1	0.00	00.00
p. MT	0	0	0	0	0	0	0	0	0.00	00.00
d. MT			1	1	0	0	1		0.50	33.33
acc. MT	0	0	4	4	0	0	4		1.00	66.67
p. MP	1	0	0	1	0	0	1		0.25	16.67
d. MP			1	1	0	1	1		0.25	16.67
acc. MP			0	0	0	0	0		0.00	00.00
p. sesamoid			0	0	0	0	0		0.00	00.00
phalanx 1			6	6	0	2	6		1.50	100.00
phalanx 2			4	4	0	2	4		1.00	66.67
d. sesamoid			2	2	0	1	2		0.50	33.33
phalanx 3			4	4	0	0	4		1.00	66.67
Total	**22**	**10**	**23**	**54**	**1**	**13**	**55**			

Table 4.3: BPR for *Equus ferus* from the Trou des Nutons, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
antler			313			1	313			
cranial			2	2	0	0	2			
maxilla	0	0	0	0	0	0	0	0	0.00	00.00
mandible	3	1	0	2	2	0	4	3	2.00	66.67
teeth			6	6	0	0	6			
hyoid			0	0	0	0	0	0	0.00	00.00
atlas			3	3	0	0	3	3	3.00	100.00
axis			3	2	1	0	3	3	3.00	100.00
cervical v.			4	0	4	0	4		0.80	26.67
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	2	0	0	2	0	0	2	2	1.00	33.33
sacrum	0	0	0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0	0	0.00	00.00
scapula	2	2	0	4	0	1	4	2	2.00	66.67
whole humerus	0	0	0	0	0	0	0	0	0.00	00.00
P. humerus	0	0	0	0	0	0	0	0	0.00	00.00
humerus shaft	0	0	0	0	0	0	0			
D. humerus	1	0	0	1	0	0	1	1	0.50	16.67
whole radius	0	0	0	0	0	0	0	0	0.00	00.00
P. radius	0	0	0	0	0	0	0	0	0.00	00.00
radius shaft	0	0	2	2	0	0	2			
D. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0	0.00	00.00
carpals	0	0	0	0	0	0	0			
MC	2	1	0	3	0	0	3	2	1.50	50.00
P. MC	0	0	0	0	0	0	0	0	0.00	00.00
D. MC	0	0	1	0	0	0	1	1	0.50	16.67
Acc. MC	0	0	0	0	0	0	0	0	0.00	00.00
whole femur	0	0	0	0	0	0	0	0	0.00	00.00
P. femur	0	0	0	0	0	0	0	0	0.00	00.00
femur shaft	1	0	0	0	0	0	1			
D. femur	1	0	0	0	1	0	1	1	0.50	16.67
patella	0	0	0	0	0	0	0	0	0.00	00.00
whole tibia	0	0	0	0	0	0	0	0	0.00	00.00
P. tibia	0	0	0	0	0	0	0	0	0.00	00.00
tibia shaft	1	0	0	0	0	0	1			
D. tibia	1	2	0	0	0	0	3	2	1.50	50.00
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0	0			
MT	2	2	0	4	0	0	4	0	2.00	66.67
P. MT	0	0	0	0	0	0	0	0	0.00	00.00
MT shaft	2	0	0	2	0	1	2			
D. MT	0	0	0	0	0	0	0	0	0.00	00.00
Acc. MT	0	0	0	0	0	0	0	0	0.00	00.00
P. MP	0	0	0	0	0	0	0	0	0.00	00.00
MP shaft	0	0	1	1	0	0	1			
D. MP	0	0	1	1	0	0	1		0.13	04.17
acc. MP	0	0	0	0	0	0	0		0.00	00.00
phalanx 1			8	8	0	0	8		2.00	66.67
phalanx 2			1	1	0	0	1		0.25	08.33
phalanx 3			1	1	0	0	1		0.13	04.17
Total	**18**	**8**	**346**	**45**	**8**	**3**	**372**			

Table 4.4: BPR for *Rangifer tarandus* and *cf. Rangifer tarandus* from the Trou des Nutons, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
antler			4	4	0	1	4			
cranial			4	1	3	0	4			
maxilla	1	2	0	3	0	0	3	2	1.50	85.71
mandible	1	0	0	1	0	0	1	1	0.50	28.57
teeth			0	0	0	0	0			
atlas			0	0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	0	0	0	0	0	0	0	0	0.00	00.00
sacrum			0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0	0.00	00.00
whole humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0	0.00	00.00
humerus shaft	1	0	0	0	1	0	1			
d. humerus	0	0	0	0	0	0	0	0	0.00	00.00
whole radius	0	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0	0.00	00.00
radius shaft	0	1	0	1	0	0	1			
d. radius	2	0	0	1	1	0	2	2	1.00	57.14
ulna	0	1	0	0	1	0	1	1	0.50	28.57
carpals	0	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0	0.00	00.00
p. MC	2	0	0	1	1	0	2	2	1.00	57.14
MC shaft	0	0	2	2	0	0	2			
d. MC	0	0	0	0	0	0	0	0	0.00	00.00
whole femur	0	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	1	0	1	0	1	1	1	0.50	28.57
d. femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	1	0	1	0	0	1	1	0.50	28.57
whole tibia	0	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	1	0	1	0	0	1	1	0.50	28.57
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	1	1	0	2	0	1	2			
MT	0	0	0	0	0	0	0	0	0.00	00.00
p. MT	2	0	0	2	0	0	2	2	1.00	57.14
d. MT	0	0	0	0	0	0	0	0	0.00	00.00
MP	0	0	0	0	0	0	0		0.00	00.00
p. MP	0	0	0	0	0	0	0		0.00	00.00
d. MP	0	0	2	0	2	0	2		0.50	28.57
phalanx 1			5	1	4	1	5		1.25	71.43
phalanx 2			7	1	6	0	7		1.75	100.00
phalanx 3			0	0	0	0	0		0.00	00.00
Total	**10**	**8**	**24**	**23**	**19**		**42**			

Table 4.5: BPR for *Cervus elaphus* from the Trou des Nutons, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
horn core			13			1	13			
cranial			14			1	14			
maxilla	07	01	00	08	00	0	08	07	04.00	20.00
mandible	14	19	07	30	10	0	40	19	20.00	100.00
teeth			33	33	00	0	33			
hyoid			02	02	00	0	02	02	01.00	05.00
atlas			04	04	00	1	04	04	04.00	20.00
axis			01	01	00	0	01	01	01.00	05.00
cervical v.			09	01	08	0	09	09	01.29	06.43
thoracic v.			19	02	17	0	19	19	01.46	07.31
lumbar v.			11	00	11	0	11	11	01.83	09.17
vertebra indet			02	02	00	0	02			
ribs			15	15	00	0	15			
innominate	03	07	00	10	00	1	10	00	05.00	25.00
sacrum			01	00	01	0	01	01	01.00	05.00
caudal v.			00	00	00	0	00		00.00	00.00
scapula	13	12	00	20	05	0	25	13	12.50	62.50
whole humerus	01	00	00	01	00	0	01	01	00.50	02.50
p. humerus	00	01	00	01	00	0	01	01	00.50	02.50
hum shaft	00	02	00	02	00	0	02			
d. humerus	08	17	00	25	00	2	25	17	12.50	62.50
whole radius	06	03	00	07	02	1	09	06	04.50	22.50
p. radius	02	03	00	05	00	0	05	03	02.50	12.50
radius shaft	01	01	00	02	00	0	02			
d. radius	00	00	00	00	00	0	00	00	00.00	00.00
ulna	07	07	00	07	00	1	14	07	07.00	35.00
carpals	02	00	00	02	00	0	02		00.33	01.67
whole MC	01	01	00	02	00	0	02	01	01.00	05.00
p. MC	03	02	00	04	01	0	05	03	02.50	12.50
d. MC	03	00	01	03	01	0	04	03	02.00	10.00
whole femur	01	01	00	00	01	0	02	01	01.00	05.00
p. femur	01	01	00	01	01	0	02	01	01.00	05.00
femur shaft	02	00	00	02	00	0	02			
d. femur	01	01	00	02	00	0	02	00	01.00	05.00
patella	00	00	00	00	00	0	00	00	00.00	00.00
whole tibia	02	00	00	00	02	0	02	02	01.00	05.00
p. tibia	02	02	00	03	01	0	04	02	02.00	10.00
tibia shaft	01	05	00	05	01	0	06			
d. tibia	02	03	00	05	00	1	05	03	02.50	12.50
fibula	00	00	00	00	00	0	00	00	00.00	00.00
tarsals	06	05	00	08	03	1	11		02.20	11.00
whole MT	05	03	00	03	05	0	08	05	04.00	20.00
p. MT	02	05	00	07	00	0	07	05	03.50	17.50
MT shaft	01	01	02	02	00	0	04			
d. MT	01	00	01	01	01	0	02	01	01.00	05.00
whole MP			00	00	00	0	00		00.00	00.00
p. MP			01	00	01	0	01		00.25	01.25
MP shaft			00	00	00	0	00			
d. MP			02	01	01	0	02		00.50	02.50
phalanx 1			21	21	00	0	21		05.25	26.25
phalanx 2			06	05	01	0	06		01.50	07.50
phalanx 3			05	05	00	0	05		01.25	06.25
Total	**98**	**103**	**170**	**260**	**74**	**10**	**371**			

Table 4.6: BPR for *Capra* sp. from the Trou des Nutons, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			39	39	00	0	39			
maxilla	11	14	02	23	04	0	27	14	13.50	44.26
mandible	29	30	02	40	21	5	61	30	30.50	100.00
teeth			62	62	00	0	62			
hyoid			00	00	00	0	00	00	00.00	00.00
atlas			07	07	00	0	07	07	07.00	22.95
axis			02	00	02	0	02	02	02.00	06.56
cervical v.			03	01	02	0	03		00.60	01.97
thoracic v.			16	00	16	0	16		01.14	03.75
lumbar v.			07	00	07	0	07		01.17	03.83
innominate	01	03	00	04	00	0	04	03	02.00	06.56
sacrum			04	02	02	0	04	04	04.00	13.11
caudal v.			00	00	00	0	00		00.00	00.00
scapula	21	14	02	26	11	4	37	21	18.50	60.66
whole humerus	00	02	00	01	01	0	02	02	01.00	03.28
p. humerus	00	00	00	00	00	0	00	00	00.00	00.00
humerus shaft	04	05	00	05	04	1	09			
d. humerus	08	21	00	23	06	4	29	21	14.50	47.54
whole radius	02	02	00	04	00	1	04	02	02.00	06.56
p. radius	07	00	00	06	01	1	07	07	03.50	11.48
radius shaft	00	00	00	00	00	0	00			
d. radius	02	00	00	00	02	0	02	02	01.00	03.28
ulna	21	15	00	36	01	3	36	21	18.00	59.02
carpals	00	00	00	00	00	0	00		00.00	00.00
whole MC	06	11	00	11	08	0	17		02.13	06.97
p. MC	00	00	00	00	00	0	00		00.00	00.00
d. MC	00	02	00	02	00	0	02		00.25	00.82
whole femur	01	01		00	02	0	02	01	01.00	03.28
p. femur	02	02	00	00	04	0	04	02	02.00	06.56
femur shaft	00	00	00	00	00	0	00			
d. femur	01	00	00	00	01	0	01	01	00.50	01.64
patella	00	00	00	00	00	0	00	00	00.00	00.00
whole tibia	02	03	00	00	05	0	05	03	02.50	08.20
p. tibia	03	02	00	02	03	0	05	03	02.50	08.20
tibia shaft	05	01	00	03	03	0	06			
d. tibia	01	00	00	01	00	0	01	01	00.50	01.64
fibula	04	02	00	04	02	0	06	04	03.00	09.84
tarsals	07	06	00	09	04	1	13		00.93	03.04
whole MT	08	14	00	10	12	0	22		02.75	09.02
p. MT	00	00	00	00	00	0	00		00.00	00.00
d. MT	00	00	00	00	00	0	00		00.00	00.00
MP	00	00	01	00	01	0	01		00.06	00.20
p. MP	00	00	00	00	00	0	00		00.00	00.00
d. MP	00	00	00	00	00	0	00		00.00	00.00
phalanx 1			07	03	04	0	07		00.44	01.43
phalanx 2			04	00	04	0	04		00.25	00.82
phalanx 3			03	03	00	0	03		00.19	00.61
Total	**146**	**150**	**161**	**327**	**133**	**20**	**457**			

Table 4.7: BPR for *Sus scrofa* from the Trou des Nutons, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
cranial			1	1	0	0	1	1		
maxilla	0	0	0	0	0	0	0	0	0.00	00.00
mandible	1	1	0	2	0	0	2	1	1.00	66.67
teeth			4	4	0	0	4			
atlas			1	1	0	0	1	1	1.00	66.67
axis			0	0	0	0	0	0	0.00	00.00
cervical v.			5	1	4	0	5	2	1.00	66.67
thoracic v.			4	3	1	0	4	2	0.29	19.05
lumbar v.			1	0	0	0	1	1	0.17	11.11
vertebra indet			1	1	0	0	1			
innominate	1	2	0	3	0	0	3	2	1.50	100.00
sacrum			0	0	0	0	0	0	0.00	00.00
scapula	0	1	0	1	0	0	1	1	0.50	33.33
whole humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0	0.00	00.00
d. humerus	0	0	0	0	0	0	0	0	0.00	00.00
whole radius	0	0	0	0	0	0	0	0	0.00	00.00
p. radius	1	0	0	1	0	0	1	1	0.50	33.33
d. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	1	0	1	0	0	1	1	0.50	33.33
carpals	0	3	0	3	0	0	3		0.19	12.50
MC	4	4	0	8	0	0	8	1	0.80	53.33
p. MC	0	1	0	1	0	0	1	1	0.10	06.67
d. MC	0	0	0	0	0	0	0	0	0.00	00.00
femur	0	1	0	1	0	0	1	0	0.50	33.33
p. femur	0	0	0	0	0	0	0	0	0.00	00.00
d. femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0	0.00	00.00
tibia	1	0	0	1	0	0	1	1	0.50	33.33
p. tibia	0	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	3	3	1	7	0	1	7		0.50	33.33
MT	2	5	0	7	0	0	7	1	0.70	46.67
p. MT	0	0	0	0	0	0	0	0	0.00	00.00
d. MT	0	0	0	0	0	0	0	0	0.00	00.00
MP	0	0	1	1	0	0	1	1	0.05	03.33
p. MP	0	1	1	2	0	0	2	1	0.10	06.67
D. MP	0	0	0	0	0	0	0	0	0.00	00.00
phalanx 1			4	4	0	0	4	1	0.20	13.33
phalanx 2			1	1	0	0	1	1	0.05	03.33
phalanx 3			2	2	0	0	2	1	0.10	06.67
Total	**13**	**23**	**26**	**56**	**5**	**1**	**63**			

Table 4.8: BPR for *Ursus arctos* from the Trou des Nutons, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin. MNI**	**% MNI**
cranial	▨	▨	00	00	0	0	00	▨	▨	▨
maxilla	06	01	00	07	0	0	07	06	03.50	06.19
mandible	56	57	00	110	3	1	113	57	56.50	100.00
teeth	▨	▨	38	38	0	0	38	▨	▨	▨
atlas	▨	▨	00	00	0	0	00	00	00.00	00.00
axis	▨	▨	03	03	0	0	03	03	03.00	05.31
cervical v.	▨	▨	01	01	0	0	01	▨	00.20	00.35
thoracic v.	▨	▨	01	01	0	0	01	▨	00.08	00.14
lumbar v.	▨	▨	00	00	0	0	00	▨	00.00	00.00
vertebra (indet.)	▨	▨	01	01	0	0	01	▨	▨	▨
innominate	08	04	00	12	0	0	12	08	06.00	10.62
sacrum	▨	▨	02	02	0	0	02	02	02.00	03.54
caudal v.	▨	▨	07	07	0	0	07	▨	00.33	00.59
scapula	00	00	00	00	0	0	00	00	00.00	00.00
whole humerus	01	00	00	01	0	0	01	01	00.50	00.88
p. humerus	04	01	00	05	0	0	05	04	02.50	04.42
humerus shaft	03	09	00	12	0	0	12	▨	▨	▨
d. humerus	15	23	00	38	0	2	38	23	19.00	33.63
whole radius	02	06	00	08	0	0	08	06	04.00	07.08
p. radius	18	14	00	32	0	0	32	18	16.00	28.32
radius shaft	00	01	00	01	0	0	01	▨	▨	▨
d. radius	05	06	00	11	0	0	11	06	05.50	09.73
ulna	22	16	00	38	0	0	38	22	19.00	33.63
carpals	00	00	00	00	0	0	00	▨	▨	▨
whole MC	04	03	00	07	0	0	07	▨	00.70	01.24
p. MC	00	00	00	00	0	0	00	▨	00.00	00.00
MC shaft	00	00	00	00	0	0	00	▨	▨	▨
d. MC	00	00	00	00	0	0	00	▨	00.00	00.00
whole femur	00	00	00	00	0	0	00	00	00.00	00.00
p. femur	01	02	00	03	0	0	03	02	01.50	02.65
femur shaft	01	00	00	01	0	0	01	▨	▨	▨
d. femur	03	00	00	03	0	0	03	03	01.50	02.65
patella	00	00	00	00	0	0	00	00	00.00	00.00
whole tibia	06	05	00	11	0	0	11	06	05.50	09.73
p. tibia	00	03	00	03	0	0	03	03	01.50	02.65
tibia shaft	01	01	01	03	0	0	03	▨	▨	▨
d. tibia	25	27	00	52	0	0	52	27	26.00	46.02
fibula	00	00	00	00	0	0	00	00	00.00	00.00
tarsals	03	01	00	03	0	0	04	▨	▨	▨
whole MT	06	03	00	09	0	0	09	▨	00.90	01.59
p. MT	00	00	00	00	0	0	00	▨	00.00	00.00
MT shaft	00	00	00	00	0	0	00	▨	▨	▨
d. MT	00	00	00	00	0	0	00	▨	00.00	00.00
whole MP	00	00	09	09	0	0	09	▨	00.45	00.80
p. MP	00	00	04	04	0	0	04	▨	00.20	00.35
MP shaft	00	00	00	00	0	0	00	▨	▨	▨
d. MP	00	00	00	00	0	0	00	▨	00.00	00.00
phalanx 1	▨	▨	00	00	0	0	00	▨	00.00	00.00
phalanx 2	▨	▨	00	00	0	0	00	▨	00.00	00.00
phalanx 3	▨	▨	00	00	0	0	00	▨	00.00	00.00
Total	**190**	**183**	**67**	**436**	**3**	**3**	**440**	▨	▨	▨

Table 4.9: BPR for *Vulpes* sp. from the Trou des Nutons, Furfooz.

THE FAUNAL ASSEMBLAGE FROM THE TROU DU FRONTAL, FURFOOZ.

INTRODUCTION

This chapter discusses the faunal assemblage from the Trou du Frontal at Furfooz (50° 12' 45" North, 4° 57' 30" East; Figure 4.1), another site excavated by Édouard Dupont as part of his investigations into the Upper Palaeolithic of the Dinant region during the 1860s. The collection is now held in the IRScNB in Brussels. As at Chaleux and Nutons, the faunal material discussed here comes from a layer termed the *1^{er} niveau ossifère* by Dupont. This was thought to correspond to the *Age du renne*, or Upper Palaeolithic period (see the transcribed archive labels in Appendix I). Late Magdalenian artefacts were recovered during the excavation, very similar to those recovered from both Chaleux and the Trou des Nutons. Accelerator dating has confirmed the presence of humanly modified Lateglacial fauna as well as later prehistoric material within the assemblage. However, it will be argued that as at the Trou des Nutons, a significant proportion of this assemblage does not date to the Lateglacial but instead to the more recent prehistoric and historic past. Regrettably, a consequence of this is that much of the faunal assemblage attributed to the *1^{er} niveau ossifère* lies beyond the scope of this dissertation.

The faunal assemblage will be described and then discussed below, and BPR tables of the individual species are provided at the end of this chapter

BACKGROUND

The Trou du Frontal lies approximately 200 m to the west of the Trou des Nutons and immediately adjacent to the Trou de la Mâchoire. Excavations commenced at the Trou du Frontal on the 22 November 1864, when Édouard Dupont and two others (presumably workmen) left the excavations then underway at the Trou des Nutons (see chapter 4), and began to explore the cave. During that day they found the partial remains of a bear (vertebrae, ribs, sternum and sacrum), a variety of goat bones and, as night was drawing on, Dupont recognised and then excavated a human frontal bone, which he identified as coming from a 15 or 16 year old. It was from this find that the cave took its name (Dupont 1865c, 10).

A few days later, excavations were resumed under the supervision of Dupont's colleague Van Beneden, at Dupont's request. Once again human bones were found, and the excavations were suspended until other specialists could be invited to the site to authenticate the context of these discoveries. Van Beneden returned to the excavations at the Trou des Nutons until the 10 December 1864 when he, Dupont, Hauzeur and de Reul re-commenced work. They decided to open the small chamber at the back of the cave and, after one member of the team had slipped past a large boulder sealing the entrance, numerous human remains were discovered (*ibid.*) associated with flints and pottery (Dupont 1867a, 7). Excavations continued throughout that month; on Boxing Day 1864 six *savants* joined Dupont, and observed further material being recovered. These visitors (whom Dupont does not name) agreed that these finds were prehistoric and most probably dated to the stone age. In his later writings (1867a; 1872) Dupont assumed that these human bones were of Palaeolithic age and associated with the Magdalenian assemblage from the site. However, we now know that these bodies were interred during the Neolithic, possibly during quite a restricted period. Two radiocarbon dates have come from this material. The first (GrN-10179 4430 ± 30 BP) came from a bulk sample of human ribs (Rosine Orban pers. comm.), the second (OxA-4196 4430 ± 80 BP) from a right tibia. The use of caves as burial places during later prehistory in Belgium and other areas of Europe has been documented (Cauwe *et al.* 1993; Gilks 1988) This tibia, alongside other human bones in the collection, showed distinct butchery traces, which could be correlated with meat removal. This passing observation is difficult to interpret directly in terms of human behaviour, as Cook (1991b, 167) has pointed out. These marks may relate to a particular burial practice, such as the Tibetan 'sky burials', a post-mortem activity such as excarnation (*cf.* Hodder 1990; Walker & San Nicolás Del Toro in press) or even prehistoric cannabalism (*cf.* Villa *et al.* 1986).

Rahir (1914, XXV - XXVI) observed that these burials were most likely to be Neolithic in age. His own excavations were on a small rock shelter above the Trou du Frontal in the same cliff face, which he termed the Abri du Frontal and from which he recovered Magdalenian flint work, bone artefacts and perforated fossil shells as well as human and animal bones. These were all suggested to be of Lateglacial age (*ibid.*, XXVIII). However, no plans or sections of his work at the Abri du Frontal were published and the actual extent of his excavations are unclear. It was not possible to identify the current location of this collection during the course of my research and so this collection in not included within this discussion. As Rahir's results do not relate to the Trou du Frontal but to a nearby site they will not be discussed further here, but have been mentioned for reference.

More recent excavations have been undertaken at the Trou du Frontal by the Service de Préhistoire, University of Liège in collaboration with the ASBL Ardenne et Gaume and were directed by Jean-Marc Leotard (Leotard & Cauwe 1986; Leotard & De Paepe 1987). These excavations began in July 1986, and because of the extensive excavations by both Dupont and Rahir they were restricted to a small area of the remnant talus cone where *in situ* sediment was preserved. Leotard & Cauwe (1986, 84) report having removed 3 square metres of Magdalenian material. During the course of these excavations they recovered further lithic material, including some characteristic Magdalenian forms (*ibid.*, 85 & pl. 5). Very little fauna was recovered, the only reported piece being an eroded and de-mineralised bone or antler fragment, which had traces of working by groove and splinter technique, and this was later considered as a possible dating sample (see below).

STRATIGRAPHY

As at both the Trou de Chaleux and the Trou des Nutons at Furfooz, Dupont recorded a detailed stratigraphic sequence from the Trou du Frontal. The uppermost layer, which also contained Upper Palaeolithic material was, once again termed the *1er niveau ossifère*[1]. The sequence as reported in Dupont (1865a, 843; Figure 5.1) is as follows:

1. *Alluviens actuelles.* Recent alluvial deposits.
2. *Argile jaune et terre gris-jaunâtre avec cailloux anguleux de calcaire et contenant en* ***S*** *des ossements humains (sépulture) et en* ***H*** *les débris de repas et de l'industrie de l'homme.* ***D*** *Dalle fermant la sépulchure. -* ***F*** *Foyer -* ***a*** *Argile des couches* ***3*** *ravinées lors du dépôt de l'argile* ***2****.* [Yellow clay and yellowish-grey earth with angular limestone pebbles and containing at **S** human bones (burial) and at **H** the remains of meals and the human industry. **D** slab sealing the grave. - **F** hearth - the clay of bed 3 eroded whilst clay 2 was being laid down.

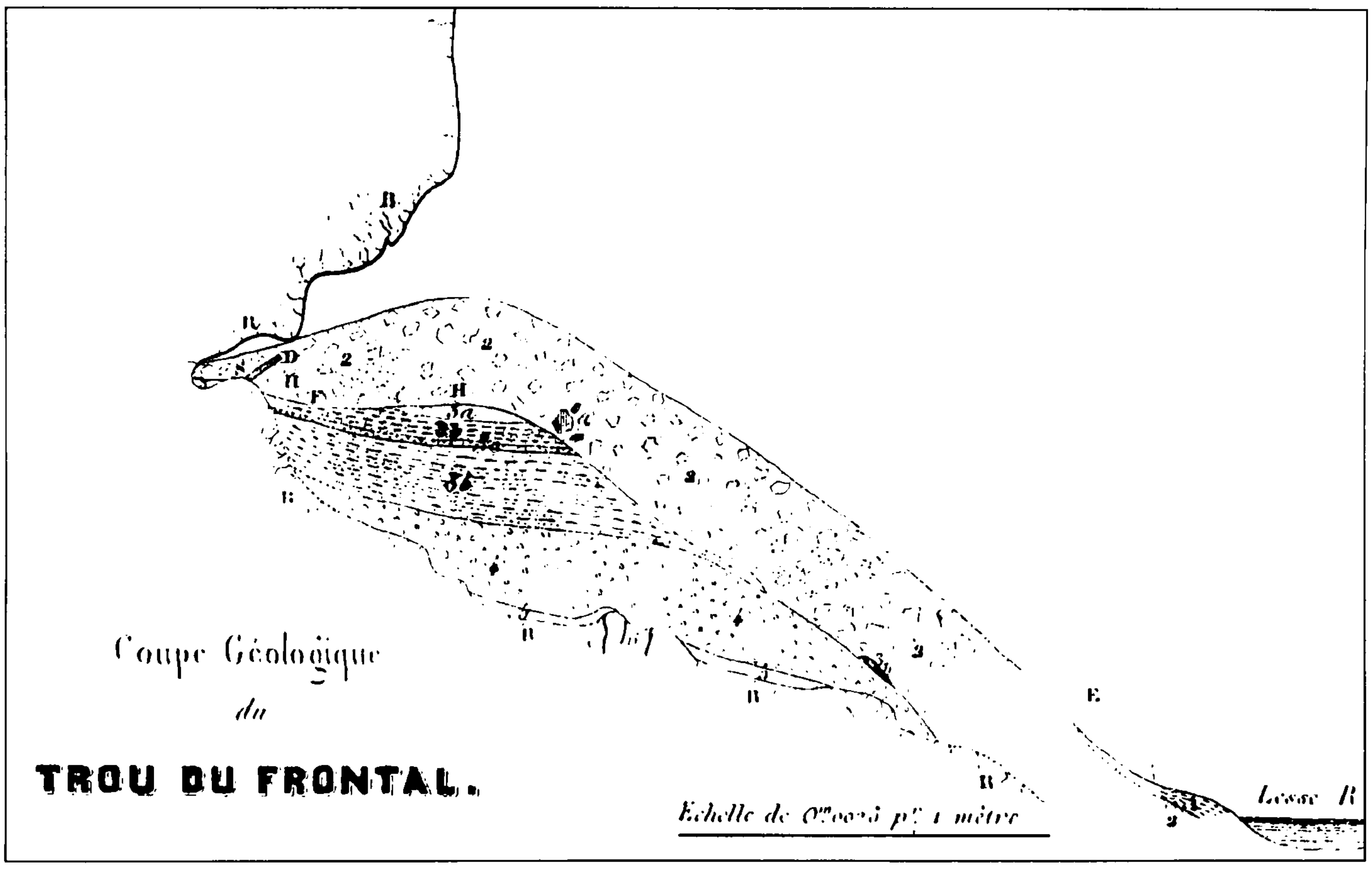

Figure 5.1: Section of the Trou du Frontal (from Dupont 1865a, Planche III).

3. *Dépôt argilo-sablonneux stratifié. -* ***3a****. Argile jaune-rougeâtre;* ***3c****. Lit de gravier;* ***3b****. Argile grise alternant avec des sables jaunes.* Deposit of stratified sandy-clay. **3a**. Reddish-yellow clay; **3c**. Gravel bed; **3b**. grey clay alternating with yellow sands.
4. *Cailloux roulés provenant de l'Ardenne.* Rolled pebbles from the Ardenne.

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[1] It is currently unclear whether Dupont identified a *2^{e} niveau ossifère*, although this is implied by use of the term *1er niveau ossifère.*

5. *Sables quartzeux verdâtres avec traces de tourbe.* Greenish quartz sand with traces of peat.
6. *Argile jaune et rouge en filons.* Veins of yellow and red clay.
7. **R**. *Rocher.* Bedrock
8. **F**. *Déblai provenant de l'exploitation.* Spoil from the workings.

Leotard & Cauwe (1986, 84) commented that the stratigraphy they observed corresponded directly with that noted by Dupont. Unfortunately I was unable to locate any key to link their published section (*ibid.*, planche 3; Figure 5.2) with the sequence described by Dupont. A close inspection of Leotard & Cauwe's section, overlaid with the 2 dimensional vertical distribution of the finds (*ibid.*, planches 3 & 4), indicates that the Magdalenian material came from their Layers 5a and 5b. There is no key as to how their different stratigraphic layers were defined.

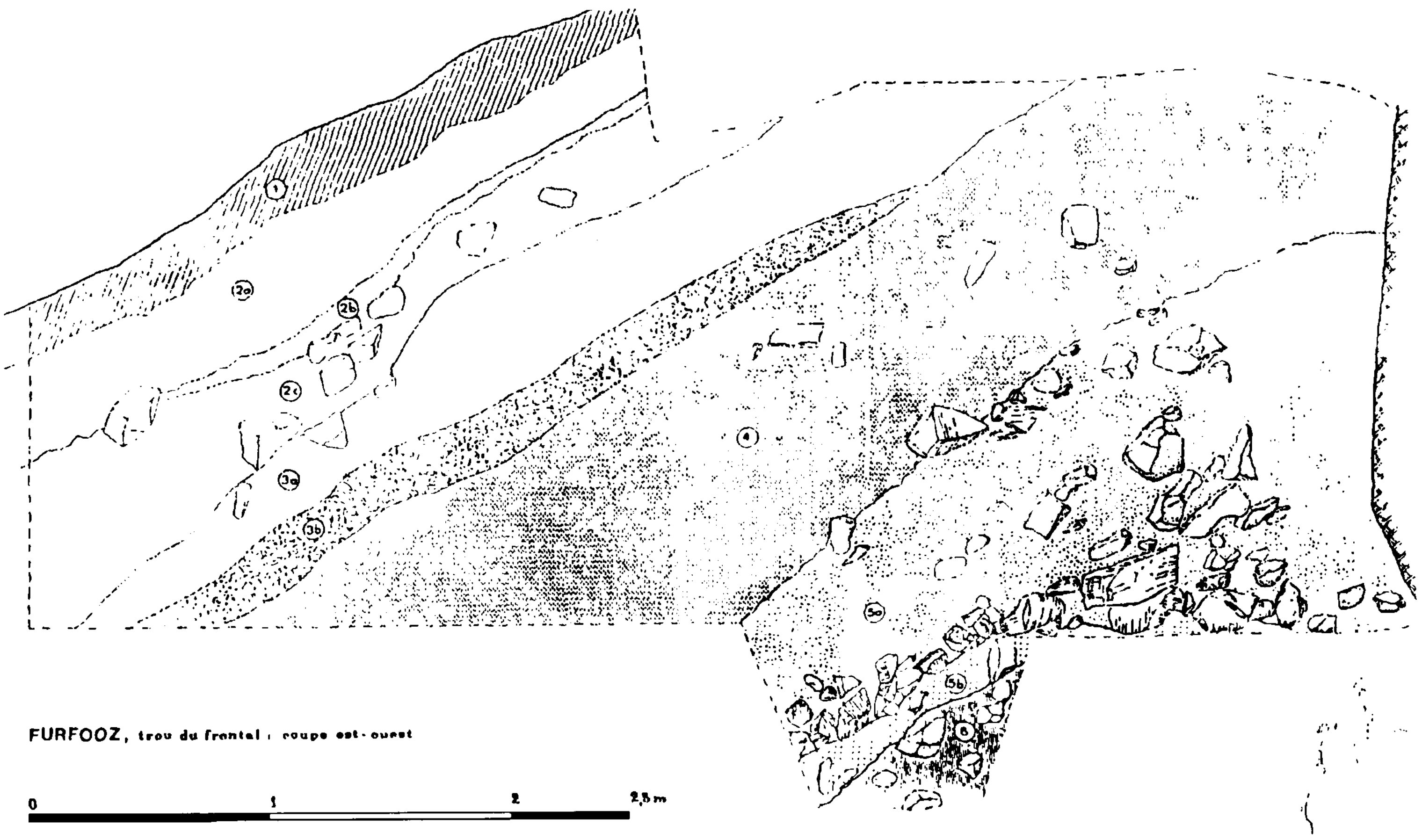


Figure 5.2: Section of the Trou du Frontal (after Leotard & Cauwe 1986, planche 3).

In Dupont's stratigraphic sequence (Figure 5.1 above) it is clearly stated that the human worked material and the hearth were all found in layer 2, close to the contacts with layers 3a and 3b. There seems to be no direct correlation between this, Leotard & Cauwe's published section and the layers in which artefacts were reported in the two reports (Dupont 1865a; Leotard & Cauwe 1986). The Magdalenian layers figured by Leotard & Cauwe seem to be somewhat lower in the sequence than any reported by Dupont, but this is not absolutely clear. It can only be assumed here that Dupont's *1^er^ niveau ossifère* at the Trou du Frontal combined a number of the separate stratigraphic layers he identified (this combination of separate layers reported in his initial accounts may also have occurred at both Chaleux and Nutons, although this is felt to be less likely (see chapters 3 & 4 above). If this is correct, it is only too likely that the *1^er^ niveau ossifère* includes a mixture of fauna and artefacts of many different ages, which may once have been stratigraphically separated. Any such differentiation has now been lost.

ARCHAEOLOGY

Arguably the most remarkable feature of this site is the large quantity of human remains recovered from it. Whilst Dupont thought that these were of Palaeolithic age, radiocarbon dating of human bone indicates a Neolithic age for these burials (see chapter 2 and discussion below). The use of caves as human burial sites during later prehistory has been well documented elsewhere, and does not require further comment here. The human bone material is held in the Dept. d'Anthropologie et Préhistoire, IRScNB alongside the archaeological material whilst the large mammal fauna is held in the Dept. de Paléontologie.

The lithics (Dewez 1987) are characteristically late Magdalenian. Backed blades and bladelets (some denticulated), crested blades, multiple piercers, burins, *pièces esquillées* and *Perçoirs doubles type de Chaleux. Zinken* have also been claimed, although as at the Trou des Nutons (chapter 4) none figured by Dewez fulfil all the criteria. In total the lithic assemblage is made up of 1301 individual pieces of which 1120 are debitage (data from Dewez 1987). Dewez (*ibid.*) also figures eyed needles, broken and complete *sagaies*, a perforated cervid canine tooth, various perforated shells (*ibid.*; figure 144), an engraved *galet* (*ibid.;* figure 145) and an engraving of the rear end of a large mammal, usually identified as *Bos primigenius* (Twiesselmann 1951) on a broken plaquette.

There are many pieces of debitage from bone and antler working. Dewez (1987, figure 135) illustrates numerous pieces of bone and antler fragments showing the distinctive grooves from groove and splinter technique. Figure 134 (*ibid.*) shows an *Equus ferus* radius which has been used as a core for the production of bone blanks.

Artefacts recovered by Leotard & Cauwe (1986) are also most likely to be Magdalenian, although the sample size is relatively small (a total of 351 pieces are listed by Leotard & Cauwe *ibid.*). Their illustrations show backed bladelets, broken backed blades, burins and a piercer (*ibid.*, planche 5). It does not seem unreasonable to assume that these pieces belong to the same Magdalenian assemblage recovered by both Dupont and Rahir from this site. From the point of view of this thesis, it is clearly established that there was a distinct Magdalenian occupation at the site. Although later prehistoric artefacts and human remains are present, there was strong a possibility that at least some of the faunal collection dates to the Pleistocene.

FAUNA

Perhaps the greatest problem in the analysis and discussion of the fauna from the Trou des Nutons (chapter 4) was the uncertainty relating to the proportion of the fauna from the *1^er^ niveau ossifère* from that site that was truly of Lateglacial age. The same problem is equally true of its neighbour, the Trou du Frontal. The faunal assemblage from Frontal is smaller (NISP = 1245) than that from the Trou des Nutons, but there are striking similarities. A rapid inspection of Table 5.1 indicates that many of the species suggested to be of later prehistoric/historic age at the Trou des Nutons are also present at the Trou du Frontal. Just under 50% of the large mammal fauna from Frontal is accounted for by the ovi-caprids and the suids combined, the ovi-caprids being slightly more abundant. It will be argued below that a significant part, if not all, of the specimens from these two groups are not of Pleistocene age and instead are the result of much more recent episodes of faunal accumulation within the cave.

Species	**NISP**	**MNI**	**% of ident. fauna**	**At Trou des Nutons**
Ovis/Capra sp.	304	10	24.42	√
Sus scrofa	295	12	23.69	√
Bos sp.	178	8	14.30	√
Equus ferus	81	4	6.51	√
Felis sp.	76	4	6.10	√
Vulpes sp.	74	3	5.94	√
Ursus arctos	59	2	4.74	√
Lepus sp.	43	5	3.45	√
Cervus elaphus	32	3	2.57	√
Rangifer tarandus	30	2	2.41	√
Canis sp.	19	3	1.53	√
Mustela sp.	17	2	1.36	√
Oryctolagus cuniculus	17	2	1.36	
Capreolus capreolus	16	3	1.28	√
Meles meles	3	1	0.24	√
Castor fiber	1	1	0.08	
Total	**1245**		**99.98**	

Table 5.1: NISP, MNI & % of identifiable fauna for all large mammal species from the Trou du Frontal, Furfooz.

The sepulchral use of the site during the local Neolithic has been clearly demonstrated by radiocarbon dating. Human burials were reported by Dupont to have been found within a restricted part of layer 2 (Figure 5.1), which I have suggested is included within Dupont's *1^{er} niveau ossifère*. The *1^{er} niveau ossifère* is also the layer from which all of the fauna discussed in this chapter originated. As noted above, Leotard & Cauwe's more recent record of the stratigraphy is said by them to be in broad accordance with Dupont's although Magdalenian material appears to have been found in a lower part of the stratigraphy. It has been suggested that, as at the Trou de Chaleux and the Trou des Nutons, Dupont combined a series of stratigraphically discrete units into what he called the *1^{er} niveau ossifère*, and in doing so combined Pleistocene material with that of much later periods. As little archival material relating to Dupont's excavations in the Lesse valley or subsequent work on the faunas has been located, it is impossible for the moment to make any attempt at re-attributing individual specimens to the layers originally observed in 1865.

Dating evidence

The recent AMS work at this site has already been discussed in some detail in chapter 2. A part of the recent AMS project has gone some way towards confirming the presence of later prehistoric components within the *1er niveau ossifère*. Two AMS dates are currently known from the site. OxA-4196 (4430 ± 80 BP) taken from a human tibia has dated the use of this site as a burial place during the local Neolithic, whilst OxA-4197 (12800 ± 130 BP) from a cut left metacarpal of *Equus ferus* indicates human activity during the Lateglacial. Conventional radiocarbon dates are also available from this site: Lv-1749 (12950 ± 170 BP) and Lv-1750 (13130 ± 170 BP) have recently been reported (Leotard 1993), although neither sample details nor any contextual relationship between these and the Magdalenian archaeology are currently available in the published literature. Another conventional date of 10350 ± 150 BP (Lv-1135) from the site exists (Gilot, 1984), although again both full contextual and sample details are lacking. A final conventional date, GrN-10179 (4430 ± 30 BP), taken from a bulk sample of human ribs is very similar to OxA-4196 and broadly confirms the sepulchral use of the site during later prehistory.

During one of my research visits to Liège, Jean-Marc Leotard made available a sample of worked bone or antler (it was not possible to determine which as the specimen was de-mineralised and eroded on its surface) from his recent excavations. This specimen is figured by Leotard & Cauwe (1986, planche 5 N°18). It is an off-cut from groove & splinter working of bone or antler and was not identifiable to species and/or anatomical element. After some consideration and consultation with Dr. Rupert Housley at the Research Laboratory for Archaeology and the History of Art in Oxford, it was decided not to proceed with the dating of this specimen for three reasons. First, any resulting date would not be of use in establishing species presence/absence. Secondly, the de-mineralised state of the bone indicated that this specimen might not respond well to the necessary chemical pretreatment. Finally it was likely that the entire specimen would be required to achieve a date, and this would mean the total destruction of the only piece of worked bone or antler from Leotard and Cauwe's excavations. Overall, it was felt that there was a strong possibility that this specimen was unsuitable for AMS dating, and so it was returned intact to Liège.

In summary, it is possible to identify the presence of at least two periods of human activity at the site based on the radiocarbon evidence. An earlier use of the site during Dryas I/early Bölling is indicated by OxA-4197. Much later use of the site as a burial place is indicated by OxA-4196. These two dates remains the only ones which can be directly linked to human presence at the site, although the conventional dates (discussed briefly above and in more detail in chapter 2) are in broad agreement. The only conventional date which does appear wholly incongruous is Lv-1135; given the lack of sample documentation, it is hard to link this with any particular episode of human activity. There are no forms of archaeological evidence to suggest that the cave was used by humans during Dryas III (the period indicated by this radiocarbon determination), although Ahrensburgian material of broadly that age has been noted in other sites in the region (specifically at the Grotte du Coléoptère and the Grotte de Remouchamps).

Seasonality

No material from the Trou du Frontal was included in Stutz's research on the Lesse valley faunas, and I am not aware of any other attempts to establish seasonality evidence on the basis of osteological data for the Trou du Frontal or its immediate surroundings during the Lateglacial. I myself felt that it would be futile to attempt to determine any seasonality evidence from the Frontal collection for a number of reasons. Firstly because a significant component of the fauna from the *1er niveau ossifère* appears to be Holocene rather than Pleistocene in age, so that any age structure or seasonality models derived from this material might have little, if any, significance for Lateglacial faunal exploitation. Secondly the limited number of large mammal species for which there are reliable methods for deriving population structure and seasonality data included species apparently present in both Lateglacial and more recent contexts (red deer, caprids, and suids) at this site. Thirdly neither I nor the staff at the IRScNB were willing to undertake any form of destructive sampling (such as that necessary for the analysis of incremental banding in teeth) on such a small collection. Finally, I had insufficient time available for the fieldwork and laboratory analysis that would have been needed. Consequently only a minimal attempt is made here to establish population structure and seasonality information. Adult, juvenile and foetal bone was recorded, and both eruption stages and wear patterns were noted when time permitted. Unfortunately much of this body of data relates to material which is far more likely to be later prehistoric in age rather than Lateglacial.

DISCUSSION OF INDIVIDUAL SPECIES

Order Perissodactyla

Family Equidae

Equus ferus - Horse

The wild horse is one of the few species at the Trou du Frontal for which there is clear evidence for both its local presence during the Lateglacial and its exploitation by humans. Detailed evidence relating to the Lateglacial butchery of this species at Chaleux has been discussed in chapter 2. As we have seen, a cut left metacarpal of *Equus ferus* yielded the only Lateglacial AMS date from Frontal (OxA-4197 12800 ± 80 BP). However, this alone cannot be used to suggest that all or even the majority of equids from Frontal are of Lateglacial age. Only 81 specimens were present within the assemblage (6.51% of the identified fauna), and of these only 9 showed any butchery traces. Detailed BPR information is given in Table 5.2.

The butchery marks observed corresponded with meat removal, tendon extraction and disarticulation. Two scapulae (both part of bulk Acc. N° 2449) had marks on both the dorsal and ventral surfaces consistent with meat filleting, matching those observed on specimens of *Equus ferus* scapulae from Chaleux. Three of the metapodia were longitudinally split along the same axis as those already noted from the Trou de Chaleux and the Trou des Nutons. These are illustrated in Figure 5.3. The surface of one of these specimens, a proximal right metacarpal, was covered by longitudinal scrapes which most

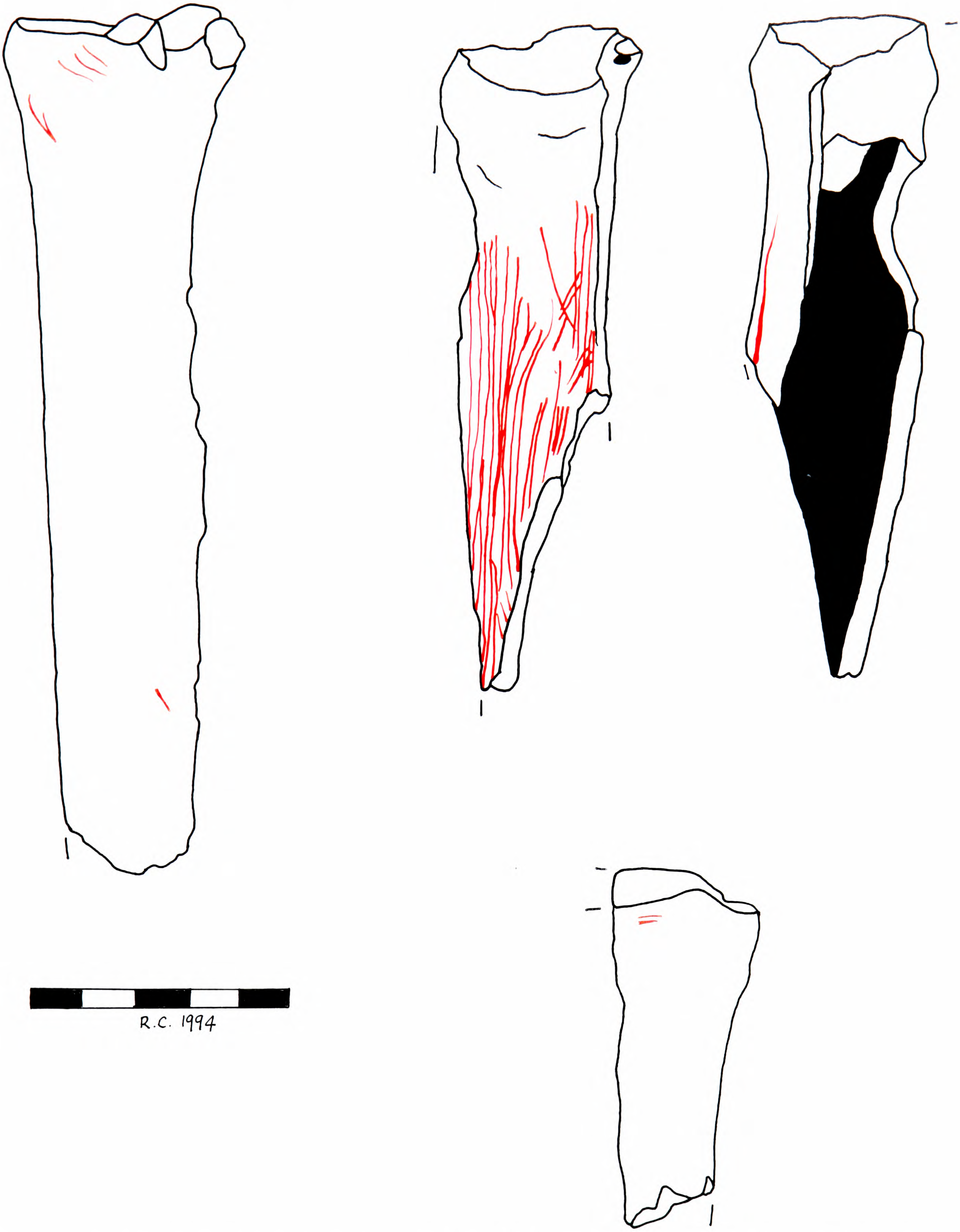


Figure 5.3: Cut *Equus ferus* metapodia from the Trou du Frontal, Furfooz. Scale in cm.

probably correlate with periosteum removal. Whilst describing Nunamiut Eskimo butchery practices Binford (1981, 134) commented that:

> "The secret of controlled breakage of marrow bones is the removal of the periosteum in the area to be impacted. The Nunamiut invariably do this by scraping it back with the edge of a knife, a rough surface on a hammerstone, or almost any handy crude scraping tool. This means that longitudinal scratches and striations along the shafts of long bones are commonly produced when bones are prepared during marrow processing."

This description and the accompanying illustration (*ibid.*, figure 4.41) fit well with the *Equus ferus* specimen illustrated here in Figure 5.3. It has to be commented that this was the only specimen in the Frontal collection (and for that matter from any of the cave sites examined in this dissertation) to show clear traces of this type of longitudinal scraping. This particular bone also showed the distinctive traces of having been used as a core for the groove and splinter technique of bone blank extraction. It is one of only a few bone specimens to have been identified as a core for this type of working from Belgian Lateglacial contexts.

Two 1st phalanges were cut, the marks being consistent with tendon extraction. They occurred in similar locations and orientations to those already noted from Chaleux. It was possible to re-articulate one hind limb (Plate 5.1) with reasonable confidence, although no butchery marks were noted running between the different bones. This suggests that complete limbs were brought to the site, some of which may have subsequently been processed. However, there is nothing to indicate the processing of complete horse carcasses at the site.

Overall, the evidence for horse butchery from Frontal shows some striking parallels with that from the Trou de Chaleux and the Trou des Nutons, although the sample of cut *Equus ferus* bones from Frontal is relatively small. It is tempting to suggest that this part of the collection is wholly of Lateglacial age because of both the radiocarbon evidence and the butchery parallels. However, I feel that these two strands of evidence are not strong enough grounds upon which to base such a supposition. The horse has been ubiquitous in north-western Europe for much of the Pleistocene and Holocene; given the highly mixed nature of the fauna from the *1^er^ niveau ossifère* at Frontal, it is likely that at least a part of the equid material is of more recent origin than the Lateglacial. Yet again, this site is one where further AMS work could be of benefit in testing the true age of the modified horse bones. It would be particularly interesting to date the metacarpal showing signs of periosteum removal, as this particular butchery activity does not appear to have figured greatly in the Magdalenian processing of large mammal carcasses in the Lesse valley, despite the apparent emphasis on marrow extraction.

Plate 5.1: Re-articulated hind limb of *Equus ferus* from the Trou du Frontal, Furfooz. Scale in inches and mm.

Order Artiodactyla

Family Cervidae

Rangifer tarandus - Reindeer

Reindeer are believed to have become locally extinct after the start of the Holocene, and the 30 specimens from Frontal can therefore safely be assumed to be of Pleistocene age. As there are no indications that any part of the archaeology or fauna from the *1er niveau ossifère* predates the Lateglacial, it will be assumed that this part of the collection dates to the Lateglacial.

Exactly half of the NISP count for *Rangifer* is accounted for by individual antlers and antler fragments (Table 5.3). Four of these show the distinctive signs of working by groove and splinter technique (one is illustrated in Plate 5.2). As this method of antler working is common throughout the European Upper Palaeolithic, there is little direct evidence to link this material directly to the Magdalenian occupation of the Trou du Frontal. Although a Bölling Interstadial age is the most likely for the exploitation of this species (the only Upper Palaeolithic archaeological material from the *1er niveau ossifère* is late Magdalenian), the possibility of reindeer being exploited during another period of the Lateglacial remains. Since there is no reason to suppose that a complete reindeer carcass was ever present within the *1er niveau ossifère*, it may well be that non-human predators were at least in part responsible for the general accumulation of reindeer bones here during the Lateglacial period. Indeed, it is clear that a number of predators were active both at the Trou du Frontal itself and elsewhere in the Lesse valley area during the Lateglacial (see below).

Only one postcranial element shows any trace of human activity, a humeral shaft with filleting marks (Figure 5.4) which indicate meat removal. Most of the primary meat bearing areas of reindeer carcasses (the trunk and upper portions of the fore and hind limbs) are absent or represented only by single specimens. However, given the low NISP count for this species (30) any apparent patterning that appears in the BPR table for this species (Table 5.3) is likely to be fortuitous.

Figure 5.4: **Cut right humeral shaft of Rangifer tarandus from the Trou du Frontal, Furfooz. Scale in cm.**

Plate 5.2: Offcut of *Rangifer tarandus* antler showing traces of working from the Trou du Frontal, Furfooz. Scale in cm and inches.

Cervus elaphus - Red Deer

Specimens of red deer are relatively abundant in north-western European Bölling Interstadial faunas. However, their presence within the *1er niveau ossifère* is no guarantee of a Pleistocene age for this part of the collection, let alone dating it to the Bölling Interstadial phase of the Lateglacial. It has already been noted that red deer occur throughout much the Late Pleistocene and Holocene in the study region (chapters 3 & 4), and it will be recalled that at the nearby Trou des Nutons human exploitation of red deer has been dated to 2210 ± 80 BP via AMS (OxA-4194; chapters 2 & 4). Only one specimen of *Cervus elaphus* from the Trou du Frontal shows any traces of human modification: a left innominate has marks which correlate with meat filleting along the iliac pillar (Figure 5.5). As only one specimen of red deer was modified, a detailed discussion of the supposed butchery activities on this species is not appropriate, and it is not even established whether

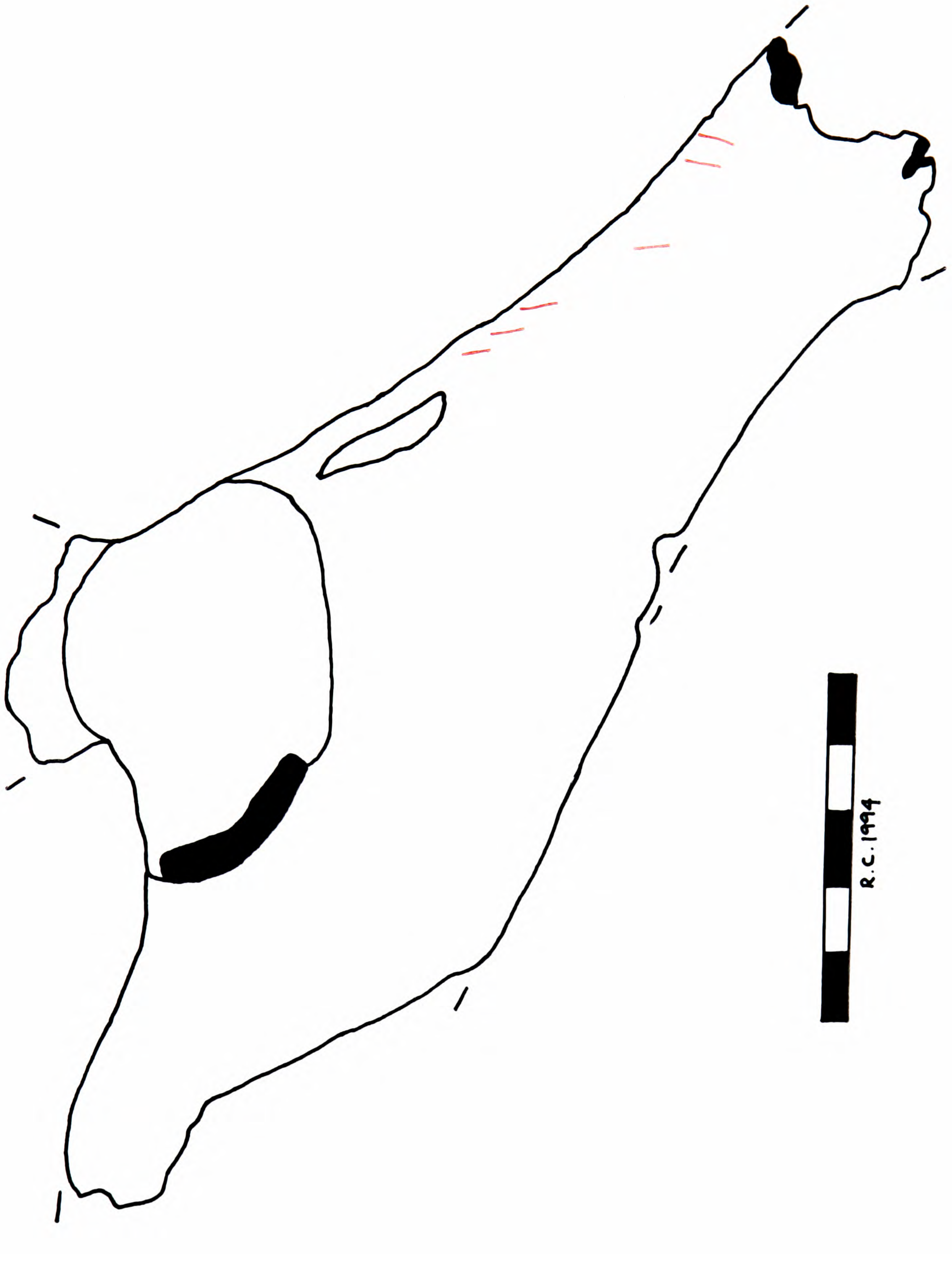


Figure 5.5: Cut left innominate of *Cervus elaphus* from the Trou du Frontal, Furfooz. Scale in cm.

these marks can be taken as evidence for Lateglacial exploitation of red deer at the Trou du Frontal. Further radiocarbon dating would be the only way of determining the true age of this particular specimen.

The MNI of 3 for red deer in Table 5.1 above was obtained by combining the MNI of 2 (based on the 2 adult right proximal femora) with the unfused (juvenile) humerus shaft shown in Table 5.4 below, indicating that parts of at least 2 adults and a juvenile were recovered from the site. Although there are no complete skeletons of red deer (NISP = 32), most of the individual body parts (e.g. the fore and hind limbs) are represented by a few of their constituent elements. The only exception to this is the lack of vertebrae of any kind. It is tempting to interpret this absence as evidence for the removal of this meat bearing area by one or more of the many predators (including humans) who may have used the Trou du Frontal, especially as the only pelvic fragment shows traces of meat filleting. However, such a conclusion could not be justified on such a small sample with so little evidence for predation and subsequent bone modification of any form. The apparent patterning could equally be explained by the selective preservation of specimens on site or during later museum curation. It is also tempting to believe that Dupont preserved much, if not all, of the fauna he recovered from his earliest excavations at the Furfooz caves; however, the strong evidence which suggested that this was the case at the Trou de Chaleux (preservation of vast quantities of unidentifiable bone and bone fragments) is lacking from either the Trou des Nutons or the Trou du Frontal. It will be suggested for many of the other species discussed in this chapter that the uncertainty over the possible selectivity of specimens has influenced the BPR, and consequently this particular technique will not be used extensively. The uncertainties relating to sample selection combined with the extremely low NISP count for the red deer from Frontal precludes any meaningful discussion of the BPR data for red deer.

Capreolus capreolus - Roe Deer

Only 16 specimens of roe deer were identified in the Frontal collection, and none of these was modified. Whilst it is possible that roe deer occurred during one or more of the

Interstadial phases of the Lateglacial, it seems more likely that the 16 specimens of *Capreolus capreolus* from the *1er niveau ossifère* actually date from the Holocene. Roe deer have been recorded from Holocene contexts throughout north-western Europe, and given the mixed nature of the fauna from the *1er niveau ossifère* the suggestion of a Holocene date seems most likely.

As none of these specimens was modified, there is nothing to link them directly to any human activity at Frontal. Instead, these bones are more likely the residues from carnivore activities at the site. Taking the low NISP count into account, in conjunction with the lack of human activity, there seems little point in discussing in detail any patterning based on the BPR data although it is given in Table 5.5 for reference.

Family Bovidae

Bos sp. - Aurochs and Domestic Cattle

Once again, the problem of Holocene contamination is the primary bar to any detailed analysis of the Lateglacial exploitation of this group. Dupont identified 2 bovids within the Frontal assemblage, *Bos primigenius major* and *Bos primigenius minor*. As I have already discussed (chapter 4), these designations are now believed to reflect sexual dimorphism rather than the presence of two sub-species. A further complication is that Dupont does not appear to have considered the possibility that at least some of these large bovids might be domestic cattle (*Bos taurus*) rather than aurochsen. It is certainly possible that at least some of the large bovids are of Holocene age. The large bovid bones from the Trou du Frontal are, for the most part, fragments rather than complete specimens, and attempts to establish more detailed species designations proved problematic. Whilst there is certainly a marked size variation between specimens this could as easily be accounted for by the presence of domestic cattle as by sexual dimorphism. Shortage of research time and lack of comparative material conspired to make accurate determination of these specimens impossible.

Neither bison nor musk oxen were claimed by Dupont from this assemblage, and no specimens of either species were noted during my own study of the Frontal material.

BPR details of the bovid section of the assemblage are given in Table 5.6 at the end of this chapter, although the patterning will not be discussed within this dissertation for three reasons: first, it is unclear just how many separate species of bovid are included within the designation *Bos* sp.; second, the true age of these specimens is unknown. and third, the totals for most of the individual anatomical elements are low (few over 30, many below 10) and it was not felt appropriate to base any detailed discussion of the large bovids on such a small (and potentially unrepresentative) sample.

Butchery marks were noted on a small proportion of the large bovid bones (7.86%). Although 14 cut bones were present, these indicated only two butchery activities. Meat filleting marks were observed on an innominate fragment (Figure 5.6) as well as two mandibles and a partial scapula, whilst disarticulation accounted for all the other marks. One proximal radius had deep cuts on the articular surface (Figure 5.7), indicating that it had been prized away from the humerus whilst articulated. It is possible that at least some of these traces are the result of Lateglacial butchery activities. There are similarities in the location and orientation of the butchery marks (and presumably the butchery technique employed) when a comparison is made with the cut marked bones of *Equus ferus* from Chaleux. The prizing apart of limb units by the insertion of flint tools within articular capsules was commented upon in chapter 3.

Sadly, one has to repeat that the problem of later prehistoric contamination of the *1^er^ niveau ossifère* at Frontal makes any detailed discussion of these butchery patterns irrelevant for the present. The actual age of any of the large bovid remains from the *1^er^ niveau ossifère* is open to question at the moment, and these specimens may well span a considerable part of the Holocene as well as the Lateglacial. At the time of writing, there is little available biostratigraphic information relating to the presence or absence of larger bovids over the last 16,000 years in the Lesse valley region. No attempts have yet been made to date any of the supposedly Lateglacial large bovids from the sites under discussion within this dissertation. It would be a useful exercise to attempt to establish in more detail which particular bovid species were present (and exploited), and the age of that exploitation, as part of future research on the collection from Frontal.

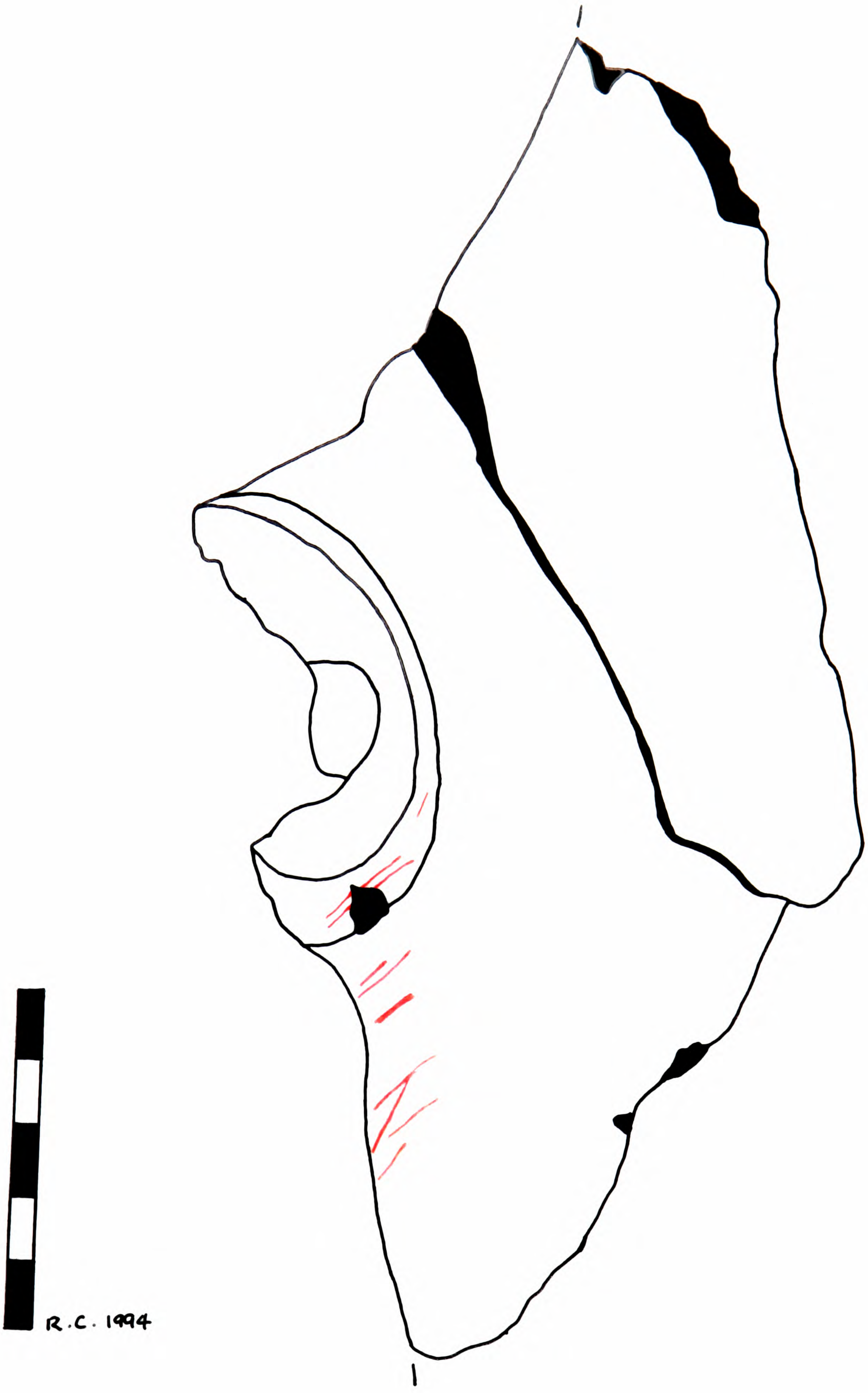


Figure 5.6: Cut *Bos* sp. innominates from the Trou du Frontal, Furfooz. Scale in cm.

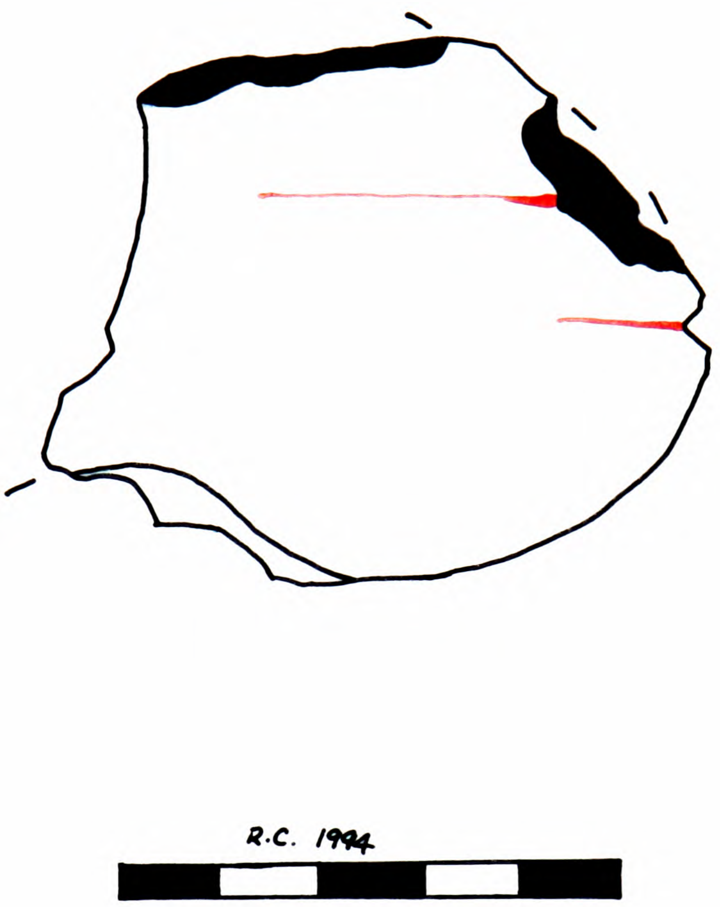


Figure 5.7: Cut *Bos* sp. proximal radius from the Trou du Frontal, Furfooz. Scale in cm.

Capra sp. - Ibex, Chamois and Goat

Ovi-caprids were the commonest group encountered within the Frontal assemblage (NISP = 304, MNI = 10). Dupont identified two caprids within the collection, wild goat (*Capra aegagrus*, the ancestral form of modern domestic goats) and chamois (*Rupicapra rupicapra*). However, none of the 13 specimens identified by Dupont as chamois could be confirmed as such, and were instead identified only as *Capra* sp. No bones of ibex (*Capra ibex*) or of domestic sheep (*Ovis aries*) were noted within this assemblage. All this leaves open the possibility that some wild caprids were present within the assemblage, and that a part of this group may have originated during the Lateglacial, but this cannot be conclusively demonstrated.

Given the problems encountered at both the Trou de Chaleux and the Trou des Nutons in differentiating Pleistocene from Holocene caprids, alongside the stratigraphic problems discussed above, it was only too likely that some if not all of the ovi-caprids at the site could be of later prehistoric age. This suspicion grew when it was observed during analysis that some specimens from this assemblage were greasy to the touch, suggesting that death had occurred in the relatively recent past. Others showed butchery traces which were more consistent with the use of metal tools rather than flint. These different strands of evidence led to the conclusion that there was little if any evidence to suggest that the ovi-caprids from Frontal were of Lateglacial age. This being the case, the ovi-caprid part of the fauna cannot usefully be discussed further here as they lie beyond the current scope of this dissertation, although given the relatively high proportion of the assemblage for which this material accounted (24.42%), BPR details are given for reference in Table 5.7. Eleven of these specimens are cut, and consequently can certainly be linked with human activity, even if not during the Lateglacial. The presence of juvenile bones and teeth might be of interest to other researchers in establishing age-structure information for this group, although much further work needs to be done to establish during which precise period(s) of human activity this material was actually accumulated.

Family Suidae

Sus scrofa - Wild Boar/Domestic Pig

The second commonest group from the *1^er^ niveau ossifère* at the Trou du Frontal was *Sus scrofa* (NISP = 295, MNI = 12) but, once again, problems of the mixing of later prehistoric/historic age material within the same stratigraphic unit are present. Many of the problems surrounding the apparent presence of Lateglacial *Suidae* in the Lesse valley have already been discussed in some detail, in relation to the Trou de Chaleux and the Trou des Nutons, and it was concluded that there is no compelling evidence to support a Pleistocene date for any of these specimens. This is also thought to be the case at the Trou du Frontal. The relatively high frequency of ovi-caprids (above) is another indicator that a significant proportion of the large mammal assemblage is of Holocene age. The suids are the next most common group, and again there seem to be no strong grounds to attribute any of the specimens observed from the Trou du Frontal to the Pleistocene.

As with the ovi-caprids, a number of the *Sus scrofa* specimens showed distinct butchery traces, linking them with human activity. However, many of these marks appeared to have been made with metal rather than flint tools. This was also linked with a rather different butchery technique from that noted on apparently Lateglacial specimens from the Lesse valley. Some of these bones have clearly been chopped with a metal cleaver or other heavy metal implement, including the mandibular fragment shown in Plate 5.3. It seems highly unlikely that the marks on this specimen could have been made with any stone tool available during the Late Pleistocene.

Whether any of the suids from the Lesse valley caves discussed here are of Lateglacial age remains ambiguous. The only attempt at dating a potentially Lateglacial specimen of *Sus scrofa* from this area resulted in a later prehistoric estimation (OxA-4193 3060 ± 85 BP from the Trou de Chaleux; see chapters 2 & 3 above). Although the possibility that wild boar formed a part of the local Lateglacial megafauna cannot be fully ruled out, it has yet to be conclusively demonstrated. That being the case, it is assumed here that the suids from the Trou du Frontal, like the ovi-caprids, do not form a part of the Lateglacial large mammal fauna and accordingly they will not be discussed in much detail here. However, as with the ovi-caprids, detailed BPR information is supplied in Table 5.8 for reference. Further dating work on this species in the Lesse valley region would be desirable, and it is likely that detailed age structure and seasonality information could be obtained from this material.

A pilot study of 4 *Sus* maxillae and 5 mandibles using Bull & Payne's (1982) technique indicated that juveniles in all of the relevant age groups had died at the site (Figures 5.8 & 5.9). Whilst this may be of interest to researchers working on the later prehistoric/historic age material, it has little relevance to the construction of a seasonality model for the human exploitation of large mammals during the Lateglacial in the Lesse valley.

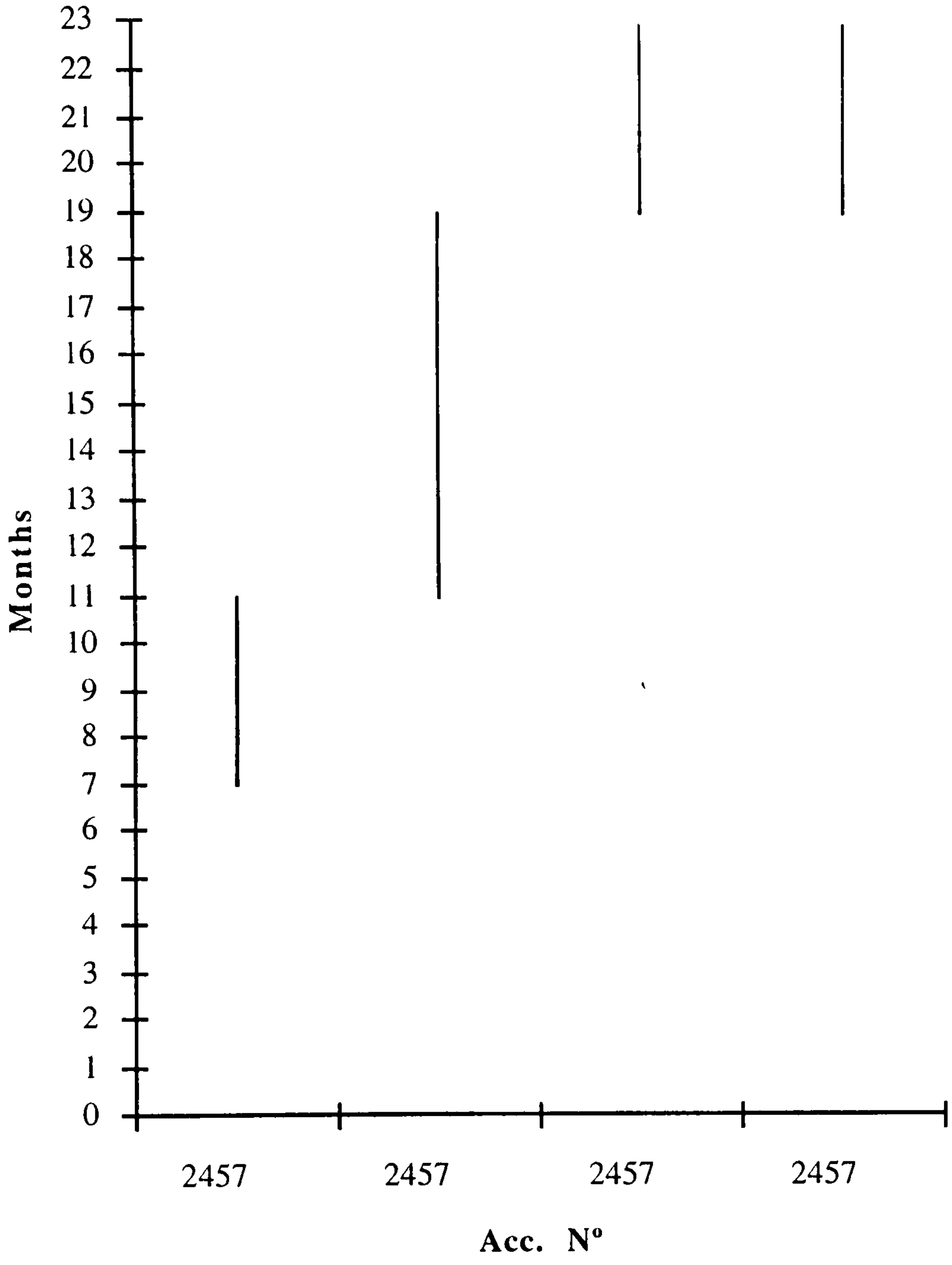


Figure 5.8: Age structure data from juvenile *Sus scrofa* maxillae from the Trou du Frontal, Furfooz.

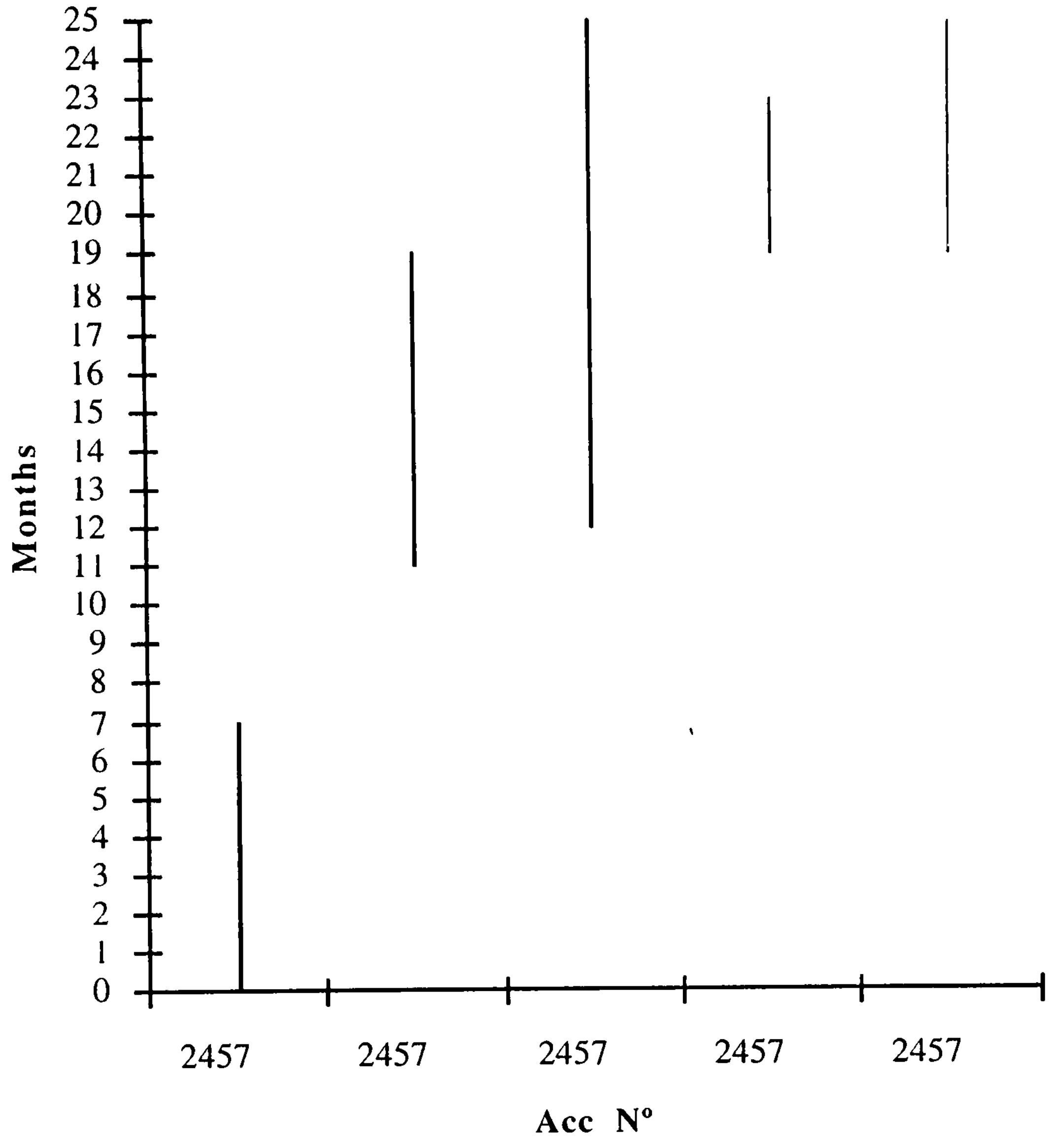


Figure 5.9: Age structure data from juvenile *Sus scrofa* mandibles from the Trou du Frontal, Furfooz.

Plate 5.3: Modified mandibular fragment of *Sus scrofa* from the Trou du Frontal, Furfooz. Scale in mm and inches.

Order Carnivora

Family Ursidae

Ursus arctos - Brown Bear

The majority of the bear specimens from the Trou du Frontal appear to be adult (most probably belonging to the same individual), although the presence of a juvenile proximal femur allows the MNI count to be modified to 2 (although this is the only juvenile bear specimen present). It will be recalled that Dupont commented on the finding of the partial remains of a bear on the first day of excavations at the Trou du Frontal. BPR information is given in Table 5.9 for reference. Perhaps the most striking feature of this part of the collection is the presence of a most of a vertebral column re-articulated by Dupont (Plate 5.4). None of the bear bones is cut or shows any other traces of human modification. The total lack of humanly induced modification indicates that there is little reason to associate the bear specimens from the Trou du Frontal with any human agency.

Bear remains were also identified at the Trou du Chaleux and the Trou des Nutons; at Chaleux there were cut marks noted on some of the bear bones (chapter 3, Figure 3.16) and it was suggested that Magdalenian hunters might have encountered a hibernating bear there. At the Trou des Nutons there were no such traces of human exploitation, although the interpretation that the bear remains had come from a hibernating individual was once again favoured. This seems also to have been the case at the Trou du Frontal, and there are no reasons to suggest that the bear's demise was due to anything other than natural causes. However, whether brown bears lived in and died at the Trou du Frontal during the Lateglacial is unproven, since the remains might equally date to any part of the Holocene. Further radiocarbon work is needed to resolve this problem.

Plate 5.4: Vertebral column of *Ursus arctos* from the Trou du Frontal, Furfooz. Scale in mm and inches.

Family Canidae

Canis sp. - Wolf and/or Domestic Dog

It was not possible to distinguish whether the larger canids at the Trou du Frontal were wild, feral or domestic, as the specimens in question were too fragmentary to premit differentiation solely on osteological criteria. None of the wolf/dog specimens from Frontal showed any sign of human modification and there is no indication of any link between the presence of the 19 *Canis* sp. bones and human activity. Given the known presence of quite high proportions of later prehistoric/historic age fauna and archaeological material from the cave, the possibility that at least a part of these canids were domesticates cannot be excluded. Their true age, or spread of ages, remains unknown.

The MNI count of 3 was derived from the 3 distal right radii, one of which had an unfused epiphyseal end and so was identified as a juvenile. The BPR for each element is given in Table 5.10 below for reference, although the Binford %MNIs will not be discussed here as the sample size of 19 specimens across all categories is too small to yield any significant patterning. Similarly the lack of any form of evidence directly linking these specimens with human activity makes any detailed discussion of BPR meaningless for the purposes of this dissertation.

Vulpes sp. - Red Fox & Arctic Fox

There were relatively few fox bones recovered from the *1^er^ niveau ossifère* at the Trou du Frontal compared with the Trou de Chaleux or the Trou des Nutons. These bones only accounted for 5.94% of the assemblage (NISP = 74), compared with 12.92% at the Trou de Chaleux (NISP = 473) and 20.51% at the Trou des Nutons (NISP = 440). In both of the latter assemblages the designation *Vulpes* sp. is the second most abundant group. A small number of the fox bones from Chaleux (5) and Nutons (3) were cut, and at Frontal 2 humeri were noted with longitudinal scrapes on their shafts.

The problems of differentiating red fox (*Vulpes vulpes*) from arctic fox (*Alopex lagopus*) have already been discussed in chapter 3. As was the case with the faunas from Chaleux and Nutons, the lack of sufficient time and access to comparative material made the identification of the foxes to species impossible. It seems probable that as material appears to have been incorporated into the *1er niveau ossifère* during the Late Pleistocene and Holocene, both red and arctic foxes are present. A detailed breakdown of the specimens present and their BPR is given in Table 5.11 below.

The most likely interpretation for the longitudinal scraping of the two humeri is periosteum removal, usually interpreted as preparatory activity for marrow-smashing (*cf.* Binford 1981, 134-136; Charles & Jacobi 1994, 14-15); an alternative for this would be the by products of carving (*cf.* McComb 1989, 37). There is no direct evidence for meat extraction from these specimens, and although it remains a possibility that the Frontal foxes were skinned for their pelts (details of the suggested Palaeolithic exploitation of foxes are given in chapter 3), there is no direct evidence for this. At the moment it seems best to assume that the majority of fox remains were not incorporated within the *1er niveau ossifère* as the result of human agency.

Family Mustelidae

Meles meles - Badger

The MNI count for badger at the Trou du Frontal was 1, the total NISP being 3 (a distal left humerus, left innominate fragment and right tibia shaft). No juvenile bones were recorded and none of these specimens showed any trace of human activity. The possible presence of badgers during the Lateglacial in the Lesse valley, and their exploitation by humans, has been discussed in some detail in chapters 3 and 4. However, it should be stressed that no evidence for the human exploitation of badgers was observed within the Trou du Frontal fauna. It was commented earlier that badgers are known to make their sets in caves and that these might have been in use over considerable periods of time (chapter 3).

One of the major themes of this chapter is the strong likelihood that the bulk of faunal material recovered from the *1er niveau ossifère* at the Trou du Frontal is not of Lateglacial age. The presence of badger within cave faunas is often taken as an indicator of intrusive material, and although the possibility that badgers were locally present alongside other mustelids during the Lateglacial is acknowledged, it is more likely that these three specimens are of Holocene age. Consequently they fall beyond the range of this dissertation and will not be discussed further.

Mustela sp. - Martens and Polecats

The smaller mustelids were slightly more common at the Trou du Frontal (NISP = 17; % = 1.36) than at the Trou des Nutons (NISP = 2; % = 0.09) or the Trou de Chaleux (NISP = 9; % = 0.25). Dupont identified both *Mustela vulgaris* (now *Mustela nivalis*, weasel) and *Mustela foina* (beech marten) at the Trou du Frontal, 13 of the mustelid bones were postcranial elements. In view of the shortage of research time, and the fact that these specimens showed no trace of human modification, I was unable to confirm these identifications.

Although there was no direct evidence linking these Frontal specimens with past human activity, the possibility that these animals were trapped for their fur cannot be completely excluded. However, if fur trapping were the reason behind their incorporation within the *1er niveau ossifère*, one would expect to find the remains of complete or almost complete (lacking the extremities) carcasses preserved. This does not appear to have been the case (see Table 5.12), although the possibilities that the Dupont faunal collection from Frontal is non-selective and that wet sieving was not used during excavation could account for the relative lack of mustelids and distort any BPR information. As so many unknown facts surround Dupont's work at Frontal, it is hard to draw any concrete conclusions from much of the fauna, including the mustelids discussed here.

The apparent absence of the smaller mustelids from Lateglacial contexts in north-western Europe has already been commented upon (chapter 2). It is possible that some, if not all, of the mustelids from the Trou du Frontal, Trou des Nutons and Trou de Chaleux are of Lateglacial age, but the presence of characteristically Holocene animal species in varying proportions in all of these assemblages means that these small mustelids may also belong to the Holocene.

Family Felidae

Felis sp. - Lynx & Wild Cat

Seventy six specimens of *Felis* sp. were recorded, although only 3 of these (mandibles) were potentially identifiable to species. It was not possible to firmly identify these as either lynx or wild cat, although the general size of the specimens indicated that wild cat was the more probable species. There was no evidence to link any of these specimens directly with human activity, and once again the actual age of the individual specimens is open to debate.

Felids were also recorded at the Trou de Chaleux and the Trou des Nutons (see chapters 3 & 4) and the ecology and behaviour of these species has already been discussed in some detail. None of the felid bones from any of the Lesse valley sites has been noted as cut. BPR information is given in Table 5.13 below for reference, although the numbers concerned for individual categories are too low for any meaningful conclusions to be drawn from 'apparent' patterning. Although it is possible that these bones come from cats skinned for their pelts, there is no tangible evidence to confirm this supposition. As there is no direct evidence for any form of human exploitation of this species at the Trou du Frontal, it seems safest to assume that these bones came to be incorporated within the *1^er^ niveau ossifère* by other means. The felids may well have been denning at the site during periods of human absence, or alternatively carcasses (or parts thereof) may have been brought there by any of the other predators recorded from the site.

Order Rodentia

Family Castoridae

Castor fiber - Beaver

The sole bone of beaver from the Trou du Frontal, a partial right mandible, had no traces of human modification. Another specimen of *Castor fiber* was noted within the Chaleux collection, although none was identified within the collection from the Trou des Nutons. The dating of supposed Lateglacial beavers in north-western Europe was discussed in chapter 2, and it was concluded that the appearance of this species at Chaleux probably dated to the Holocene rather than the Late Pleistocene. This argument is also valid for the specimen from the Trou du Frontal. As with the Chaleux beaver the Frontal specimen is unmodified, so there in no direct reason to link this species with human activity. The Trou du Frontal is also near water (the river Lesse) and it seems probable that the beaver bone was incorporated into the *1er niveau ossifère* either by non-human carnivore activity or by purely natural processes.

Order Lagomorpha

Family Leporidae

Lepus sp. - Brown Hare & Arctic Hare

Only 43 hare bones were identified in this assemblage, representing 3.45% of the overall large mammal assemblage. Detailed BPR information in given in Table 5.14, although the patterning given by the Binford %MNIs will not be discussed in detail as the sample size within each category is considered to be too small. Four specimens had clear butchery marks, giving evidence of the human exploitation of Lagomorphs. These occurred on across the distal arttculations of two humeral fragmentsm on the buccal surface of a left mandible and across the shaft of a proximal femur. None of these specimens has been directly dated, although their inclusion in a later radiocarbon project remains a possibility. Consequently the precise age of these specimens and of hare exploitation at the Trou du Frontal remains unclear. The Lateglacial exploitation of Lagomorphs at another north-western European findspot (Robin Hood Cave, Creswell Crags) has been documented and discussed in some detail (Charles & Jacobi, 1994). In that particular case, individual hare specimens were AMS dated to the Bölling Interstadial and the exploitation of hares appears to have been of considerable economic significance to the Lateglacial inhabitants of the Crags. The same cannot really be said of the specimens from the Trou du Frontal, although it is noteworthy that parallels for the three butchered specimens from Frontal (Figure 5.10) can be found within the Lateglacial faunal assemblages from the various caves within the Creswell Crags.

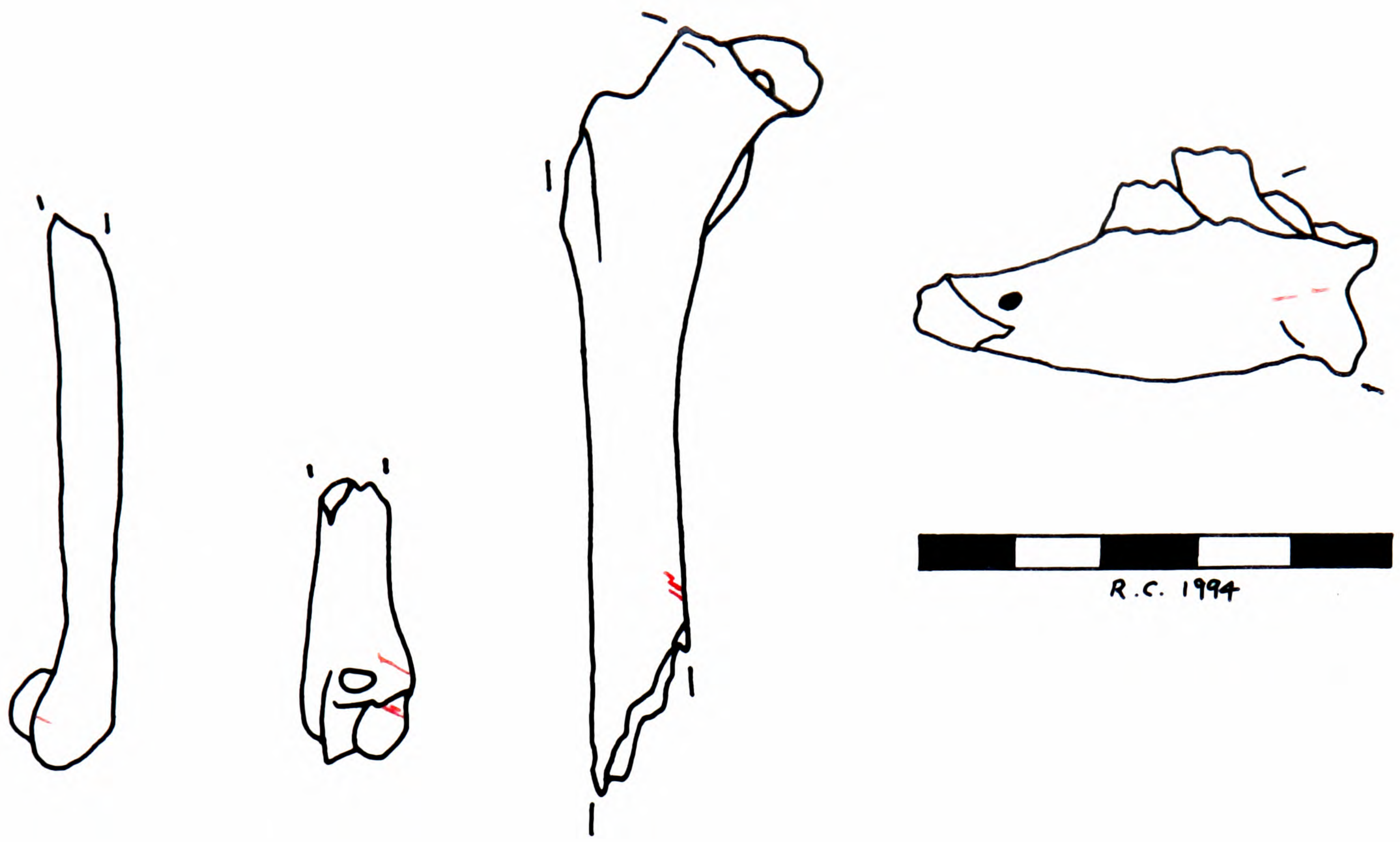


Figure 5.10: Cut *Lepus* sp. bones from the Trou du Frontal, Furfooz. Scale in cm.

Oryctolagus cuniculus - Rabbit

Specimens of *Oryctolagus cuniculus* were noted amongst the Lagomorphs within the collection, and occurred in the same numbers as the mustelids discussed above (NISP = 17; % = 1.36). All of these specimens were clearly much smaller than the hares from the collection, and their physical condition (some were still greasy to the touch) suggested that they were of relatively recent origin, and certainly of Holocene rather than Pleistocene age. There is no evidence to suggest that rabbits were ever part of the Lateglacial fauna in Belgium. There were no butchery marks on any of these specimens, and as they fall beyond the scope of this dissertation they will not be discussed in any further detail here. BPR information for *Oryctolagus cuniculus* is given in Table 5.15 solely for reference purposes.

CONCLUSIONS

It has become apparent through the discussions surrounding the individual species at the Trou du Frontal that there are many barriers to the interpretation of the Lateglacial faunal exploitation by humans at this site even though we know that this did occur. There are also striking similarities between the Trou du Frontal faunal assemblage and that from the Trou des Nutons. Both assemblages contain a high proportion of domesticates, and it is unlikely that these are of Lateglacial age. Instead, there are strong pieces of evidence to suggest that much of the faunal material from Frontal and Nutons is of Holocene age. AMS dates indicate human activity at these sites during the Neolithic and the Iron Age/Roman periods, as well as during the Bölling Interstadial phase of the Lateglacial.

It has not proved possible to provide a more detailed stratigraphic assignation to any of the Dupont collection than to the *1^er^ niveau ossifère* in general, although it is apparent that Dupont recorded such a distinction in relation to the Trou du Frontal both in the field and in his earlier writings (1865c; 1867a; 1872). As no archival material relating to Dupont's excavations in the Lesse valley could be located at the IRScNB (see chapter 2), I was unable to re-attribute any of the fauna to any sub-set of the *1^er^ niveau ossifère.*

Despite this, it does appear possible to seperate out some components of a Lateglacial fauna from the Holocene material. This has been done by a process of comparison and elimination, and must remain tentative to some extent. Many of the species which occur at the Trou du Frontal are known to have been locally present during the Bölling Interstadial phase. Some individual modified specimens show striking parallels in the location and orientation of butchery marks and bone breakage patterns with modified specimens from other nearby and well dated Lateglacial contexts. Most notable amongst these are the damage patterns on the *Equus ferus* specimens (Figure 5.3). It is suggested here that these specimens are of Lateglacial age, and indeed it has been possible to confirm this in part by the application of AMS dating. This has led to the suggestion that there may be a consistency in butchery styles and techniques employed by late Magdalenian hunter-gatherers in the region of the river Lesse.

Archaeological evidence from both lithic typology and AMS dating (see chapter 2) indicates that the Late Magdalenian presence in the Lesse valley (and Belgium more generally) was restricted the the earlier part of the Bölling Interstadial phase (*circa* 12,800 BP). It is conceivable that all of the known Magdalenian assemblages from the Lesse valley could have been created during the course of a few visits (or even a single one) to the region. There seems to be no *prima facie* reason to assume that, once this part of north-western Europe had been re-colonised after the Last Glacial Maximum, human occupation was necessarily continuous. Raw materials from Frontal, Nutons and Chaleux have been sourced to the Paris Basin, and it may be possible that this area was a focal zone for hunter-gatherer aggregation (*cf.* Conkey 1980) during the Bölling Interstadial phase. As yet, this suggestion cannot be fully tested, since further work is needed on the raw material provenances. Comparisons between the flint sources used from Bölling age sites in the Lesse valley, the Paris basin, southern Germany and southern Britain would be one way of investigating this.

Although it has been possible to extract some seasonality information from specimens of *Sus scrofa* following the methods outlined by Bull & Payne (1982), the results are thought to bear little if any relation to the seasonality of Lateglacial activity at the Trou du Frontal. Instead it is believed that the suids from Frontal are of Holocene age, and some of these may be of a very recent origin. Similarly the ovi-caprids are also believed to postdate the Lateglacial. There is some evidence for the Lateglacial exploitation of large mammals at the Trou du Frontal; some specimens of both *Equus ferus* and *Rangifer tarandus* are modified. The true age of human exploitation of other species, such as *Cervus elaphus*, *Vulpes* sp. and *Bos* sp., remains undetermined, although parallels have been noted with butchered specimens believed to be of Lateglacial age from the Trou de Chaleux.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial	▨	▨	3	3	0	0	3	▨	▨	▨
maxilla	0	0	2	2	0	0	2	1	1.00	28.57
mandible	0	0	7	7	0	0	7	1	3.50	100.00
teeth	▨	▨	23	20	3	0	23	▨	▨	▨
hyoid	▨	▨	0	0	0	0	0	0	0.00	00.00
atlas	▨	▨	0	0	0	0	0	0	0.00	00.00
axis	▨	▨	0	0	0	0	0	0	0.00	00.00
cervical v.	▨	▨	0	0	0	0	0	▨	0.00	00.00
thoracic v.	▨	▨	0	0	0	0	0	▨	0.00	00.00
lumbar v.	▨	▨	0	0	0	0	0	▨	0.00	00.00
innominate	0	1	0	1	0	0	1	1	0.50	14.29
sacrum	▨	▨	1	1	0	0	1	1	1.00	28.57
caudal v.	▨	▨	1	0	1	0	1	▨	0.07	01.90
scapula	4	1	0	5	0	3	5	4	2.50	71.43
whole humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0	0.00	00.00
humerus shaft	0	1	0	1	0	0	1	1	0.50	14.29
d. humerus	0	0	0	0	0	0	0	0	0.00	00.00
whole radius	0	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0	0.00	00.00
radius shaft	0	1	0	1	0	0	1	1	0.50	14.29
d. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	1	0	0	1	0	0	1	1	0.50	14.29
carpals	0	2	0	2	0	0	2	▨	0.14	04.08
whole MC	0	0	0	0	0	0	0	0	0.00	00.00
p. MC	2	1	0	3	0	2	3	2	1.50	42.86
d. MC	▨	▨	0	0	0	0	0	▨	0.00	00.00
acc. MC	0	0	0	0	0	0	0	▨	0.00	00.00
whole femur	0	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	1	1	2	0	0	2	1	1.00	28.57
femur shaft	1	1	0	2	0	1	2	1	1.00	28.57
d. femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0	0.00	00.00
whole tibia	0	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0	0.00	00.00
tibia shaft	0	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	1	0	1	0	0	1	0	0.50	14.29
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	5	1	0	6	0	0	6	▨	0.50	14.29
whole MT	0	0	0	0	0	0	0	0	0.00	00.00
p. MT	1	0	0	1	0	1	1	1	0.50	14.29
d. MT	▨	▨	0	0	0	0	0	▨	0.00	00.00
acc. MT	0	0	0	0	0	0	0	▨	0.00	00.00
p. MP	0	0	1	1	0	0	1	▨	0.25	07.14
d. MP	▨	▨	1	1	0	0	1	▨	0.25	07.14
acc. MP	▨	▨	2	2	0	0	2	▨	0.25	07.14
p. sesamoid	▨	▨	2	2	0	0	2	▨	0.25	07.14
phalanx 1	▨	▨	3	3	0	2	3	▨	0.75	21.43
phalanx 2	▨	▨	2	2	0	0	2	▨	0.50	14.29
d. sesamoid	▨	▨	6	6	0	0	6	▨	1.50	42.86
phalanx 3	▨	▨	1	1	0	0	1	▨	0.25	07.14
Total	**14**	**11**	**56**	**77**	**4**	**9**	**81**	▨	▨	▨

Table 5.2: BPR for *Equus ferus* from the Trou du Frontal, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
antler			15			4	15			
cranial			0	0	0	0	0			
maxilla	0	0	0	0	0	0	0	0	0.00	00.00
mandible	0	0	0	0	0	0	0	0	0.00	00.00
teeth			1	1	0	0	1			
hyoid			0	0	0	0	0	0	0.00	00.00
atlas			0	0	0	0	0	0	0.00	00.00
axis			1	1	0	0	1	1	1.00	100.00
cervical v.			1	1	0	0	1		0.20	20.00
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	0	0	0	0	0	0	0	0	0.00	00.00
sacrum			0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0	0.00	00.00
humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0	0.00	00.00
humerus shaft	0	1	0	0	0	1	1			
d. humerus	0	0	0	0	0	0	0	0	0.00	00.00
radius	0	1	0	1	0	0	1	1	0.50	50.00
p. radius	0	0	0	0	0	0	0	0	0.00	00.00
radius shaft	0	0	0	0	0	0	0			
d. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0	0.00	00.00
carpals	0	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0	0.00	00.00
p. MC	0	2	0	2	0	0	2	2	1.00	100.00
d. MC	0	0	0	0	0	0	0	0	0.00	00.00
acc. MC	0	0	0	0	0	0	0	0	0.00	00.00
femur	0	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	0	0	0	0	0	0	0	0.00	00.00
d. femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	1	0	1	0	0	1			
MT	0	1	0	1	0	0	1	0	0.50	50.00
p. MT	0	1	0	1	0	0	1	0	0.50	50.00
d. MT	0	0	0	0	0	0	0	0	0.00	00.00
acc. MT	0	0	0	0	0	0	0	0	0.00	00.00
MP	0	0	1	1	0	0	1	1	0.25	25.00
p. MP	0	0	0	0	0	0	0			
MP shaft	0	0	2	2	0	0	2			
d. MP	0	0	0	0	0	0	0			
acc. MP	0	0	0	0	0	0	0			
p. sesamoid			1	1	0	0	1		0.25	25.00
phalanx 1			1	1	0	0	1		0.25	25.00
phalanx 2			0	0	0	0	0		0.00	00.00
phalanx 3			0	0	0	0	0		0.00	00.00
Total	**0**	**7**	**23**	**14**	**0**	**5**	**30**			

Table 5.3: BPR for *Rangifer tarandus* from the Trou du Frontal, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			0	0	0	0	0			
maxilla	0	1	0	1	0	0	1	1	0.50	50.00
mandible	1	1	0	2	0	0	2	1	1.00	66.67
teeth			0	0	0	0	0			
atlas			0	0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	1	0	0	1	0	1	1	1	0.50	33.33
sacrum			0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0		0.00	00.00
scapula	1	1	0	2	0	0	2	1	1.00	66.67
whole humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0	0.00	00.00
humerus shaft	2	1	0	2	1	0	3			
d. humerus	0	0	0	0	0	0	0	0	0.00	00.00
whole radius	0	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0	0.00	00.00
d. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0	0.00	00.00
carpals	1	2	0	3	0	0	3			
MC	0	1	0	1	0	0	1	1	0.50	33.33
p. MC	0	0	0	0	0	0	0	0	0.00	00.00
d. MC	0	0	0	0	0	0	0	0	0.00	00.00
whole femur	0	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	2	0	2	0	0	2	2	1.00	66.67
d. femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	1	0	0	0	0	1	1	0.50	33.33
whole tibia	0	0	0	1	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0	0.00	00.00
d. tibia	1	1	0	2	0	0	2	1	1.00	66.67
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0	0			
MT	0	0	0	0	0	0	0	0	0.00	00.00
p. MT	0	1	0	1	0	0	1	1	0.50	33.33
d. MT	0	0	0	0	0	0	0	0	0.00	00.00
MP	0	0	0	0	0	0	0	0	0.00	00.00
p. MP			0	0	0	0	0	0	0.00	00.00
MP shaft			2	2	0	0	2			
d. MP			0	0	0	0	0	0	0.00	00.00
acc. MP			0	0	0	0	0		0.00	00.00
phalanx 1			6	6	0	0	6		1.50	100.00
phalanx 2			3	3	0	0	3		0.75	50.00
phalanx 3			2	2	0	0	2		0.50	33.33
Total	**7**	**12**	**13**	**31**	**1**	**1**	**32**			

Table 5.4: BPR for *Cervus elaphus* from the Trou du Frontal, Furfooz

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
antler			1	1	0	0	1			
cranial			0	0	0	0	0			
maxilla	0	0	0	0	0	0	0	0	00.00	00.00
mandible	0	0	0	0	0	0	0	0	00.00	00.00
teeth			2	2	0	0	2			
atlas			0	0	0	0	0	0	00.00	00.00
axis			0	0	0	0	0	0	00.00	00.00
cervical v.			0	0	0	0	0		00.00	00.00
thoracic v.			0	0	0	0	0		00.00	00.00
lumbar v.			0	0	0	0	0		00.00	00.00
innominate	1	0	0	1	0	0	1	1	00.50	33.33
sacrum			0	0	0	0	0	0	00.00	00.00
caudal v.			0	0	0	0	0		00.00	00.00
scapula	1	0	0	1	0	0	1	1	00.50	33.33
humerus	0	0	0	0	0	0	0	0	00.00	00.00
p. humerus	0	0	0	0	0	0	0	0	00.00	00.00
d. humerus	0	0	0	0	0	0	0	0	00.00	00.00
radius	1	1	0	2	0	0	2	1	01.00	66.67
p. radius	0	0	0	0	0	0	0	0	00.00	00.00
d. radius	1	0	0	1	0	0	1	1	00.50	33.33
ulna	3	0	0	3	0	0	3	3	01.50	100.00
carpals	0	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0	00.00	00.00
p. MC	0	1	0	1	0	0	1	1	00.50	33.33
d. MC	0	0	0	0	0	0	0	0	00.00	00.00
femur	0	0	0	0	0	0	0	0	00.00	00.00
p. femur	0	0	0	0	0	0	0	0	00.00	00.00
d. femur	0	0	0	0	0	0	0	0	00.00	00.00
patella	0	0	0	0	0	0	0	0	00.00	00.00
tibia	0	0	0	0	0	0	0	0	00.00	00.00
p. tibia	0	0	0	0	0	0	0	0	00.00	00.00
tibia shaft	1	0	0	1	0	0	1	1	00.50	33.33
d. tibia	0	3	0	3	0	0	3	3	01.50	100.00
fibula	0	0	0	0	0	0	0	0	00.00	00.00
tarsals	0	0	0	0	0	0	0			
MT	0	0	0	0	0	0	0	0	00.00	00.00
P. MT	0	0	0	0	0	0	0	0	00.00	00.00
D. MT	0	0	0	0	0	0	0	0	00.00	00.00
phalanx 1			0	0	0	0	0		00.00	00.00
phalanx 2			0	0	0	0	0		00.00	00.00
phalanx 3			0	0	0	0	0		00.00	00.00
Total	**8**	**5**	**3**	**16**	**0**	**0**	**16**			

Table 5.5: BPR for *Capreolus capreolus* from the Trou du Frontal, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin. MNI**	**% MNI**
horn core			2	2	0	0	2			
cranial			16	16	0	1	16			
maxilla	0	0	0	0	0	0	0	0	00.00	00.00
mandible	8	7	0	15	0	3	15	8	07.50	100.00
teeth			50	50	0	0	50			
hyoid			0	0	0	0	0	0	00.00	00.00
atlas			1	1	0	0	1	1	01.00	13.33
axis			1	1	0	0	1	1	01.00	13.33
cervical v.			2	2	0	0	2		00.40	05.33
thoracic v.			1	1	0	1	1		00.08	01.03
lumbar v.			0	0	0	0	0		00.00	00.00
innominate	6	4	2	12	0	3	12	6	06.00	80.00
sacrum			1	1	0	0	1	1	01.00	13.33
caudal v.			0	0	0	0	0		00.00	00.00
scapula	1	1	0	2	0	1	2	1	01.00	13.33
whole humerus	0	0	0	0	0	0	0	0	00.00	00.00
p. humerus	2	1	0	3	0	0	3	2	01.50	20.00
humerus shaft	0	0	0	0	0	0	0			
d. humerus	2	1	0	3	0	0	3	2	01.50	20.00
whole radius	0	0	0	0	0	0	0	0	00.00	00.00
p. radius	3	2	0	5	0	2	5	3	02.50	33.33
radius shaft	1	1	0	2	0	0	2			
d. radius	1	0	0	0	1	0	1	1	00.50	06.67
ulna	1	0	0	1	0	0	1	1	00.50	06.67
carpals	2	3	0	5	0	0	5		00.42	05.56
whole MC	1	0	0	0	1	0	1	1	00.50	06.67
p. MC	2	1	0	3	0	0	3	2	01.50	20.00
d. MC	0	0	0	0	0	0	0	0	00.00	00.00
whole femur	0	0	0	0	0	0	0	0	00.00	00.00
p. femur	3	0	0	3	0	1	3	3	01.50	20.00
d. femur	1	4	1	6	0	0	6	4	03.00	40.00
patella	0	0	0	0	0	0	0	0	00.00	00.00
whole tibia	0	0	0	0	0	0	0	0	00.00	00.00
p. tibia	1	1	0	2	0	0	2	1	01.00	13.33
tibia shaft	1	0	0	1	0	0	1			
d. tibia	1	0	0	1	0	0	1	1	00.50	06.67
fibula	0	0	0	0	0	0	0	0	00.00	00.00
tarsals	1	3	0	4	0	2	4		00.40	05.33
whole MT	1	1	0	2	0	0	2	1	01.00	13.33
p. MT	1	1	0	2	0	0	2	1	01.00	13.33
d. MT	0	0	0	0	0	0	0	0	00.00	00.00
p. MP	2	0	1	3	0	0	3		00.75	10.00
MP shaft	1	0	4	5	0	0	5			
d. MP	0	1	2	2	1	0	3		00.75	10.00
sesamoid	0	0	3	3	0	0	3		00.13	01.67
phalanx 1			4	4	0	0	4		00.50	06.67
phalanx 2			9	9	0	0	9		01.13	15.00
phalanx 3			3	3	0	0	3		00.38	05.00
Total	**43**	**32**	**103**	**175**	**3**	**14**	**178**			

Table 5.6: BPR for *Bos* sp. from the Trou du Frontal, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
horn core			4	4	0	0	4			
cranial			21	21	0	0	21			
maxilla	1	6	0	7	0	0	7	6	3.50	44
mandible	6	10	0	12	4	0	16	10	8.00	100
teeth			71	66	5	0	71			
hyoid			8	8	0	0	8	8	8.00	100
atlas			2	2	0	1	2	2	2.00	25
axis			1	1	0	0	1	1	1.00	13
cervical v.			0	0	0	0	0		0.00	00
thoracic v.			14	14	0	0	14		1.08	13
lumbar v.			17	17	0	0	17		2.83	35
innominate	3	6	0	9	0	3	9	6	4.50	56
sacrum			1	1	0	0	1	1	1.00	13
caudal v.			0	0	0	0	0		0.00	00
scapula	2	3	0	5	0	2	5	3	2.50	31
whole humerus	1	1	0	2	0	0	2	1	1.00	13
p. humerus	0	0	0	0	0	0	0	0	0.00	00
humerus shaft	1	2	0	3	0	0	3			
d. humerus	0	2	0	2	0	1	2	2	1.00	13
whole radius	1	2	0	3	0	0	3	2	1.50	19
p. radius	2	3	0	5	0	0	5	3	2.50	31
radius shaft	1	1	0	2	0	0	2			
d. radius	3	0	0	3	0	0	3	3	1.50	19
ulna	2	2	0	4	0	0	4	2	2.00	25
carpals	4	7	1	12	0	0	12		2.00	25
whole MC	3	1	0	2	2	0	4	3	2.00	25
p. MC	0	2	0	1	1	0	2	2	1.00	13
d. MC	1	0	0	1	0	0	1	1	0.50	06
whole femur	1	0	0	1	0	0	1	1	0.50	06
p. femur	1	1	0	2	0	1	2	1	1.00	13
femur shaft	1	0	2	3	0	0	3			
d. femur	2	0	0	2	0	1	2	2	1.00	13
patella	2	0	0	2	0	0	2	2	1.00	13
whole tibia	0	0	0	0	0	0	0	0	0.00	00
p. tibia	0	0	0	0	0	0	0	0	0.00	00
tibia shaft	0	0	1	1	0	0	1			
d. tibia	2	6	0	8	0	0	8	6	4.00	50
fibula	0	0	0	0	0	0	0	0	0.00	00
tarsals	5	3	1	9	0	1	9		1.80	23
whole MT	1	1	0	2	0	0	2	1	1.00	13
p. MT	1	2	0	1	2	0	3	2	1.50	19
MT shaft	0	0	1	1	0	0	1			
d. MT	0	0	0	0	0	0	0	0	0.00	00
whole MP			0	0	0	0	0		0.00	00
p. MP			0	0	0	0	0		0.00	00
MP shaft			0	0	0	0	0		0.00	00
d. MP			8	6	2	0	8		2.00	25
phalanx 1			23	22	1	0	23		5.75	72
phalanx 2			15	15	0	0	15		3.75	47
phalanx 3			5	5	0	0	5		1.25	16
Total	**47**	**61**	**196**	**287**	**17**	**10**	**304**			

Table 5.7: BPR for *Capra* sp. from the Trou du Frontal, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			30	30	00	0	30			
maxilla	06	02	02	05	05	2	10	06	05.00	45.45
mandible	08	12	02	07	15	1	22	12	11.00	100.00
teeth			35	31	04	0	35			
hyoid			01	01	00	0	01	01	01.00	09.09
atlas			08	07	01	1	08	08	08.00	72.73
axis			01	00	01	0	01	01	01.00	09.09
cervical v.			04	04	00	0	04		00.80	07.27
thoracic v.			09	01	08	0	09		00.64	05.84
lumbar v.			02	00	02	0	02		00.33	03.03
innominate	07	09	00	12	04	4	16	09	08.00	72.73
sacrum			05	04	01	0	05	05	05.00	45.45
caudal v.			00	00	00	0	00		00.00	00.00
scapula	03	05	00	00	08	0	08	05	04.00	36.36
sternum			01	01	00	0	01	01	01.00	09.09
whole humerus	01	00	00	01	00	0	01	01	00.50	04.55
p. humerus	01	00	00	01	00	1	01	01	00.50	04.55
humerus shaft	07	06	00	11	02	1	13			
d. humerus	05	03	00	05	03	2	08	05	04.00	36.36
whole radius	00	00	00	00	00	0	00	00	00.00	00.00
p. radius	03	02	00	05	00	0	05	03	02.50	22.73
radius shaft	03	01	00	02	02	0	04			
d. radius	00	00	00	00	00	0	00	00	00.00	00.00
ulna	05	05	00	09	01	2	10	05	05.00	45.45
carpals	00	01	00	01	00	0	01		00.06	00.57
whole MC	04	19	01	14	10	2	24		03.00	27.27
p. MC	00	01	00	01	00	0	01		00.13	01.14
d. MC	00	02	00	02	00	0	02		00.25	02.27
whole femur	01	00	00	00	01	0	01	01	00.50	04.55
p. femur	00	01	00	00	01	1	01	01	00.50	04.55
femur shaft	01	04	00	04	01	1	05			
d. femur	01	01	00	01	01	0	02	01	01.00	09.09
patella	00	02	00	02	00	0	02	02	01.00	09.09
whole tibia	01	01	00	00	02	0	02	01	01.00	09.09
p. tibia	01	02	00	02	01	1	03	02	01.50	13.64
tibia shaft	01	03	00	01	03	0	04			
d. tibia	02	01	00	01	02	0	03	02	01.50	13.64
fibula	02	01	00	03	00	0	03	02	01.50	13.64
tarsals	03	00	01	03	01	0	04		00.29	02.60
whole MT	04	02	00	06	00	0	06		00.75	06.82
p. MT	04	01	00	05	00	0	05		00.63	05.68
d. MT	00	03	00	03	00	0	03		00.38	03.41
sesamoid			01	01	00	0	01			
phalanx 1			14	12	02	1	14		00.88	07.95
phalanx 2			02	02	00	0	02		00.13	01.14
phalanx 3			10	10	00	0	10		00.63	05.68
phalanx indet.			02	02	00	0	02			
Total	**74**	**90**	**131**	**213**	**82**	**20**	**295**			

Table 5.8: BPR for *Sus scrofa* from the Trou du Frontal, Furfooz.

Element	Left	Right	Indet	Adult	Cut	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0			
maxilla	0	0	0	0	0	0	0	0.00	00.00
mandible	0	0	0	0	0	0	0	0.00	00.00
teeth			4	4	0	4			
atlas			0	0	0	0	0	0.00	00.00
axis			1	1	0	1	1	1.00	100.00
cervical v.			5	5	0	5		1.00	100.00
thoracic v.			10	10	0	10		0.71	71.43
lumbar v.			4	4	0	4		0.67	66.67
indet. v.			5	5	0	5			
innominate	1	1	0	2	0	2	1	1.00	100.00
sacrum	0	0	1	1	0	1	1	1.00	100.00
ribs			23	23	0	23			
scapula	0	0	0	0	0	0	0	0.00	00.00
humerus	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0.00	00.00
d. humerus	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0.00	00.00
d. radius	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0.00	00.00
carpals	0	1	0	1	0	1		0.06	06.25
MC	0	0	0	0	0	0		0.00	00.00
p. MC	0	0	0	0	0	0		0.00	00.00
d. MC	0	0	0	0	0	0		0.00	00.00
femur	0	0	0	0	0	0	1	0.00	00.00
p. femur	0	1	0	1	0	1	0	0.50	50.00
d. femur	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0		0.00	00.00
MT	1	1	0	2	0	2		0.20	20.00
p. MT	0	0	0	0	0	0		0.00	00.00
d. MT	0	0	0	0	0	0		0.00	00.00
MP			0	0	0	0		0.00	00.00
phalanx 1			0	0	0	0		0.00	00.00
phalanx 2			0	0	0	0		0.00	00.00
phalanx 3			0	0	0	0		0.00	00.00
Total	**2**	**4**	**53**	**59**	**0**	**59**			

Table 5.9: BPR for *Ursus arctos* from the Trou du Frontal, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0	0			
maxilla	0	0	0	0	0	0	0	0	00.00	00.00
mandible	0	0	0	0	0	0	0	0	00.00	00.00
teeth			1	1	0	0	1			
atlas			0	0	0	0	0	0	00.00	00.00
axis			0	0	0	0	0	0	00.00	00.00
cervical v.			0	0	0	0	0		00.00	00.00
thoracic v.			0	0	0	0	0		00.00	00.00
lumbar v.			0	0	0	0	0		00.00	00.00
innominate	0	0	0	0	0	0	0	0	00.00	00.00
sacrum			0	0	0	0	0	0	00.00	00.00
caudal v.			0	0	0	0	0		00.00	00.00
scapula	2	0	0	2	0	0	2	2	01.00	50.00
humerus	0	0	0	0	0	0	0	0	00.00	00.00
p. humerus	0	0	0	0	0	0	0	0	00.00	00.00
d. humerus	0	0	0	0	0	0	0	0	00.00	00.00
radius	0	0	0	0	0	0	0	0	00.00	00.00
p. radius	2	0	0	2	0	0	2	2	01.00	50.00
d. radius	1	3	0	3	1	0	4	3	02.00	100.00
ulna	1	0	0	1	0	0	1	1	00.50	25.00
carpals	0	0	0	0	0	0	0			
MC	0	2	0	2	0	0	2		00.25	12.50
p. MC	0	0	0	0	0	0	0		00.00	00.00
d. MC	0	0	0	0	0	0	0		00.00	00.00
femur	0	0	0	0	0	0	0	0	00.00	00.00
p. femur	0	0	0	0	0	0	0	0	00.00	00.00
d. femur	0	0	0	0	0	0	0	0	00.00	00.00
patella	0	1	0	1	0	0	1	1	00.50	25.00
tibia	0	0	0	0	0	0	0	0	00.00	00.00
p. tibia	1	0	0	1	0	0	1	0	00.50	25.00
tibia shaft	0	1	0	1	0	0	1			
d. tibia	0	0	0	0	0	0	0	0	00.00	00.00
fibula	0	0	0	0	0	0	0	0	00.00	00.00
tarsals	0	0	0	0	0	0	0			
MT	0	0	0	0	0	0	0		00.00	00.00
p. MT	0	0	0	0	0	0	0		00.00	00.00
d. MT	0	0	0	0	0	0	0		00.00	00.00
MP			0	0	0	0	0		00.00	00.00
p. MP			3	3	0	0	3		00.19	09.38
d. MP			1	1	0	0	1		00.06	03.13
phalanx 1			0	0	0	0	0		00.00	00.00
phalanx 2			0	0	0	0	0		00.00	00.00
phalanx 3			0	0	0	0	0		00.00	00.00
Total	**7**	**7**	**5**	**18**	**1**	**0**	**19**			

Table 5.10: BPR for *Canis* sp. from the Trou du Frontal, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin. MNI**	**% MNI**
cranial			07	07	0	0	7			
maxilla	02	03	00	05	0	0	05	3	02.50	83.33
mandible	02	02	02	06	0	0	06	2	03.00	100.00
teeth			17	17	0	0	17			
atlas			02	02	0	0	02	2	02.00	66.67
axis			00	00	0	0	00	0	00.00	00.00
cervical v.			00	00	0	0	00		00.00	00.00
thoracic v.			01	01	0	0	01		00.08	02.56
lumbar v.			03	03	0	0	03		00.43	14.29
innominate	01	01	00	02	0	0	02	1	01.00	33.33
sacrum			00	00	0	0	00	0	00.00	00.00
caudal v.			06	06	0	0	06		00.29	09.52
scapula	00	00	00	00	0	0	00	0	00.00	00.00
whole humerus	01	01	00	02	0	1	02	2	01.00	33.33
p. humerus	00	00	00	00	0	0	00	0	00.00	00.00
d. humerus	01	00	00	01	0	1	01	0	00.50	16.67
whole radius	00	00	00	00	0	0	00	0	00.00	00.00
p. radius	01	01	00	02	0	0	02	1	01.00	33.33
d. radius	00	00	00	00	0	0	00	0	00.00	00.00
ulna	01	01	00	02	0	0	02	1	01.00	33.33
carpals	00	00	00	00	0	0	00			
whole MC	01	02	01	04	0	0	04		00.50	16.67
p. MC	00	00	00	00	0	0	00		00.00	00.00
d. MC	00	00	00	00	0	0	00		00.00	00.00
whole femur	00	00	00	00	0	0	00	0	00.00	00.00
p. femur	00	01	00	01	0	0	01	1	00.50	16.67
d. femur	00	01	00	01	0	0	01	1	00.50	16.67
patella	00	00	00	00	0	0	00	0	00.00	00.00
whole tibia	00	00	00	00	0	0	00	0	00.00	00.00
p. tibia	01	00	00	01	0	0	01	1	00.50	16.67
d. tibia	01	00	00	01	0	0	01	1	00.50	16.67
fibula	00	00	00	00	0	0	00	0	00.00	00.00
tarsals	02	00	00	02	0	0	02			
whole MT	00	00	04	04	0	0	04		00.50	16.67
p. MT	00	00	01	01	0	0	01		00.13	04.17
d. MT	00	00	00	00	0	0	00		00.00	00.00
MP	00	00	02	02	0	0	02		00.13	04.17
phalanx 1			01	01	0	0	01		00.06	02.08
phalanx 2			00	00	0	0	00		00.00	00.00
phalanx 3			00	00	0	0	00		00.00	00.00
Total	**14**	**13**	**47**	**74**	**0**	**2**	**74**			

Table 5.11: BPR for *Vulpes* sp. from the Trou du Frontal, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0			
maxilla	0	0	0	0	0	0	0	0.00	00.00
mandible	2	0	2	4	0	4	2	2.00	100.00
teeth			0	0	0	0			
atlas			0	0	0	0	0	0.00	00.00
axis			0	0	0	0		0.00	00.00
cervical v.			0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0		0.00	00.00
innominate	0	0	0	0	0	0	0	0.00	00.00
sacrum			0	0	0	0		0.00	00.00
caudal v.			0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0.00	00.00
whole humerus	0	1	3	4	0	4	2	2.00	100.00
p. humerus	0	0	0	0	0	0	0	0.00	00.00
d. humerus	0	0	0	0	0	0	0	0.00	00.00
whole radius	0	0	1	1	0	1	0	0.50	25.00
p. radius	0	0	0	0	0	0	0	0.00	00.00
d. radius	0	0	0	0	0	0	0	0.00	00.00
ulna	2	1	0	3	0	3	2	1.50	75.00
carpals	0	0	0	0	0	0			
whole MC	0	0	0	0	0	0		0.00	00.00
p. MC	0	0	0	0	0	0		0.00	00.00
d. MC	0	0	0	0	0	0		0.00	00.00
whole femur	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	1	0	1	0	1	1	0.50	25.00
d. femur	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0.00	00.00
whole tibia	1	0	0	1	0	1	1	0.50	25.00
p. tibia	0	0	0	0	0	0	0	0.00	00.00
tibia shaft	0	0	0	0	0	0		0.00	00.00
d. tibia	0	0	1	1	0	1	1	0.50	25.00
fibula	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	1	1	0	1			
whole MT	0	0	0	0	0	0		0.00	00.00
p. MT	0	0	0	0	0	0		0.00	00.00
d. MT	0	0	0	0	0	0		0.00	00.00
whole MP			1	1	0	1		0.05	02.50
p. MP			0	0	0	0		0.00	00.00
d. MP			0	0	0	0		0.00	00.00
phalanx 1			0	0	0	0		0.00	00.00
phalanx 2			0	0	0	0		0.00	00.00
phalanx 3			0	0	0	0		0.00	00.00
Total	**5**	**3**	**9**	**17**	**0**	**17**			

Table 5.12: BPR for *Mustela* sp. from the Trou du Frontal, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			0	0	0	0	0			
maxilla	0	0	0	0	0	0	0	0	00.00	00.00
mandible	0	2	1	3	0	0	3	2	01.50	50.00
teeth			6	6	0	0	6			
atlas			1	1	0	0	1	1	01.00	33.33
axis			1	1	0	0	1	1	01.00	33.33
cervical v.			1	1	0	0	1		00.20	06.67
thoracic v.			2	2	0	0	2		00.15	05.13
lumbar v.			1	1	0	0	1		00.14	04.76
innominate	2	4	0	6	0	0	6	4	03.00	100.00
sacrum			1	1	0	0	1		01.00	33.33
caudal v.			0	0	0	0	0		00.00	00.00
scapula	0	0	0	0	0	0	0	0	00.00	00.00
humerus	1	1	0	2	0	0	2	1	01.00	33.33
p. humerus	0	0	0	0	0	0	0	0	00.00	00.00
d. humerus	2	3	0	5	0	0	5	3	02.50	83.33
radius	1	2	0	3	0	0	3	2	01.50	50.00
p. radius	1	0	0	1	0	0	1	1	00.50	16.67
d. radius	0	0	0	0	0	0	0	0	00.00	00.00
ulna	3	2	0	5	0	0	5	3	02.50	83.33
carpals	0	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0		00.00	00.00
p. MC	0	0	0	0	0	0	0		00.00	00.00
d. MC	0	0	0	0	0	0	0		00.00	00.00
femur	0	1	0	1	0	0	1	1	00.50	16.67
p. femur	0	0	0	0	0	0	0	0	00.00	00.00
d. femur	0	0	0	0	0	0	0	0	00.00	00.00
patella	0	0	0	0	0	0	0	0	00.00	00.00
tibia	1	0	0	1	0	0	1	1	00.50	16.67
p. tibia	0	1	0	1	0	0	1	1	00.50	16.67
tibia shaft	1	0	0	1	0	0	1			
d. tibia	1	1	0	2	0	0	2	1	01.00	33.33
fibula	0	1	1	2	0	0	2	1	01.00	33.33
tarsals	0	0	0	0	0	0	0			
MT	8	10	0	18	0	0	18		02.25	75.00
p. MT	0	0	0	0	0	0	0		00.00	00.00
d. MT	0	0	0	0	0	0	0		00.00	00.00
MP			9	9	0	0	9		00.56	18.75
phalanx 1			2	2	0	0	2		00.13	04.17
phalanx 2			1	1	0	0	1		00.06	02.08
phalanx 3			0	0	0	0	0		00.00	00.00
Total	**21**	**28**	**27**	**76**	**0**		**76**			

Table 5.13: BPR for *Felis* sp. from the Trou du Frontal, Furfooz.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0	0			
maxilla	0	0	0	0	0	0	0	0	0.00	0.00
mandible	2	0	0	2	0	1	2	0	1.00	33.33
teeth			1	1	0	0	1			
atlas			0	0	0	0	0	0	0.00	0.00
axis			0	0	0	0	0	0	0.00	0.00
cervical v.			0	0	0	0	0		0.00	0.00
thoracic v.			1	1	0	0	1		0.08	2.78
lumbar v.			1	1	0	0	1		0.14	4.76
innominate	0	5	0	4	1	0	5	5	2.50	83.33
sacrum	0	0	0	0	0	0	0	0	0.00	0.00
caudal v.			0	0	0	0	0		0.00	0.00
scapula	0	0	0	0	0	0	0	0	0.00	0.00
humerus	1	1	0	2	0	0	2	1	1.00	33.33
p. humerus	0	0	0	0	0	0	0	0	0.00	0.00
d. humerus	3	3	0	6	0	2	6	3	3.00	100.00
radius	0	0	0	0	0	0	0	0	0.00	0.00
p. radius	0	0	0	0	0	0	0	0	0.00	0.00
d. radius	0	0	0	0	0	0	0	0	0.00	0.00
ulna	2	3	0	4	1	0	5	3	2.50	83.33
carpals	0	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0	0.00	0.00
p. MC	0	0	0	0	0	0	0	0	0.00	0.00
d. MC	0	0	0	0	0	0	0	0	0.00	0.00
femur	0	0	0	0	0	0	0	0	0.00	0.00
p. femur	0	3	0	2	1	1	3	3	1.50	50.00
femur shaft	1	1	0	0	2	0	2			
d. femur	0	0	0	0	0	0	0	0	0.00	0.00
patella	0	0	0	0	0	0	0	0	0.00	0.00
tibia	0	0	0	0	0	0	0	0	0.00	0.00
P. tibia	0	0	0	0	0	0	0	0	0.00	0.00
tibia shaft	2	0	0	0	2	0	2			
d. tibia	1	4	0	5	0	0	5	4	2.50	83.33
fibula	0	0	0	0	0	0	0	0	0.00	0.00
tarsals	0	3	0	3	0	0	3			
MT	0	0	0	0	0	0	0		0.00	0.00
p. MT	0	0	0	0	0	0	0		0.00	0.00
d. MT	0	0	0	0	0	0	0		0.00	0.00
MP			4	4	0	0	4		1.00	33.33
p. MP			0	0	0	0	0		0.00	0.00
d. MP			0	0	0	0	0		0.00	0.00
phalanx 1			1	1	0	0	1		0.25	8.33
phalanx 2			0	0	0	0	0		0.00	0.00
phalanx 3			0	0	0	0	0		0.00	0.00
Total	**12**	**23**	**8**	**36**	**7**	**4**	**43**			

Table 5.14: BPR for *Lepus* sp. from the Trou du Frontal, Furfooz.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			0	0	0	0			
maxilla	0	0	0	0	0	0	0	0.00	0.00
mandible	1	1	0	2	0	2	2	1.00	50.00
teeth			2	2	0	2			
atlas			0	0	0	0	0	0.00	0.00
axis			0	0	0	0	0	0.00	0.00
cervical v.			0	0	0	0		0.00	0.00
thoracic v.			0	0	0	0		0.00	0.00
lumbar v.			0	0	0	0		0.00	0.00
innominate	2	2	0	4	0	4	2	2.00	100.00
sacrum	0	0	0	0	0	0	0	0.00	0.00
caudal v.			0	0	0	0		0.00	0.00
scapula	1	0	0	1	0	1	1	0.50	25.00
humerus	0	1	0	1	0	1	1	0.50	25.00
p. humerus	0	0	0	0	0	0	0	0.00	0.00
d. humerus	0	0	0	0	0	0	0	0.00	0.00
radius	1	0	0	1	0	1	1	0.50	25.00
p. radius	0	0	0	0	0	0	0	0.00	0.00
d. radius	0	0	0	0	0	0	0	0.00	0.00
ulna	0	0	0	0	0	0	0	0.00	0.00
carpals	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0.00	0.00
p. MC	0	0	0	0	0	0	0	0.00	0.00
d. MC	0	0	0	0	0	0	0	0.00	0.00
femur	1	0	0	1	0	1	1	0.50	25.00
p. femur	0	0	0	0	0	0	0	0.00	0.00
d. femur	0	1	0	1	0	1	1	0.50	25.00
patella	0	0	0	0	0	0	0	0.00	0.00
tibia	2	1	0	3	0	3	2	1.50	75.00
p. tibia	1	0	0	1	0	1	1	0.50	25.00
d. tibia	0	0	0	0	0	0	0	0.00	0.00
fibula	0	0	0	0	0	0	0	0.00	0.00
tarsals	0	0	0	0	0	0			
MT	0	0	0	0	0	0		0.00	0.00
p. MT	0	0	0	0	0	0		0.00	0.00
d. MT	0	0	0	0	0	0		0.00	0.00
MP			0	0	0	0		0.00	0.00
p. MP			0	0	0	0		0.00	0.00
d. MP			0	0	0	0		0.00	0.00
phalanx 1			0	0	0	0		0.00	0.00
phalanx 2			0	0	0	0		0.00	0.00
phalanx 3			0	0	0	0		0.00	0.00
Total	**9**	**6**	**2**	**17**	**0**	**17**			

Table 5.15: BPR for *Oryctolagus cuniculus* from the Trou du Frontal, Furfooz.

THE FAUNAL ASSEMBLAGE FROM THE MAGDALENIAN LAYER AT THE GROTTE DU COLÉOPTÈRE À BOMAL-SUR-OURTHE

INTRODUCTION

In this chapter I shall examine the faunal collection from the Magdalenian layer at the Grotte du Coléoptère. This site is approximately 54 km north-east of the Lesse valley, and is located in valley of the river Aine, a tributary of the river Ourthe (Figure 6.1), which itself feeds into the river Meuse near Liège. The cave itself is shown in Plate 6.1. The site takes its name from the discovery of a worked ivory object, thought to have been fashioned in the form of a beetle, most probably a member of the water beetle family Dytiscidae (Hamal-Nandrin & Servais 1925, 125): this piece is shown, alongside other worked bone antler and ivory objects from the cave in Plate 6.2.

The cave has yielded several archaeological horizons and a quite complex stratigraphic sequence. I will summarise these before turning to the Lateglacial fauna, which is my primary concern.

BACKGROUND

The first recorded excavations at the Grotte du Coléoptère were those of Joseph Hamal-Nandrin and Jean Servais between the 27th May 1923 and 27th April 1924. During the course of their excavations they investigated much of the interior of the cave and parts of its platform; they recovered later prehistoric (Dewez's level 4), Mesolithic (Dewez's level 5), Ahrensburgian (Dewez's level 6a) and late Magdalenian (Dewez's level 8) assemblages which were stratigraphically separated (Hamal-Nandrin & Servais 1925). The full extent of these first excavations is hard to establish, as Hamal-Nandrin and Servais give little indication of the areas excavated (*ibid.*). Further details relating to these excavations are given by Dewez (1975, 1987). Later excavations by Michel Dewez between May 1972

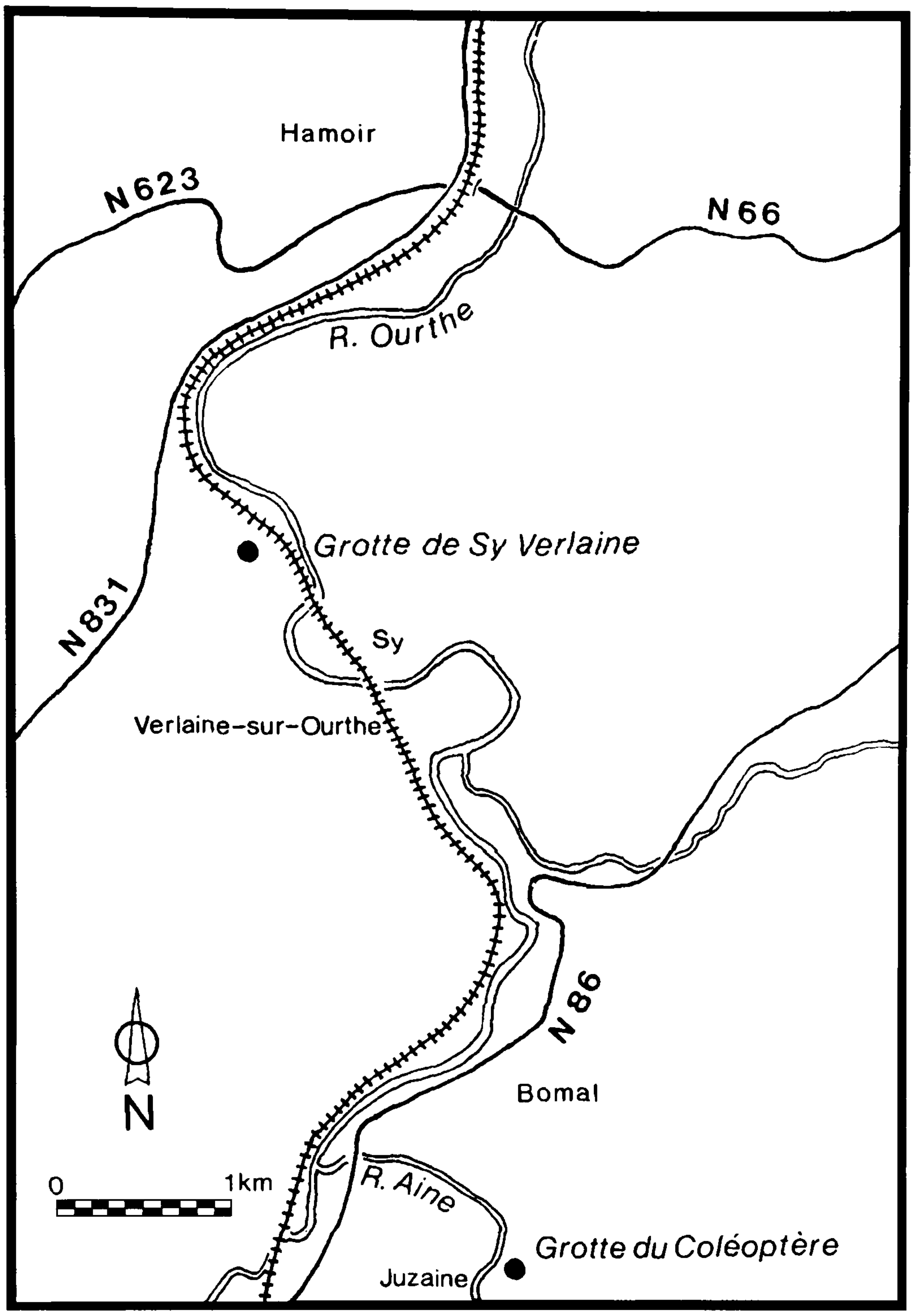


Figure 6.1: **Location map of the Grotte de Coléoptère and the Grotte de Sy Verlaine. (Drawing by R. Cook).**

and 1978 were located on a small portion of the terrace outside the cave (Figure 6.2). The uppermost layer recorded cut through spoil presumed to come from the 1920s excavation; sealed below this was an intact stratigraphic sequence, which could be correlated with that recorded by the earlier investigators of the site, and which Dewez and his colleagues were able further to sub-divide (Dewez 1975; Dewez *et al.* 1983). Dewez recovered later prehistoric, Mesolithic, late Magdalenian and Ahrensburgian archaeological material associated with faunal and floral remains (Dewez 1975); the Ahrensburgian material was confined to his *couche 6B* and the Magdalenian to *couche 8*. The Mesolithic layer, couche 5, has been published in detail (Dewez *et al.* 1983). However, the unfortunate loss of parts

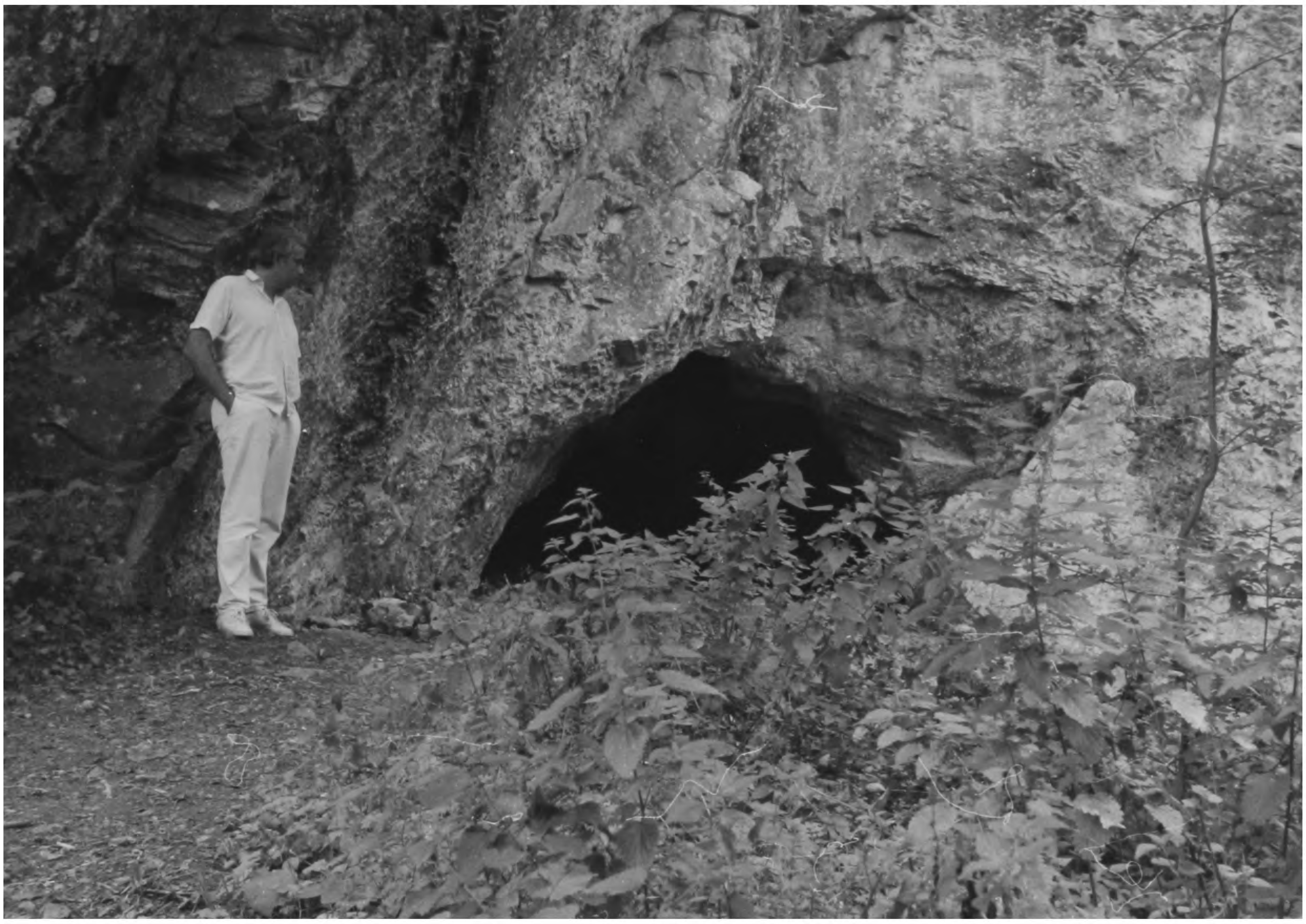


Plate 6.1: The Grotte du Coléoptère à Bomal-sur-Ourthe, J-M. Cordy in foreground.

of the site archive in an accidental fire have precluded much further detailed work on the collections from the Ahrensburgian and late Magdalenian layers.

Although two Lateglacial archaeological layers were recorded from the site, only the Magdalenian faunal assemblage will be discussed in detail within this dissertation. I also studied the Ahrensburgian fauna during my visits to Liège, and some AMS work was undertaken in connection with this (see chapter 2). However, as this thesis is essentially concerned with the Belgian Magdalenian, only the Magdalenian fauna from the site will be discussed. Further work is planned on the Ahrensburgian fauna, and it is hoped that these results will be published at a later stage.

I was able to examine the faunal collection in its entirety at the University of Liège, and am most grateful to both Professor Michel Dewez and Dr Jean-Marie Cordy for giving unrestricted access to this material and the site archive. The standards of excavation and recovery of material are excellent and extensive collections of small mammals and molluscs are preserved. The large and small mammals from Coléoptère have begun to be published in some detail by Cordy (1974, 1975 & 1983), although this coverage has yet to be extended to all of the excavated layers.

STRATIGRAPHY

M. Lohest and P. Fourmarier, in an appendix to Hamal-Nandrin and Servais' 1925 report of work at Coléoptère, described the stratigraphy at the site. Within the cave itself they proposed a tripartite division, whilst 4 layers were recognised within the platform and talus cone. They designated the layers A, B and C, inside and A, A1, B and C outside (see Figure 6.2). In both cases A was the uppermost sediment, and the stratigraphy was described as follows:

Inside the cave

1. Layer A: *Terre noirâtre formant la partie superficielle du dépôt.* Blackish earth constituting the surface part of the deposit.
2. Layer B: *Limon jaune à blocaux calcaires, parfois très volumineux, galets de grès et de quartz, fragments de schiste; ossements de renne, de cheval, etc. et industrie magdalénienne.* Yellow silt with limestone blocks, sometimes very bulky, sandstone and quartz pebbles, schist fragments; bones of reindeer, horse, etc. and [the] Magdalenian artefacts.
3. Layer C: *Couche mince de terre plus plastique, avec Rhinoceros tichorhinus, Ursus spelaeus, etc..* Thin bed of more plastic earth, with Rhinoceros tichorhinus [now *Coelodonta antiquitatis*] and *Ursus spelaeus* [cave bear, but more likely to be *Ursus arctos*] etc..

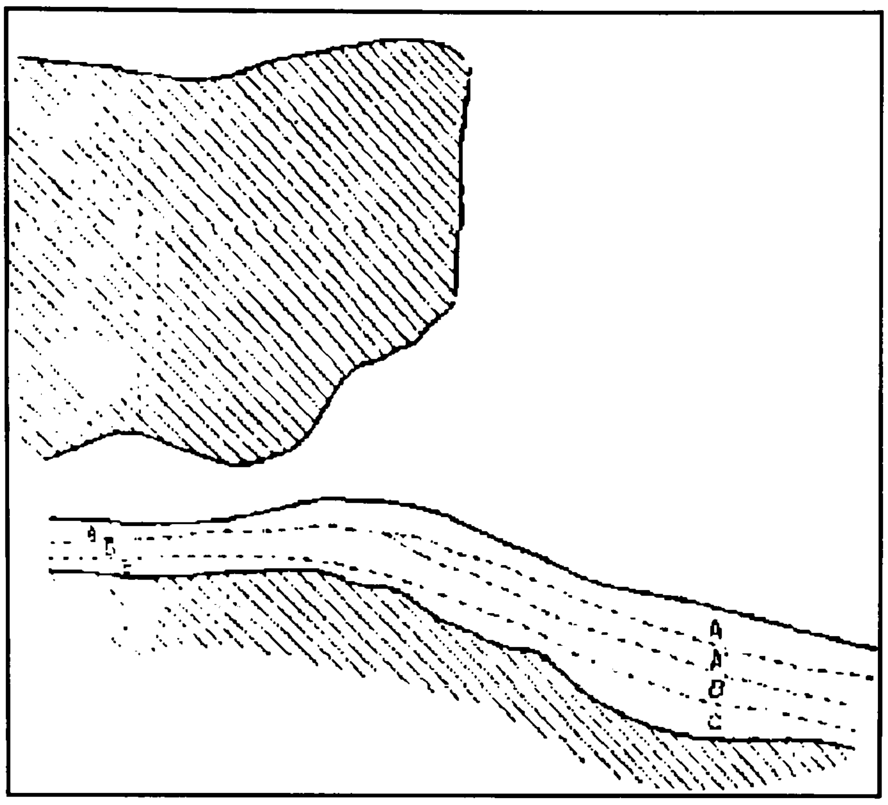


Figure 6.2: Stratigraphy of the Grotte du Coléoptère reported by Lohest & Fourmarier (from Servais & Hamal-Nandrin 1925).

Outside the cave

1. Layer A: *(Correspondant au niveau A de la grotte). Limon noirâtre formant la couche de terre végétale englobant des blocs de calcaire et des galets de grès dévonien et de quartz et des fragments de schiste; des restes de l'industrie néolithique y ont été rencontrés.* (corresponding to level A inside the cave). Blackish silt forming the humus-rich layer, containing limestone blocks, small grade Devonian sandstone and quartz pebbles, schist fragments; some traces of the Neolithic industry were found here.
2. Layer A': *Limon gris à petits blocaux calcaires, galets de grès et de quartz et débris de schiste, avec ossements de renne, de cheval et d'oiseaux; avec restes peu nombreux d'industrie.* Grey silt with small limestone fragments, small sandstone and quartz pebbles and schist fragments with reindeer, horse and bird bones; with a few remains of the industry [unclear whether refering to the Neolithic or Magdalenian].
3. Layer B: *(Correspondant au niveau B de la grotte). Limon jaune à blocaux calcaires parfois très volumineux, galets de grès et de quartz et débris de schiste; ossements de renne, de cheval, etc. et industrie magdalénienne.* (Corresponding to level B inside the cave) Yellow silt with limestone rubble, sometimes very bulky, small sandstone and

quartz pebbles, schist fragments; bones of reindeer, horse, etc. and Magdalenian artefacts.

4. Layer C: *(Correspondant au niveau C de la grotte) Limon jaune à blocaux calcaires, cailloux roulés, fragments de schiste, avec Rhinoceros tichorhinus, Ursus spelaeus, etc.* (Corresponding to level C of the cave). Yellow silt with limestone rubble, water-worn pebbles, fragments of shale with *Rhinoceros tichorhinus* [*Coelodonta antiquitatis*], *Ursus spelaeus* [cave bear, most probably *Ursus arctos*] etc.

The recent excavations directed by Professor Dewez have led to a refinement of this stratigraphic sequence although there is little disagreement between the two schemes. Dewez recorded 10 sections across his excavated area on the northern portion of the platform. Two of these are published and the remaining 8 were made available to me for reference purposes during my visits to Liège. His sections show that the excavation area was initially buried beneath Hamal-Nandrin's and Servais' spoil. One of these (coupe AB), is reproduced below in Figure 6.5.

Guy and Michel Toussaint have summarised the stratigraphy encountered at the Grotte du Coléoptère in Dewez *et al.* 1973 (pp. 13-25). The layers were numbered 1 to 12 (top to base) in their more detailed stratigraphic sequence which is as follows:

1. *Remblai des fouilles Hamal-Nandrin.* Spoil/backfill from Hamal-Nandrin's excavations.
2. *Sol forestier.* Soil of 'forest' type [? humic layer].
3. *Cailloutis formé essentiellement de gros cailloux calcaires émoussés et peu aplatis, quasi sans matrice fine. Stérile au point de vue archéologique.* A pebble bed essentially made up of large abraded and not very flattened limestone pebbles. Almost without any fine matrix. Archaeologically sterile.
4. *Cailloutis formé de cailloux assez aplatis dans une matrice fine noir, contenant de nombreuses coquilles. Dans cette couche a été trouvé un matériel archéologique assez pauvre, vraisemblablement attributable à l'âge du Bronze.* Pebble bed of somewhat flattened pebbles in a fine black matrix, containing many shells. A rather impoverished

archaeological assemblage was found in this bed, probably attributable to the Bronze Age.

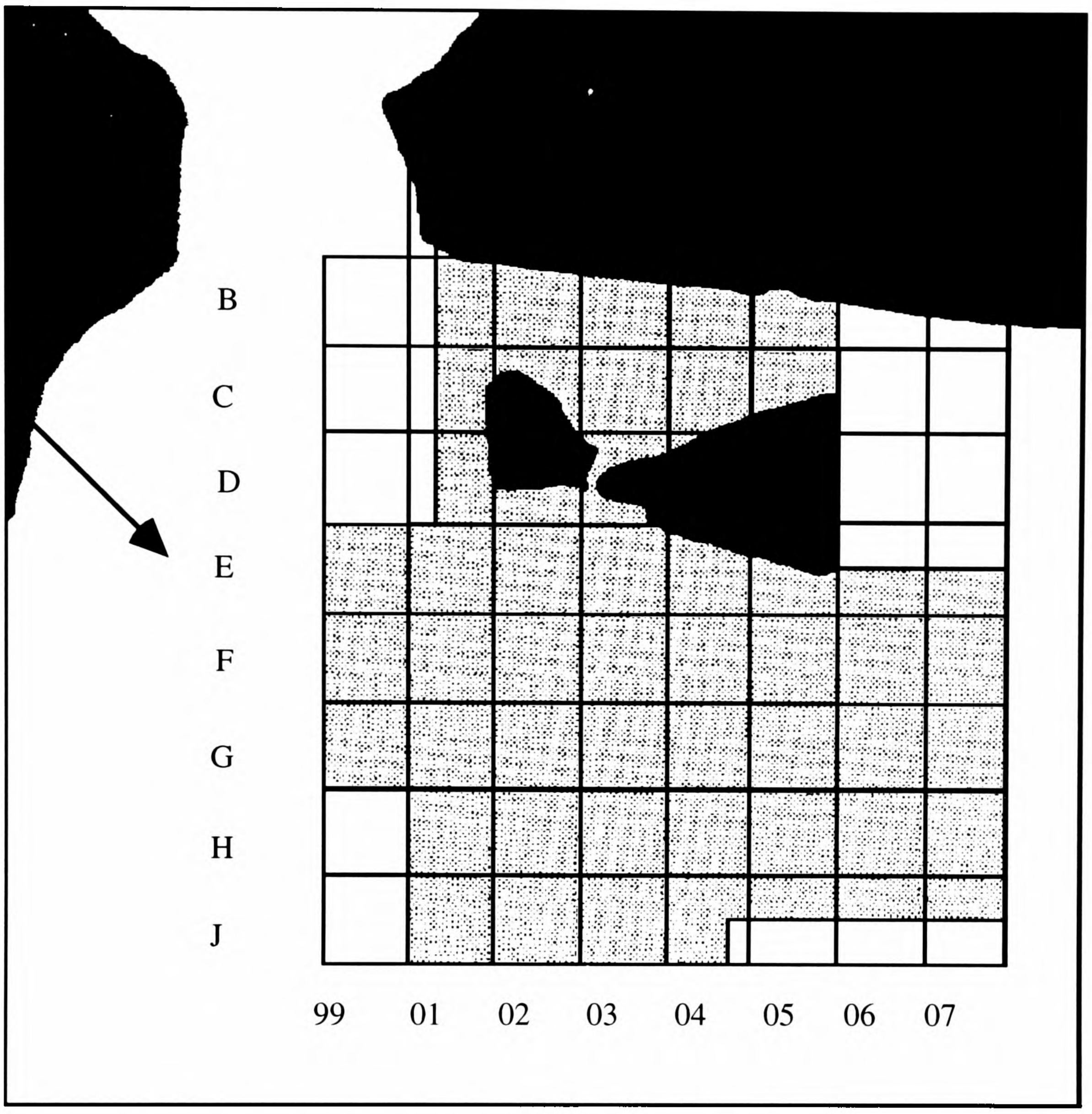


Figure 6.3: Plan of the 1972-78 excavations at the Grotte du Coléoptère. Shading=excavated area, metre square grid given, arrow indicates north.

5a. *Cailloutis formé de cailloux calcaires émoussés et un peu aplatis dans un matrice brun-rougeâtre. Dans ce cailloutis se trouvait le matériel archéologique mésolithique.* Pebble bed of slightly flattened and rolled limestone pebbles contained in a reddish-brown matrix. Mesolithic archaeological material was found in this pebble bed.

5b. *Cailloutis formé de cailloux calcaires assez émoussés et un peu aplatis, parfois volumineux, dans une matrice fine brun-rougeâtre. Stérile au point de vue archéologique, sauf quelques objets en position généralement subverticale, descendus de la couche 5a.* Pebble bed, composed of rather abraded and slightly flattened limestone pebbles sometimes bulky, in a fine reddish-brown matrix. Archaeologically sterile, except for a few pieces in sub-vertical positions, which have been displaced downwards from 5a.

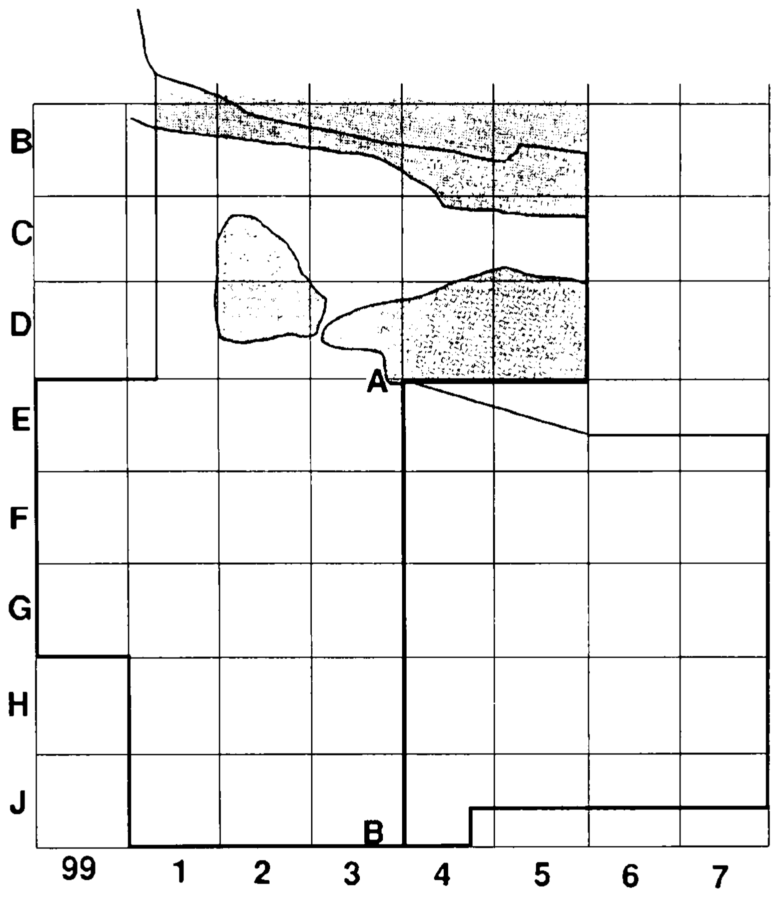


Figure 6.4: Location of section AB.

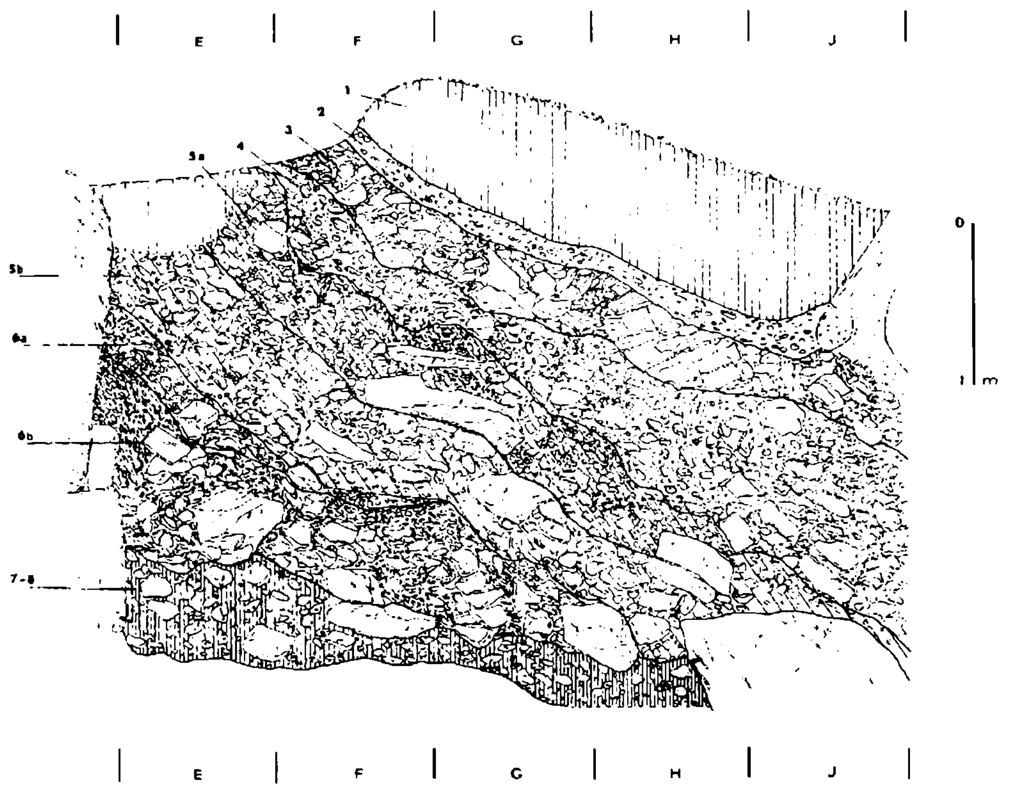


Figure 6.5: Section AB (after Dewez *et al.* 1983, Figure 3).

6a. *Cailloutis formé de cailloux calcaires anguleux et aplatis, généralement assez petits, dans une matrice fine de teinte grisâtre. Sterile au point de vue archéologique.* Pebble bed formed from angular and flattened limestone pebbles, generally rather small, within a fine matrix greyish in shade. Archaeologically sterile.

6b. *Cailloutis formé de cailloux calcaires anguleux et aplatis, en "open-work" ou contenant un peu de matrice fine teinte grisâtre. C'est à la base de cette couche que se trouvait l'occupation ahrensbourgienne.* Pebble bed of angular and flattened limestone pebbles, occurring as 'open-work' or containing a small amount of a fine-grained matrix greyish in shade. It was at the base of this bed that the Ahrensburgian occupation was located.

7. *"Limon grisâtre" avec cailloux calcaires peu abondants. Lors de la première campagne de fouilles du CIRA, cette couche repérée dans les carrees BC 23 contre la falaise, a été subdivisé sur base de la présence d'un niveau d'occupation ocré datant du Magdalénien en:* "Greyish silt" with not very frequent limestone pebbles. During CIRA's first excavation season, this bed was encountered in squares BC 23 against the cliff face, was subdivided on the basis of the presence of a ochred occupation level dated to the Magdalenian at:

8a. *Sédiment situé au-dessus du sol d'occupation.* Sediment positioned above the occupation horizon.

8b. *Sol d'occupation. Contient le Magdalénien.* Occupation horizon. Containing the Magdalenian.

8c. *Sédiment en dessous du sol d'occupation. Lors des autres campagnes de fouilles, ces subdivisions n'ont plus été observées, vraisemblablement suite aux variations latérales de faciès (plus forte proportion de cailloux) et au mélange des couches 7 et 8 par cryoturbation, dans les bandes D à J, comme en témoignent notamment des os redressés. Des fentes de gel ont aussi été observées (M. Dewez, communication orale). Ce fait a conduit à distinguer une couche appelée 7-8.* Sediment below the occupation horizon. During the other excavation seasons, these subdivisions could no longer be observed, probably due to the lateral variations of this facies (higher proportion of pebbles) and the mixing of beds 7 and 8 by cryoturbation, in the strips D to J, particularly demonstrated by bones which have been pushed upwards. Some frost fissures were also observed (M. Dewez verbal communication). This has caused us to identify a bed called 7-8.

7-8. *Cailloutis formé de cailloux calcaires un peu émoussés et peu aplatis, dans une matrice brunâtre assez abondant. Contient du Magdalenian.* Pebble bed of slightly abraded and not very flattened limestone pebbles, in a rather abundant brownish matrix. Contains some Magdalenian.

8bis. *Cailloutis formé de cailloux calcaires anguleux assez aplatis dans une matrice fine peu abondante. Couche supplémentaire, apparaissait lors de l'extension de la fouille vers la nord-ouest. Stérile au point de vue archéologique.* Pebble bed made up of angular and not very flattened limestone pebbles, within a sparse fine-grained matrix. This is an extra layer which appeared during the extension of the excavations towards the north-west. Archaeologically sterile.

8ter. *Cailloutis formé de cailloux calcaires anguleux et peu aplatis dans une matrice fine assez abondante. Couche supplémentaire, apparaissant lors de l'extension de la fouille vers la nord-ouest. Stérile au point de vue archéologique.* Band of angular limestone angular, only slightly flattened in a rather abundant fine matrix. An extra bed which appeared when the excavation was extended in a north-western direction. Archaeologically sterile.

9. *Argile jaune avec quelques gros blocs clacaires. Stérile au point de vue archéologique, ce niveau contient cependant une macrofaune assez riche.* Yellow clay with a few large limestone blocks. Archaeologically sterile, this level however contained a rather rich macrofauna.

10. *Limon grisâtre mélangé à des paillettes de schiste et à des galets roulés. Niveau localisé à la sortie d'un petit conduit karstique. Stérile au point de vue archéologique.* Greyish silt mixed with flat pieces of schist and with small rolled pebbles. Level localised at the exit of a small karstic conduit. Archaeologically sterile.

11. *Couche constituée de paillettes de schistes. Niveau localisé à la sortie d'un petit conduit karstique. Stérile de point de vue archéologique.* Layer consisting of flat schist

fragments. Level localised at the exit of a small karstic conduit. Archaeologically sterile.

12. *Bed-rock constitué de calcaires frasniens.* Frasnian limestone bed rock.

Toussaint & Toussaint (*ibid.*) proposed a correlation between their observed stratigraphy and that of Hamal-Nandrin and Servais where the latters' layer A corresponded with the Toussaints' levels 2 to 5b inclusive, A' with 6a and 6b, B with 7, 7-8, 8bis and 8ter, and finally C with 9, 10 and 11. I have nothing to add to this correlation and am happy to accept it. It confirms the broad divisions of Hamal-Nadrin and Servais's work, whilst permitting much finer detail from Dewez's excavations. The Grotte du Coléoptère is especially important, as it is one of the few sites which has more than a single Lateglacial age archaeological layer. Level 6b was recognised as containing Ahrensburgian and 8 yielded Magdalenian assemblages.

ARCHAEOLOGY

The Magdalenian assemblage from Coléoptère is one of the most distinctive and typical examples of the Magdalenian yet found in Belgium. The cave's name comes from the small oval ivory object in Plate 6.2, which is said to resemble a beetle of the family Dytiscidae. The Grotte du Coléoptère also yielded 6 uniserial harpoons of bone and antler (Dewez 1987; McComb 1989), arguably the most distinctive of the Magdalenian *fossiles directeurs*, whilst other finds from the site include eyed needles, a decorated *sagaie* base, perforated fossil shells from the Paris basin and a chamber of a Nautilus. Dewez also illustrates a partial reindeer antler which has had part of the beam pecked out, presumably as preparation for the manufacture of a *bâton de commandement* (1987 Figure 279 N° 32). The lithic assemblage included backed blades and bladelets, burins and long end scrapers all of these types well known in the Magdalenian of France. In addition to this Dewez (1987, Figures 273, 277, 279 & 280 N°71) identified numerous bones with cut marks which he identified as *documents apparemment non utilitaires*, from both Magdalenian and Ahrensburgian contexts. However, rather than being non-utilitarian artefacts, many of these instead appear to be cut marked bones and bone fragments which are simply the by

Plate 6.2: Worked bone, antler and ivory artefacts from the Grotte du Coléoptère. Scale in mm.

product of animal butchery activities rather than any sytematic series of notations or other such form of enigmatic *objecs d'art*.

Fauna

Dewez recounts (1987, 399) that the Hamal-Nandrin and Servais collection from Coléoptère was divided into two parts (formal worked objects and *ébauches*), and that in

1943 the latter of these groups was removed from the MRAH stores. A few of the lithics were recovered from the latter group (*ibid.*) and with these a small amount of fauna is preserved within the MRAH collections, although unfortunately there is now no way of re-attributing these specimens to the individual layers from which they come. Consequently the MRAH collection will not be considered here.

One of the most striking features of Dewez's collection from the Grotte du Coléoptère is the excellent standard of recovery. Vast quantities of small mammal bones and bone fragments are present from all layers. Unfortunately, few identifiable large mammal bones were recovered from level 8, which contained the Magdalenian material. Given the high standards of on-site recovery this would seem to indicate a true absence rather than mere sample selectivity on the part of the excavators. Inspection of the Hamal-Nandrin and Servais collection in the MRAH confirmed that identifiable remains had been recovered during the course of their excavations, while a photograph of their excavations published as figure 1 in their 1925 report confirms that they excavated both within the cave itself, and outside on a part of the terrace. As no detailed plan of their excavations was ever published, or could be located at the MRAH, it was not possible to determine the spatial extent of these excavations or their relationship in spatial terms to Dewez's work on the terrace. It seems possible that bones were subject to quite different taphonomic situations inside and outside the cave, as well as differential preservation and differing rates of sedimentation, and this might in part explain why so few identifiable bones were recovered by Dewez (who did not excavate inside the cave). However, this remains purely in the realms of surmise. Due to the lack of a large sample of identifiable bones (NISP for level 8 = 228), the scope for discussions of the faunal assemblage and Magdalenian faunal exploitation at this site are dissappointingly limited, the vast majority of the cut marks having been noted on bone fragments which were unidentifiable to species or anatomical element (see for example Dewez 1987, Figure 279 N°s 34 to 36). All this is highly regrettable, given the importance of the site, the quality of the Magdalenian material, and the skill shown by the relevant excavators.

NISP counts for the different large mammal species are given in Table 6.1 below. The species range is relatively small by comparison with the other Magdalenian assemblages discussed in this dissertation, the main animal present on the basis of the NISP counts being the reindeer *Rangifer tarandus*. However, 128 of the 133 specimens of *Rangifer tarandus* came from antler fragments as opposed to bones.

Species	MNI	NISP
Rangifer tarandus	1	133
Equus ferus	3	59
Vulpes sp.	1	21
Lepus sp.	1	10
Capra sp.	1	3
Mammuthus primigenius	1	1
Cervus elaphus	1	1
Total	▨	**228**

Table 6.1: NISP & MNI counts for the Magdalenian layer at the Grotte du Coléoptère

Dating

The presence of uniserial harpoons strongly suggests that this assemblage is Magdalenian V, following the classic French scheme for the French Magdalenian, based on *fossiles directeurs*. AMS dating of cut marked bones from Coléoptère has been described in detail within chapter 2, and is summarised below.

Two conventional dates from the site (Lv-686 12150 ± 150 BP, Lv-717 12400 ± 110 BP) were obtained by earlier researchers, but unfortunately no detailed sample information was available in the publications relating to research at this site. Although these two dates fell close to each other within the Bölling Interstadial phase, the nature of the contextual relationship between these samples and the Magdalenian archaeology from the site was unclear. Consequently it was felt that further dating work at the site might be a useful path to follow, and so a modified 1st phalanx of *Equus ferus* (CO 76 N° 153; Plate 6.3) from the 7-8 level of Dewez's excavation was selected for dating. This resulted in OxA-3635 12870 ± 95 BP. It should be stressed that this accelerator date is the only one from the Magdalenian layer which can be directly linked with human activity during the Bölling Interstadial phase or the latter part of Dryas I, and it should be noted that it is rather earlier than the two conventional dates from this layer. It is, however, very much in line with the other accelerator dates for the Belgian Magdalenian taken from cut bones, as well as falling within the temporal spread conventionally associated with Magdalenian V in other regions.

For the sake of completeness I will also report that an attempt was made to date human presence and activity in the Ahrensburgian layer from Dewez's excavations. Few bones identifiable to species and element were present (119), and even fewer of these showed traces of human activity (1). Eventually two specimens were selected as potential samples, a modified caprid proximal radius and a human tooth. The caprid was finally discarded as it could not be firmly identified to species, and the possibility that it originated from a recent domesticate rather than a Lateglacial chamois or ibex could not be excluded. The human tooth (a lower right M2 or M3) was then submitted. OxA-3636 4695 ± 65 BP was the resulting date, and instead of dating the Ahrensburgian at the site, is Neolithic. J-M. Cordy in Dewez *et al.* (1983) has reported the presence of *Homo sapiens* in layer 5 (above the Ahrensburgian) again solely identified on the presence of human teeth and these were assumed to be Mesolithic. Given the later prehistoric date of the tooth from layer 6b, it is possible that these specimens might also turn out to be of more recent age than hitherto suggested; however, that remains to be established. Bronze Age archaeological material is also recorded from layer 4, and human teeth were also present in the collection from this layer. It is possible that some human teeth either fell from a higher layer into an excavation area, or were introduced into the Ahrensburgian layer by another taphonomic route. As precise details of the circumstances of this particular find could not be ascertained, the presence of the tooth in layer 6b cannot be fully explained. As the date demonstrates the presence of later prehistoric material within what had been believed to be a sealed and stratigraphically discrete layer, the suggestion that the caprids from layer 6b are of Palaeolithic age cannot be supported without further dating of these specimens. This falls beyond the current remit of this project, but should be bourn in mind for future work on the collection from the Grotte du Coléoptère.

Order Proboscidea

Family Elephantidae

Mammuthus primigenius - Mammoth

A single fragment of ivory was recorded in the Dewez collection from the Grotte du Coléoptère, giving a MNI of 1 for this species. Although mammoths are known to have survived in north-western Europe into the Lateglacial (*cf.* Lister 1991), I have recently argued in conjunction with R.M. Jacobi (1994) that the presence of fragmentary ivory alone in Lateglacial faunal assemblages is not in itself a proof of the human exploitation of mammoths for meat, or even of their presence locally. Ivory was an essential raw material during the Upper Palaeolithic, used to make projectile points as well as more esoteric objects we now class as "Palaeolithic Art", as such it may well have been traded between different hunter-gathere groups, as well as being transported by such groups large distances. The presence of ivory alone in an archaeological collection cannot in itself be used as evidence for the local presence of mammoths. As no post-cranial elements of mammoth were identified in the Coléoptère assemblage, it is felt unlikely that this constituted a major part of the human diet during the Lateglacial at Coléoptère.

Order Perissodactyla

Equus ferus - Horse

Equus ferus is the second most abundant species in the assemblage on the basis of the NISP count. It has already been noted that the number of identifiable large mammal specimens from level 8 was relatively low, and the NISP count of 59 for *Equus ferus* is considered to be too low to permit any detailed discussion of BPR, although BPR information is presented in Table 6.2 at the end of this chapter.

The MNI of 3 for this species was determined by comparing the 28 mandibular fragments. In three instances, parts of the same tooth from the same side were noted on specimens which could not have come from the same individual. Only one identifiable specimen from level 8 with butchery marks was noted, the 1st phalanx of *Equus ferus* which yielded the sample dated to 12870 ± 95 BP (OxA-3635). The butchery marks on

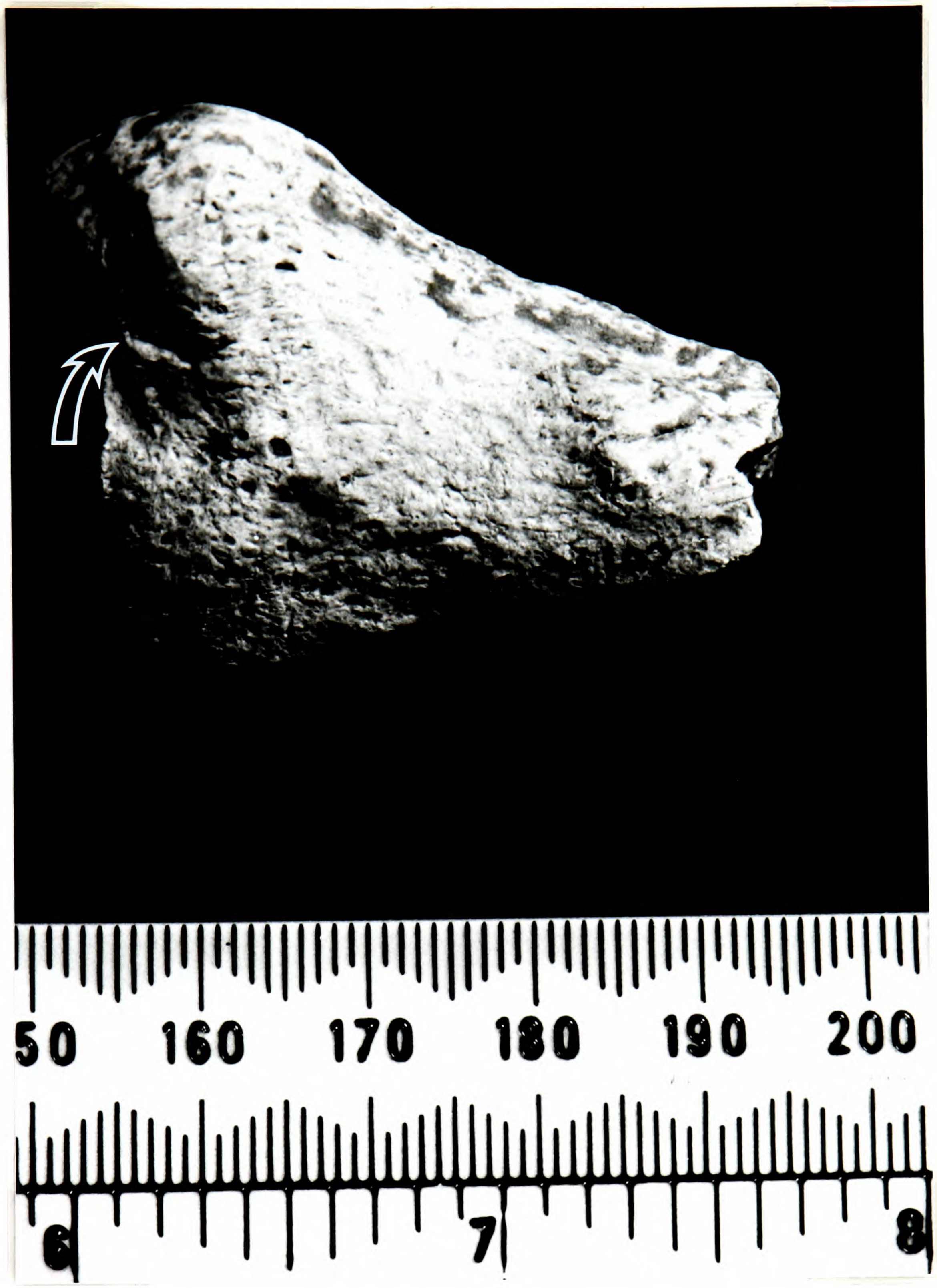


Plate 6.3: Cut partial 1st phalanx of *Equus ferus* from the Grotte du Coléoptère. OxA-3635 12870 ± 95 BP. Scale in mm and inches.

this specimen (Plate 6.3) are located around the proximal end, and represent disarticulation. A few parallels for these have been noted on some of the *Equus ferus* phalanges from late Magdalenian sites discussed here (see for example Figures 3.11 & 4.5). This is the only identifiable cut bone certainly from the Magdalenian level at the Grotte du Coléoptère, and as such can hardly be used as the basis for any detailed discussion of large mammal butchery practices at this site during the Bölling Interstadial phase.

Order Artiodactyla

Rangifer tarandus - Reindeer

The reindeer is by far the most abundant species from the Grotte du Coléoptère, although it has to be added that 128 of the 133 *Rangifer tarandus* specimens come from antler fragments and that no complete antlers were noted within the collection (Table 6.3). None of the 5 remaining specimens showed any trace of butchery activity, and the sample size is far too small on which to base any meaningful conclusions about either BPR or butchery practices. Indeed, there is no direct evidence to link any of the *Rangifer tarandus* specimens from the Grotte du Coléoptère with human activity. Similarly, no gnawing or puncture marks were noted on any of the bones, and so it has not been possible to identify the actions of any predator on these bones or make any suggestions as to the agency which caused them to be deposited within level 8.

The possibility that reindeer antlers were cached in many of the Belgian caves during the Lateglacial has already been discussed in relation to the Trou des Blaireaux (chapter 2) and the Trou des Nutons (chapter 4). This is not thought to be a particularly compelling argument, as the vast majority of these antlers originate from juvenile and/or female reindeer and as they are relatively gracile they are an unsuitable raw material for working. Antlers may be incorporated within a cave sediment for a wide range of reasons e.g. antler collection by carnivores whilst in velvet (*cf.* Haynes 1980). The problems surrounding such a model have been discussed with regard to similar suggestions surrounding the Trou des Blaireaux at Vaucelles in chapter 2, and the Trou des Nutons in chapter 4. In neither case is it felt appropriate to attribute the presence of juvenile and/or female reindeer antlers to human activity, and that is also the case here.

Cervus elaphus - Red Deer

The only specimen of red deer to be identified within the collection was a partial maxillary fragment (CO 76 N° 157), which could not be confidently attributed to side. Neither butchery marks nor carnivore damage was noted on this particular specimen. The human exploitation of red deer has been discussed in relation to the Trou de Chaleux (chapter 3), Trou des Nutons (chapter 4) and the Trou du Frontal (chapter 5). Red deer are known to form part of the regional Lateglacial megafauna, and there seem to be no grounds to suggest that this specimen is of anything other than a Lateglacial age. It will not be discussed further here.

Family Bovidae

Capra sp. - Ibex, Chamois and Goat

Three caprids were noted within the Coléoptère fauna from level 8, one tooth and two 3rd phalanges. As with the red deer specimen discussed above, none of these showed any traces of human activity. It was not possible to identify firmly any of these specimens to species. Consequently the presence of ibex and/or chamois cannot be confirmed or denied. Despite the fact that these appear to have originated from a stratigraphically sealed unit of Lateglacial age, the possibility that some or all of these specimens actually originated from recent domesticates cannot be wholly excluded, especially given the AMS date (OxA-3636 4695 ± 65 BP) taken from a human tooth apparently stratified within the Ahrensburgian layer at the same site. This suggests that there has been some degree of movement between stratigraphic units of smaller anatomical elements. Whether the Magdalenian layer includes such intrusive specimens is currently unclear, but this must remain a possibility.

Order Carnivora

Family Canidae

Vulpes sp. - Red Fox and/or Arctic Fox

21 specimens of fox were noted, all of which are likely to have come from the same individual, though this cannot be conclusively demonstrated. BPR details are given in Table 6.4. Alongside a mandibular fragment, parts of both fore and hind limbs are present There is no direct evidence to assume that this fox was incorporated into level 8 as a result of human agency. The exploitation of foxes solely as fur bearing mammals would leave few (if any) archaeological traces, this possibility cannot be completely excluded. Equally,

however, the presence of the fox could be explained by a natural death, or as the result of carnivore activity.

It was not possible to determine whether these specimens came from arctic or red fox, as the single mandible fragment, which might provide the answer was undiagnostic. Accordingly these specimens have been designated as *Vulpes* sp. although the possibility that they may originate from both species is acknowledged. If this were shown to be the case, the MNI count would increase to at least 2.

Order Lagomorpha

Family Leporidae

Lepus sp. - Arctic Hare and Brown Hare

Only 10 hare bones were identified in the main part these were fragments rather than complete bones, and none could be identified specifically as either brown or arctic hares with any degree of certainty. BPR information is given in Table 6.5 below, and no specimens were cut. The possible Lateglacial exploitation of hares has been discussed in relation to other Lateglacial Belgian sites, and the exploitation of hare(s) at the Grotte du Coléoptère certainly remains a possibility, albeit an unproven one.

CONCLUSIONS

As only 1 cut bone could be certainly attributed to the Magdalenian layer at the Grotte du Coléoptère, a discussion of Late Magdalenian butchery practice at this site is hardly a serious possibility. Other butchered bones were noted, but either came from the Ahrensburgian layer, or lacked any layer attribution. Only 6 identifiable bones with butchery marks were present in the entire collection: a cut partial caprid radius, the partial 1st phalanx of *Equus ferus* already mentioned, a maxillary fragment of *Equus ferus*, a right distal tibia of *Equus ferus* and a proximal femur of *Ursus arctos*. Only the first two of these had any layer attribution. As we have seen the partial 1st phalanx of *Equus ferus* has been accelerator dated to the earlier part of the Bölling Interstadial phase of the Lateglacial, and falls very much in line with other AMS dates on modified bones from Belgian Late

Magdalenian contexts (*cf.* chapter 2). There are grounds to suggest that some smaller faunal elements may have been subject to postdepositional disturbance resulting in their movement between layers, and this was certainly so in the case of the human tooth apparently from an Ahrensburgian context, but dated via AMS to the local Neolithic.

Whilst the Grotte du Coléoptère offers some good archaeological evidence to confirm Late Magdalenian presence in this part of Belgium, it sadly does not enhance our knowledge of how these people butchered animal carcasses. It may be that sufficient amounts of the Magdalenian level remain intact at the site to warrant further excavation in due course, which might yield further faunal material, but for the time being I can find little to add to what has been said above.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			0	0	0	0	0			
maxilla	0	0	1	1	0	0	1	1	0.50	03.57
mandible	0	1	27	28	0	0	28	3	14.00	100.00
teeth			25	25	0	0	25			
hyoid			0	0	0	0	0	0	0.00	00.00
atlas			0	0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	0	1	0	1	0	0	1	1	0.50	03.57
sacrum			0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0	0.00	00.00
humerus	0	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0	0.00	00.00
carpals	0	0	0	0	0	0	0		0.00	00.00
MC	0	0	0	0	0	0	0	0	0.00	00.00
acc. MC	0	0	0	0	0	0	0		0.00	00.00
femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0	0		0.00	00.00
MT	0	0	0	0	0	0	0	0	0.00	00.00
acc. MT	0	0	0	0	0	0	0		0.00	00.00
p. MP	0	0	0	0	0	0	0		0.00	00.00
MP shaft			1	1	0	0	1			
d. MP			0	0	0	0	0		0.00	00.00
acc. MP			0	0	0	0	0		0.00	00.00
phalanx 1			3	3	0	1	3		0.75	05.36
phalanx 2			0	0	0	0	0		0.00	00.00
phalanx 3			0	0	0	0	0		0.00	00.00
Total	**0**	**2**	**57**	**59**	**0**	**1**	**59**			

Table 6.2: BPR for *Equus ferus* from the Grotte du Coléoptère.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
antler	▨	▨	128	▨	▨	0	128	▨	▨	▨
cranial	▨	▨	0	0	0	0	0	▨	▨	▨
maxilla	0	0	1	1	0	0	1	1	0.50	100.00
mandible	0	0	0	0	0	0	0	0	0.00	00.00
teeth	▨	▨	0	0	0	0	0	▨	▨	▨
hyoid	▨	▨	0	0	0	0	0	0	0.00	00.00
atlas	▨	▨	0	0	0	0	0	0	0.00	00.00
axis	▨	▨	0	0	0	0	0	0	0.00	00.00
cervical v.	▨	▨	0	0	0	0	0	▨	0.00	00.00
thoracic v.	▨	▨	0	0	0	0	0	▨	0.00	00.00
lumbar v.	▨	▨	0	0	0	0	0	▨	0.00	00.00
innominate	0	0	0	0	0	0	0	0	0.00	00.00
sacrum	▨	▨	0	0	0	0	0	0	0.00	00.00
caudal v.	▨	▨	0	0	0	0	0	▨	0.00	00.00
scapula	0	0	0	0	0	0	0	0	0.00	00.00
humerus	0	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0	0.00	00.00
carpals	0	0	0	0	0	0	0	▨	▨	▨
MC	0	0	1	1	0	0	1	1	0.50	100.00
p. MC	0	0	0	0	0	0	0	0	0.00	00.00
d. MC	0	0	0	0	0	0	0	0	0.00	00.00
acc. MC	0	0	0	0	0	0	0	0	0.00	00.00
femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0	0	▨	▨	▨
MT	0	0	0	0	0	0	0	0	0.00	00.00
p. MT	0	0	1	1	0	0	1	1	0.50	100.00
d. MT	0	0	1	1	0	0	1	1	0.50	100.00
acc. MT	0	0	0	0	0	0	0	0	0.00	00.00
MP	0	0	0	0	0	0	0	0	0.00	00.00
acc. MP	0	0	0	0	0	0	0	▨	▨	▨
p. sesamoid	▨	▨	0	0	0	0	0	▨	0.00	00.00
phalanx 1	▨	▨	0	0	0	0	0	▨	0.00	00.00
phalanx 2	▨	▨	1	1	0	0	1	▨	0.25	50.00
phalanx 3	▨	▨	0	0	0	0	0	▨	0.00	00.00
Total	**0**	**0**	**133**	**5**	**0**	**0**	**133**	▨	▨	▨

Table 6.3: BPR for *Rangifer tarandus* from the Grotte du Coléoptère.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
cranial			00	00	0	0	00			
maxilla	00	00	00	00	0	0	00	0	00.00	00.00
mandible	00	00	01	01	0	0	01	1	00.50	50.00
teeth			00	00	0	0	00			
atlas			00	00	0	0	00	0	00.00	00.00
axis			00	00	0	0	00	0	00.00	00.00
cervical v.			00	00	0	0	00		00.00	00.00
thoracic v.			00	00	0	0	00		00.00	00.00
lumbar v.			00	00	0	0	00		00.00	00.00
innominate	00	00	00	00	0	0	00	0	00.00	00.00
sacrum			00	00	0	0	00	0	00.00	00.00
caudal v.			00	00	0	0	00		00.00	00.00
scapula	00	00	00	00	0	0	00	0	00.00	00.00
humerus	00	00	00	00	0	0	00	0	00.00	00.00
radius	00	00	00	00	0	0	00	0	00.00	00.00
p. radius	00	00	01	01	0	0	01	1	00.50	50.00
d. radius	00	00	02	02	0	0	02	1	01.00	100.00
ulna	00	00	01	01	0	0	01	1	00.50	50.00
carpals	00	00	00	00	0	0	00			
MC	00	00	00	00	0	0	00	0	00.00	00.00
femur	00	00	00	00	0	0	00	0	00.00	00.00
p. femur	00	00	00	00	0	0	00	0	00.00	00.00
d. femur	00	00	01	01	0	0	01	1	00.50	50.00
patella	00	00	00	00	0	0	00	0	00.00	00.00
tibia	00	00	01	01	0	0	01	1	00.50	50.00
p. tibia	00	00	00	00	0	0	00	0	00.00	00.00
d. tibia	00	00	01	01	0	0	01	1	00.50	50.00
fibula	00	00	00	00	0	0	00	0	00.00	00.00
tarsals	00	00	02	02	0	0	02			
MT	00	00	00	00	0	0	00		00.00	00.00
MP	00	00	09	09	0	0	09		00.56	56.25
phalanx 1			01	01	0	0	01		00.06	06.25
phalanx 2			01	01	0	0	01		00.06	06.25
phalanx 3			00	00	0	0	00		00.00	00.00
Total	**0**	**0**	**21**	**21**	**0**	**0**	**21**			

Table 6.4: BPR for *Vulpes* sp. from the Grotte du Coléoptère.

Element	Left	Right	Indet	Adult	Juv	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0			
maxilla	0	0	1	1	0	1	1	0.50	40.00
mandible	0	0	1	1	0	1	1	0.50	40.00
teeth			0	0	0	0			
atlas			0	0	0	0	0	0.00	0.00
axis			0	0	0	0	0	0.00	0.00
cervical v.			0	0	0	0		0.00	0.00
thoracic v.			0	0	0	0		0.00	0.00
lumbar v.			0	0	0	0		0.00	0.00
innominate	0	0	0	0	0	0	0	0.00	0.00
sacrum	0	0	0	0	0	0	0	0.00	0.00
caudal v.			0	0	0	0		0.00	0.00
scapula	0	0	0	0	0	0	0	0.00	0.00
humerus	0	0	0	0	0	0	0	0.00	0.00
p. humerus	0	1	1	2	0	2	1	1.00	80.00
d. humerus	0	0	0	0	0	0	0	0.00	0.00
radius	0	0	0	0	0	0	0	0.00	0.00
p. radius	0	0	1	1	0	1	1	0.50	40.00
d. radius	0	0	1	1	0	1	1	0.50	40.00
ulna	0	0	1	1	0	1	1	0.50	40.00
carpals	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0.00	0.00
femur	0	0	0	0	0	0	0	0.00	0.00
patella	0	0	0	0	0	0	0	0.00	0.00
tibia	0	0	0	0	0	0	0	0.50	40.00
p. tibia	0	0	1	1	0	1	0	0.00	0.00
d. tibia	0	0	1	1	0	1	1	0.00	0.00
fibula	0	0	0	0	0	0	0	0.00	0.00
tarsals	1	0	0	1	0	1			
MT	0	0	0	0	0	0		0.00	0.00
p. MT	0	0	0	0	0	0		0.00	0.00
d. MT	0	0	0	0	0	0		0.00	0.00
MP			0	0	0	0		0.00	0.00
p. MP			0	0	0	0		0.00	0.00
d. MP			0	0	0	0		1.25	100.00
phalanx 1			0	0	0	0		0.00	0.00
phalanx 2			0	0	0	0		0.00	0.00
phalanx 3			0	0	0	0		0.00	0.00
Total	**1**	**1**	**8**	**10**	**0**	**10**			

Table 6.5: BPR for *Lepus* sp. from the Grotte du Coléoptère.

THE FAUNAL ASSEMBLAGE FROM THE GROTTE DE SY VERLAINE

INTRODUCTION

This chapter deals with the large mammal fauna from the Grotte de Sy Verlaine (Figure 6.1), in the valley of the river Ourthe. The site was selected for study as it was one of the two Belgian Magdalenian sites (the other being the Trou des Blaireaux à Vaucelles) which had yielded an 'early' radiocarbon date (Lv-690 13780 ± 220 BP) for the Late Magdalenian, indicating human presence in Belgium after the LGM but before the start of the Bölling Interstadial phase of the Lateglacial. During the course of my visits to Belgium I was able to study the Destinez & Moreels and Thisse collections held in the Dept. de Paléontologie at the University of Liège, and the Rahir and Lequeux collection held in the Musées Royaux d'Art et d'Histoire in Brussels.

BACKGROUND

The Grotte de Sy Verlaine (50° 24' 15" North, 5° 31' 30" East; Plate 7.1) lies approximately half way between the two villages of Sy and Verlaine in a limestone cliff, close to the Liège - Hamoir railway line. I was fortunate to visit the site with professor Michel Dewez and Dr Jean-Marie Cordy in the summer of 1991. The cave has a small enterance, lacks a central chamber, and is instead a narrow passage which ends some 20 m into the hillside (Plate 7.1). The site is also known as the "Caverne de Verlaine" and the "Trou des Nutons, Verlaine" (see footnotes 4 & 5 in chapter 2). The first recorded excavation of the site were by P. Destinez and L. Moreels, who reported their results to Société Géologique de Belgique in 1888. Although they refer to their plans to publish a monograph on their excavations and results in this publication, this was never completed. They reported the recovery of Magdalenian lithics, worked bone including a bone point with an anthropomorphic carving at one end (McComb 1989, plate 5.5), fossil shells which

Plate 7.1: The Grotte de Sy Verlaine, M. Dewez in foreground.

they provenanced to the Paris Basin (Destinez & Moreels 1888, CXLVI) and 3 fossilised internal casts of a Nautilus' chamber. The Grotte de Sy Verlaine lies close to the Grotte du Coléoptère, and it is interesting to note that these are the only two Belgian Magdalenian sites from which fossilised internal casts of Nautilus' chambers have been recovered. These were presumably brought to these caves as manuports.

A small amount of archival material is preserved in the MRAH collections relating to this site, although most of it appears to be notes taken by previous researchers on the site. There is also a sketch plan of the cave with approximate measurements, jotted on a reciept pad and dated the 12th September 1920.

Further excavations were undertaken by Professor J. Fraipont between 1889 and 1901 at the cave, although I have not been able to locate a copy of the only published account of these (Fraipont 1908, cited in Dewez 1987). Dewez indicates that these finds added to those of Destinez and Moreels, but no further information is currently available.

E. Rahir (1925) recounts further work at the site during 1909 to obtain specimens for the MRAH collections. This work was apparently hindered by the presence of a tree on the cave terrace.

Between 1936 and 1952 J. Thisse-Derouette, a local amateur archaeologist undertook further excavation work at the site; preparation of this material for publication is still in progress (Dewez 1987, 367-8). Finally, another amateur archaeologist, M. Roncart, undertook excavations at the site with the objective of recovering further prehistoric material. Unfortunately, the collection resulting from this excavation is now lost (*op cit.*, 368), although Dewez reported that there were a few flints amongst other finds.

During my own visit to the site in 1991, I examined the interior of the cave for any traces of remnant sediment adhering to the walls and found no trace of any such evidence. The cave itself appears to have been fully excavated, although there might be some possibility for further work on the terrace outside the cave mouth.

STRATIGRAPHY

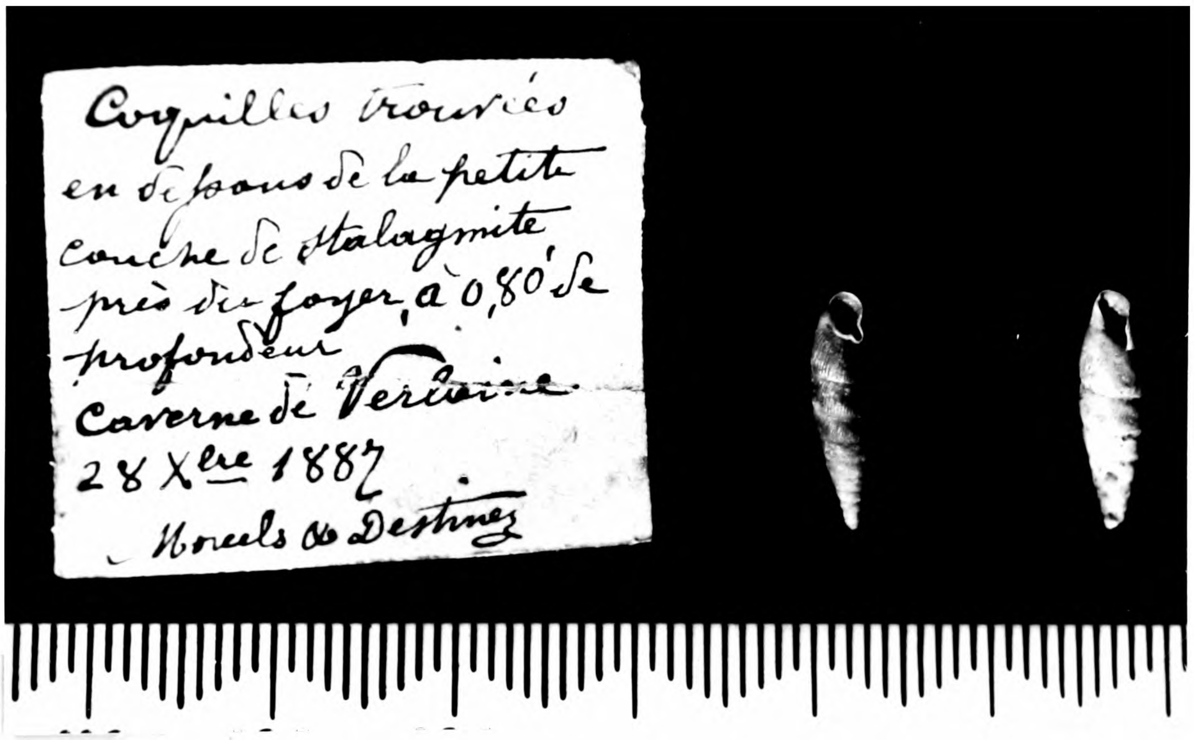
Destinez and Moreels (1888, CXLVII) noted a tripartite division of the stratigraphy as follows:

1. *Cette caverne ne possédait qu'une seule couche ossifère, non remaniée; cette couche était protegée par un niveau supérieur.* This cave possesed only a single bone-bearing level, not reworked; this bed was protected by an upper level.
2. *[Le] niveau supérieur, formé d'éboulis consistant en fragments de la roche encaissante et en cailloux roulés que nous croyons apportés plutôt qu'entraînés, vu leur petit nombre et leurs dimensions qui sont sensiblement égales.* [The] upper level, formed by scree consisting of fragments of the surrounding rock and rolled limestone pebbles which we

believe were brought there deliberately rather than carried in accidentally, given their dimensions which are more or less equal.

3. *Dans certains endroits, notamment contre les parois de la caverne, ces deux niveaux étaient séparés par un dépôt de stalagmites d'une épaisseur variant entre cinq et trente centimètres.* In certain places, in particular against the cave walls, these two levels were separated by a deposit of stalagmite varying in thickness between five and thirty centimetres.

Dewez (1987, 366-367) adds further details to this. The bone bearing level apparently contained the remains of *Rhinoceros tichorhinus* [now *Coelodonta antiquitatis*], *Ursus*, *Equus caballus* [now *Equus ferus*], *Cervus tarandus*[now *Rangifer tarandus*], etc. Archival material held at the Université de Liège (*ibid.*) records the finding of a hearth within a red layer close to the entrance of the cave. Apparently much archaeological material was recovered from both the hearth and this red layer, and it was near this hearth that one of the fossilised internal casts of a Nautilus' chamber was found next to 2 tertiary shells and a woolly rhinoceros tooth (the 2 shells are shown in Plate 7.2).



Coquilles trouvées
en dessous de la petite
couche de stalagmite
près du foyer, à 0,80 de
profondeur
Caverne de Verlaine
28 X^{bre} 1887
Moreels & Destinez

Plate 7.2: Fossil shells and label from the Grotte de Sy Verlaine. Dept. de Paléontologie, Université de Liège. Scale in mm.

Unfortunately these stratigraphic distinctions have not been preserved with regard to the faunal collections. Consequently the material described below could have come from any of the 3 stratigraphic units detailed here. With this in mind, it was felt appropriate to compile an inventory of what material was preserved, and then to attempt to locate parts of the fauna which could be directly linked to human activity by the presence of butchery marks.

ARCHAEOLOGY

The archaeological material from the Grotte de Sy Verlaine arguably constitutes one of the most enigmatic Magdalenian assemblages from the study region. The stone artefacts include characteristic Magdalenian forms, such as backed blades and bladelets, also present are distinctive pieces of worked bone, antler and ivory such as eyed needles, a needle core and broken *sagaie* bases. A detailed account of the artefacts recovered from the site can be found in Dewez (1987). Perhaps the most distinctive artefact to be recovered from the Grotte de Verlaine is the mid- section of a uniserial harpoon (Doize 1960, figure 1; Dewez 1987, figure 244). It should also be noted that there are some bone fragments in the collections which at first glance appear to be worked bone implements (see, for example, Dewez 1987, plate 247 N° 26). My own examination showed, however, that these pieces have been smoothed and etched by corrosive substances: such bone fragments (Plate 7.6) are highly characteristic of bones which have passed through a carnivore's digestive tract and cannot be regarded as the result of human activity.

The 3 fossilised internal casts of a Nautilus' chamber are described in some detail by Dewez (1987, 390 - 391); all appear to have had traces of ochre on their surface, and all 3 are reported to have been marked by stone tools. One of these (Université de Liège N° 1562) is reputed to carry a regular series of incisions which Dewez suggests (1987, 391) are a notation (*cf.* Marshack 1972). Other such objects have been noted in Late Upper Palaeolithic contexts from north-western Europe (Hawkes *et al.* 1970; Charles 1989 & 1991), and more specifically from Belgium itself (Dewez 1974 & 1980), although I have grave reservations about the validity of the two *côtes enochées* from Presle (Dewez 1980, planche 3).

Fossil shells were also recovered from the Grotte de Sy Verlaine, by Destinez and Moreels and by Thisse; these have been sourced to the Paris basin (Dewez 1987, 391). Dewez was also able to confirm their identifications with M. Gilbert of the IRScNB who listed the following species:

Species	NISP
Melanopsis buccinoides	3
Sigmesalia regularis	4
Gravesicerithium gravesi	2
Tympanotonos conoidens	1
Turetella terebellata	1
Cryptochorda stromboides	1
Hipponix cornucopidae	1
V. campanile sp.	1

Table 7.1: Identifications of fossil shells found at the Grotte de Sy Verlaine. Data from Dewez (1987).

FAUNA

The faunal collections from the Grotte de Sy Verlaine retain little stratigraphic information. A few specimens, such as the fossil shells, have been curated with their hand-written labels, giving some degree of provenance information (Plate 7.2). For the most part, however, there is little indication of the stratigraphic position of the majority of specimens in the collections. The different species present in the faunal collections are given in Table 7.2. This list includes a wide range of species, a number of which have been argued in preceding chapters not to be of Lateglacial age, at other sites discussed in this dissertation. Animals more characteristic of the mid-Weichselian such as the hyaena (*Crocuta crocuta*) and the woolly rhinoceros (*Coelodonta antiquitatis*) are present, as are other species which are believed to belong to the mammal fauna of the current interglacial (the beaver - *Castor fiber*, one or more mustelids - *Mustela* sp. and the rabbit - *Oryctolagus cuniculus*). In the case of some of the species present it is ambiguous whether they belong to the Bölling Interstadial phase or to some other part of the Holocene or the Weichselian, such as the cats (*Felis* sp.).

Species	**NISP**	**MNI**	**% of ident. fauna**
Equus ferus	117	1	22.41
Vulpes sp.	92	1	17.62
Felis sp.	81	10	15.52
Ursus arctos	33	1	6.32
Rangifer tarandus	28	1	5.36
Crocuta crocuta	27	1	5.17
Ovi-caprid	23	1	4.41
Canis sp.	20	1	3.83
Meles meles	19	1	3.64
Lepus sp.	19	3	3.64
Oryctolagus cuniculus	12	2	2.30
Cervus elaphus	10	1	1.92
Homo sapiens	9	1	1.72
Sus scrofa	9	1	1.72
Mustela sp.	7	2	1.34
Coelodonta antiquitatis	6	1	1.15
Castor fiber	4	1	0.77
Bos sp.	4	1	0.77
Mammuthus primigenius	2	1	0.38
Total	522	▨	**99.99**

Table 7.2: NISP counts of all large mammal species from the Grotte de Sy Verlaine.

The only cut bones in the assemblage came from either reindeer or horse. Since both of these animals are known to have been present in the region during the Lateglacial, and the only Palaeolithic material recovered from the site is Magdalenian, it will be assumed that these 8 bones were cut during the Magdalenian use of the site.

Human bones were also present in the assemblage. It is unclear whether these do or do not date to the Pleistocene, although, as we have already seen later prehistoric inhumations and ossuaries have been noted in a number of Belgian cave sites (see chapters 4, 5 & 6). As there are no stratigraphic details associated with these specimens, it is not immediately clear whether any of the human bones date to the Pleistocene or to the Holocene (all of them are anatomically modern). One partial ulna shaft's tip was embedded in stalagmite, presumably that which Destinez & Moreels (1888, CXLVII; see above) noted as separating their 'upper level' from their 'bone layer' in certain places. Whether all the human bones came from the 'upper level' or from the 'bone level' (or a combination of both) is unclear. It is also uncertain whether the human remains come from the same individual, although the MNI count for them is 1.

Large numbers of bone fragments, unidentifiable to species or element were also present within the faunal collections from the site. Their presence suggests that on-site recovery was reasonable, although just how selective the subsequent decisions to preserve various bones is unclear. Given that numerous faunal and archaeological collections have been made from the Grotte de Sy Verlaine over the course of the last 100 years, it seems likely that the excavation and recovery procedures followed by each excavator were not the same, and that different selection criteria were applied by the excavators and subsequent museum curators. If this is indeed the case, then one can only say, with regret, that it is extremely difficult to draw many firm conclusions regarding species presence/absence, the proportion of different species in the assemblage(s), or any apparent patterning in BPR data.

Seasonality

It has already been suggested that the faunal assemblage from the Grotte de Sy Verlaine was accumulated over many thousands of years and cannot now be re-attributed to its original stratigraphic contexts. It will be argued below that very few of the large mammal bones from the site can be directly linked with human activity at the site, as opposed to that of other predators. If this is indeed the case, then discussions relating to the season(s) of human use at the site are by necessity somewhat restricted. None of the 8 cut bones from the collections is specimens likely to yield any seasonality data (they are all post-cranial elements). The identifiable specimens of the two species which show butchery evidence - *Equus ferus* and *Rangifer tarandus* - have relatively limited potential for seasonality techniques. A maxillary and a mandibular fragments of *Equus ferus* are present which may be suitable for Ariane Burke's technique of dental sectioning (Burke 1992). There is only one mandibular fragment of *Rangifer tarandus* (an adult), and so again the potential for establishing seasonality evidence from his source is limited, although thin sectioning of the teeth in this fragment (*cf.* Gordon 1988) might give some indication of the seasons of reindeer presence in the region. There are also 11 antler fragments, only one of which is a shed base. This specimen was relatively small, and identified as female or juvenile, and might accordingly indicate a seasonality of Summer (post-calving), although Gordon (*ibid.*, 15) has commented that the counting dental increments is a more reliable method of seasonality estimation, as it is far less likely to have been distorted by human collection, transport and storage of a potential raw material.

Gordon's study of reindeer seasonality during the French Magdalenian (1988) extended to 8 reindeer teeth from the Ahrensburgian site of Remouchamps in Belgium. The dental increments from this site indicated that the reindeer had died during the autumn. By combining this information with seasonality data from sites in the Paris Basin, he suggested that there was a reindeer migration route which he termed "the northern range", which ran between the Paris basin, the rivers Ourthe and Amblève, also infringing on the Lesse valley (Gordon 1988, 88 & figure 27). This supposition seesm to me somewhat unsafe, as Gordon compares reindeer seasonality data from two groups of sites some 250 km apart in space, and some 3 millennia apart in time. It is hard to prove that the same herds of reindeer were commuting between the Paris basin and the north-western Ardennes for 3,000 years and, given the rapid series of climatic fluctuations which characterised the Lateglacial (*cf.* Alley *et al.* 1993) it does not seem unreasonable to expect that the distribution of large mammal species during this period would have fluctuated quite dramatically.

Dating evidence

The dating evidence for this site has already been discussed in some detail in chapter 2, but for the sake of clarity will be briefly recapitulated here. The apparently early radiocarbon date for this site, Lv-690 13780 ± 220 BP, suggested that the archaeological material from this site was deposited during Dryas I, predating the Bölling Interstadial phase. I have argued elsewhere (chapter 2) that the earliest firm evidence for human presence in Belgium after the LGM occurs at the very start of the Bölling Interstadial phase. This date has in any case posed a problem for studies of the Belgian Lateglacial, as it does not directly tally with what on purely typological grounds one would expect to be the likely age of the archaeological assemblage from the Grotte de Sy Verlaine. One of the most distinctive artefacts to be recovered from the site was a uniserial harpoon. These harpoons are *fossiles directeurs* for the late Magdalenian and, more specifically, uniserial harpoons are one of the *fossile directeurs* for Magdalenian stage V. Magdalenian V is usually thought to post-date Dryas I, and swayed by these considerations, Dewez tentatively suggested (1987, 391; pers. comm.) that the archaeological assemblage might instead belong to Magdalenian IV.

As the fauna had been curated without any stratigraphic details being preserved, and as it clearly contains species characteristic of the Holocene, Lateglacial and the mid-Weichselian, there seemed to be little chance of reliably separating components accumulated during the Lateglacial from those accumulated during other parts of Pleistocene and Holocene time. To pour mud on already cloudy waters, the conventional radiocarbon age estimation was actually taken from unidentified bone fragments, and so a direct contextual link between these and human activity (and consequently the relevance of Lv-690 to human presence) was open to very serious question. An attempt was made to address this problem and establish the actual age of human activity at the site by selecting for AMS dating a single cut bone, a pisiform) of *Equus ferus* (Plate 7.3). The species *Equus ferus* was preferred as it was the species most frequently found with butchery marks, both within the faunal collection from Sy Verlaine, and in many of the other late Magdalenian sites studied in the north-western Ardennes. In addition to this, the pisiform (from the MRAH collections) appeared to be one of the few cut bones from this site which had not been treated with an organic based preservative. The resulting date, OxA-4014 12870 ± 110 BP, falls very much in line with other AMS dates from Late Magdalenian contexts in Belgium (see chapter 2). I would accordingly suggest that this reading, rather than Lv-690, should be regarded as our best current evidence for the age of the Magdalenian use of the Grotte de Sy Verlaine.

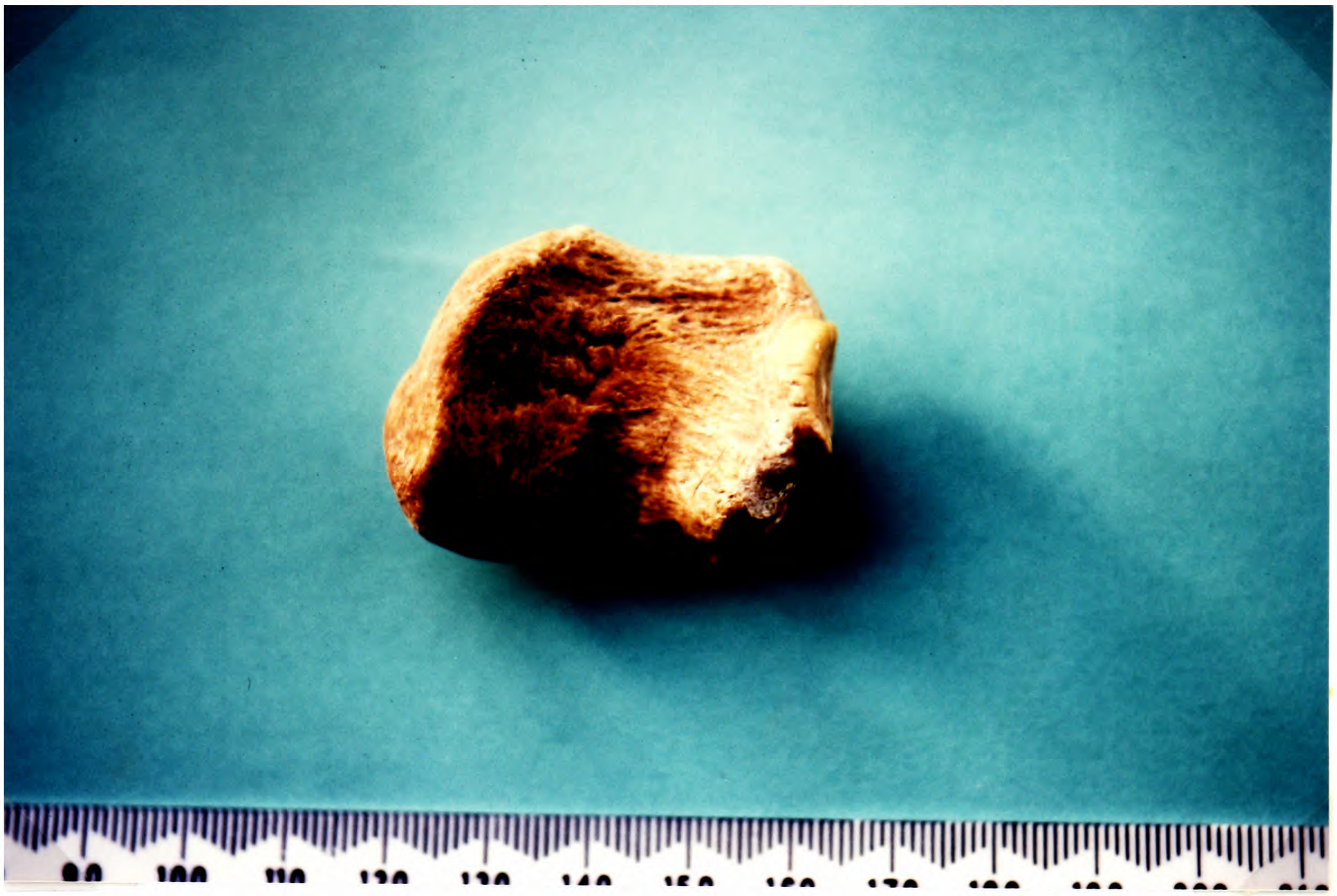


Plate 7.3: Cut pisiform of *Equus ferus* from the Grotte de Sy Verlaine. MRAH collection. OxA-4014 12870 ± 110 BP. Scale in mm.

Discussion of Individual species

Order Proboscidea

Mammuthus primigenius - Mammoth

Only one other site studied by in this dissertation has yielded any Mammoth specimens - the Grotte du Coléoptère (chapter 6). There, Mammoth was represented solely by a fragment of ivory. A similar situation exists for the Grotte de Sy Verlaine, where 2 conjoining fragments of ivory from the Thisse collection are the only specimens attributable to this species. Mammoths are known to have survived in north-western Europe during the Lateglacial (*cf.* Lister 1991). However, the finding of small ivory fragments within an assemblage is hardly a firm basis upon which to construct an argument for the presence of Mammoths in the region of the site. Ivory was frequently used as a raw material for making implements during the Upper Palaeolithic, such as the characteristic *sagaies* found in late Magdalenian contexts in this region. The use of fossil ivory as a raw material during the Upper Palaeolithic has been suspected by some researchers (R.M. Jacobi pers. comm.). Consequently it does not seem justifiable to assume that the ivory is either Lateglacial, or originates from the Ardennes. A more detailed discussion of the problems surrounding small fragments of ivory in apparently Lateglacial contexts can be found within Charles & Jacobi (1994).

Order Perissodactyla

Family Rhinoceratidae

Coelodonta antiquitatis - Woolly Rhinoceros

The six specimens of *Coelodonta antiquitatis* from the Grotte de Sy Verlaine were all teeth or tooth fragments (one of these is illustrated in Plate 7.4); there were no 'meat bearing elements' recorded, nor (as one might expect) were any butchery marks noted on any of the teeth. The MNI for these is 1. I was alerted to the possibility that these six specimens might be derived from an earlier fauna, having encountered just such a problem in the Lateglacial faunal assemblage from the Robin Hood Cave, Creswell Crags (Charles 1990; Charles & Jacobi 1994). In that case the derived fauna manifested itself in the form of stained and rolled bone fragments, alongside the teeth of *Coelodonta antiquitatis* and *Crocuta crocuta*. An AMS date from a molar of *Coelodonta antiquitatis* (OxA-3454 42900 ± 2400 BP) confirmed that particular specimen (although it had been stratified in a Lateglacial layer - LSB spit 18) was not truly a part of the Lateglacial fauna from the Robin Hood Cave. Instead, in this particular instance, the *Coelodonta antiquitatis* specimens are thought to have been derived from the middle Devensian sediments stratified beneath the Lateglacial layers at the Robin Hood Cave.

Roger Jacobi and I have argued (Charles & Jacobi 1994) that woolly rhinoceros was not a part of the British megafauna during the Lateglacial, and that no specimens of this animal can be confidently identified from a secure context in the British Isles after the LGM. The situation in Belgium, however, may have been rather more complicated. There are no direct radiocarbon dates for woolly rhinoceros in north-western Europe (and more

Plate 7.4: Tooth of *Coelodonta antiquitatis* from the Grotte de Sy Verlaine. MRAH collection. Scale in mm and inches.

specifically the north-western Ardennes) which post-date the LGM. However, a fossil of *Coelodonta antiquitatis* is reported from the late Magdalenian site of Gönnersdorf in the Neuwied basin (Bosinski *et al.* 1978), although Poplin (*ibid.*, 99) suggests that this partial mandible with dentition might have been collected as a curio rather than directly hunted by humans. This leaves open the possibility that the Gönnersdorf was a fossil specimen collected during the Lateglacial as a manuport. However, engraved plaquettes from Gönnersdorf (*op. cit.*) do include representations of woolly rhinoceroses, the implication being that they were 'sketched' by the Late Magdalenian inhabitants of that site from life and/or memory.

Thus it remains unclear whether *Coelodonta antiquitatis* was a part of the Lateglacial megafauna of the north-western Ardennes. It is notably absent from any of the other Late Magdalenian faunas examined within this dissertation (although it was certainly present in levels 9 and below at the Grotte du Coléoptère). Nevertheless, that may simply indicate that by Lateglacial times the woolly rhinoceros was a rare (but not extinct) animal in north-western Europe. The possibility that there are components of a fauna or faunas which predate the Lateglacial within the Grotte de Sy Verlaine will be discussed in more detail below.

Family Equidae

Equus ferus - Horse

Equus ferus was the most abundant species present at the Grotte de Sy Verlaine (NISP = 117). 82 of the 117 specimens of *Equus ferus* were teeth, and the count for post-cranial anatomical elements is relatively low (35). This may be significant, as the relatively high proportion of teeth compared to other anatomical elements is a likely indicator that a part of the faunal assemblage might have been subjected to quite destructive depositional and post-depositional forces, from which only the most robust elements will have survived (*cf.* Charles 1990). This argument will be developed further in relation to other species (such as *Coelodonta antiquitatis* and *Crocuta crocuta*) discussed above and below. An MNI count of only 1 was obtained from the main anatomical elements, although this could be modified to at least 2 on the basis of both adult and milk teeth being present in the collection (Table 7.3). The count could be further modified to at least 3, as 12 distal sesamoids were noted (these occur next to the 2nd and 3rd phalanges in the hooves, and so each horse has a total of 4).

Equus ferus appears to have been economically significant to the Late Magdalenian occupants of the north-western Ardennes. I have already discussed the evidence for horse exploitation at other Late Magdalenian sites in the study region (chapters 3, 4, 5 & 6) and there appears to be a remarkable consistency in the butchery techniques used at these sites. The Grotte de Sy Verlaine is no exception to this, although only 6 of the bones show any butchery traces. These bones are illustrated in Figure 7.1. 4 of the bones illustrated come from the lower limbs, and display marks which suggest by both their orientation and location that tendon extraction was undertaken. Other evidence for tendon extraction from *Equus ferus* lower limbs has been discussed in some detail with regard to the Trou de Chaleux (chapter 3).

As just described, one of the equid bones, a cut pisiform (Plate 7.3), was AMS dated (see discussion above), and resulted in OxA-4014 12800 ± 110 BP. We have already noted that this date is the only radiocarbon age estimation from the site which can be linked clearly with human presence at the site.

Order Artiodactyla

Family Cervidae

Rangifer tarandus - Reindeer

Reindeer was one of the most ubiquitous species present in north-western Europe during the Late Pleistocene. An MNI of 1 was obtained for *Rangifer tarandus* from the Grotte de Sy Verlaine. No juvenile bones of this species were observed in the collections. BPR information is given in Table 7.4. The NISP count for *Rangifer tarandus* from the Grotte de Sy Verlaine is relatively low (NISP = 28; 5.36% of identifiable specimens) and because of the poor contextual information from this site it is hard to be sure how many (if any) of these specimens originate from the Magdalenian layer. However, two of these bones were cut (Figure 7.2), and these at least seem very likely to be the result of Magdalenian butchery activities at the site. The two bones, a proximal right metacarpal and a partial second phalanx, both indicate disarticulation activities. The marks on the proximal metacarpal are consistent with the over-lying capsule being severed, and those on the phalanx with tendon extraction. Reindeer is one of the two species from the Grotte de Sy Verlaine which show definite evidence for humans being the agents responsible for their presence at the site.

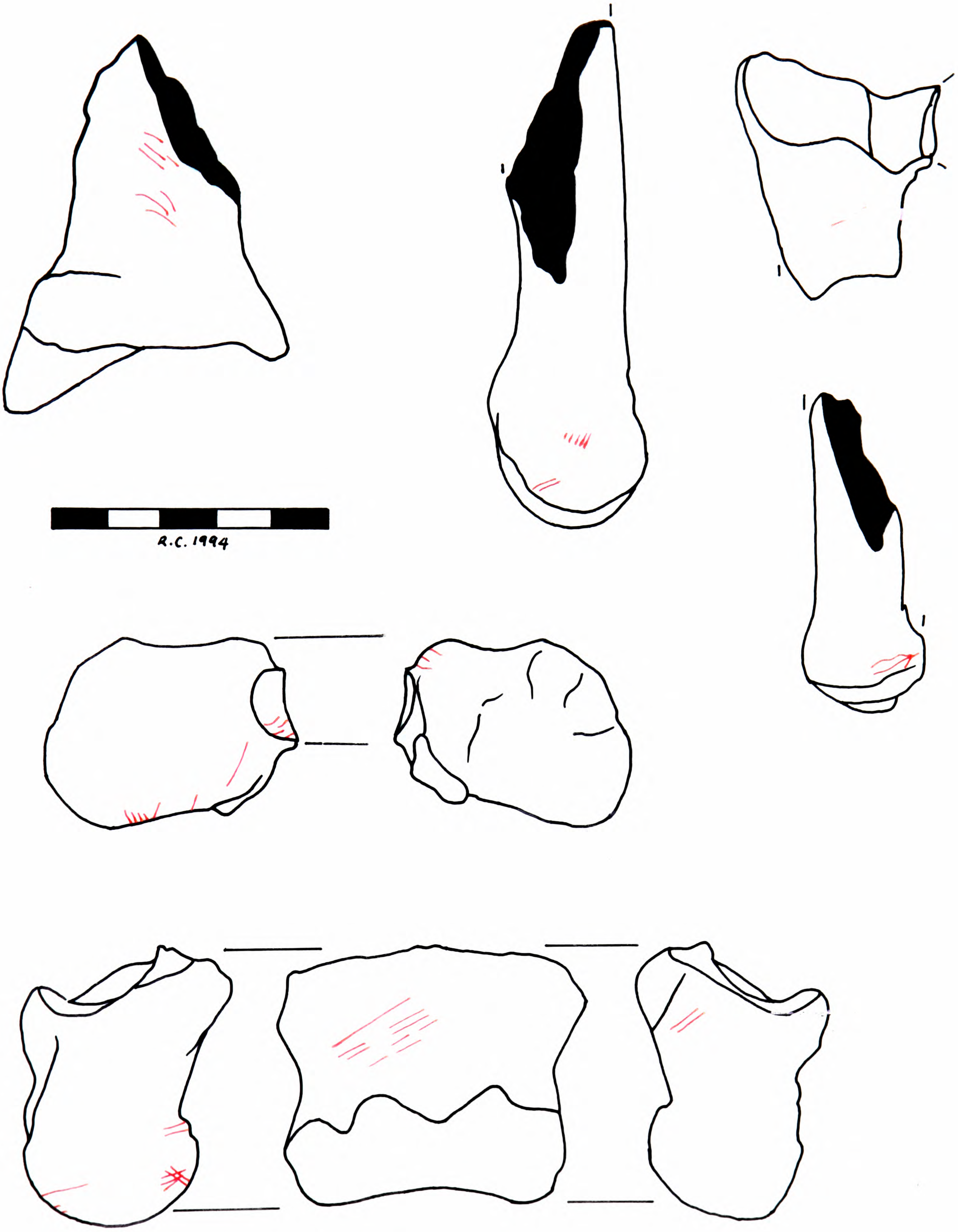


Figure 7.1: Cut bones of *Equus ferus* from the Grotte de Sy Verlaine. Scale in cm.

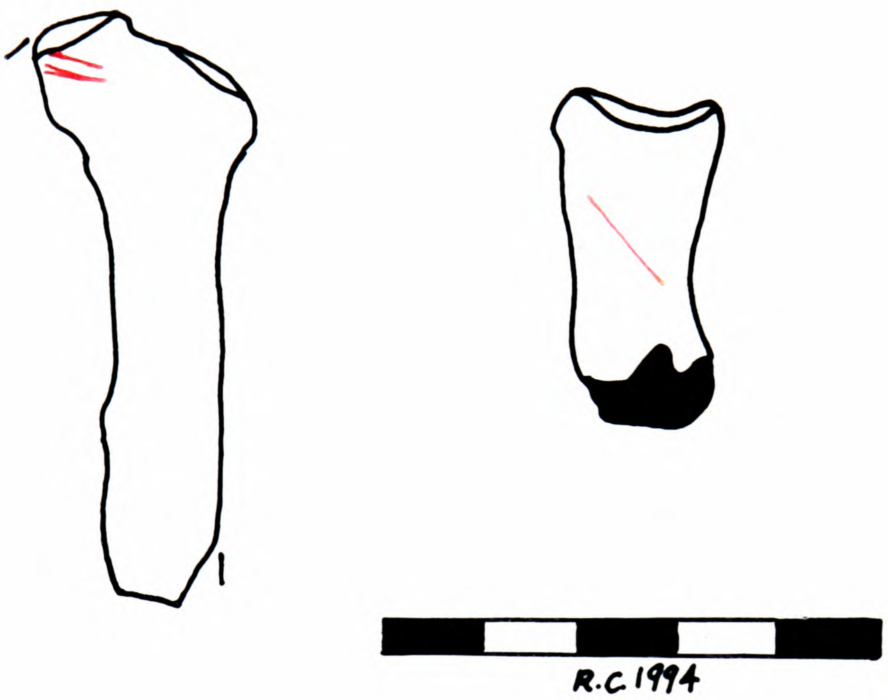


Figure 7.2: Cut bones of *Rangifer tarandus* from the Grotte de Sy Verlaine. Scale in cm.

Cervus elaphus - Red Deer

None of the 10 red deer bones from the Grotte de Sy Verlaine is modified, and so there is nothing to link these specimens with human activity at the site. An MNI of 1 was established, although this may not be immediately apparent from the BPR data as presented in Table 7.5. This is because a number of bones have been consistently excluded from MNI calculations in the BPR tables as they create problems in calculating simple MNIs -

these include teeth, due to the presence and potential complications of dealing with both adult and juvenile dentitions; carpals and tarsals, as they are both grouped as a single units rather than identified to individual bones in the tables; and sesamoids and phalanges, as they are problematic to differentiate between fore from hind and left from right. In the case of the Sy Verlaine, all 10 specimens of *Cervus elaphus* were either phalanges or teeth. The MNI of 1 simply reflects the possibility that all of these specimens potentially could have come from the same animal.

Family Bovidae

Bos sp. - Aurochs, Bison and Domestic Cattle

Only 4 bovid specimens, identifiable only as *Bos* sp., were present in the collections from the Grotte de Sy Verlaine. These were a tooth, two 2nd phalanges and a 3rd phalanx. None of these showed any butchery marks, and so no information can be obtained from them regarding Lateglacial butchery activities. Indeed, it is questionable whether any of these specimens actually dates to the Lateglacial: it was not possible to determine the precise species for any of these specimens, so no further hints as to their likely age could be found.

The ovi-caprids - ibex, chamois, goat and sheep

The possibility of identifying potentially Lateglacial specimens within the ovi-caprids from the Sy Verlaine collection proved highly problematic. The presence of 'recent' domesticates within many of the supposed Lateglacial faunal assemblages has been discussed in some detail within this dissertation. As the contextual details for most of the fauna from Grotte de Sy Verlaine has been lost, it is almost impossible to make any definitive statements relating to the probable age of a significant proportion of the faunal assemblage. The presence of butchery marks made by stone tools can certainly be used to identify specimens (and species) which had been subjected to human activity, and on that basis the only evidence for humans being agents of faunal accumulation during the

Pleistocene at Sy Verlaine is during the earlier part of the Bölling Interstadial, and can be related to Late Magdalenian use of the site.

That having been said, none of the ovi-caprid bones shows any evidence for human modification, and so the incorporation of these 23 bones cannot be linked to human activities. Domestic sheep and goat are known to have been present in the region since the Neolithic, whereas the presence of ibex and chamois during the Late Palaeolithic has been brought into question throughout this dissertation. In none of the cave sites discussed here has either chamois or ibex been firmly identified on osteological grounds. It is regrettable that the presence of ovi-caprids within faunal collections seems to have led faunal analysts to assume that such bones originate from Pleistocene chamois and ibex, rather than questioning whether later prehistoric and/or historic age specimens are also present. From the start of my research I treated these supposed Lateglacial caprids encountered with a degree of scepticism, and I have yet to locate a unequivocal specimen of either *Rupicapra rupicapra* or *Capra ibex* in any of the Late Magdalenian assemblages studied. This is not the same as saying that these species were definately not present locally during the Pleistocene (and more specifically the Lateglacial); it is just the case that their presence has yet to be firmly demonstrated. As none of the 23 ovi-caprid specimens from the Grotte de Sy Verlaine is modified, and it is thought more likely that they are not Lateglacial, they will not be discussed further here, although BPR information is given for reference purposes in Table 7.6.

Family Suidae

Sus scrofa - Wild Boar and Domestic Pig

An MNI of 1 was obtained for *Sus scrofa* from the Grotte de Sy Verlaine, the total NISP count for this species being 9. None of these was cut. BPR information is given in Table 7.7. Much has already been written in preceding chapters about both the possibility of wild boar being a part of the Belgian Lateglacial fauna, and also the problem of the apparent mixing of Holocene and Pleistocene faunas in a number of the sites studied (*cf.* chapters 3, 4 & 5). As with the ovi-caprids discussed above, in no case have I found it possible to demonstrate that *Sus scrofa* was a part of the local megafauna during the Lateglacial. Instead, I have tended to take the presence of *Sus scrofa* as an indicator that fauna more recent than the Lateglacial has been included within faunal collections from a site. Given the almost complete absence of stratigraphic and contextual data from the Grotte de Sy Verlaine, I am inclined once again to take the presence of *Sus scrofa* as an indicator of the presence of later material in the collections. I see no compelling reason to suppose that these specimens were part of the Lateglacial megafauna from the site, although this statement could be tested by further AMS work.

Order Carnivora

Family Ursidae

Ursus arctos - Brown Bear

31 of the 33 identifiable elements of *Ursus arctos* were teeth and teeth fragments. Only 2 post-cranial elements were identified (Table 7.8). It was only possible to establish an MNI count of 1 from the pieces present within the collections from Sy Verlaine, as the teeth were generally very fragmentary, and the possibility that pieces of the same tooth could have been counted twice between different collections was present. None of the specimens of *Ursus arctos* was cut, and so there is no evidence for humans having had a part in the incorporation of these specimens into the Grotte de Sy Verlaine.

Although we have seen in previous chapters that brown bears were present in the north-western Ardennes during the Lateglacial, the lack of stratigraphic data and firm dating evidence for this species at Sy Verlaine leaves open the possibility that some, if not all, of the *Ursus arctos* specimens may date to other parts of Pleistocene and Holocene time. It has already been suggested that the presence of a relatively high number of teeth and teeth fragments compared with post-cranial elements might indicate that a particular species may have either been derived from a stratigraphically lower (and presumably older) fauna, or instead simply be a part of such a fauna. The lack of contextual data from this site rather precludes any detailed discussion of such a possibility, although its presence has to be acknowledged.

Family Canidae

Canis sp. - Wolf and Domestic Dog

An MNI of 1 was obtained from the 20 specimens identified as *Canis* sp. All of these came from an adult, and are consistent with coming from the same individual. BPR information is given in Table 7.9 below. There is no evidence for the human modification of any of these bones. It was not possible to determine whether these specimens came from a domestic dog or a wolf as the few elements that might have proved diagnostic were too fragmentary to identify with any degree of certainty. Given the potential time range over which the Grotte de Sy Verlaine appears to have been collecting fauna (the mid-Weichselian to the present) and our inability to attribute specimens to a stratigraphic level, there is little to hint at which is the more likely species designation. As none of the *Canis* sp. bones have been modified, they fall beyond the direct remit of this dissertation, and so will not be discussed further here.

Vulpes sp. - Red Fox and Arctic Fox

Specimens of fox *Vulpes* sp. were the second most abundant species present within the assemblage (NISP = 92), and an MNI of 2 was obtained from a number of different elements (see Table 7.10). Unfortunately it was not possible to differentiate between red fox (*Vulpes vulpes*) and arctic fox (*Alopex lagopus*) on osteological grounds, as the specimens were too fragmentary, although there did appear to be a marked variation in size between some of the specimens. This might suggest that both species were present although, given that the faunal assemblage from the Grotte de Sy Verlaine is known to be a mixture of different levels (see the section on stratigraphy above) and that some species more characteristic of the mid Weichselian than the late Weichselian (*Coelodonta antiquitatis* and *Crocuta crocuta*) are present, the fauna is likely to have been accumulated over several tens of millennia, and so size variation through time is possible. Similarly the presence of sub-adult foxes in the collection might account for the size variations, although it should be noted that none of the fox bones preserved had unfused epiphyses and that no fusion lines were recognised. Consequently there is no evidence to support the suggestion that juveniles were present within the cave.

Family Hyaenidae

Crocuta crocuta - Hyaena

26 of the 27 specimens of hyaena from the site were teeth, the only hyaena bone to be recovered was a maxillary fragment. Hyaenas have been absent from the faunal collections from other sites discussed in this dissertation (although Patou-Mathis 1994, 174 & 177 noted hyaena teeth in the assemblage from the Trou de Chaleux recovered by the Université de Liège). In the case of the Trou de Chaleux it was suggested that the teeth noted by Patou-Mathis might have derived from a fauna older than the Lateglacial. This is also the suggestion put forward here. I have already suggested that due to the lack of stratigraphic details for most of the fauna from the Grotte de Sy Verlaine there is a high probability that parts of the faunal collection were not brought to the cave during the Lateglacial, but instead incorporated during the more recent past; the possibility that parts of the fauna recovered from the cave may precede the Lateglacial should also be considered.

There is evidence to suggest that at least a part of the faunal collection from Sy Verlaine predates the Lateglacial, specifically the specimens of woolly rhinoceros (*Coelodonta antiquitatis*) and hyaena (*Crocuta crocuta*). Neither species has been firmly identified from an unquestionable Lateglacial context in the north-western Ardennes (the specimen of *Coelodonta antiquitatis* from Gönnersdorf was discussed above, and thought to be a fossil brought to that site during the Lateglacial), and instead they are believed to have become locally extinct prior to the Bölling Interstadial phase.

There is also evidence to suggest that at various times in the past the Grotte de Sy Verlaine has been used as a den for a range of predators, the hyaenas were certainly one such group. Many bone fragments, unidentifiable to species, showed the distinctive acid-etching found on bones and bone fragments which have passed through a large carnivores digestive system (Sutcliffe 1970; Plate 7.5), or have been subjected to residual stomach acids having been exposed on a surface on which such carnivores defecated. In addition to this three hyaena coprolites were recognised (one of these is illustrated in Plate 7.6).within the collections held in Liège and Brussels. Modern hyaenas habitually defecate in and around their dens (*cf.* Brain 1981, 64) and so the presence of hyaena coprolites within the Grotte de Sy Verlaine is taken as further evidence of their use of this site as a den.

Plate 7.5: Acid etched and eroded bone fragments from the Grotte de Sy Verlaine. Dept. de Paléontologie, Université de Liège. Scale in mm and inches.

There is no suggestion that any of the hyaena specimens were incorporated in the cave due to human agency, the only bone is not cut, and none of the teeth has been worked. As with the 6 woolly rhinoceros teeth discussed above, *Crocuta crocuta* is represented almost entirely by teeth and teeth fragments. This is one of the strongest pieces of evidence that both these species predate the Lateglacial, and instead derive from an earlier fauna, most probably of mid-Weichselian age.

Plate 7.6: Hyaena coprolite from the Grotte de Sy Verlaine. Dept. de Paléontologie, Université de Liège. Scale in mm.

Family Mustelidae

Meles meles - Badger

The possibility that badgers were present in Belgium during the Lateglacial and that they and other mustelids were being trapped for their fur during this period has already been discussed at length in other parts of this dissertation (chapters 3, 4 and 5). There is no direct evidence for the human exploitation of badgers at the Grotte de Sy Verlaine. It is quite possible that the cave served from time to time as a badger set, and that humans played no role in the accumulation of these particular bones. Indeed, as with virtually all of the fauna discussed in this chapter, there is little to indicate even the approximate time period during which these bones were incorporated into the Pleistocene and Holocene sediments at the site.

An MNI count of 1 was obtained for *Meles meles*, although the possibility that parts of different individuals may have been included within the sediments over time cannot be wholly excluded. The NISP count of 19 is considered far too low to permit a discussion of BPR for this species, although BPR details are given for reference in Table 7.11 below.

Mustela sp. - The Martens

7 bones of small mustelids were identified only as *Mustela* sp. An MNI of 2 was obtained on two maxillas, although it is unclear just how many mustelid species are included within the Sy Verlaine collections. None of these bones was cut, and so there is no direct link between any of these specimens and human activity. The possibility that mustelids were exploited during the Lateglacial for their fur and meat has been discussed elsewhere within this dissertation, and cannot be wholly excluded in this instance. However, given the time transgressive nature of the fauna from the Grotte de Sy Verlaine it is very hard to know whether any of the mustelids within these collections date to the Pleistocene, let alone the Lateglacial. Short of a substantial project of AMS work on the biostratigraphy of these mammals, this question cannot be resolved, and the fauna from the Grotte de Sy Verlaine would hardly form an ideal data set on which to found such a biostratigraphic study due to its lack of stratigraphic integrity.

Family Felidae

Felis sp. - Wild cat, Lynx and Domestic Cat

The problems of differentiating *Felis sylvestris*, *Felis cattus* and *Lynx lynx* have already been discussed in some detail in other chapters. At the Grotte de Sy Verlaine 81 specimens identified as *Felis* sp. were recognised. Once again, the lack of any stratigraphic information for these specimens prevents us from determining whether any of these were originally associated with the Magdalenian assemblage recovered from the site. Whilst examining the faunal collections from Sy Verlaine I recorded in my notes my impression that some of the felids from Sy Verlaine 'appeared recent' whilst others 'appeared ancient', based on whether bones felt greasy to the touch. There was also a marked size difference between some of the specimens, although that alone cannot be taken as proof of the presence of lynx. On balance, it seems most likely that the 81 felid specimens from the Grotte de Sy Verlaine include both wild and domestic cats, although whether the category 'wild cats' includes *Lynx lynx* alongside *Felis sylvestris* remains to be conclusively demonstrated. BPR information for the felids from Sy Verlaine is given in Table 7.12. None of the felid bones showed any traces of human modification.

Order Lagomorpha

Family Leporidae

Lepus sp. - Arctic Hare and Brown Hare

The low sample size and fragmentary nature of the hare bones recovered from the Grotte de Sy Verlaine precluded any clear differentiation between *Lepus timidus* and *Lepus europaeus*, and so all specimens were identified solely as *Lepus* sp. 19 specimens were recorded, giving an MNI count of 1. BPR information is given in Table 7.13. None of these bones was cut, and it is unclear whether there was any contextual association between these specimens and the Late Magdalenian assemblage from the site. Although the possibility of human exploitation of Lagomorphs during the Lateglacial has been discussed elsewhere within this dissertation (chapters 3, 4 &5), there is no firm evidence from the Grotte de Sy Verlaine to support such a suggestion.

Oryctolagus cuniculus - Rabbit

Oryctolagus cuniculus is not believed to have been a part of the local Pleistocene fauna, and the 12 specimens of this species present at the Grotte de Sy Verlaine all appeared to be in a different preservation condition from the bulk of the fauna. An MNI of 2 can be calculated for this species (Table 7.2) as both adult and juvenile bones were present in the collections (although an MNI of 1 is shown in Table 7.14, as the figures there were calculated solely on the duplication of anatomical elements). A number of specimens were greasy to the touch, and so are believed to be of very recent origin. None of these showed any trace of human modification. This being the case these specimens will not be discussed further here, having no relevance to the search for definitive evidence for the Lateglacial exploitation of Lagomorphs.

Order Rodentia

Family Castoridae

Castor fiber - Beaver

The 4 specimens of *Castor fiber* could all have come from the same individual (a tooth, a proximal humerus and two proximal radii). The possibility that beavers formed a part of the Lateglacial mammal fauna has already been discussed within this dissertation (chapter 3), where their presence was felt to be unlikely. None of the beaver bones shows any traces of butchery marks and, although we cannot completely rule out the possibility that this species was hunted for its fur alongside other smaller mammals during the Late Magdalenian, there is certainly no evidence to support such an assertion. The specimens of *Castor fiber* from the Grotte de Sy Verlaine will not be discussed further within the framework of this dissertation.

Conclusions

It is unfortunate that the fauna from the Grotte de Sy Verlaine has lost much of its contextual information, so that the inferences which can be drawn from the faunal assemblage(s) at the site are rather limited. The cave itself is an elongated passage, with no chamber, and as such would have provided an ideal den for a range of carnivores. This seems to be attested by the presence not only of bones from a number of carnivore species, including *Crocuta crocuta*, *Canis* sp., *Vulpes* sp., and *Felis* sp. but also by their fossilised droppings (*cf.* Plate 7.6) and of a relatively large number of bones and bone fragments which have been modified as either a direct or indirect result of carnivore activity.

For many, the main interest in the assemblage from Sy Verlaine comes from the apparently ‘early’ radiocarbon date of 13780 ± 220 BP (Lv-690), thought to be associated with the Magdalenian assemblage. However I feel that the lack of stratigraphic definition within the collections, combined with the abundant evidence for carnivore accumulation of bones and bone fragment (the raw material conventionally dated) gives sufficient grounds to question the supposed link between Lv-690 and human presence. Further dating of a single cut pisiform of *Equus ferus* from the site has now yielded a date which falls at the traditional boundary between Dryas I and the Bölling Interstadial phase (12870 ± 110 BP OxA-4014). Whether by coincidence or otherwise, this date is very much in line with other AMS dates on cut bone identifiable to species and element from Belgian Late Magdalenian contexts (see chapter 2). At present these dates are thought to give the earliest evidence for the human re-colonisation of this part of north-western Europe after the LGM.

As the fauna from the Grotte de Sy Verlaine appears to have been irretrievably mixed, this particular dataset cannot be considered as a reliable basis for any discussion relating to species presence/absence during the Late Pleistocene, let alone the Lateglacial. A few comments, however, can be made with regard to faunal exploitation by humans at this site. Two species (horse & reindeer) showed traces of human modification (see Figures 7.1 & 7.2). All 8 of the cut bones in the assemblage certainly appear to have been cut by stone rather than metal tools, and parallels for the location and orientation of the cut marks can be found within other assemblages dated to the Bölling Interstadial phase of the Lateglacial. The AMS date discussed above (OxA-4014 12870 ± 110 BP) taken from one of these cut bones falls at the Bölling/Dryas I boundary. It is assumed here that all 8 of these cut bones date to the Lateglacial, and are the accidental by-products of the human exploitation of these two species. The only Palaeolithic archaeological residues to come from the site are Late Magdalenian, and it is assumed that the artefacts were discarded and/or cached by the same person or people responsible for the cut bones. The archaeological assemblage from the site is relatively small (Dewez 1987), and the stone tools could easily be the result of a few hours knapping. Dewez (1987, 369) comments that the backed bladelets are very fragmentary, and many of his illustrations (1987, figure 241; reproduced here as Figure 7.3) are of broken pieces.

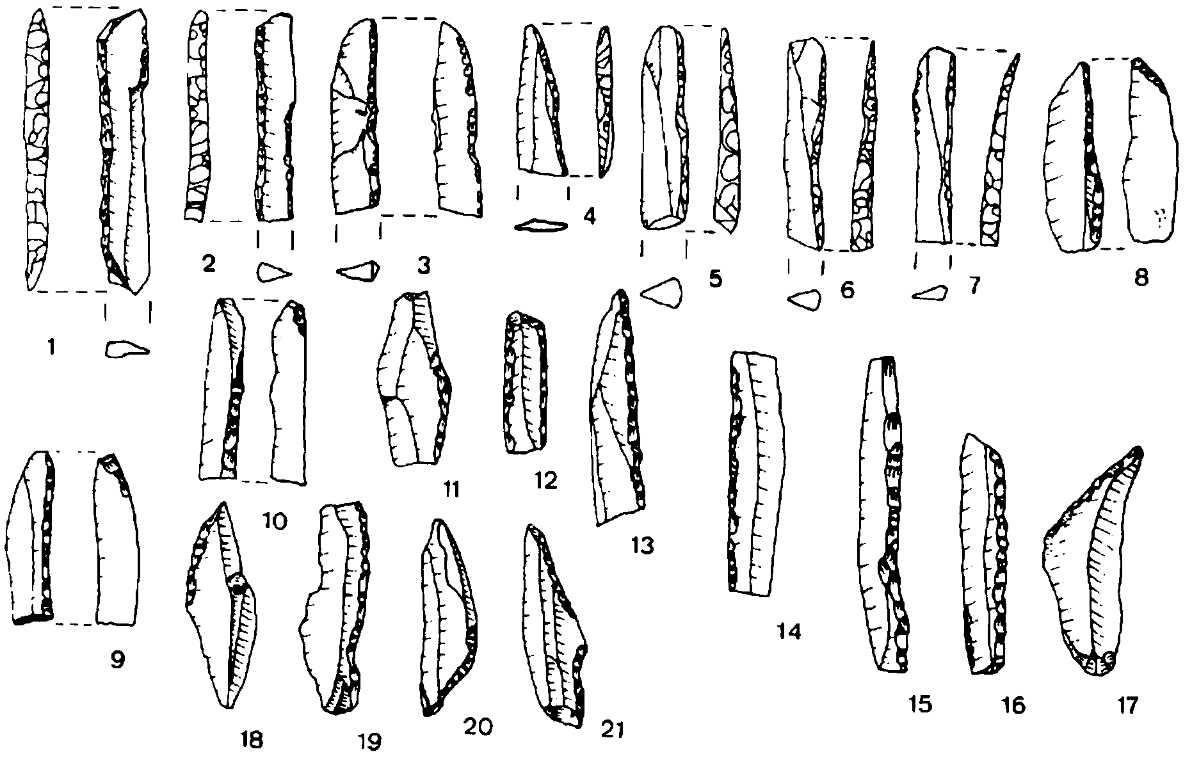


Figure 7.3: Backed blades & bladelets from the Grotte de Sy Verlaine (after Dewez 1987, figure 241).

It is not always clear whether these pieces are anciently broken, or whether the damage is of more recent origin, but I will assume that they are at least in the main part anciently broken. This might suggest that one activity at the site was the refitting of broken tools, and so the possibility that raw materials and unused stone tools were cached there remains.

Humans do not appear to have used the cave extensively - the only evidence for human presence at the site is a small number of stone, bone & ivory artefacts together with the 8 cut bones. As there is no chamber to the cave, only a narrow passage running into the hillside, it is unlikely that the cave would have been comfortable to live in for any sustained period of time. Instead,the main occupants of the site during the Pleistocene and Holocene appear to have been members of different carnivore species, who also left behind characteristic damage patterns of many of the bones and bone fragments.

Sadly, my research suggests that the importance of this site for the Belgian Lateglacial record appears to have been over-exaggerated, and much of it relates primarily to the 'early' radiocarbon date from this site (Lv-690), which seems to me now discredited. I have argued here that there is no direct contextual link between the material dated to produce Lv-690 and late Magdalenian use of the site. AMS dating of one of the cut bones from the site indicates human activity at the start of the Bölling Interstadial phase/end of Dryas I. The evidence that humans used the cave is relatively limited, and it seems unlikely that human use of the site was either extensive or of any long duration.

Element	Left	Right	Indet	Adult	Juv	Cut	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0	0			
maxilla	0	0	1	1	0	0	1	1	0.50	16.67
mandible	0	0	1	1	0	0	1	1	0.50	16.67
teeth			82	81	1	0	82			
hyoid			0	0	0	0	0	0	0.00	00.00
atlas			0	0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	0	0	0	0	0	0	0	0	0.00	00.00
sacrum			0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0		0.00	00.00
scapula	1	0	0	1	0	1	1	1	0.50	16.67
humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0	0.00	00.00
d. humerus	0	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0	0.00	00.00
d. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0	0.00	00.00
carpals	1	0	11	12	0	1	12		0.86	28.57
MC	0	0	0	0	0	0	0	0	0.00	00.00
p. MC	0	0	0	0	0	0	0	0	0.00	00.00
d. MC			0	0	0	0	0		0.00	00.00
acc. MC	0	0	0	0	0	0	0		0.00	00.00
femur	0	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	0	0	0	0	0	0	0	0.00	00.00
d. femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0	0		0.00	00.00
MT	0	0	0	0	0	0	0	0	0.00	00.00
p. MT	0	0	0	0	0	0	0	0	0.00	00.00
d. MT			0	0	0	0	0		0.00	00.00
acc. MT	0	0	0	0	0	0	0		0.00	00.00
MP	0	0	0	0	0	0	0		0.00	00.00
p. MP	0	0	0	0	0	0	0		0.00	00.00
d. MP			1	1	0	1	1		0.25	08.33
acc. MP			1	1	0	0	1		0.13	04.17
p. sesamoid			0	0	0	0	0		0.00	00.00
phalanx 1			4	4	0	2	4		1.00	33.33
phalanx 2			2	2	0	1	2		0.50	16.67
d. sesamoid			12	12	0	0	12		3.00	100.00
phalanx 3			0	0	0	0	0		0.00	00.00
Total	**2**	**0**	**115**	**116**	**1**	**6**	**117**			

Table 7.3: BPR for *Equus ferus* from the Grotte de Sy Verlaine.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Cut**	**Total**	**MNI**	**Bin MNI**	**% MNI**
antler			11			0	11			
cranial			0	0	0	0	0			
maxilla	0	0	0	0	0	0	0	0	0.00	00.00
mandible	0	0	1	1	0	0	1	1	0.50	40.00
teeth			7	7	0	0	7			
hyoid			0	0	0	0	0	0	0.00	00.00
atlas			0	0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0	0		0.00	00.00
innominate	0	0	0	0	0	0	0	0	0.00	00.00
sacrum			0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0	0.00	00.00
humerus	0	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	0	0	0	0	0	0	0.00	00.00
d. humerus	0	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0	0.00	00.00
d. radius	0	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0	0.00	00.00
carpals	0	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0	0.00	00.00
p. MC	0	1	0	1	0	1	1	0	0.50	40.00
d. MC	0	0	0	0	0	0	0	0	0.00	00.00
acc. MC	0	0	0	0	0	0	0	0	0.00	00.00
femur	0	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	0	0	0	0	0	0	0	0.00	00.00
d. femur	0	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	1	1	0	0	1			
MT	0	0	0	0	0	0	0	0	0.00	00.00
p. MT	0	0	0	0	0	0	0	0	0.00	00.00
d. MT	0	0	0	0	0	0	0	0	0.00	00.00
acc. MT	0	0	0	0	0	0	0	0	0.00	00.00
MP	0	0	0	0	0	0	0			
acc. MP	0	0	1	1	0	0	1			
p. sesamoid			0	0	0	0	0		0.00	00.00
phalanx 1			5	5	0	0	5		1.25	100.00
phalanx 2			1	1	0	1	1		0.25	20.00
phalanx 3			0	0	0	0	0		0.00	00.00
Total	**0**	**1**	**27**	**17**	**0**	**2**	**28**			

Table 7.4: BPR for *Rangifer tarandus* from the Grotte de Sy Verlaine.

Element	Left	Right	Indet	Adult	Juv	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0			
maxilla	0	0	0	0	0	0	0	0.00	00.00
mandible	0	0	0	0	0	0	0	0.00	00.00
teeth			2	2	0	2			
atlas			0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0		0.00	00.00
innominate	0	0	0	0	0	0	0	0.00	00.00
sacrum			0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0.00	00.00
humerus	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0.00	00.00
carpals	0	0	0	0	0	0			
MC	0	0	0	0	0	0	0	0.00	00.00
femur	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0			
MT	0	0	0	0	0	0	0	0.00	00.00
MP	0	0	0	0	0	0	0	0.00	00.00
acc. MP			0	0	0	0		0.00	00.00
phalanx 1			7	7	0	7		0.88	100.00
phalanx 2			1	1	0	1		0.13	14.29
phalanx 3			0	0	0	0		0.00	00.00
Total	**0**	**0**	**10**	**10**	**0**	**10**			

Table 7.5: BPR for *Cervus elaphus* from the Grotte de Sy Verlaine.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Total**	**MNI**	**Bin MNI**	**% MNI**
horn core			0	0	0	0			
cranial			0	0	0	0			
maxilla	0	0	0	0	0	0	0	0.00	00
mandible	0	0	1	1	0	1	1	0.50	100
teeth			8	8	0	8			
hyoid			0	0	0	0	0	0.00	00
atlas			0	0	0	0	0	0.00	00
axis			0	0	0	0	0	0.00	00
cervical v.			0	0	0	0		0.00	00
thoracic v.			0	0	0	0		0.00	00
lumbar v.			0	0	0	0		0.00	00
innominate	0	0	0	0	0	0	0	0.00	00
sacrum			0	0	0	0	0	0.00	00
caudal v.			0	0	0	0		0.00	00
vertebra indet.			4	4	0	4			
scapula	0	0	0	0	0	0	0	0.00	00
humerus	0	0	0	0	0	0	0	0.00	00
radius	0	0	0	0	0	0	0	0.00	00
ulna	0	0	0	0	0	0	0	0.00	00
carpals	0	0	1	1	0	1			
MC	0	0	1	1	0	1	1	0.50	100
femur	0	1	0	1	0	1	1	0.50	100
patella	0	0	0	0	0	0	0	0.00	00
tibia	0	0	0	0	0	0	0	0.00	00
fibula	0	0	0	0	0	0	0	0.00	00
tarsals	1	1	0	2	0	2			
MT	0	0	1	1	0	1	1	0.50	100
MP			0	0	0	0		0.00	00
phalanx 1			1	1	0	1		0.25	50
phalanx 2			1	1	0	1		0.25	50
phalanx 3			2	2	0	2		0.50	100
Total	**1**	**2**	**20**	**23**	**0**	**23**			

Table 7.6: BPR for the ovi-caprids from the Grotte de Sy Verlaine.

Element	Left	Right	Indet	Adult	Juv	Total	MNI	Bin MNI	% MNI
cranial	▨	▨	0	0	0	0	▨	▨	▨
maxilla	1	0	1	2	0	2	1	01.00	100.00
mandible	0	0	0	0	0	0	0	00.00	00.00
teeth	▨	▨	5	5	0	5	▨	▨	▨
hyoid	▨	▨	0	0	0	0	0	00.00	00.00
atlas	▨	▨	0	0	0	0	0	00.00	00.00
axis	▨	▨	0	0	0	0	0	00.00	00.00
cervical v.	▨	▨	0	0	0	0	▨	00.00	00.00
thoracic v.	▨	▨	0	0	0	0	▨	00.00	00.00
lumbar v.	▨	▨	0	0	0	0	▨	00.00	00.00
innominate	0	0	0	0	0	0	0	00.00	00.00
sacrum	▨	▨	0	0	0	0	0	00.00	00.00
caudal v.	▨	▨	0	0	0	0	▨	00.00	00.00
scapula	0	0	0	0	0	0	0	00.00	00.00
humerus	0	0	0	0	0	0	0	00.00	00.00
radius	0	0	0	0	0	0	0	00.00	00.00
ulna	0	0	0	0	0	0	0	00.00	00.00
carpals	0	0	0	0	0	0	▨	▨	▨
MC	0	0	0	0	0	0	▨	00.00	00.00
femur	0	0	0	0	0	0	0	00.00	00.00
patella	0	0	0	0	0	0	0	00.00	00.00
tibia	0	0	0	0	0	0	0	00.00	00.00
fibula	0	0	0	0	0	0	0	00.00	00.00
tarsals	0	0	0	0	0	0	▨	▨	▨
whole MT	0	0	0	0	0	0	▨	00.00	00.00
MP	▨	▨	1	1	0	1	▨	▨	▨
phalanx 1	▨	▨	0	0	0	0	▨	00.00	00.00
phalanx 2	▨	▨	1	1	0	1	▨	00.06	06.25
phalanx 3	▨	▨	0	0	0	0	▨	00.00	00.00
Total	**1**	**0**	**8**	**9**	**0**	**9**	▨	▨	▨

Table 7.7: BPR for *Sus scrofa* from the Grotte de Sy Verlaine.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial	▨	▨	0	0	0	0	▨	▨	▨
maxilla	0	0	0	0	0	0	0	0.00	00.00
mandible	0	0	0	0	0	0	0	0.00	00.00
teeth	▨	▨	31	31	0	31	▨	▨	▨
atlas	▨	▨	0	0	0	0	0	0.00	00.00
axis	▨	▨	0	0	0	0	0	0.00	00.00
cervical v.	▨	▨	0	0	0	0	▨	0.00	00.00
thoracic v.	▨	▨	0	0	0	0	▨	0.00	00.00
lumbar v.	▨	▨	0	0	0	0	▨	0.00	00.00
innominate	0	0	0	0	0	0	0	0.00	00.00
sacrum	▨	▨	0	0	0	0	0	0.00	00.00
scapula	0	0	0	0	0	0	0	0.00	00.00
humerus	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	1	1	0	1	1	0.50	100.00
carpals	0	0	0	0	0	0	▨	0.00	00.00
MC	0	0	0	0	0	0	▨	0.00	00.00
femur	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0	▨	0.00	00.00
MT	0	0	1	1	0	1	▨	0.10	20.00
MP	▨	▨	0	0	0	0	▨	0.00	00.00
phalanx 1	▨	▨	0	0	0	0	▨	0.00	00.00
phalanx 2	▨	▨	0	0	0	0	▨	0.00	00.00
phalanx 3	▨	▨	0	0	0	0	▨	0.00	00.00
Total	**0**	**0**	**33**	**33**	**0**	**33**	▨	▨	▨

Table 7.8: BPR for *Ursus arctos* from the Grotte de Sy Verlaine.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			0	0	0	0			
maxilla	1	0	0	1	0	1	1	00.50	100.00
mandible	0	0	0	0	0	0	0	00.00	00.00
teeth			3	3	0	3			
atlas			0	0	0	0	0	00.00	00.00
axis			0	0	0	0	0	00.00	00.00
cervical v.			0	0	0	0		00.00	00.00
thoracic v.			0	0	0	0		00.00	00.00
lumbar v.			0	0	0	0		00.00	00.00
innominate	0	0	0	0	0	0	0	00.00	00.00
sacrum			0	0	0	0	0	00.00	00.00
caudal v.			0	0	0	0		00.00	00.00
vertebra (indet.)			1	1	0	1			
scapula	0	0	0	0	0	0	0	00.00	00.00
humerus	0	0	0	0	0	0	0	00.00	00.00
radius	0	0	0	0	0	0	0	00.00	00.00
ulna	0	0	0	0	0	0	0	00.00	00.00
carpals	0	0	0	0	0	0			
MC	0	0	0	0	0	0		00.00	00.00
femur	0	0	0	0	0	0	0	00.00	00.00
patella	0	0	0	0	0	0	0	00.00	00.00
tibia	0	0	0	0	0	0	0	00.00	00.00
fibula	0	0	0	0	0	0	0	00.00	00.00
tarsals	2	1	2	5	0	5			
MT	0	0	0	0	0	0		00.00	00.00
MP			1	1	0	1		00.05	10.00
p. MP			2	2	0	2		00.10	20.00
d. MP			4	4	0	4		00.20	40.00
phalanx 1			2	2	0	2		00.10	20.00
phalanx 2			1	1	0	1		00.05	10.00
phalanx 3			0	0	0	0		00.00	00.00
Total	**3**	**1**	**16**	**20**	**0**	**20**			

Table 7.9: BPR for *Canis* sp. from the Grotte de Sy Verlaine.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial			03	03	0	3			
maxilla	01	02	01	04	0	04	2	02.00	33.33
mandible	02	00	10	12	0	12	2	06.00	100.00
teeth			36	36	0	36			
atlas			00	00	0	00	0	00.00	00.00
axis			00	00	0	00	0	00.00	00.00
cervical v.			00	00	0	00		00.00	00.00
thoracic v.			00	00	0	00		00.00	00.00
lumbar v.			00	00	0	00		00.00	00.00
innominate	00	00	01	01	0	01	1	00.50	08.33
sacrum			00	00	0	00	0	00.00	00.00
caudal v.			01	01	0	01		00.05	00.79
scapula	01	02	01	04	0	04	2	02.00	33.33
humerus	00	00	00	00	0	00	0	00.00	00.00
p. humerus	00	00	00	00	0	00	0	00.00	00.00
d. humerus	00	00	03	03	0	03	2	01.50	25.00
radius	00	00	00	00	0	00	0	00.00	00.00
p. radius	00	00	03	03	0	03	2	01.50	25.00
d. radius	00	00	03	03	0	03	2	01.50	25.00
ulna	00	00	00	00	0	00	0	00.00	00.00
carpals	00	00	00	00	0	00			
MC	00	00	00	00	0	00		00.00	00.00
p. MC	00	00	00	00	0	00		00.00	00.00
d. MC	00	00	00	00	0	00		00.00	00.00
femur	00	00	00	00	0	00	0	00.00	00.00
p. femur	00	01	01	02	0	02	1	01.00	16.67
d. femur	00	00	00	00	0	00	0	00.00	00.00
patella	00	00	00	00	0	00	0	00.00	00.00
tibia	00	00	01	01	0	01	1	00.50	08.33
p. tibia	00	00	00	00	0	00	0	00.00	00.00
d. tibia	01	00	05	06	0	06	1	03.00	50.00
fibula	00	00	00	00	0	00	0	00.00	00.00
tarsals	01	01	09	11	0	11			
MT	00	00	00	00	0	00		00.00	
p. MT	00	00	00	00	0	00		00.00	
d. MT	00	00	00	00	0	00		00.00	
MP	00	00	01	01	0	01		00.05	
phalanx 1			01	01	0	01		00.05	
phalanx 2			00	00	0	00		00.00	
phalanx 3			00	00	0	00		00.00	
Total	**6**	**6**	**80**	**92**	**0**	**92**			

Table 7.10: BPR for *Vulpes* sp. from the Grotte de Sy Verlaine.

Element	Left	Right	Indet	Adult	Juv	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0			
maxilla	0	0	0	0	0	0	0	0.00	00.00
mandible	0	0	1	1	0	1	1	0.50	50.00
teeth			11	11	0	11			
atlas			0	0	0	0	0	0.00	00.00
axis			0	0	0	0		0.00	00.00
cervical v.			1	1	0	1		0.20	20.00
thoracic v.			0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0		0.00	00.00
innominate	0	0	1	1	0	1	1	0.50	50.00
sacrum			0	0	0	0		0.00	00.00
caudal v.			0	0	0	0		0.00	00.00
scapula	0	0	0	0	0	0	0	0.00	00.00
humerus	1	1	0	2	0	2	1	1.00	100.00
p. humerus	0	0	0	0	0	0	0	0.00	00.00
d. humerus	0	0	0	0	0	0	0	0.00	00.00
radius	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	2	2	0	2	1	1.00	100.00
d. radius	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	0	0	0	0	0	0.00	00.00
carpals	0	0	0	0	0	0			
MC	0	0	0	0	0	0		0.00	00.00
p. MC	0	0	0	0	0	0		0.00	00.00
d. MC	0	0	0	0	0	0		0.00	00.00
femur	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	0	0	0	0	0	0	0.00	00.00
d. femur	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	1	1	0	1	1	0.50	50.00
tibia	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	0	0	0	0	0			
MT	0	0	0	0	0	0		0.00	00.00
p. MT	0	0	0	0	0	0		0.00	00.00
d. MT	0	0	0	0	0	0		0.00	00.00
MP			0	0	0	0		0.00	00.00
phalanx 1			0	0	0	0		0.00	00.00
phalanx 2			0	0	0	0		0.00	00.00
phalanx 3			0	0	0	0		0.00	00.00
Total	**1**	**1**	**17**	**19**	**0**	**19**			

Table 7.11: BPR for *Meles meles* from the Grotte de Sy Verlaine.

Element	Left	Right	Indet	Adult	Juv	Total	MNI	Bin MNI	% MNI
cranial			4	4	0	4			
maxilla	0	2	0	2	0	2	2	1.00	12.50
mandible	6	10	0	16	0	16	10	8.00	100.00
teeth			21	21	0	21			
atlas			0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0		0.00	00.00
innominate	0	0	0	0	0	0	0	0.00	00.00
sacrum			1	1	0	1		1.00	12.50
caudal v.			0	0	0	0		0.00	00.00
scapula	0	0	3	3	0	3	2	1.50	18.75
humerus	2	1	0	3	0	3	2	1.50	18.75
p. humerus	0	0	1	1	0	1	1	0.50	06.25
d. humerus	0	0	8	8	0	8	4	4.00	50.00
radius	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0.00	00.00
d. radius	0	0	4	4	0	4	1	2.00	25.00
ulna	0	0	7	7	0	7	4	3.50	43.75
carpals	0	0	0	0	0	0			
MC	0	0	0	0	0	0		0.00	00.00
p. MC	0	0	0	0	0	0		0.00	00.00
d. MC	0	0	0	0	0	0		0.00	00.00
femur	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	1	0	1	0	1	1	0.50	06.25
d. femur	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	0	0	0	0	0	0.00	00.00
fibula	0	0	0	0	0	0	0	0.00	00.00
tarsals	0	1	0	1	0	1			
MT	0	0	0	0	0	0		0.00	00.00
p. MT	0	0	0	0	0	0		0.00	00.00
d. MT	0	0	0	0	0	0		0.00	00.00
MP			7	7	0	7		0.44	05.47
phalanx 1			1	1	0	1		0.06	00.78
phalanx 2			1	1	0	1		0.06	00.78
phalanx 3			0	0	0	0		0.00	00.00
Total	**8**	**15**	**58**	**81**	**0**	**81**			

Table 7.12: BPR for *Felis* sp. from the Grotte de Sy Verlaine.

Element	Left	Right	Indet	Adult	Juv	Total	MNI	Bin MNI	% MNI
cranial			0	0	0	0			
maxilla	0	0	0	0	0	0	0	0.00	00.00
mandible	0	1	0	1	0	1	1	0.50	33.33
teeth			1	1	0	1			
atlas			0	0	0	0	0	0.00	00.00
axis			0	0	0	0	0	0.00	00.00
cervical v.			0	0	0	0		0.00	00.00
thoracic v.			0	0	0	0		0.00	00.00
lumbar v.			0	0	0	0		0.00	00.00
innominate	0	0	1	1	0	1	1	0.50	33.33
sacrum	0	0	0	0	0	0	0	0.00	00.00
caudal v.			0	0	0	0		0.00	00.00
vertebra indet.			3	3	0	3			
scapula	0	3	0	3	0	3	3	1.50	100.00
humerus	0	0	0	0	0	0	0	0.00	00.00
p. humerus	0	0	2	2	0	2	1	1.00	66.67
d. humerus	0	0	2	2	0	2	1	1.00	66.67
radius	0	0	0	0	0	0	0	0.00	00.00
p. radius	0	0	0	0	0	0	0	0.00	00.00
d. radius	0	0	0	0	0	0	0	0.00	00.00
ulna	0	0	1	1	0	1	1	0.50	33.33
carpals	0	0	0	0	0	0			
MC	0	0	1	1	0	1	1	0.13	12.50
p. MC	0	0	0	0	0	0	0	0.00	00.00
d. MC	0	0	0	0	0	0	0	0.00	00.00
femur	0	0	0	0	0	0	0	0.00	00.00
p. femur	0	0	0	0	0	0	0	0.00	00.00
femur shaft	0	0	1	1	0	1			
d. femur	0	0	0	0	0	0	0	0.00	00.00
patella	0	0	0	0	0	0	0	0.00	00.00
tibia	0	0	0	0	0	0	0	0.00	00.00
p. tibia	0	0	0	0	0	0	0	0.00	00.00
d. tibia	0	0	1	1	0	1	1	0.50	33.33
fibula	0	0	0	0	0	0	0	0.00	00.00
tarsals	1	0	1	2	0	2			
MT	0	0	0	0	0	0		0.00	00.00
p. MT	0	0	0	0	0	0		0.00	00.00
d. MT	0	0	0	0	0	0		0.00	00.00
MP			0	0	0	0		0.00	00.00
p. MP			0	0	0	0		0.00	00.00
d. MP			0	0	0	0		0.00	00.00
phalanx 1			0	0	0	0		0.00	00.00
phalanx 2			0	0	0	0		0.00	00.00
phalanx 3			0	0	0	0		0.00	00.00
Total	**1**	**4**	**14**	**19**	**0**	**19**			

Table 7.13: BPR for *Lepus* sp. from the Grotte de Sy Verlaine.

Element	**Left**	**Right**	**Indet**	**Adult**	**Juv**	**Total**	**MNI**	**Bin MNI**	**% MNI**
cranial	▨	▨	0	0	0	0	▨	▨	▨
maxilla	0	0	1	1	0	1	1	0.50	25.00
mandible	0	0	0	0	0	0	0	0.00	0.00
teeth	▨	▨	0	0	0	0	▨	▨	▨
atlas	▨	▨	0	0	0	0	0	0.00	0.00
axis	▨	▨	0	0	0	0	0	0.00	0.00
cervical v.	▨	▨	0	0	0	0	▨	0.00	0.00
thoracic v.	▨	▨	0	0	0	0	▨	0.00	0.00
lumbar v.	▨	▨	0	0	0	0	▨	0.00	0.00
innominate	0	0	0	0	0	0	0	0.00	0.00
sacrum	▨	▨	1	1	0	1	0	1.00	50.00
caudal v.	▨	▨	0	0	0	0	▨	0.00	0.00
scapula	0	0	0	0	0	0	0	0.00	0.00
humerus	0	1	0	1	0	1	1	0.50	25.00
p. humerus	0	0	0	0	0	0	0	0.00	0.00
d. humerus	1	0	0	1	0	1	1	0.50	25.00
radius	0	1	1	2	0	2	1	1.00	50.00
p. radius	0	0	0	0	0	0	0	0.00	0.00
d. radius	1	0	0	1	0	1	1	0.50	25.00
ulna	0	0	0	0	0	0	0	0.00	0.00
carpals	0	0	0	0	0	0	▨	▨	▨
MC	0	0	0	0	0	0	0	0.00	0.00
p. MC	0	0	0	0	0	0	0	0.00	0.00
d. MC	0	0	0	0	0	0	0	0.00	0.00
femur	1	0	0	1	0	1	1	0.50	25.00
p. femur	0	0	0	0	0	0	0	0.00	0.00
d. femur	0	0	0	0	0	0	0	0.00	0.00
patella	0	0	0	0	0	0	0	0.00	0.00
tibia	1	2	1	3	1	4	0	2.00	100.00
p. tibia	0	0	0	0	0	0	0	0.00	0.00
d. tibia	0	0	0	0	0	0	0	0.00	0.00
fibula	0	0	0	0	0	0	0	0.00	0.00
tarsals	0	0	0	0	0	0	▨	▨	▨
MT	0	0	0	0	0	0	▨	0.00	0.00
p. MT	0	0	0	0	0	0	▨	0.00	0.00
d. MT	0	0	0	0	0	0	▨	0.00	0.00
MP	▨	▨	0	0	0	0	▨	0.00	0.00
p. MP	▨	▨	0	0	0	0	▨	0.00	0.00
d. MP	▨	▨	0	0	0	0	▨	0.00	0.00
phalanx 1	▨	▨	0	0	0	0	▨	0.00	0.00
phalanx 2	▨	▨	0	0	0	0	▨	0.00	0.00
phalanx 3	▨	▨	0	0	0	0	▨	0.00	0.00
Total	**4**	**4**	**4**	**11**	**1**	**12**	▨	▨	▨

Table 7.14: BPR for *Oryctolagus cuniculus* from the Grotte de Sy Verlaine.

CONCLUSIONS: LATE MAGDALENIAN CHRONOLOGY AND FAUNAL EXPLOITATION IN THE NORTH-WESTERN ARDENNES - FINAL THOUGHTS

In this chapter I propose to draw together a series of divergent arguments which have run throughout the preceding chapters. I shall also attempt briefly to place the late Magdalenian archaeological material found in the north-western Ardennes within a broader European context.

CHRONOLOGY

In chapter 2 I discussed in detail the current dating evidence available for the Magdalenian, Creswellian, Tjongerian and Ahrensburgian. Having reviewed all of the dating evidence available to me, I suggested that there was no *prima facie* reason why it should be supposed that any of the Lateglacial groups mentioned above should be contemporary or contemporaneous; instead I suggested that they were sequential. I have also argued that two lesser-known variants of the Creswellian, the *Creswello-Tjongerian* and the *Creswello-Hamburgian* should be abolished, as the assemblages which have been classified as such have many contextual problems, lack integrity and suffer from extremely small sample size (and the inherent bias which results from this). I suggested that much of this material has been inadvertently 'over-classified', and that whilst it is probable that such assemblages are indeed of Lateglacial age, they should simply be treated as undiagnostic collections, which could probably be termed *Federmesser* in its broadest sense.

Having highlighted what I believed to be major problems with the existing chronology (that some of the dates were wildly divergent from prior expectations, that the documentation of dating samples had been poor, that there were apparent contextual problems between dating samples and the archaeological material that they were thought to date), I presented an account of the two AMS projects I undertook in conjunction with the Oxford Accelerator Unit. In summary I was able to radiocarbon date 16 samples, all from either human bone, humanly modified bone or artefacts. Nine of these dates were on late

Magdalenian material, 3 from cut marked bones from an Ahrensburgian site (the Grotte de Remouchamps), the final 4 on cut marked bones and a human tooth confirming suspicions that later prehistoric/historic age material was also present in supposedly 'sealed' Lateglacial contexts. In each case there was a direct link between the sample dated and human presence or activity. The discussion of the conventional radiocarbon chronology for Belgium in the light of these new AMS dates is also suggested to be of direct relevance to the known chronology of the earliest human re-colonisation of north-western Europe after the Last Glacial Maximum (*circa* 18,000 BP).

It is the dates relating to the Magdalenian which are of primary concern here. Eight of the 9 dates fall at the earlier part of the Bölling Interstadial phase, between 12,600 BP and 12,900 BP. The sole remaining date, OxA-4199 12,240 ± 130 BP from a mid section of a worked antler artefact found at the Trou da Somme, falls into the later Bölling, and it should be stressed that there is no evidence to indicate that once human re-colonisation of north-western Europe had occurred (or at least is detectable in the archaeological record), settlement of the region was continuous. Indeed, the archaeological record for the late Magdalenian in this region is relatively ephemeral when compared with the long-term sequences found in other regions of Europe (most notably in south-western France). Few of the Belgian Lateglacial sites have multiple occupation horizons, and there is little to suggest any long-term continuity of human occupation in the region. In general, the archaeological assemblages which are believed to date to the Lateglacial are relatively small (hence some of the problems of definition and recognition referred to above), with the exception of a few larger sites such as the Trou de Chaleux (Magdalenian), Meer and Rekem (Tjongerian).

Recent publications relating to the earliest human settlement of other areas of north-western Europe indicate a similar pattern (*cf.* Jacobi 1986a; Street *et al.* 1994; Taborin 1994). In south-western Germany and the Paris Basin, the best evidence currently available suggests that Magdalenian re-settlement of both these regions occurred slightly earlier than in Belgium, pre-dating the Bölling Interstadial phase (although it should be noted that radiocarbon dates, even on material with a strong contextual association, can only date the *first known occurrence*, rather than the *first instance* of human settlement). As the prospect of a detailed radiocarbon calibration curve extending into the Pleistocene becomes more of a reality (Becker & Kromer 1991; Becker 1993; Bard *et al.* 1993; Street *et al.* 1994), it is anticipated that our understanding of the precise timing of the re-colonisation will become more detailed. For the present, uncalibrated radiocarbon dates indicate a general sequence in which the Paris Basin and the Neuwied Basin were occupied by Magdalenian groups at the very end of Dryas I, the Belgian Ardennes at the interface between Dryas I and the Bölling Interstadial phase, and the British caves (with associated Creswellian archaeological residues) later into the Bölling Interstadial, *circa* 12,400 BP.

Late Magdalenian Faunal exploitation in the north-western Ardennes

Chapters 3 to 7 have discussed the evidence for Late Magdalenian faunal exploitation in the north-western Ardennes. The evidence from the Trou de Chaleux has necessarily dominated this, as Chaleux has yielded the most abundant faunal and archaeological material which could be reliably dated to the Lateglacial. The exploitation of wild horse (*Equus ferus*) dominates the relevant discussion, as it does the assemblage, although a wide range of other large mammals which show extensive evidence for butchery activities has also been documented. These have included musk oxen, a hitherto unsuspected member of the Lateglacial megafauna for the Ardennes, as well as a range of fur-bearing mammals, including fox. A single specimen of saiga antelope (*Saiga tatarica*) was also confirmed within the assemblage, although there was no direct evidence to link this particular specimen to human predation. The possible contamination of the faunal assemblage by later prehistoric and/or historic age material was also discussed, and it was concluded that there was as yet little unquestionable evidence to demonstrate that species such as ibex (*Capra ibex*) and chamois (*Rupicapra rupicapra*) were present in the north-western Ardennes during the Bölling Interstadial phase.

The faunas from other late Magdalenian sites discussed in detail in this dissertation (the Trou des Nutons at Furfooz, the Trou du Frontal, the Grotte de Coléoptère and the Grotte de Sy Verlaine) almost all had greater problems of stratigraphic integrity than those found at the Trou de Chaleux. The problems of later prehistoric and historic age contamination were highlighted at the two Furfooz caves, both of which assemblages were in fact dominated by later prehistoric domesticates. The age of some of these domesticates has been confirmed by the AMS dating of single modified bones (see chapters 2, 4 & 5). The faunal assemblage recovered from the Grotte de Sy Verlaine had a very similar series of problems (chapter 7), although in that particular instance it has been suggested that a significant component of the faunal assemblage was accumulated prior to the Bölling Interstadial by predators more characteristic of the Mid- rather than the Late-Weichselian.

Another bar to the interpretation of the late Magdalenian fauna from the Grotte du Coléoptère was the small number of identifiable specimens which could be linked with any degree of confidence to the Late Magdalenian archaeological layer (8) at the site. In this particular instance, only one cut bone could be confidently attributed to the Late Magdalenian layer at the site, a partial 1st phalanx of *Equus ferus*. This was AMS dated and the result (OxA-3635 12870 ± 95 BP) was very much in line with other AMS dates on modified Late Magdalenian fauna from the study region. Although the Grotte du Coléoptère remains an important site for the lithic and worked bone assemblages recovered from it, the comments which can be made about the fauna from level 8 are unfortunately minimal.

The problems outlined above have inevitably meant that the evidence of butchery activities found on the fauna from the Trou de Chaleux has dominated my discussion of late Magdalenian faunal exploitation in the north-western Ardennes. In all of the sites studied, wild horse (*Equus ferus*) has been an important species, both in terms of the quantities in which the remains of horse occur, and the butchery activities for which evidence remains. Reindeer (*Rangifer tarandus*), traditionally thought of as the primary source of foods, skins, antler and sinew for Upper Palaeolithic hunter-gatherers of north-western Europe, occurred far less frequently than horse in all of the assemblages discussed, and only 20 cut reindeer specimens were identified in total across all the assemblages studied (this figure excludes worked antler and antler fragments). As horse appears to have been a major component in the late Magdalenian economy in the north-western Ardennes, modified specimens of this species were primarily selected as AMS samples. Admittedly, this might also lead to an unintentional bias in the chronology, as it is possible that horses were only hunted/trapped during a restricted part of the Late Magdalenian occupation of this region. Radiocarbon dates on musk ox bones and worked antler artefacts attributable to the late Magdalenian are, however, very much in line with AMS dates taken from horse bones.

The reader will note that I have used Body Part Representation information, in the shape of %MNIs on a very limited scale the reasoning behind this was laid out in chapter 1, and relates primarily to the availability of an adequate statistical sample. Just as my use of this particular analytical aid has been so limited, so has my use of so called *utility indices* (Binford 1978). These have been used by various researchers, most notably Lewis Binford (1978, 1981, 1984) to give measures of animal body part utility. My reluctance to use these has two main groundings, the first being the lack of an adequate statistical sample in most cases. The second is, as Murray (n.d., 3) clearly stated, that:

> "whilst a potentially powerful tool because "it employs a general understanding of economic behaviour in a way that can be used to anticipate, and thus explain variability in prehistoric faunal assemblages," (Bettinger 1991, 75) the utility index with its theoretical underpinnings of maximization and efficiency has co-opted hunter-gatherer zooarchaeology."

These utility indices may well be a useful analytical tool in so far as they may give a measure of animal body part utility, but I concur with Murray (*ibid.*) that they allow little, if any, flexibility in understanding and interpreting culturally specific activities (for example the social aspects of meat distribution in a hunter-gatherer band); indeed, they appear to tell us as much about the archaeologist's concern with the maximisation of resources (which itself is situated within the discipline's theoretical concerns of the 1970s and early 1980s) and cultural biases, as they do about the behaviour of past societies.

Comparable butchery studies

At the time of writing, definitive butchery studies in general are only available in a limited quantity. Binford has provided the bulk of comparative studies (1978, 1981, 1984) and his authoritative written style has strongly influenced other workers in their approaches. Comparable studies of Lateglacial (and more specifically late Magdalenian) faunal exploitation are relatively rare, but a few exist (Albrecht *et al.* 1983; Berke 1988; Bouvier 1979; Bratlund 1991a, 1991b, 1993 & in prep.; Charles & Jacobi 1994; Grønnow 1987; Poplin 1973, 1976, n.d.; Parkin *et al.* 1986). These have formed the basis of comparative discussions within the preceding chapters relating the faunal assemblages from the north-western Ardennes to those from other regions of western Europe.

Much of the discussion in this dissertation has centred around the faunal evidence from the Trou de Chaleux (chapter 3), in which striking similarities have been noted with other Late Magdalenian sites from north-western Europe, and a contrast has been drawn between apparently consistent butchery patterning found at published late Magdalenian sites, and that found at two Creswellian sites in the British Isles. The matter is complicated further as the different faunal assemblages from these sites have markedly different composition, most probably reflecting widely divergent subsistence and butchery strategies utilised over the four seasons and developed to best exploit the varied resources locally available. Consequently, comparisons between the Ahrensburgian faunal assemblage from Stellmoor and the late Magdalenian assemblage from the Trou de Chaleux do not seem to be really comparing like with like. Stellmoor an open air site, dominated by reindeer and is generally interpreted as a reindeer crossing point of the river in the Ahrensburg tunnel valley, where Ahrensburgian hunters intercepted their prey (Bokelmann 1991; Bratlund 1991a, 1991b, in prep.; Grønnow 1987; Rust 1943). Chaleux shows a more generalised faunal range, although there is an emphasis on the processing of horse. Gough's Cave at Cheddar is also generalised, an almost equal emphasis being placed on the processing of horse and red deer, although other large mammals are present in varying frequencies (Currant 1986; Parkin *et al.* 1986). The evidence for faunal exploitation at the Robin Hood

Cave at Creswell Crags has been suggested to be highly specialised, focusing on the trapping and subsequent processing of arctic hares (Charles & Jacobi 1994). These different studies cover at least 3 millennia in time and a wide geographical region.

A more relevant exercise would be to compare material which can be attributed to the same archaeological entity and which comes from the same geographical region. As this dissertation deals with Late Magdalenian butchery evidence from the north-western Ardennes, this effectively leaves us with the assemblages from Gönnersdorf, Andernach-Martinsberg, Petersfels and the Paris Basin as the only appropriate and available sources of comparison. Most of these, of course, are open air sites, whilst the Belgian sites discussed in detail here are all caves.

The only published late Magdalenian sites in the Paris Basin to have good faunal preservation are Pincevent and Verberie. At Marsangy and Etiolles (Poplin n.d.; Poplin 1994) faunal preservation is poor due to the high soil acidity. At both these sites there are a few faunal remains which have survived from Lateglacial times. At Marsangy the 35 bones recovered have been identified as horse, reindeer and red deer (Poplin n.d.). At Etiolles the faunal range is slightly wider and includes mammoth and wild boar in addition to the species represented at Marsangy. Poplin (n.d. & 1994) comments on the bone breakage patterns observed in these two assemblages, although the bone surfaces themselves are too badly eroded to yield cut marks. An analogy has already been drawn between the longitudinal splitting of the *Equus ferus* 1st phalanges noted in the Magdalenian sites of the north-western Ardennes, and the published photograph in Poplin (1994). In general, the bone breakage patterns described appear very similar to those observed from the Belgian late Magdalenian sites, although the samples are perhaps too small to base any firm comparisons.

The fauna from Pincevent sections 27 and 36 is dominated by reindeer (David 1972; Enloe *et al.* 1994). The published photographs of bones indicate that bone surface preservation is poor, although cut marks can be recognised (David 1972, figure 199). The bones recovered from section 36 appear to have been smashed for marrow, and many have been conjoined and refitted, although there is no suggestion in the published report (*ibid.*)

that any were longitudinally split. Full details are not yet available for Section 27, and the published literature to date concentrates primarily on the spatial patterning within this zone rather than on the evidence for human modification of bone.

The only published account of butchery at the late Magdalenian site of Verberie available at the time of writing (Audouze 1988), gives little detailed information about the butchery evidence itself, instead concentrating on the intra-site spatial patterning and the evidence pertinent to this from the re-fitting and conjoining of flint and bone.

Overall there are few direct discussions of the butchery evidence found at the sites in the Paris Basin. In those which do exist (see, for example, Audouze 1988 and Audouze & Enloe 1991) there has been little detailed discussion of butchery practice *per se*, and much more attention has been paid to drawing analogies with the work of Binford amongst the Nunamiut.

Moving attention to Germany, analyses of the faunal assemblage from the late Magdalenian site of Petersfels (Albrecht *et al.* 1983) show a similar concern with spatial patterning, re-fits and conjoins rather than a detailed discussion of the butchery evidence itself. Poplin's report (1973) on the large mammal fauna from Andernach-Martinsberg is primarily concerned with the accurate identification to species of the specimens found there, although he does briefly comment that some of the bovid bones are broken (presumably for marrow extraction) and that cut marks are present. His much more detailed report on the fauna from Gönnersdorf (1976), does document bone breakage and butchery marks, many of which parallel those described here in relation to the north-western Ardennes. However, there is clearly scope for much more work on the butchery evidence and butchery practice of late Magdalenian hunter-gatherers in north-western Europe. Time restrictions imposed on the completion of this research project have precluded an exhaustive study of the literature relating to the German sites. To comment in more detail would therefore be to risk serious innaccuracy. It would certainly be interesting to undertake a detailed comparative study of the German material in the future.

The ethnicity of butchery ?

The butchery evidence described and discussed within this dissertation presented a remarkably consistent body of information, yielding systematic evidence for the processing of large mammals. I have suggested in public lectures, and it can also be noted elsewhere in the archaeological literature (White 1952, 1953, 1954 & 1955; Murray n.d.), that butchery practices within and between past and present hunter-gatherer groups may have an *ethnic* component. White's initial exploration of this theme in the 1950s, was, as Murray (*loc. cit.*) comments "somewhat naive". However, that alone should not be enough to invalidate the fundamental idea. I shall attempt to explain why, and discuss the potential for such an idea below.

The lack of contemporaneity between the Magdalenian, Creswellian, Tjongerian and Ahrensburgian groups found in Belgium suggests to me that the differences in material technology found between these groups may relate more to stylistic signalling within hunter-gatherer groups as a form of group identity and group maintenance (*cf.* Wiessner 1983 & 1984), than to stylistic signalling between groups as a form of boundary maintenance (*cf.* Wobst 1977).

This dissertation deals with faunal assemblages conventionally termed Magdalenian, and so it is with direct reference to the Magdalenian that I shall discuss concepts surrounding the possible *ethnicity* of butchery. The Magdalenian 'techno-complex' or 'culture' has a wide spatio-temporal distribution. It spans a vast geographic range, from Iberia to Poland and material which is termed Magdalenian occurs over a 9,000 year timespan. Consequently, it is hardly surprising to find that the large mammal species range found within Magdalenian sites across Europe fluctuates through space and time; whilst this may in part reflect differing hunting strategies, the time range indicated saw considerable environmental change so that there will also have been variations in the locally available megafauna (*cf.* Boyle 1990). Readings from archaeological, anthropological and ethnographic studies (for example Binford 1983; see also several papers in Gamble & Boismeier 1991) indicate that the spatial distribution of faunal remains on an archaeological site may well relate to, and to some extent reflect, social relations within hunter-gatherer groups. The distribution of meat and other resources obtained from mammal carcasses in contemporary hunter-gatherer societies has frequently been observed to relate to individual status and social relations within the group (*cf.* Lee 1979 & Gibson 1991).

The refitting of knapping debris and stone tools within a site has for some time been used as a 'tool' for looking at intrasite spatial patterning and such studies have flourished within European Lateglacial archaeology (see, for example, Barton 1992 & Van Noten 1978). It is certainly possible to conjoin animal bone fragments (Audouze & Enloe 1991) within an archaeological site, and I suggest here that it should also be possible to re-fit the joints of animals and to use butchery marks as a key for this (see, for example, Plate 5.1). Analysis of such data may in turn give hints as to the social distribution of meat, marrow and other faunal-based resources within archaeological sites. Unfortunately such a detailed analysis did not prove appropriate for most of the sites discussed within this dissertation, as spatial data was only recorded during the most recent excavations at the Grotte du Coléoptère, and at that site only one bone which can be firmly provenanced to the Magdalenian layer has cut marks (see chapter 6).

However, the caves in the Lesse Valley (specifically the Trou de Chaleux, Trou des Nutons, Furfooz, and Trou du Frontal, Furfooz), as well as those in the vicinity of the river Ourthe (Grotte du Coléoptère and the Grotte de Sy Verlaine) seem to me to offer at least the potential for developing ideas around butchery and ethnicity. Their late Upper Palaeolithic occupations are broadly contemporary (all can be attributed to Magdalenian stage V in the classic terminology), fall at the earliest part of the Bölling interstadial phase, and are within 2 km of each other, well within the 'site territory' for hunter-gatherers suggested by Higgs *et al.* (1967). The lithic assemblages are manufactured using a similar range of raw materials, and where information relating to raw material sources is available (Dewez 1987; Cabboi 1991; Otte *et al.* 1984) it suggests that the same ones were being exploited. Mobiliary items found in these caves, including shells, have been traced to similar source regions: long distance sources for a variety of these objects were originally suggested by Dupont (1872), and more recently confirmed by Dewez (1987) and Cabboi (1991). A good example of this is provided by many of the fossil shells found in these sites, which came from the Paris Basin. Consequently, it seems likely that these caves may well have been in use by the same group of late Magdalenian hunter-gatherers simultaneously, or so close together in time that it is impossible to differentiate with the framework of current radiometric techniques. The sites considered here can, therefore, offer the potential to examine a Lateglacial regional settlement pattern, and within that the traces of the activities of a few (or even a single) hunter-gatherer band(s) over a discrete period of time. It is within this context that I will use the term *ethnicity*, and explore the possible manifestation of ethnic identity through the medium of butchery practice. Ideally one would wish to have a group of sites that had been fully and carefully excavated under modern conditions, but such is rarely the case. In my considered opinion, however, the caves in the north-western Ardennes offer a good opportunity at least to explore the concept of *ethnicity* as outlined above.

The term *ethnicity* itself is a politically charged one, especially when viewed in the broader context of recent world politics. Even use of the term *ethnic* evokes memories and references to the Nazi ideas of "racial purity" of the 1930s and 40s; more contemporary chords resonate with the so-called *ethnic-cleansing* in Bosnia and Serbia. However, just because a term is currently politically charged, this does not mean that it should be abandoned, or that alternative, "politically correct" synonyms be used in its place. Accordingly, I will continue to use this term, but with a restricted definition.

A Definition of Ethnicity

The term *Ethnicity* seems to be inextricably linked with ideas of *nation*, and of self identity but what exactly does it mean ? The word ethnic is derived from *ethnos*, a Greek word meaning *heathen* or *pagan*. In the mid nineteenth century, its meaning began to shift within the English Language from the Greek idea of group to references to "racial characteristic"; it was but a short step from there to the ideas of races and racial purity of the Nazis. However, within the field of Social Anthropology, the term *ethnicity* refers to aspects of relationships between groups which consider themselves, and are regarded by others, as culturally distinctive. In this sense, *ethnicity* is related to both group relationships and the classification of people (Eriksen 1993, 4). *Ethnicity* has also come to incorporate the idea of a sub-group, a minority, which identifies itself, and sets itself apart.

Ethnicity, then is a social idea, and not necessarily one based on biological descent. As a social concept or construction, it is also highly malleable. The idea of ethnicity reflects how individuals choose to define themselves in relation to a group or groups. As time passes, so may an individual's perception of his or her *ethnic identity. Ethnicity* is, therefore, an extremely fluid idea, not a universal or a constant, but instead highly adaptable. In this sense individuals may be members of a number of ethnic groups simultaneously and membership (or more properly feelings of identity/affiliation) with these groups can be very flexible and constantly in negotiation.

Affiliations to a specific group are frequently linked not only to ideas of belonging but also to some sense of possession of specific physical territories - a contemporary example is the identification within the British Jewish community (*ethnic group*) with the modern state of Israel. Whilst concepts of *land ownership* are rarely found within anthropological accounts of contemporary and/or recent hunter-gatherer societies, a more general idea of territoriality which may be allied with a sense of belonging or *place* is appropriate here. Examples could include native American and Australian groups reclaiming the 'special places' of their ancestors and, in doing so, vying with the legalistic property claims of other non-indigenous groups. Similarly, the term *ethnicity* implies the presence of a social memory of, and for, a group which in turn can be used to create and re-create (and in the process define and re-define) group identity. This in turn offers a framework within which history/folk-memory may be re-written and in the process subtly distorted.

It is one thing to discuss *ethnicity* in the context of recent anthropological studies, and quite another to find archaeological evidence for it in past societies. Aspects of *territoriality* have been addressed within an archaeological context by both Jochim (1983) and Conkey (1980). These studies have looked for distinguishing features of group style within the lithic and bone technologies of Late Upper Palaeolithic groups. In these studies the common theme has been that *style* is a medium to signal to others. However, *style* is also a unifying force, as it can be used to define an individual and affirm membership within the larger group (Wiessner 1983, 1984 & 1990). Similarly it is one medium through which group identity might be strengthened during times of stress (or doubt), stress being induced, for example, through environmental, social, economic and/or religious media. Space is one dimension within which archaeological data was created and is gathered. Space itself is a physical fact but, looked at from another angle, it is also a social creation (Gosden, 1994). Social space is continually defined and re-defined by the individual and the group, and so there is a constant dialectical relationship between individuals and the landscape within which they exist. There is also a duality between *space* (the world in general) and *place* (the familiar). This idea of *place* is a key concept within discussions of ethnicity.

However, ethnic groups and their defining boundaries often appear to remain constant within the framework of anthropological time (or the anthropological present), although their membership is fluid. These boundaries appear to be maintained via a range of social processes, which operate to support discrete categories, even though the participants change (cf. Barth 1969: 9 - 10). The tyranny of the *anthropological present* has frequently been acknowledged, and this can create problems in looking at short and long term continuity and change. Short term change and continuity dominates anthropological research, whilst the longer term is traditionally more the realm of archaeologists. Ethnic boundaries and their maintenance on a long term scale is something which has rarely been directly addressed within anthropological frameworks.

An ethnic boundary may also correspond with a physical territory; however, a physical territory does not constitute an *ethnic region.* As a social construct *ethnicity* does not require a territory, and multiple ethnic groups may use the same or overlapping territories. So how can ethnicity be identified within the archaeological record ?

A Definition of Ethnicity in the Archaeological Record

It is as important to suggest what we can do with the archaeological record, as it is to be aware of the limitations of research tools, whether purely methodological or theoretical. Archaeologists have identified and classified *cultural groups* in prehistory; in the archaeological sense these are usually identified on the presence or absence of certain artefact types. Despite attempts to deconstruct the validity of these units of analysis by some researchers, they do frequently seem to hang together as coherent units - for example, the Creswellian is geographically discrete in its distribution, centring on Britain and perhaps parts of Belgium and the Netherlands (see discussion in chapter 2). It has been argued to be temporally discrete (Jacobi 1991; *pace* Campbell 1980). As we have already seen, the *Magdalenian* is a very broad term. The late Upper Palaeolithic sites examined within this thesis are classified as *Magdalenian*, and it is in relation to these that I will discuss ideas of *ethnicity*.

If ethnic identities (subgroups) are self defining, then it is likely that elements of their material culture will form part of the 'language' (verbal, physical and symbolic) which itself will contribute towards the formation of a *group identity*. Some of these aspects will be conscious and some unconscious, and there is likely to be a complex and subtle interplay between both. Conscious aspects may include elements of material culture such as clothing design, decoration, combination and choice of personal ornamentation. Unconscious aspects may include routine actions, things which are done because they have always been done that way. A good contemporary example of this subtle interplay is the Hal'al slaughter and subsequent butchery of certain animals within the Islamic tradition, which is rigorously defined, but done because that is "how it should be done" according to a complex series of religious rules. However, this does not necessarily mean that all butchery practices incorporate a religious element; compare, for example, the cuts of meat available today at butchers shops in Britain and in continental Europe, or the recent change in contemporary Australia from British to north American *styles* of dressing meat due to changes in personal preferences and demand (C. Gosden, pers. comm.). These butchery practices are very different, and are usually defined within national boundaries, can be formally defined and highly standardised (see for example Moore *et al.* 1983). It is within these conscious and unconscious actions that we can perhaps begin to identify differences on a smaller scale than that of the *culture*, once again for geographically restricted groups, but on a far smaller scale - perhaps even at the scale of the individual band.

It is to this smaller scale that I refer here when I use the term *ethnicity*. My use of the term is not, within an archaeological context, as detailed or specific as the anthropological definitions given above. However, it provides a potentially useful unit of analysis, in that it automatically incorporates questions of social relations and organisation, both within groups and between groups on a small scale.

Because ethnic identity is something essentially self defined and self defining, it may empower individuals to determine their personal destiny, and it also empowers the group. This, in turns switches research emphasis away from the questions traditionally asked of a Palaeolithic archaeological assemblage - primarily technological - and instead moves into questions of social identity and being relating both to individuals and the larger social groups to which they belong. Such discussions of the nature of groups and *ethnic identity* may offer an approach to discussions of social organisation during the late Palaeolithic of north-western Europe. Inevitably much of the material evidence that could be relevant to such issues within the Palaeolithic (e.g. clothing and body adornment) have a minimal potential for survival in most archaeological contexts. It is, therefore, important to examine other areas of activity and everyday life in which personal and group expression may have manifested themselves. For the purposes of the following discussion I will concentrate on the evidence from butchery activities.

The ethnicity of butchery

Butchery practices are one area of human activity which highlight the interplay of conscious and unconscious action. It is a common saying that there is only one way to skin a cat. This is not true: there are numerous ways to skin a cat, but they are finite. However, the techniques of skinning and indeed other butchery practices, will be learnt by example, observation and trial and error until an individual becomes so skilled that conscious thought becomes almost unnecessary, unless problems arise. This interplay between the conscious and unconscious action has already been highlighted within discussions of lithic production and *châines operatoires* (see, for example Schlanger 1990; Pelegrin 1990; Pigeot 1990).

Because there is a wide range of butchery techniques available, there is the potential for these techniques to vary due to specific events, independent butchery style and a whole range of intermediate situations. I have argued throughout this dissertation that the faunal assemblages and components thereof which can be firmly linked with the late Magdalenian of the north-western Ardennes show a remarkable consistency within the butchery techniques utilised, a particularly striking example being the longitudinal splitting of the major long bones and 1st phalanges of *Equus ferus*. I suggest here that this consistency itself constitutes a *stylistic signature* in butchery activity, in the sense that Hodder (1990) defined style as "a way of doing" and that Wiessner (1983, 1984 & 1990) has argued that style can be used as a medium for self-definition (assertive) and the group-definition (emblemic) . At this level *style* and *ethnicity* blend into each other, s*tyle* being a critical component of the visible expression of *ethnicity*. As detailed studies of butchery activities and butchery practice become more frequent, for the Upper Palaeolithic and indeed for earlier and later periods, I predict that more examples of what I am suggesting in this dissertation will become apparent.

The 'place' of the north-western Ardennes in the Magdalenian world picture

On no account can the archaeological and palaeontological evidence from the many caves in the north-western Ardennes and nearby open-air sites be thought of as demonstrating that this was a 'core' area for human settlement and activity. I have argued above, and elsewhere in this dissertation, that human settlement in this region during the Lateglacial was highly marginal, and that the north-western Ardennes could been seen as a *frontier zone* for hunter-gatherer populations during the earlier part of the Bölling Interstadial. More generally, the archaeological evidence from the north-western Ardennes offers one particular perspective on the human groups who expanded into north-western Europe after the LGM (*cf.* Gamble 1991). Later advances of such groups can be found in the Hamburgian of Germany, Denmark and the Netherlands and in the Tjongerian of the Netherlands (the Tjongerian material found in Belgium can perhaps be considered as the southerly part of this particular group's range). These northerly expansions may well be the archaeologically visible traces of population pressure, as both Gamble (1991) and Jochim (1983) have suggested from different perspectives. The highly ephemeral nature of the archaeological material recovered from the Belgian caves, rock shelters and open air sites indeed suggests that human settlement of this region during the late Magdalenian was not long term, especially when the total amount of material is contrasted with the detailed stratigraphic sequences and numerically larger lithic and faunal assemblages which elsewhere indicate apparently continuous human occupation (most notably those found in the Dordogne region of south-western France, *cf.* Jochim 1983; Gamble 1991).

If one accepts the accuracy of the various published accounts (Dewez 1987; Destinez & Moreels 1888; Leotard 1985a; Otte *et al.* 1994) , and the museum displays created by Édouard Dupont over century ago, there is strong evidence to support a link of some kind between the late Magdalenian human group (or groups) which left traces of their activities behind in the north-western Ardennes and the late Magdalenian group(s) found in the Paris Basin during the Bölling and latest Dryas I. Fossil shells found at the Trou de Chaleux and the Grotte de Sy Verlaine have been sourced to the Paris Basin, and there are apparent similarities in the butchery activities and techniques utilised in both areas (specifically the extraction of *Equus ferus* tendons and the subsequent longitudinal splitting of the metapodia and 1st phalanges). A more tentative link might also be drawn with late Magdalenian sites along the Middle Rhine in Germany, although less published comparative information is available for this region. The distances between these regions are certainly within the suggested ranges for hunter-gatherer bands, and the archaeological and palaeontological residues discussed within this dissertation could even be the result of a few visits (or even a single one) by a late Magdalenian band to what is today the Belgian Ardennes.

Final Thoughts and prospects for further research

I view the faunal studies presented in this dissertation as a starting point. There is still much work to be done. The need for detailed evidence relating to the season(s) of late

Magdalenian occupation in this region is acute. It has been suggested that the thin-sectioning technique developed by Burke (1992) may prove the best starting point for such an evaluation, especially since it was developed especially for Pleistocene horses - mammals repeatedly and systematically exploited in the north-western Ardennes by people whom we would now term *late Magdalenian.*

Further AMS work would certainly be desirable, and current problems with our present knowledge of the Lateglacial chronology of human settlement in the region as well as those relating to mammal biostratigraphy have been highlighted. Whether sufficient funding for such a programme at present exists, or may do so in the future, is a very open question.

Tentative ideas surrounding the possible *ethnicity* of butchery have been briefly aired in this final chapter. I have not attempted to do more than set up a target for critical comment and some ideas for further investigation. There is certainly a remarkable consistency surrounding the butchery evidence described and discussed within this dissertation from sites in the north-western Ardennes. Parallels have been suggested in outline between late Magdalenian butchery evidence from Belgium, and that documented from other regions of north-western Europe. At the time of writing the available case studies are few, and many only partly published. The suggestion that butchery practice amongst late Magdalenian hunter-gatherer groups in north-western Europe carried within it an *ethnic signature* remains just that, a suggestion. It remains to be seen whether it will stand the test of future research projects, but I believe that it may.

APPENDIX I - ARCHIVE LABELS HELD IN THE IRSCNB

TROU DE CHALEUX LABELS

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Le Cheval fut de beaucoup le principal gibier des Troglodytes de Chaleux. Parties diverses du crâne dont deux avec entailles fines et une avec de fortes entailles.
2261 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Parties diverses du crâne et de la face de Chevaux. Trois portant de fines entailles.
2262 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Os divers du crâne et os hyoïdes ou os de la langue de Chevaux. Comme ces Chevaux étaient manifestement tués et dépecés loin de la caverne, on voit par le nombre ces os hyoïdes que la langue du gibier faisait partic de restes du gibier apporté par les Trogolodytes. 1 hyoïde et 4 fragments de crânes avec des entailles.
2263 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Parties diverses du crâne et la face de Chevaux. Trois portant de fines entailles.
2264 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments de mâchoires de Chevaux. Le crâne de ce gibier, vu les nombreux restes, et surtout l'énorme quantité de dents, était l'une des parties favorites pour l'alimentation. 2 debris d'intermaxillaires et 2 autres de mâchoires supérieures avec entailles.
2265 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments de 13 intermaxillaires, avec incisives, de Chevaux adultes. L'un porte de fortes entailles, deux autres des entailles fines.
2266 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments de mâchoires inférieurs de Chevaux adultes. Neuf portant de fortes entailles.
2267 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Débris divers du crâne et du maxillaire inférieur de Chevaux. 5 fragments de maxillaires avec entailles fines.
2268 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments de maxillaires inférieurs, d'intermaxillaires, d'omoplates et d'humerus de Chevaux. Huit parties de maxillaires avec entailles fines.
2269 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Débris de maxillaires inférieurs de Chevaux. Deux avec fortes entailles et quatre avec entailles fines.
2270 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Débris de maxillaires inférieurs de Chevaux. L'un avec entailles fines.
2271 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Débris de maxillaires inférieurs de Chevaux. Deux avec entailles fines et une avec marque d'un coup de Percuteur.
2272 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments de mâchoires de Chevaux, notamment de trois poulains. Deux avec fortes entailles et trois avec entailles fines.
2273 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Débris de la partie antérieur de maxillaires inférieurs. L'un a été entamé par usure; trois portant des fortes entailles et quatre les entailles fines.
2274 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments de vertèbres cervicales de Chevaux. Deux avec entailles fines.
2278 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 23 vertèbres dorsales et lombaires de Chevaux. Ce sontà peu près les seules vertèbres du tronc qui se sont présentées, ce qui montre que les Troglodytes, dépeçant sur place leur gros gibier, délaissaient presque constamment les parties du tronc.
2279 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments du sacrum de Chevaux; deux vertèbres dorsales de poulains; 18 vertèbres du commencement de la queue, se distribuant ainsi:

1er vertèbre caudale : 3	3e vertèbre caudale : 5
2e vertèbre caudale : 6	4e vertèbre caudale : 4

Trois fragments de sacrum et trois vertèbres caudales avec entailles fines.
2293 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 86 vertèbres de Chevaux du milieu de la queue:

5e vertèbre caudale : 13	7e vertèbre caudale : 34	9e vertèbre caudale : 1
6e vertèbre caudale : 16	8e vertèbre caudale : 22	

Dont 11 avec entailles fines. - Ces vertèbres caudales y compris celles des deux cadres voisins et se montant ensemble à 160, contrastent fortement par leur nombre avec les vertèbres du tronc et du cou, ce qui montre que les troglodytes avaient soin d'apporter la queue, sans doute pour utiliser le crin.
2294 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Fragments d'os iliaques de Chevaux; ils sont au nombre de 6 - 56 vertèbres de l'extremité de la queue. Trois parties d'iliaques avec fines entailles; l'une en outre avec marques de coups de Percuteurs.
2295 É.D. Avril 1907.

2296 - specimens present but label missing

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 14 fragments d'omolpates de Chevaux. L'un porte de fortes et de fines entailles et a été conditionné pour servir de perçoir; 6 autres avec entailles fines.
2297 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 24 fragments d'omoplates de Chevaux. On remarquera que la plupart appartiennent à la partie articulaire. L'un avec marque d'un coup de Percuteur; 4 autres ont des entailles fines.
2298 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 22 fragments d'omoplates de Chevaux. Le plus grand nombre en est la partie antérieur. L'un a la marque d'un coup de Percuteur; 3 ont des fortes entailles; 6 des entailles fines.
2299 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 20 fragments d'humérus de Chevaux, principalement la partie articulaire. Deux spécimens provenant de deux poulains très jeune, peut-être de foetus. Deux fragments avec marques de coups, 4 autres avec entailles fines.
2300 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 16 fragments d'humérus de Chevaux. L'un a la marque d'un coup de Percuteur et des entailles fines; deux autres des entailles fines seulement.
2301 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 16 épiphyses inférieurs d'humérus de Chevaux. L'un a la marque d'un coup de Percuteur et des entailles fines; deux autres ont des fortes entailles; deux autres encore des entailles fines.
2302 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 27 fragments de cubitus de Chevaux dont cinq avec entailles fines, un avec marque de coup et entailles fines et quatre autres avec la marque de coups de Percuteurs.
2303 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 8 fragments de radius dont deux avec la marque de coups de Percuteurs et 10 fragments de cubitus dont un porte des entailles fines ou fortes et a servi de perçoir, et deux autres avec entailles fines.
2304 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 17 fragments de radius de Chevaux. L'un a les marques de trois coups de Percuteurs; un autre celle d'un coup; un autre avec celle d'un coup également et des entailles fines, un autre encore ne porte que des entailles fines.
2305 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 17 fragments de radius de Chevaux dont un avec fortes entailles, un avec entailles fines et un avec la marque d'un coup de Percuteur. 15 pisiformes dont un avec entailles fines.
2306 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 25 scaphoïdes de Chevaux dont un avec entaille fine; 17 semi-lunaires; 12 pyramidaux dont un avec entailles fines.
2307 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 20 trapézoïdes de Chevaux; 31 grands os dont un avec entailles fines; 21 os crochus.
2308 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 18 fragments de fémurs de Chevaux dont un avec la marque d'un coup de Percuteur et entailles fines, un autre avec la marque d'un coup.
2309 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 21 fragments de fémurs de Chevaux dont deux avec entailles fines, un avec fortes entailles et deux autres avec marques de coups de Percuteurs.
2334 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 29 fragments de fémurs de Chevaux dont quatre avec entailles fines et un avec la marque d'un coup de Percuteur.
2335 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 6 fragments de fémurs de Chevaux dont un avec marque d'un coup de Percuteur; 16 rotules dont un avec entailles fines.
2336 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 26 fragments de tibias de Chevaux dont trois avec les marques de coups de Percuteurs.
2337 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 19 fragments de tibias de Chevaux dont un avec un forte entaille et un autre avec entailles fines. - 5 fragments de péronés.
2338 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 16 fragments de tibias de Chevaux dont deux avec fortes entailles et deux autres avec entailles fines.
2339 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 12 astragales de Chevaux dont deux avec entailles fines, et 11 calcanéums dont un avec marque d’un coup de Percuteur et des entailles fines, un autre avec marque d’un coup de Percuteur et un autre encore avec des entailles fines.
2340 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 5 astragales de Chevaux dont un avec entailles fines; 7 calcanéums dont un avec; 18 scaphoïdes.
2341 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 31 stylets de Chevaux dont un a servi de Perçoir, deux ont de fortes entailles et un autre porte des entailles fines; 7 cuboïdes dont un avec entailles fines; 21 cunéiformes dont un également avec entailles fines.
2342 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 50 stylets de Chevaux dont huit avec entailles fines.
2343 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 3 fragments de métacarpiens de Chevaux; 24 métatarsiens dont un qu’on avait commencé à perforer, deux avec chacun deux coups de Percuteurs et entailles fines, un avec un coup et entailles fines, quatre autres avec un seul coup et sept avec entailles fines.
2344 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 29 fragments de métacarpiens de Chevaux dont un a servi de Lissoir, un avec marque de deux coups de Percuteur, quatre avec marque d’un coup et cinq avec entailles fines.
2345 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Un métacarpien de Cheval et 29 fragments dont un avec deux coups de Percuteur, quatre avec un seul coup, deux avec entailles fines.
2346 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 7 fragments de métacarpiens de Chevaux dont deux avec entailles fines; 12 fragments de métatarsiens dont deux également avec entailles fines; 9 autres fragments dont un avec marque d’un coup de Percuteur et avec un forte entaille.
2347 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 15 fragments de métacarpiens et 9 de métatarsiens de Chevaux, dont un a servi de Lissoir et un autre porte des entailles fines.
2348 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 6 fragments de métacarpiens de Chevaux dont deux avec marque d’un coup de Percuteur et un avec fortes entailles. - 13 fragments de métatarsiens dont un a reçu deux coups de Percuteur, un autre un seul coup et deux autres encore de fortes entailles.
2349 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 27 sésamoïdes antérieurs de Chevaux; 60 postérieurs; 3 autres fragments.
2350 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 44 fragments de phalanges de Chevaux dont six avec entailles fines.
2351 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 45 fragments de phalanges de Chevaux dont quatre ont reçu un coup, un autre un coup de fortes entailles et trois autres encore des entailles fines.
2352 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 5 phalanges antérieurs de Chevaux dont trois avec entailles fines; 4 phalanges posterieurs dont deux avec entailles fines; 19 autres fragments de phalanges dont neuf on reçu des coups de Percuteur, un autre a reçu un coup et de fortes entailles et trois autres encore des entailles fines.
2353 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 10 phalanges antérieurs de Chevaux dont une avec entailles fines; 14 phalanges postérieures dont trois avec entailles fines.
2354 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 7 phalanges et 8 fragments de phalanges de Chevaux dont trois avec entailles fines, deux avec fortes entailles; 15 phalangines et 6 fragments dont trois avec entailles fines.
2355 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 36 phalangines de Chevaux dont neuf avec entailles fines.
2356 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 37 phalangines de Chevaux dont treize poulains; 5 autres fragments. Quatre de ces osportent des entailles fines.
2357 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 19 fragments de sabots dont un avec entailles fines; 64 os sésamoïdes du sabot dont un avec un coup de Percuteur.
2358 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 28 sabots de Chevaux et fragments dont deux avec entailles fines.
2359 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. 28 sabots de Chevaux dont trois avec entailles fines.
2360 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Molaires supérieures droites de Chevaux:
1e molaire : 32 3e molaire : 51 5e molaire : 62
2e - : 27 4e - : 43 6e - : 40
non compris des fragments.

Le chiffre maximum étant 62, indiquerait que ce nombre de Chevaux au moins fut tué par ces Troglodytes.

2387 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Molaires supérieures gauches de Chevaux:
1e molaire : 38 3e molaire : 40 5e molaire : 77
2e - : 22 4e - : 39 6e - : 40
non compris de fragments.

Le chiffre de 77 atteint par la 5e molaire est dépassé par celui de la molaire inférieure gauche qui est de 79.

2389 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Molaires inférieures droites de Chevaux:
1e molaire : 29 3e molaire : 60 dont 24 de poulains 5e molaire : 27
2e - :51 dont 18 de poulains 4e - : 48 6e - : 45
non compris les fragments et 3 dents insuffisamment développées.

On remarquera le chiffre éléve de poulains, ce qui pourrait indiquer que beaucoup de ces Chevaux provinrent de razzias de gibier.

2390 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Equus caballus. Molaires inférieures gauches de Chevaux:
1e molaire : 35 dont une de poulain 3e molaire : 47 dont 6 de poulains 5e molaire : 54
2e - : 79 dont 22 de poulains 4e - : 17 6e - : 38
non compris les fragments.

Le nombre des 2es molaires est le plus élevé pour l'ensemble des dents. Il en résulte que les Troglodytes de Chaleux ont tué et mangé 79 Chevaux qu minimum.

2391 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Cervus tarandus. Ossements divers d'au moins 8 Rennes, d'après les métatarsiens gauches. Un de ceux-ci perforé sur une de ses faces; deux vertèbres dorsales, une côte, une omoplate, un fémur, un métatarsien et un phalange avec entailles fines; fragments de radius, de cubitus et de métatarsien avec marques de coups de Percuteurs.

2569 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Bison europoeus. Ossements divers du Bison. Un os du sternum avec entailles.

2590 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Bison europoeus. Os des extrémités de deux Bison adultes. - Cervus elaphus. Ossements divers d'au moins deux Cerfs. Fragment de tibia avec entailles; un autre avec la marque d'un coup de Percuteur.

2591 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Bos primigenius major et minor. Ossements divers du grand et du petit Urus. Omoplate, phalange postérieure, fragment de fémur et 3e vertèbre cervicale avec entailles; fragment de métatarsien avec la marque d'un coup de Percuteur.
2592 É.D. Avril 1907.

2593 - specimens present but label missing

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Ovibos moschatus. Ossements divers de Boeuf musqué jeunes et adultes. Un métatarsien avec plusieurs entailles.
2594 É.D. Avril 1907.

2598 - specimens present but label missing

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Antilope Saiga. Cheville d'antilope aujourd'hui reléguée dans la région de la Caspiene et alors habitant l'Occident, surtout en Périgord. - Capra ibex. Métatarsien et phalange de Bouquetin, espèce aujourd'hui reléguée sur les hautes mantagnes Europées nes. Capra egagrus. Ossements divers de la Chèvre égagre. Cervus capreolus. Os divers du Chevreuil, dont un tibia avec coup de Percuteur.
2599 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Antilope rupicapra. Ossements divers d'au moins deux Chamois extrémité inférieure d'un métacarpien avec entaille faite par sciage; fémur gauche avec entailles; cubitus avec la marque de deux coups de Percuteur. Capra egagrus. Ossements divers de plusieurs spécimens d'egagre jeunes et adultes. Métacarpien usé par frottement et un autre portant des entailles.
2600 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Ursus arctos. Ossements divers dont un fragment de mâchoire inférieure avec entailles, les unes fines, les autres plus fortes. - Canine d'un aute Ours dont la couronne est usée sur les deux faces latérales, calcanéum avec la marque d'un coup.
2601 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Ossements humaine de deux adultes, trouvés dans une anfractuosité de la caverne avec d'autres débris d'alimentation; cubitus dont la diaphyse a été radée, fragment d'une omoplate avec entailles, diaphyse de tibia avec marques de coups. Gulo borealis. Partie d'omoplate d'un Glouton avec la marque d'un coup. - Canis lupus. Os divers. - Castor fiber. - Fémur d'un Castor.
2602 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Canis lagopus ou Renard Bleu et Vulpes ou Renard Ordinaire; Meles taxus ou Blaireau; Lepus timidus ou Lièvre.
2623 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Ossements divers d'Oiseaux dont deux avec entailles fines.
2629 É.D. Avril 1907.

TROU DE CHALEUX - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Felis chaus. Apellé chat des jungles aux indes et chat rouge par les cafres, il habite toute l'Afrique et le sud de l'Asie jusqua'u la Caspienne. A l'époque Quaternaire il remontait jusque sous nos lattitudes. Schmerling l'avait déjà distingué du chat sauvage (1830 - 1833), mais, depourvu des pièces de comparaison, il avait désigné sous le nom de Felis magna. Les restes d'ici sont de deux spécimens. - Felis catus. - Mustela foina, erminoea et vulgaris. - Os des Oiseaux.
2630 É.D. Avril 1907.

TROU DES NUTONS LABELS

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Cervus tarandus. Restes de quatre Rennes dont un faon. Un atlas avec entailles; une omoplate avec la marque de deux coups de Percuteurs.
2533 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Cervus elaphus. Restes de deux cerfs adultes et de cinq faons. Un humérus et deux fémurs de faons portent des entailles.
2534 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Cervus tarandus. Restes d'os membres de deux Rennes adultes. Une phalange trouée d'une côté. Deux tibias et un fragment de métatarsien avec entailles. Fragments de radius, de tibia et de métacarpien avec marques de coups de Percuteurs.
2535 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Antilope rupicapra. Restes de chamois, d'après le chevilles, les maxillaires inférieurs, les métatarsiens et les astragales. Une boîte crânienne est restée intacte. Un radius est perforé, mais l'un des trous au moins n'est pas usé. Un tibia avec entailles. Cervus elaphus - restes divers d'un cerf et d'un faon. Le merraine de l'adulte a été coupé circulairement pour le briser; la partie adhérente du frontal porte aussi une coupure. Fémur avec entailles.
2536 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra ibex. Restes divers d'au moins 4 bouquetins, notamment presque tout le squelette d'un jeune. Cette espèce n'habite à notre époque que les hautes montagnes de l'Europe. Un radius, un métacarpien, un tibia et une phalange montrent des entailles; une cheville un radius et un iliaque avec coups de percuteurs.

Il y a lieu de remarques que ce niveau a fourni d'importantes parties du squelette d'un bouquetin, d'un ours et d'un loup, que leurs crânes et beaucoup de leurs os longs n'ont pas été brisée pour en retirer la cervelle et la moelle. Le fait est exceptionel dans nos cavernes. Ces animaux ont cependant été transportés par les Troglodytes et ont été l'objet d'un commencement de dépècement.
2537 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra, probablement C. egagrus, reléguée aujourd'hui au Caucase et dans l'Asie mineure. D'après les maxillaires supérieurs gauches, les restes sont de 7 individus; de 14 d'après les maxillaires inférieurs. Le trou Magrite en a fourni 26. Ce qui indique de véritable « coup de filet » opérés pour les Troglodytes et la haute probabilité de l'emploi de haies pour pousser le gibier vers des abîmes.
2538 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra... egragrus. Le cadre voisin renferme deux fragments de crânes avec coupures et entailles, deux chevilles détachées par coupures circulaires, un maxillaire inférieur avec marque d'un coup de percuteur. Ici un autre maxillaire inférieur et trois omoplates portent également la marque de coups de Percuteurs.
2539 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra... egragrus. Trois humérus avec entailles. L'un porte en plus la marque d'un coup de percuteur, ce qui est aussi le cas pour un radius.
2540 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra... egragrus. Os divers de Chèvres qui sont probablement l'Egagre.
2541 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra... egragrus. Os divers de Chèvre probablement égagres. Tibia dont la partie inférieur a été détaché par une coupure circulaire; un autre avec entailles. Un iliaque avec coup de Percuteur. Deux ossements ayant un peu subi l'action du feu. Cervus capreolus. Quelques restes de Chevreuil.
2542 É.D. Novembre 1906.

2543 not present in the IRScNB stores

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Equus caballus. Os des membres, etc..., de Chevaux. Un iliaque a été utilisé comme lissoir; un humerus et des fragments de fémur et de tibia ont reçu des coups de Percuteurs.
2544 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Equus caballus. Os des extrémités de Chevaux. Un métatarsien, une phalange et une sésamoïde du sabot avec entailles; une autre phalange avec la marque d'un coup de Percuteur.
2545 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Dents et débris de crânes de sangliers adultes. Un os de la langue avec entailles; un intermaxillaire avec marque d'un coup de Percuteur.
2546 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Maxillaires supérieurs et inférieurs de Sangliers adultes. D'apres les inférieurs, il y aurait encore huit individus. Trois de ces mandibles avec entailles, un autre avec marque d'un coup de Percuteur.
2547 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Maxillaires inférieurs d'une vingtaine de Sangliers adultes. Trois fragments avec entailles et un autre avec coup.
2548 É.D. Novembre 1906

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Os divers de marcassins et vertèbres de Sangliers adultes. Un humérus de marcassins avec entailles.
2549 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Omoplates et vetèbres de Sangliers adultes et jeunes. Deux omoplates avec entailles, deux autres avec marques de coups de percuteurs.
2550 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Omoplates et humérus de Sangliers adultes et jeunes. Deux humérus et deux omoplates avec entailles; humérus avec entaille et coup de Percuteur; trois humérus et une omoplate avec coups de Percuteurs; trois humérus et une omoplate avec coup de Percuteurs.
2551 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Humérus et cubitus de Sangliers adultes et jeunes. Deux humérus et cinq cubitus avec entailles; un humérus avec coup de Percuteur.
2552 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Iliaque et os des membrès de Sangliers adultes et jeunes. Trois radius avec entailles; trois fémurs, un tibia, un radius et un iliaque avec coup de Percuteur.
2553 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Tibias, péronés et os des extrémités de Sangliers adultes et jeunes. Deux tibias et un métacarpien avec entailles; un tibia avec coup de Percuteur.
2554 É.D. Novembre 1906

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Ursus arctos. Nombreux ossements d'un Ours brun adulte et d'un autre n'etant pas encore adulte. L'humérus gauche de l'adulte porte des entailles au silex; le maxillaire du même à reçu deux coups de Percuteur qui ne l'ont pas brisé. - Le jeune ne semble pas avoir été complètement dépecé. L'Ours brun a été exterminé chez nous, il y a huit à neuf siècles.
2555 É.D. Novembre 1906.

2556 - Specimens present but label missing

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Meles taxus. Os divers de Blaireaux. Il est possible qu'une partie soit moderne. Mais un cubitus porte des fines entailles longitudinales, ce qui annonce l'action des Troglodytes.
2557 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Canis..... Os divers de Chien. Un maxillaire inférieur avec entailles et deux coups de Percuteurs; un fragment d'humérus avec entailles; un autre de cubitus avec coup. - Meles taxus. Os divers de Blaireaux dont un tibia avec entailles latérales. - Mustela foina. Os de Fouine. Castor fiber. Côte et métatarsien de Castor.
2558 É.D. Novembre 1906

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Canis lupus. Crâne, les 7 vertèbres cervicales et la 1re [sic} dorsale, omoplates, iliaque et os des membres d'un Loup. Un fragment d'humérus avec une forte entaille; un fragment de radius avec la marque d'un coup de Percuteur.
2559 .D. Novembre 1906

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Canis lagopus. Maxillaires inférieurs, dents et os divers de renards polaires. Un de ces maxillaires avec entailles. Canis vulpes. Restes divers de renards ordinaires.
2560 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Canis lagopus. Os divers de renards polaires, dont un tibia avec coup de Percuteur.
2561 É.D. Novembre 1906

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Canis lagopus. Maxillaires inférieurs de inférieurs de 42 renards bleus ou renards polaires, d'après ceux de gauche et y compris les restes du cadre suivant. Humérus et cubitus. Un maxillaire avec entailles; deux autres avec coups de Percuteurs. Ces carnivores, adjourd' hui émigrés de nos régions, vivent en bandes. Les Troglodytes leur faisaent généralement une chasse active.
2562 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er et 2e NIVEAUX OSSIFÈRES - AGE DU RENNE. Canis lagopus. Os divers de renards polaires, dont un iliaque, un radius et un cubitus avec coups de percuteurs. - Canis vulpes. Os divers de renards ordinaires.
2563 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Du 2e niveau ossifère : Castor fiber. Quelques ossements de Castor. - Du 1er niveau : Felis catus. Os du crâne et des membres. - Gulo borealis. Maxillaires inférieurs et os des membres de deux Gloutons. Cette espèce n'habite plus que les régions arctiques. - Mustela erminea, putorius et foina. - Lepus timidus.
2564 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Ossements d'Oiseaux divers.
2604 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Cervus tarandus. Bois de mue de femelles et de jeunes Rennes. Les Troglodytes recueillaient toujours en grand nombre ces sortes de restes pour en confectionner surtout des pointes de sagai. Il y en a ici 313 fragments dont huit avec entailles et deux avec marques de coups de Percuteurs.
2608 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Bos primigenius minor. Restes de petits Urus adultes. Un humérus, deux radius et un métacarpien avec entailles. Un cubitus avec marque d'un coup de Percuteur.
3216 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Bos primigenius minor. Restes de petits Urus adultes. Deux métatarsiens, un calcaneum, un astragale et une phalange avec entailles.
3217 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Bos primigenius minor. Restes de petits Urus adultes. Trois fragments d'os de la langue et une omoplate avec marques de coups de percuteurs. - Deux lombaires avec coupures, l'un en outre avec coups.
3218 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE. Bos primigenius. Restes d'Urus adultes. Tête de fémur dont le col porte des coupures, ainsi qu'un fragment d'humerus. - Bos primigenius minor. Restes de trois petits adultes. Un fragment de tibia avec coupure; un autre avec entailles.
3219 É.D. Novembre 1906.

FURFOOZ - TROU DES NUTONS - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Bos primigenius. Restes divers de plusieurs Urus adultes. Quatre maxillaires inférieurs, un axis, une 3e cervicale et une omoplate avec coupures, cette dernière portant en outre des entailles. Une arcade zygomatique, un fragment de maxillaire inférieur, une phalange unguéale avec entailles. Un astragale poli en un point.
3220 É.D. Novembre 1906.

TROU DU FRONTAL LABELS

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Talpa europoea. - Arvicola amphibius. - Spermophilus... - Myodes torquatus. - Myoxus nitela. - Criceteus frumentarius. - Aucun de ces restes ne semble pas la trace de l'action de l'homme.
2183 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Mustela erminea. - Talpa europoea. - Arvicola amphibius. - Lagomys pusillus. - Myoxus glis et nitela. - Criceteus frumentarius. - Aucun de ces restes ne semble porter la trace de l'action de la homme.
2184 É.D. Novembre 1906.

2185 not present in IRScNB stores

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Talpa europoea - Crocidura aranea - Crossopus fodiens - Arvicola amphibius, Glareolus, Ratticeps, etc... - Lagomys pusillus - Cricetus frumentarius - Myodes torquatus - Mus sylvatilos - Aucun de ces restes ne semble porter la marque de l'action de l'Homme.
2186 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Os de poissons divers. Coquilles de mollusques fluviatiles et terrestres divers.
2187 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Os d'Oiseaux, de Batraciens etde Poissons divers. Aucun ne semble pas la trace de l'action de l'homme.
2188 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Cervus tarandus. Bois de mue, dent, axis et os des membres de Rennes: un bois avec copure; un autre (de jeune) arrondi; un troisième (de femelle) dont le merrain a été détaché par des coups de pierre coupante; un quatrième (de mâle) dont l'andouiller a été enlevé au moyen d'entailles; humérus avec entailles.
2447 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Cervus elaphus. Os divers de Cerfs: humérus, iliaque et tibia avec entailles; fragment de maxillaire inférieur et humérus avec coups de Percuteurs.
2448 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.

Equus caballus. Os divers de chevaux, adulte et jeune: une omoplate avec entailles et une autre avec coup de percuteur.
2449 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Equus caballus. Os divers de chevaux: fragment de fémur, une côte et deux phalanges; fragment de tibia, fragments de trois métacarpiens et d'un métatarsien avec coups de percuteurs.
2450 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Bos primigenius minor. Os divers de plusieurs petits Urus adultes: trois fragments de crânes et deux maxillaires inférieurs avec entailles.
2451 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Bos primigenius minor. Os divers de plusieurs petits Urus adultes: deux fragments d'humérus avec copures et entailles.
2452 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Bos primigenius minor. Os des membres du petit Urus adulte: fragment de fémur et d'humérus, deux fragments de radius avec entailles; une fragment de radius avec coups de Percuteurs.
2453 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Bos primigenius minor. Iliaques et fémurs de plusieurs petits Urus adultes; six iliaques avec copures et entailles; deux autres avec entailles seulement.
2454 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Bos primigenius minor. Os divers de petits Urus adultes: deux fragments de métacarpiens et un astragale avec entailles.
2455 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Bos primigenius major. Os divers du grand Urus. Bos primigenius minor. Os divers de petits Urus adultes: un métatarsien avec copure; un métacarpien avec entaille; une phalange avec coup de Percuteur.
2456 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Os divers d'une dizaine de sangliers adultes et jeunes: un maxillaire inférieur avec copures; un autre avec nombreuses entailles.
2457 É.D. Novembre 1906

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Os divers de sangliers: une arcade zygomatique avec entaille; une vertèbre lombaire avec coupe de percuteur.
2458 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Felis cattus. Os divers de chats. Canis lagopus. Os divers de renards polaires. - Castor fiber. Maxillaire inférieur avec deux coups de percuteurs et diaphyse de tibia avec entailles.
2459 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Os divers de sangliers: fragments d'humérus avec coupure; une autre avec la cavité olécranienne polie; trois autre, un os du sternum et une côte avec entailles.
2460 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Os divers de sangliers: deux iliaques et un cubitus avec entailles; deux autres iliaques avec coups de Percuteurs.
2461 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Sus scrofa. Os divers de sangliers: trois fémurs une rotule, un tibia et un métacarpien avec entailles; un métacarpien et un métatarsien avec coups de Percuteurs.
2462 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra... egagrus. Restes divers dont un crâne: fragment de crâne avec un coup de Percuteur; deux autres fragments de crânes avec fortes entailles practiquées pour enlever les chevilles; cheville avec entailles.
2463 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra... egagrus. Maxillaires inférieurs et dents de la chèvre, probablement l'egragre acteul du Caucase: un maxillaire avec coup de Percuteur. Ces restes appartiennent à une dizaine d'individus. Ils étaient déjà abondants dans le Trou des Nutons.
2464 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra... egagrus. Os divers de chèvres: un humérus et une omoplate avec entailles; une vertèbre, une omoplate, humérus et un cubitus avec coups de Percuteurs; un radius perforé des deux côtés de son articulation supérieur et paraissant avoir été une pendeloque.
2465 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE
Capra... egagrus. Os divers de chèvres: iliaque avec coupures et entailles; autre iliaque, fémur, tibia et deux métatarsiens avec entailles.
2466 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Capra egagrus. Os divers de Chevres. Antilope Rupicapra. Os divers de Chamois. Deux individus d'après les métacarpiens et les fémurs: omoplate avec entailles; femur avec coup de Percuteur.
2467 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Canis lupus. Os divers de deux loups, d'après les omoplates: métacarpe avec entailles. - Canis..... Os divers de Chiens. - Meles taxus. - Mustela foina. - Erinaceus europoeus. Maxillaire inférieur et humérus d'un Hérisson. Cervus capreolus. Os divers de chevreuils. Radius avec entailles et un coup de Percuteur.
2468 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Canis vulpes. Os divers de renards. Un radius avec entailles. Lepus timidus. Os divers de lièvres. Deux humérus et un fémur avec entailles, un maxillaire et un iliaque avec coups de Percuteurs.
2469 É.D. Novembre 1906.

FURFOOZ - TROU DU FRONTAL - 1er NIVEAU OSSIFÈRE - AGE DU RENNE.
Ursus arctos. Tronc d'un ours brun adulte, probablement d'une femelle. 1^{e}, 5^{e} et 13^{e} vertèbres dorsales, 1^{e} lombaire, iliaque avec coups de Percuteurs. Des dents isolées et des débris d'os des membres extrémétes, dont un métatarsien avec coup de percuteur et un fragment de fémur un peu carbonisé. - Mustela vulgaris ou belette. - M. erminea. - M. putorius. - Myoxis nitela.
2488 É.D. Novembre 1906.

BIBLIOGRAPHY

Albrecht, G., Burke, H. & F. Poplin (Eds.) (1983): Naturwissenschaftliche Untersuchungen an Magdalénien-Inventaren vom Petersfels, Grabungen 1974-1976. Tübinger Monographien zur Urgeschichte. Herausgegeben von Hansjürgen Müller-Beck Band **8**.

Albrecht, G., Berke, H. & F. Poplin (1983): Restes de mammifères du Petersfels P1 et Petersfels P3, fouilles 1974-1976. In. Albrecht, G., Burke, H. & F. Poplin (Eds.) Naturwissenschaftliche Untersuchungen an Magdalénien-Inventaren vom Petersfels, Grabungen 1974-1976. Tübinger Monographien zur Urgeschichte. Herausgegeben von Hansjürgen Müller-Beck Band **8**: 63-127.

Alley, R.B., Meese, D.A., Shuman, C.A., Gow, A.J., Taylor, K.C., Grootes, P.M., White, J.W.C., Ram, M., Waddington, E.D., Mayewski, P.A. & G.A. Zielinski (1993): Abrupt increase in Greenland snow accumulation at the end of the Younger Dryas event. Nature **362**: 527-529.

Allsworth-Jones, P. (1986): The Szeletian and the transition from Middle to Upper Palaeolithic in Central Europe. Oxford University Press. Oxford.

Andrews, P. (1990): Owls, caves and fossils: predation, preservation and accumulation of small mammal bones in caves, with an analysis of the Pleistocene cave faunas from Westbury-sub-Mendip, Somerset, UK. Natural History Museum Publications. London.

Andrews, P. & J. Cook (1985): Natural modifications to bones in a temperate setting. Man (N.S.) **20**: 675-691.

Audouze, F. (1988): Les activités de boucherie à Verberie (Oise). In. J. Tixier (ed.) Technologie Préhistorique: 97-111.

Audouze, F. & J. Enloe (1991): Subsistence strategies and economy in the Magdalenian of the Paris Basin, France. In Barton, N., Roberts, A.J. & Roe, D. The Late Glacial in north-west Europe: human adaptation and change at the end of the Pleistocene. C.B.A. Research Report **77**: 63-71.

Bahn, P.G. (1983): Late Pleistocene economies of the French Pyrenees. In G.N. Bailey (Ed.) Hunter-gatherer economy in Prehistory. Cambridge University Press. Cambridge: 168-186.

Bailey, G.N. (1983): Economic change in Late Pleistocene Cantabria. In G.N. Bailey (Ed.) Hunter-gatherer economy in Prehistory. Cambridge University Press. Cambridge: 149-165.

Bard, E., Arnold, M., Fairbanks, R.G., & B. Hamelin (1993): ^{230}Th-^{234}U Ages obtained by Mass Spectrometry on Corals. Radiocarbon **35**(1): 191-199.

Bárta, J. (1989): Hunting of Brown Bears in the Mesolithic: Evidence from the Medvedia Cave near Ruzín in Slovakia. In C. Bonsall (Ed.) The Mesolithic in Europe. John Donald Publishers LTD. Edinburgh: 456-460.

Barton, R.N.E. (1990): The en éperon technique in the British Late Upper Palaeolithic. Lithics **11**: 31-33.

Barton, R.N.E. (Ed.) (1992): Hengistbury Head, Dorset. Volume 2: The Late Upper Palaeolithic and early Mesolithic sites. OUCA Monograph **34**.

Becker, B (1993): An 11,000-year German Oak and Pine Dendrochronology for Radiocarbon Calibration. Radiocarbon **35**(1): 201-213.

Becker, B. & B. Kromer (1991): Dendrochronology and radiocarbon calibration of the early Holocene. In. Barton, N., Roberts, A.J. & Roe, D.A.R. The Late Glacial in north-west Europe: human adaptation and environmental change at the end of the Pleistocene. CBA Research report **77**: 22-24.

Bellier, C. & P. Cattelain (1983): Fouilles au "Trou des Blaireaux" à Vaucelles (Doische - Prov. Namur) Campagnes 1981-1982. Notae Praehistoricae **3**: 42-49.

Bellier, C. & P. Cattelain (1986a): Le Trou des Blaireaux à Vaucelles. Helinium **26**: 47-57.

Bellier, C. & P. Cattelain (1986b): Le Trou des Blaireaux à Vaucelles. Aslira **18**: 35-49.

Benecke, N. (1987): Studies on Early Dog Remains from Northern Europe. Journal of Archaeological Science **14**: 31-49.

Berke, H. (1988): Butchering marks on horse bones from the Magdalenian site of Petersfels, southwest Germany. In R.E. Webb (Ed.) Recent Developments in Environmental Analysis in Old and New World Archaeology. British Archaeological Reports. International Series **416**: 105-116.

Bettinger, R.L. (1991): Hunter-gatherer: Archaeological and Evolutionary Theory. Plenum Press. New York.

Binford, L.R. (1978): Nunamiut Ethnoarchaeolgy. Academic Press. New York.

Binford, L.R. (1981): Bones: Ancient men and modern myths. Academic Press. New York.

Binford, L.R. (1983): In Pursuit of the Past. Thames & Hudson. London.

Binford, L.R. (1984): Faunal Remains from Klasies River Mouth. Academic Press. New York.

Bokelmann, K. (1991): Some new thoughts on old data on humans and reindeer in the Ahrensburgian tunnel valley in Schleswig-Holstein, Germany. In Barton, N., Roberts, A.J. & Roe, D. The Late Glacial in north-west Europe: human adaptation and change at the end of the Pleistocene. C.B.A. Research Report **77**: 72-81.

Bosinski, G. & G. Fischer (1974): Gönnersdorf Band 1. Die Menschendarstellungen von Gönnersdorf der Ausgrabungen von 1968. Franz Steiner Verlag GMBH.

Bosinski, G., Brunnacker, K., Brunnacker, M., Franken, E., Koci, A., Leroi-Gourhan, A., Malec, F., Meyer, H., Poplin, F., Puisségur, J-J., Rad, M.R., Schweingruber, F.H., Strauch, F., Tembrock, M-L., Urban, B. & S. Veil (1978): Geowissenschaftliche untersuchungen in Gönnersdorf. Franz Steiner Verlag GMBH.

Bouvier, J.-M. (1979): Le mystère des fendeurs de phalanges ou Contribution à la conaissance du travail de l'os au Magdalénien IV. Bulletin de la Société Préhistorique Française **76**(4): 105-109.

Boyle, K.V. (1990): Upper Palaeolithic Faunas from South-West France: a Zoogeographic Perspective. British Archaeological Reports International Series **557**.

Brain, C.K. (1981): The Hunters or the Hunted ? An Introduction to African Cave Taphonomy. London.

Bratlund, B. (1991a): A study of hunting lesions containing flint fragments on reindeer bones at Stellmoor, Schleswig-Holstein, Germany. In Barton, N., Roberts, A.J. & Roe, D. The Late Glacial in north-west Europe: human adaptation and change at the end of the Pleistocene. C.B.A. Research Report **77**: 193-207.

Bratlund, B. (1991b): Die spätglazialen "Opfertiere" von Meiendorf und Stellmoor, Kreis Stormarn: Neue ansätze zur interpretation alter funde. Offa **48**: 41-73.

Bratlund, B. (1993): Ein Riesenhirschschädel mit Bearbeitungsspuren aus Lüdersdorf, Kreis Grevesmühlen. Offa **49-50**: 7-14.

Bratlund, B. (in prep.): A survey of the Ahrensburgian faunal assemblage of Stellmoor. Unpublished MS.

Breuil, H. (1912): Les subdivisions du Paléolithique Supérieur et leur signification. Congrès International d'Anthropologie et d'Archéologie Préhistorique.

Breuil, H. (1927): Oeuvres d'art paléolithiques inédites du Périgord et art oriental espagnol. Revue Anthropologique: 101-108.

Breuil, H. (1954): Le Magdalénien. Livre Jubilaire de la Société Préhistorique Française 1904-1954. Les Grandes Civilisations Préhistoriques de la France. Bulletin de la Société Préhistorique Française **51**(8): 59-64.

Brézillon, M. (1983): La Dénomination des objects de Pierre Taillée. IV^{e} supplement à Gallia Préhistoire. CNRS.

Bull, G. & Payne, S. (1982): Tooth eruption and epiphysial fusion in pigs and wild boar. In Wilson, B, Grigson, C., & S. Payne (Eds.) Ageing and Sexing Animal Bones from Archaeological Sites. British Archaeological Reports British Series **109**.

Bunn, H.T. & E.M. Kroll (1986): Systematic butchery by Plio-Pleistocene hominids at Olduvai Gorge, Tanzania. Current Anthropology **27**: 431-452.

Burch, E.S. (1972): The caribou-wild reindeer as a human resource. American Antiquity **37**: 339-368.

Burke, A. (1992): Prey Movements and Settlement Patterns during the Upper Palaeolithic in Southwestern France. Unpublished PhD. Thesis. New York University.j

Cabboi, L. (1991): Le Magdalenien du Trou de Chaleux: nouvelles recherches. Unpublished Mémoire de Licence, Faculty of Philosphy and Letters, University of Liège.

Cahen, D., Keeley. L.H. & F.L. Van Noten (1979): Stone tools, Toolkits, and Human Behaviour in Prehistory. Current Anthropology **20**(4): 661-683.

Campbell, J.B. (1980): Le Problème des subdivisions du Paléolithique Supérieur Britannique dans son cadre Européen. Bulletin de la Société Royale Belge d'Anthropologue et Préhistoire **91**: 39-77.

Cauwe, N. (1989): Recherches archéologiques et paléontologiques à la Grotte Margaux (Namur, Dinant). Notae Praehistoricae **9**: 23.

Cauwe, N. Steenhoudt, F. & D. Bosquet (1993): Deux sépultures collectives dans un abri-sous-roche de Freyr: pérennitee d'un site funéraire du Mesolithique au Néolithique moyen-récent. Notae Praehistoricae **12**: 163-165.

Charles, R. (1989): Incised ivory fragments and other Late Upper Palaeolithic finds from Gough's Cave, Cheddar, Somerset. Proceedings of the University of Bristol Spelaeological Society **18**(3): 400-408.

Charles, R. (1990): Faunal remains and the 'Human Factor'. B.A. Dissertation. Department of Archaeology, University of Cambridge.

Charles, R. (1991): Note sur la découverte de nouvelles incisions rythmiques du Paléolithique supérieur provenant de Gough's Cave, Somerset, Angleterre. Bulletin de la Société Préhistorique Française **88**(2): 45-48.

Charles, R. (1993a): Evidence for faunal exploitation during the Belgian Lateglacial: recent research on the Dupont collection from the Trou de Chaleux. Exploitation des Animaux Sauvages à Travers le Temps. XIII^{e} Rencontres Internationales d'Archéologie et d'Histoire d'Antibes. IV^{e} Colloque internationale de l'Homme et l'Animal, Société de Recherche Interdisciplinaire. Éditions APDCA, Juan-les-Pins.

Charles, R. (1993b): Towards a new chronology for the Belgian Lateglacial: recent radiocarbon dates from the Oxford AMS system. Notae Praehistoricae **12**: 59-64.

Charles, R. (1994): Towards a new chronology for the Belgian Lateglacial, part II: recent radiocarbon dates from the Oxford AMS system. Notae Praehistoricae **13**: 31-39.

Charles, R. & R.M. Jacobi (1994). Lateglacial faunal exploitation at the Robin Hood Cave, Creswell Crags. Oxford Journal of Archaeology **13**(1): 1-32.

Clark, G.A. & L.G. Straus (1983): Late Pleistocene hunter-gatherer adaptations in Cantabrian Spain. In G.N. Bailey (Ed.) Hunter-gatherer economy in Prehistory. Cambridge University Press. Cambridge: 131-148.

Clark, J.G.D. (1954): Excavations at Star Carr. Cambridge University Press. Cambridge.

Clark, J.G.D. (1975): The Earlier Stone Age Settlement of Scandinavia. Cambridge University Press. Cambridge.

Clutton-Brock, J. (1987): A Natural History of Domesticated Mammals. Cambridge University Press. Cambridge.

Clutton-Brock, J. & R. Burleigh (1983): Some archaeological applications of the dating of animal bone by radiocarbon with particular reference to post-Pleistocene extinctions. In Mook, W.G. & H.T. Waterbolk (Eds.) 1st International

Symposium on 14C and Archaeology, Groningen, Proceedings 1981 PACT **8**: 409-418.

Clutton-Brock, J., Corbet, G.B. & M. Hills (1976): A review of the family *Canidae*, with a classification by numerical records. Bulletin of the Natural History Museum (Zoology) **29**(3): 119-199.

Coles, J.M. (1991): Elk and Ogopogo. Belief systems in the hunter-gatherer rock art of northern lands. Proceedings of the Prehistoric Society **57**(1): 129-147.

Conkey, M.W. (1980): The identification of prehistoric hunter-gatherer aggregation sites: the case of Altimara. Current Anthropology, **21**: 609-630.

Conkey, M.W. & C. Hastorf (Eds.) (1990): The uses of style in archaeology. Cambridge University Press. Cambridge.

Cook, J. (1986): Marked human bones from Gough's Cave, Somerset. Proceedings of the University of Bristol Spelaeological Society **17**(3): 275-285.

Cook, J. (1991a): Preliminary report on marked human bones from the 1986-87 excavations at Gough's Cave, Somerset, England. Anthropologie **XXIX**(3): 181-187.

Cook, J. (1991b): Preliminary report on marked human bones from the 1986-1987 excavations at Gough's Cave, Somerset, England. In Barton, N., Roberts, A.J. & Roe, D. The Late Glacial in north-west Europe: human adaptation and change at the end of the Pleistocene. C.B.A. Research Report **77**: 160-168.

Cordy, J-M. (1974): Étude préliminaire de deux faunes à rongeurs du tardiglaciaire Belge. Annales de la Société Géologique de Belgique **97**: 5-9.

Cordy, J-M. (1975): Bio- et chronostratigraphie des dépôts Tardiglaciares et Holocènes de la Grotte du Coléoptère à Bomal-Sur-Ourthe. Annales de la Société Geologique de Belgique **98**(2): 291-296.

Cordy, J-M. (1983): Les mammifères. In M. Dewez, J-M. Cordy, E. Gilot, S. Koslowski, E. Mourer, G. Toussaint & M. Toussaint (1983): La couche mesolithique de la Grotte du Coléoptère (Bomal-sur-Ourthe) Société Wallonne de Paléthnologie Memoire **5**: 27-32.

Cordy, J-M. (1984): Évolution des faunes Quaternaires en Belgique. In. D. Cahen & P. Haesaerts (Eds.) Peuples chasseurs de la Belgique Préhistorique dans leur cadre naturel: 66-77.

Cremades, M. (1992): Analyse et reconstitution technologiques en art mobilier Paléolithique l'example du glouton gravé sur baton perforé de la Madeleine (Dordogne). L'Anthropologie **96**(2-3): 319-336.

Currant, A.P. (1986): The Lateglacial mammal fauna of Gough's Cave, Cheddar, Somerset. Proceedings of the University of Bristol Spelaeological Society **17**(3): 286-304.

Currant, A.P. (1987): Late Pleistocene saiga antelope *Saiga tatarica* on Mendip. Proceedings University of Bristol Spelaeological Society **18**(1): 74-80.

Currant, A.P. (1991) A Late Glacial Interstadial mammal fauna from Gough's Cave, Somerset, England. In. Barton, N., Roberts, & D.A. Roe (Eds.) The Late Glacial in north-west Europe: human adaptation and environmental change at the end of the Pleistocene. CBA Research report **77**: 48-50.

Currant, A.P. Jacobi, R.M. & C.B. Stringer (1989): Excavations at Gough's Cave, Somerset 1986-7. Antiquity **63** (238): 131-136.

Danthine, H. (1955-60): Fouilles dans un gisement préhistorique du Domaine de Presle: rapport preliminaire. Documents et Rapports de la Société Royale d'Archéologie et de Paléontologie de Charleroi **L**: 1-39.

Dart, R. (1957): The Makapansgat australopithecine osteodontokeratic culture. Proceedings of the Third Pan African Congress on Prehistory (Livingstone 1955). Chatto & Windus. London.

David, F. (1972): Témoins osseux. In A. Leroi-Gourhan & M. Brézillon (Eds.) Fouilles de Pincevent: Essai d'analyse ethnographique d'un habitat Magdalenien. VII^e supplement à Gallia Préhistoire. Éditions du CNRS. Paris.

Dawkins, W. Boyd (1863): Wookey Hole hyaena den. Proceedings of the Somersetshire Archaeology and Natural History Society (for 1861-2) **11**(2): 197-219.

Dawkins, W. Boyd (1874): Cave Hunting. Macmillan & Co. London.

Dawkins, W. Boyd (1880): Early Man in Britain. Macmillan & Co. London

De Jong, C.G. Van Z. (1986): A systematic study of Recent Bison, with particular consideration of the wood Bison (*Bison bison athabascae* Rhodes 1898) National Museum of Canada Publications in the Natural Sciences **6**.

Debaille, E. (1945): Grottes de Presles: Industries Aurignacienne. Documents et Rapports de la Société Royale d'Archéologie et de Paléontologie de l'arrondissement judiciare de Charleroi **XLV**: 9-14.

Debaille, E. & L. Foulon (1926): Rapport sur les fouilles effectuées en 1904 dans les Grottes de Presles. Documents et Rapports de la Société Royale d'Archéologie et de Paléontologie de l'arrondissement judiciare de Charleroi **XXXVII**: 3-24.

Demars, P-Y. & P. Laurent (1989): Types d'outils Lithiques du Palélithique Supérieur en Europe. C.N.R.S. Cahiers du Quaternaire N° 14. C.N.R.S., Paris.

Destinez, P. & L. Moreels (1888): Exploration de la caverne de Verlaine (Luxembourg): Notice préliminaire. Annales de la Société Gèologique de Belgique **15**: CXLV-CXLVII.

Dewez, M. (1975): Nouvelles Recherches àla Grotte du Coléoptère à Bomal-sur-Ourthe (Province de Luxembourg). Rapport provisionaire de la prèmier campagne de fouilles. Helinium **15**: 105-133.

Dewez, M. (1976): Remarques a propos d'un fragment de concretion excentrique en forme de symbole feminin provenant de l'Abri de Megarnie. Bulletin de la Société Royale Belge d'Etudes Géologique et Archéologiques «Les Chercheurs de la Wallonie» **XXIII**: 193-207.

Dewez, M. (1977): Neue Grabungen in der Höhle von Martinrive (Prov. Lüttich, Belgien). Archäologisches Korrespondenzblatt **7**(2): 89-93.

Dewez, M. (1977 - 79): Le probleme du paléolithique supérieur à la quatrième Grotte d'Engis. Bulletin de la Société Royale Belge d'études Géologiques et Archéologiques «Les Chercheurs de la Wallonie» **XXIV**: 131-145.

Dewez, M.C. (1980): Le matériel archéologique osseux du Creswellien de Presle. Bulletin de la Société Royale Belge d'Anthropologie et Préhistoire **91**: 91-102.

Dewez, M. (1986): Campagnes de Fouilles 1985-1986 à la Grotte Walou (Trooz, Province de Liège). Notae Praehistoricae **6**: 115.

Dewez, M. (1987): Le Paléolithique Supérieur Récent dans les Grottes de Belgique Publications d'Histoire de l'Art et d'Archéologie de l'Université Catholique de Louvain LVII. Louvain-la-Neuve.

Dewez, M. (1992a): Le Magdalénien en Belgique, origine et filiation. Le Peuplement Magdalénien. Paléogéographie Physique et Humaine. Colloque de Chancelade.

Dewez, M. (1992b): La Grotte Walou à Trooz (province de Liège, Belgique), presentation du site. In Toussaint, M. (Ed.) Cinq Millions d'années, l'Aventure Humaine. Etudes et Recherches Archéologique de l'Université de Liège. Liège: 311-318.

Dewez, M., Brabant, H., Bouchund, J., Callut, M., Damblon, F., Degerbøl, M., Ek, C., Frère, H. & E. Gilot (1974): Nouvelles recherches à la Grotte de Remouchamps. Bulletin de la Société Royale Belge d'Anthropologie et Préhistoire **85**: 5-161.

Dewez, M., Cordy, J-M., Gilot, E., Koslowski, S., Mourer, E., Toussaint, G. & M. Toussaint (1983): La couche mesolithique de la Grotte du Coléoptère (Bomal-sur-Ourthe) Société Wallonne de Paléthnologie Memoire **5**.

Doize, R-L. (1960): Le grand Harpon de Verlaine (Belgique). Bulletin de la Société Royale Belge d'Anthropologie et Préhistoire **71**: 25-31.

Domico, T. (1988): Bears of the World. Facts on File, New York & Oxford.

Dupont, E. (1865a): Étude sur les cavernes des bords de la Lesse et de la Meuse, explorés jusqu'au mois d'octobre 1865. Bulletin de l'Academie Royale des Sciences, Lettres et des Beaux-Arts de Belgique 2^{e} Series **XX**: 824-850.

Dupont, E. (1865b): Sur L'Analogie d'un Dépôt de Pierres et de Boue Produit par un Orage et du Dépôt à Fragments de Roches Anguleux de Cavernes de la Lesse. Bulletin de l'Academie Royale des Sciences, Lettres et des Beaux-Arts de Belgique. 2^{e} Series **XX**: 250-253.

Dupont, E. (1865c): Rapport adressé a M. Le ministre de L'Intérieur sur les Fouilles Scientifiques exécutées dans la Province de Namur pendant L'année 1864. Bruxelles. Deltombe.

Dupont, E. (1865d): Rapport adressé a M. Le ministre de L'Intérieur sur les Fouilles Scientifiques exécutées dans les cavernes des bords de la Lesse, jusqu'au mois de Novembre 1865 Bruxelles. Deltombe.

Dupont, E. (1866): Fouilles de Cavernes de Belgique. Actes de la Société Helvétique des Sciences Naturelles 50e session, Neuchatel: 137-147.

Dupont, E. (1867a): Notice preliminaires sur les Fouilles dans les Cavernes de la Belgique. Bruxelles. 2 vols.

Dupont, E. (1867b): Rapport adressé a M. Le ministre de L'Intérieur sur les resultats des travaux Scientifiques exécutées dans les cavernes des environs de Dinant jusqu'au mois de janvier 1867. Bruxelles. Deltombe.

Dupont, E. (1868a): Étude sur les Cavernes du Bois de Foy à Montaigle. Bulletin de l'Academie Royale des Sciences, Lettres et des Beaux-Arts de Belgique 2e Series. **25**: 199-224.

Dupont, E. (1868b): Sur la Sucession des Temps Quaternaires, d'apres les Modifications Observées dans la Taille du Silex. Bulletin de l'Academie Royale des Sciences, Lettres et des Beaux-Arts de Belgique 2e Series **25**: 38-41.

Dupont, E. (1872): L'homme pendant les ages de la pierre dans les environs de Dinant-Sur-Meuse. 2e Ed. Bruxelles.

Enloe, J.G., David, F. & T.S. Hare (1994): Patterns of Faunal Processing at Section 27 of Pincevent: The use of spatial analysis and ethnoarchaeological data in the interpretation of archaeological site structure. Journal of Anthropological Archaeology **13**: 105-124.

Eriksen, T.H. (1993): Ethnicity and Nationalism. Pluto Press, London.

Fairbanks, R.G. (1993): Flip-flop end to last ice age. Nature **362**: 495.

Gamble, C.S. (1991): The social context for European Palaeolithic art. Proceedings of the Prehistoric Society **57**(1): 3-15.

Gamble, C.S. & W.A. Boismeier (Eds.) (1991) Ethnoarchaeological Approaches to Mobile Campsites: hunter-gatherer and pastoralist case studies. International Monographs in Prehistory. Ethnoarchaeological series **1**

Garrod, D.A.E. (1926a): The Upper Palaeolithic Age in Britain. Proceedings of the University of Bristol Spelaeological Society (for 1925) **2**(3): 299-301

Garrod, D.A.E. (1926b): The Upper Palaeolithic Age in Britain. Clarendon Press, Oxford.

Gee, H.E. (1990): Bovidae from the Pleistocene of Britain. Unpublished PhD. dissertation, Cambridge University.

Getty, R. (Ed.) (1975): Sisson and Grossman's The Anatomy of the Domestic Animals. 2 Vols. W.B. Saunders Company.

Gibson, T. (1991): Meat sharing as a political ritual: forms of transaction versus modes of subsistence. In. T. Ingold, D. Riches & J. Woodburn (Eds.) Hunters and Gatherers: volume 2 property, power and ideology. 165-179.

Gilks, J.A. (1988): The Cave Burial Research Project. British Archaeology March/April 1988: 6-7.

Ginsberg, J.R. & D.W. MacDonald (1990): Foxes, Wolves, Jackals, and Dogs. An action plan for the conservation of Canids. IUCN/SSC Canid Specialist Group.

Gordon, B.C. (1988): Of Men and Reindeer Herds in French Magdalenian Prehistory. British Archaeological Reports International Series **390**.

Gowlett, J.A.J., Hedges, R.E.M., Law, I.A. & C. Perry (1986): Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 4. Archaeometry **28**(2): 206-221.

Grønnow, B. (1987): Meiendorf and Stellmoor revisited: an analysis of Late Palaeolithic reindeer exploitation. Acta Archaeologica **56**: 131-166.

Hamal-Nandrin, J. & J. Servais (1925): Contribution a l'étude du Paléolithique Supérieur en Belgique. La Grotte dite "du Coléoptère" rapport sur les fouilles, 1923-24. Revue Anthropologique N°s 4, 5 &6: 120-144.

Hamal-Nandrin, J., Servais , J. & M. Louis (1935): Nouvelle contribution à l'étude du préhistorique dans la Campine limbourgeoise (Belgique). Bulletin de la Société Préhistorique Française **3**: 1-31.

Hawkes, C.J., Tratman, E.K. & R. Powers (1970): Decorated piece of rib bone from the Palaeolithic levels at Gough's Cave, Cheddar, Somerset. Proceedings of the University of Bristol Spelaeological Society **12**(2): 137-142.

Haynes, G. (1980): Evidence of carnivore gnawing on Pleistocene and recent mammalian bones. Paleobiology **6**(3): 341-351.

Haynes, G. (1983): Frequencies of spiral fracture and green bone fracture on ungulate limb bones in modern surface assemblages. American Antiquity **48**(1): 102-114.

Hedges, R.E.M. (1986): The Future Prospects of Accelerator dating. In. Gowlett, J.A.J. & R.E.M. Hedges Archaeological Results from Accelerator Dating. O.U.C.A.

Hedges, R.E.M., Housley, R.A., Law, I.A., Perry, C. & E. Hendy (1988): Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 8. Archaeometry **30**(2): 291-305.

Hedges, R.E.M., Housley, R.A., Law, I.A. & C.R. Bronk (1989): Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 9. Archaeometry **31**(2): 207-234.

Hedges, R.E.M., Housley, R.A., Bronk Ramsey, C. & G.J. Van Klinken (1993): Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 16. Archaeometry **35**(1): 147-167.

Hedges, R.E.M., Housley, R.A., Bronk Ramsey, C. & G.J. Van Klinken (1994): Radiocarbon dates from the Oxford AMS system: *Archaeometry* datelist 18. Archaeometry **36**(2): 337-371.

Hemingway, M.F. (1980): The Initial Magdalenian in France. British Archaeological Reports International Series **90**. 2 vols.

Higgs, E.S. (Ed.) (1972): Papers in Economic Prehistory. Cambridge University Press. Cambridge.

Higgs, E.S. (Ed.) (1975): Palaeoeconomy. Cambridge University Press. Cambridge.

Higgs, E.S., Vita-Finzi, C., Harris, D.R. & A.E. Fagg (1967): The Climate. Environment and Industries of Stone Age Greece: Part III. Proceedings of the Prehistoric Society **33**: 1-29.

Hodder, I. (1990): Style as historical quality. In. M. Conkey & C. Hastorf (Eds.) The uses of Style in Archaeology. New Directions in Archaeology. Cambridge University Press: 44-51.

Huxtable, J, & M.J. Aitken (1986): Dating of European Flint by Thermoluminescence. In Olin, J.S. & Blackman, M.J. (Eds.) Proceedings of the 24th International Archaeometry Symposium Smithsonian Institution Press, Washington D.C.

Huyge, D. (1986): Een vroeg-mesolithisch wooncomplex te Zonhoven-Kapelberg (Belgisch Limburg). Notae Praehistoricae **6**: 29-32.

Ingold, T., Riches, D. & J. Woodburn (1991) Hunters and Gatherers. 2 vols. Berg. Oxford.

Jackson, P. (n.d.): Weasels, Badgers, Civets and Mongooses and their relatives. International Union for Conservation of Nature and Natural Resources. Gland. Switzerland.

Jacobi, R.M. (1986a): A.M.S. results from Cheddar Gorge - Trodden and untrodden 'lifeways'. In J.A.J. Gowlett & R.E.M. Hedges (Eds.) Archaeological Results from Accelerator dating. OUCA Monograph **11**: 81-86.

Jacobi. R.M. (1986b): The Lateglacial Archaeology of Gough's Cave at Cheddar. In. S.N. Collcutt (Ed.) The Palaeolithic of Britain and its nearest neighbours: recent trends. Dept. of Archaeology & Prehistory, University of Sheffield. pp 75-79.

Jacobi, R.M. (1991): The Creswellian, Creswell and Cheddar. In Barton, N., Roberts, & Roe, D.A. (Eds.) The Late Glacial in north-west Europe: human adaptation and environmental change at the end of the Pleistocene. CBA Research report **77**: 128-140.

Jaques, V. (1899): Rapport sur le travail de M. Doudou sur de nouvelles fouilles dans les cavernes d'Engis. Bulletin de la Société d'Anthropologie de Bruxelles **XVIII**: LII.

Jarman, M.R., Bailey, G.N. & H.N. Jarman (Eds.) (1982): Early European Agriculture. Its foundations and development. Cambridge University Press. Cambridge.

Jochim, M.A. (1983): Palaeolithic cave art in ecological perspective. In G.N. Bailey (Ed.) Hunter-gatherer economy in Prehistory. Cambridge University Press. Cambridge: 212-219.

Klein, R.G. (1973): Ice-Age Hunters of the Ukraine. University of Chicago Press. Chicago.

Klein, R.G. (1977): The mammalian fauna from the Middle and Later Stone Age (Later Pleistocene) levels at Border Cave, Natal Province, South Africa. South African Archaeological Bulletin **32**: 14-27.

Klein, R.G., Allwarden, K. & C. Wolf (1983): The calculation and interpretation of ungulate age profiles from dental crown heights. In G.N. Bailey (Ed.) Hunter-gatherer economy in Prehistory. Cambridge University Press. Cambridge: 47-57.

Kruuk, H. (1989): The Social Badger. Ecology and behaviour of a group living carnivore (*Meles meles*). Oxford University Press.

Lartet, E. & H. Christy (1875): Reliquae Aquitanicae: being contributions to the archaeology of Périgord and ajoining provinces of southern France. Williams & Norgate. London.

Larsen, E.B. (1981): Moulding and Casting of Museum Objects using siliconerubber [*sic*] and epoxyresin [*sic*]. Konservatorskolen Det Kongelige Danske Kunstakademi.

Lauwers, R. (1985a): Eerste opgravingscampagne op de Tjongeriaannederzetting te Rekem. Archaeologica Belgica (N.S.) **I**(2): 7-12.

Lauwers, R. (1985b): Tjongeriaannederzetting te Rekem (Limburg): Eerste Opgravingscampagne. Notae Praehistoricae **5**: 43-49.

Lauwers, R. (1985c): Découverte d'un vaste campement du Paléolithique final dans la Vallée de la Meuse, Belgique. L'Anthropologie **89**(4): 557-559.

Lauwers, R. (1986a): Verder onderzoek op de Tjongeriaannederzetting te Rekem (gem. Lanaken). Archaeologica Belgica (N.S.) **II**(1): 9-14.

Lauwers, R. (1986b): Een twede opgravingscampagne op de Tjongeriaan Nederzetting van Rekem. Notae Praehistoricae **6**: 33-42.

Lauwers, R. (1988): Le Gisement Tjongerian de Rekem (Belgique): premier bilan d'une analyse spatiale. In M. Otte (Ed.) De la Loire à l'Oder: les civilisations du Paléolithique final dans le nord-ouest européen. British Archaeological Reports International Series **444**(1): 217-234.

Lawson, T.J. & C. Bonsall (1986a): Early settlement in Scotland: the evidence from Reindeer Cave, Assynt. Quaternary Newsletter **49**: 1-7.

Lawson, T.J. & C. Bonsall (1986b): The Palaeolithic in Scotland: a reconsideration of evidence from Reindeer Cave, Assynt. In. Collcutt, S.N. (Ed.) The Palaeolithic of Britain and its nearest neighbours: recent trends. University of Sheffield, Dept. of Archaeology.

Lee, R. (1979): The !Kung San. Men, women and work in a foraging society. Cambridge University Press. Cambridge.

Legge, A.J. & P.A. Rowley-Conwy (1988): Star Carr revisited. Centre for Extra-Mural Studies, Birkbeck College, University of London.

Lejeune, M. (1987a): L'art mobilier Paléolithique et Mesolithique en Belgique. CEDA Artefacts **4**.

Lejeune, M. (1987b): Decouverte d'une plaquette gravée dans le Magdalenien de Chaleux (Dinant). Notae Praehistoricae **7**: 23-26.

Leotard, J.-M. (1985a): Le Paléolithique superieur final des grottes de Presle. Memoir de licence presented to the Faculty of Philosophy and Letters, Art History, Archaeology and Musicology section, University of Liège. 216p.

Leotard, J.-M. (1985b): Le Paléolithique superieur final des grottes de Presle (Aiseau). Notae Praehistoricae **5**: 131-132.

Leotard, J.-M. (1988): Occupation Magdalenienne au Trou da Somme massif de Roche-al-Rue (Waulsort). Notae Praehistoricae **8**: 17-23.

Leotard, J.-M. (1993): Tourisme Magdalénien dans la région Dinantaise. Notae Praehistoricae **12**: 63-64.

Leotard, J.-M. In prep.: Le Paléolithique final des Grottes de Presle Etudes et Recherches Archéologiques de l'Université de Liège **37**.

Leotard, J.-M. & M. Otte (1985): Fouilles au site "Creswellien" de Presle (Hainaut). Notae Praehistoricae **5**: 33-35.

Leotard, J.-M. & N. Cauwe (1986): Fouilles 1986 au Trou du Frontal à Furfooz. Notae Praehistoricae **6**: 83-93.

Leotard, J.-M. & P. De Paepe (1987): Fouilles 1987 au Trou du Frontal à Furfooz (Dinant). Notae Praehistoricae **7**: 28.

Leotard J.-M. & M. Otte (1988): Occupation Paléolithique Final aux Grottes de Presle: fouilles de 1983-4 (Aiseau - Belgique. Pl. 1). In M. Otte (Ed.) De la Loire à l'Oder: les civilisations du Paléolithique final dans le nord-ouest européen. British Archaeological Reports International Series **444**(1): 189-215.

Letocart, L. (1970): Un Gisement du Paléolithique Final à Oburg "St. Macaire" (Hainault). Gripp, K., Schütrumpf, R. & Schwabedissen, H. (Eds.) Frühe Menschheit und Umwelt: Archälogische Beiträge **1**: 352-361.

Leroi-Gourhan, A. (Ed.) (1988): Dictionnaire de la Préhistoire. Presses Universitaires de France. Paris.

Leroi-Gourhan, A. & M. Brézillon (1972): Fouilles de Pincevent: Essai d'analyse ethnographique d'un habitat Magdalenien. VII^e supplement à Gallia Préhistoire. Éditions du CNRS. Paris

Levine, M. (1982): The use of crown height measurements and Eruption-wear sequences to age horse teeth. In Wilson, B, Grigson, C., & S. Payne (Eds.) Ageing and Sexing Animal Bones from Archaeological Sites. British Archaeological Reports British Series **109**.

Lister, A.M. (1984): Evolutionary and ecological origins of British deer. Proceedings of the Royal Society of edinburgh **82B**: 205-229.

Lister, A.M. (1991): Late Glacial mammoths in Britain. In. Barton, N., Roberts, & D.A. Roe (Eds.) The Late Glacial in north-west Europe: human adaptation and environmental change at the end of the Pleistocene. CBA Research report **77**: 51-59.

Lohest, M, Hamal-Nandrin, J., Servais, J. & Ch. Fraipont (1922): La Grotte de Martinrive. Revue Anthropologique **32**: 349-355.

Lyman, R.L. (1994): Vertebrate Taphonomy. Cambridge Manuals in Archaeology, Cambridge University Press.

Mangerud, J. Anderson, S.T., Bergland, B.E. & J.J. Donner (1974): Quaternary stratigraphy of Norden, a proposal for terminology and classification Boreas **3**: 26-31.

Marshack, A. (1972): Cognitive aspects of Upper Palaeolithic engraving. Current Anthropology **13** (3-4): 445-461.

Martin, H. (1921): Le Oisement de la Quina. Extracts from la Bulletin de la Société Préhistorique Française. 1906-1921. Paris.

McComb, P. (1989): Upper Palaeolithic Osseous Artifacts from Britain and Belgium. British Archaeological Reports International Series **481**.

Mellars, P.A. (1968): The chronology of Mousterian industries in the Perigord region. Proceedings of the Prehistoric Society **35**: 134-141.

Mellars, P.A. (1973): The character of the Middle-Upper Palaeolithic transition in south-west France. In A.C. Renfrew (Ed.) The explanation of culture change. Duckworth & Co. London.

Moore, R., Stone, J. & H. Tattershall (1983): The meat buyers' guide for caterers. International Thomson Publishing Limited.

Murray, M.S. (n.d.): A Zooarchaeological approach to Arctic Prehistory. Unpublished MS. Dept. of Anthropology. McMaster University. 19p.

Murray, N.A., Bonsall, C., Sutherland, D.G., Lawson, T.J. & A.C. Kitchener (1993): Further radiocarbon determinations on reindeer remains of Middle and Late Devensian age from the Creag Nan Uamh caves, Assynt, NW Scotland. Quaternary Newsletter **70**: 1-10.

Myers, T.P., Voorhies, M.R., & G.R. Corner (1980): Spiral fractures and bone pseudotools at palaeontological sites. American Antiquity **45**(3): 483-490.

Neal, E. (1948): The Badger. New Naturalist Monographs. Collins.

Noe-Nygaard, N. (1975): Two shoulder blades with healed lesions from Star Carr. Proceedings of the Prehistoric Society **41**: 10-16.

Olsen, S.L. (1984): Analytical Approaches to the Manufacture and Use of Bone Artifacts in Prehistory. Ph.D. dissertation submitted to the University of London.

Otte, M. (1984): Paléolithique Supérieur en Belgique. In. Cahen, D. & Haesaerts, P. (Eds.). Peuples Chasseurs de la Belgique Préhistorique dans leur Cadre Naturel. Bruxelles: 157-197.

Otte, M. (Ed.) (1988a) De la Loire à l'Oder: les civilisations du Paléolithique final dans le nord-ouest européen.**444**.

Otte, M. (1988b): Le Paléolithique de Belgique essai de synthèse. L'Anthropologie **87**(3): 291-321.

Otte, M. & S. Cabboi (1988): La Grotte de Chaleux, resultats preliminaires de la fouille 1988. Notae Praehistoricae **8**: 25-37.

Otte, M., Baden-Powell, D., Cabboi, S., Charles, R., Cordy, J-M., Gilot, E., Lejeune, M., Leotard, J-M., Noirel-Schutz, C., Patou-Mathis, M., & W. Schoch (1994): Le Magdalénien du Trou de Chaleux (Hulsonniaux - Belgique Etudes et Recherches Archéologique de l'Université de Liège **60**.

Otte, M. & E. Teheux (1986): Fouilles 1986 à Chaleux. Notae Praehistoricae **6**: 63-77.

Otte, M., Vandermoere, N., Heyse, I. & J-M. Léotard (1984): Maldegem et le Paléolithique récent du nord-ouest Européen. Helinium **24**: 105-126.

Padayya, K. (1971): The late Palaeolithic of the Netherlands - a review. Helinium **11**(3): 257-270.

Pales, L. & M. Garcia (1981a): Atlas Ostéologique des mammifères. II Tête-rachis. Ceintures scapulaire et pelvienne. Herbivores. CNRS.

Pales, L. & M. Garcia (1981b): Atlas ostéologique des mammifères. II. Tête-rachis. Ceintures scapulaire et pelvienne. Carnivores. Homme. CNRS.

Parkin, R.A., Rowley-Conwy, P. & D. Serjeantson (1986): Late Palaeolithic exploitation of horse and Red deer at Gough's Cave, Cheddar Somerset. Proceedings of the University of Bristol Spelaeological Society **17**(3): 311-330.

Partridge, J. (1988): Management Guidelines for Bears and Racoons. The Association of British Wild Animal Keepers.

Patou, M. (1992): Apports de l'archéozoologie à la compréhension du peuplement magdalénien dans le Bassin mosan (Belgique). Le Peuplement Magdalénien: Paléogéograaphie physique et Humaine. Colloque de Chancelade. 309-316.

Patou-Mathis, M. (1994): La grande faune. In. Otte, M., Baden-Powell, D., Cabboi, S., Charles, R., Cordy, J-M., Gilot, E., Lejeune, M., Leotard, J-M., Noirel-Schutz, C., Patou-Mathis, M., & W. Schoch (1994): Le Magdalénien du Trou de Chaleux (Hulsonniaux - Belgique) Etudes et Recherches Archéologique de l'Université de Liège **60**: 172-178.

Pelegrin, J. (1990): Prehistoric Lithic Technology: Some aspects of Research. Archaeological Review from Cambridge **9**(1): 116-125.

Perkins, D. & P. Daly (1968): A hunter's village in neolithic Turkey. Scientific American **219**: 577-580.

Pigeot, N. (1990: Technical and Social Actors: Flintknapping Specialists at Magdalenian Etiolles. Archaeological Review from Cambridge **9**(1): 126-141.

Pike-Tay, A. (1991): Red Deer Hunting in the Upper Paleolithic of South-West France: A Study in Seasonality. British Archaeological Reports International Series **569**.

Poplin, F. (1973): Die Großfauna. In. G. Bosinski & J. Hahn (Eds.) Der Magdalénien-Fundplatz Andernach, Martinsberg. Rheinische Ausgrabungen. Bonn 11: 175-191.

Poplin, F. (1976): Les grands vertébrés de Gönnersdorf. Fouilles 1968. Gonnersdorf Band **2** Wiesbaden.

Poplin, F. (1994): Le faune d'Etiolles: milieu animal, milieu taphonomique, milieu humaine. In. Y. Taborin (Ed.) Environments et habitats magdaléniens dans le centre du Bassin parisien. Documents d'Archéologie Française **43**: 94-104.

Poplin, F. (n.d.): Les restes osseux animaux. In B. Schmider (Ed.) Marsangy. Un campement des derniers chasseurs magdaléniens sur les bords de l'Yonne. Etudes et Recherches Archéologique de l'Université de Liège **55**: 37-44.

Popping, H.J. (1933a): Een an ander over de Palaeolithische Cultuur aan het Riviertje "De Kuinder". De Levende Natuur **37**: 156-165.

Popping, H.J. (1933b): Jong-Palaeolithische Werktuigvormen uit oppervlakte-vondsten. Mensch en Maatschappij **6**: 1-6.

Popping, H.J. (1934): De Jong-Palaeolithische Kuinder Culturen Station Makkinga. Mensch en Maatschappij **6**: 378-400.

Popping, H.J. & W. Beijerinck (1933): Een Palaeolithische Nederzetting aan het Kuinder-dal nabij Oosterwolde (Fr). Tijdschrift van het Koninklijkk Nederlandsch Aardrijkskundig Genootschap: 1-43. Leiden.

Potts, R. & P Shipman (1981): Cutmarks made by stone tools on bone from Olduvai Gorge, Tanzania. Nature **291**: 577-580.

Prior, R. (1968): The Roe Deer of Cranbourne Chase. Oxford University Press. Oxford.

Rahir, E. (1914): Découvertes archéologiques faites a Furfooz. Bulletin et Mémoires de la Société d'Anthropologie de Bruxelles **XXXIII**: XVI-LXV.

Rasquin, L. De (1910): La Caverne Funéraire d'Engis: nouvelles fouilles. Société Belge de Spéléologie et de Préhistoire avec section de vulgarisation scientifique «Les Chercheurs de la Wallonie» **4**: 186- 195.

Renfrew, A.C. (Ed.) (1973): The explanation of culture change. Duckworth & Co. London.

Rose, J.J. (1993): A replication technique for Scanning Electron Microscopy. American Journal of Physical Anthropology **62**: 255-261.

Rust, A. (1943): Die alt- und mittelsteinzeitlichen funde von Stellmoor. Neumünster.

Schlanger, N. (1990): Technique as Human Action: Two perspectives. Archaeological Review from Cambridge **9**(1): 18-26.

Schmerling, P-C. (1833): Recherches sur les ossemens fossiles decouverts dans les cavernes de la province de Liège. P.-J. Collardin. Liège.

Schmider, B. (Ed.) (n.d.): Marsangy. Un campement des derniers chasseurs magdaléniens sur les bords de l'Yonne. Etudes et Recherches Archéologique de l'Université de Liège **55**.

Schreiber, A., Wirth, R., Riffel, M., & H. Van Rompaey (1989): Weasels, Civets, Mongooses, and their relatives. An Action Plan for the Conservation of Mustelids and Viverrids. IUCN/SSC Mustelid and Viverrid Specialist Group.

Schwabedissen, H. (1954): Die Federmesser-Gruppen des nord-westeuropäischen Flachlandes zur Ausbreitung des Spät-Magdalénien. Wachholtz. Neumünster.

Speth, J.D. (1983): Bison Kills and Bone Counts. University of Chicago Press. Chicago & London.

Spiess, A.E. (1979): Reindeer and Caribou Hunters an Archaeological Study. Academic Press. London.

Stiner, M.C. (1991): Food procurement and transport by human and non-human predators. Journal of Archaeological Science **18**: 455-482.

Straus, L.G. (1991): Human Geography of the Late Upper Paleolithic in Western Europe: Present State of the Question. Journal of Anthropological Research **47**(2): 259-278.

Straus, L.G., Otte, M., Cordy, J-M., Leotard, J-M., Noiret, P., Gautier, A., Haesaerts, P. & Ph. Lacroix (1993); Palaeolithic and Mesolithic research in Belgium, 1993: Le Trou Magrite, Hurccorgne and l'Abri du Pape. Old World Archaeology Newsletter **17**(1): 17-24.

Street, M. (1991): Bedburg-Königshoven: a Pre-Boreal Mesolithic site in the Lower Rhineland, Germany. In. Barton, N., Roberts, & D.A. Roe (Eds.) The Late

Glacial in north-west Europe: human adaptation and environmental change at the end of the Pleistocene. CBA Research report **77**: 256-270.

Street, M., Baales, M. & B. Weninger (1994): Absolut Chronologie des späten Paläolithikums und des Frühmesolithikums im Nördlichen Rheinland. Archäologisches Korrespondenzblatt **24**: 1-28.

Stuart, A.J. (1982): Pleistocene vertebrates in the British Isles. Longman. London & New York.

Stutz, A.J. (1993): Settlement Patterns in the Late Glacial Northwestern Europe: the Example from the Lesse Valley Magdalenian. Unpublished BA dissertation, Harvard University.

Sutcliffe, A.J. (1970): Spotted Hyaena: Crusher, gnawer, digester and collector of Bones. Nature **227**: 1110-1113.

Taborin, Y. (1994): Environments et habitats magdaléniens dans le centre du Bassin parisien. Documents d'Archéologie Française **43**. Editions de la maison des sciences de l'Homme. Paris.

Teheux, E & M. Otte (1989): Foyers magdaléniens à Chaleux (Belgique). (Actes du Colloque de Nemours 1987). Memoires du Musée de Préhistoire d'ile de France **2**: 189-196.

Tixier, J. (1988): Technologie Préhistorique: 97-111.

Toussaint, M. & G. Toussaint (1983): Le Paléolithique supérieur final de la caverne du Bois de la Saute (Province de Namur, Belgique). Bulletin de la Société Préhistorique Française **80**(3): 88-93.

Trolle-Lassen, T. (1987): Human exploitation of fur animals in Mesolithic Denmark - a case study. Archaeozoologia **1**(2): 85-102.

Turner, E. (1991): Pleistocene Stratigraphy and Vertebrate Faunas from the Neuwied Basin region of Western Germany. Cranium **8**(1): 21-34.

Twisselmann, F. (1951): Les représentations de l'homme et des animaux Quaternaires découvertes en Belgique. Memoirs de la Institut Royale des Sciences Naturelles de Belgique 113.

Twiesselmann (1975): Description de trois gravures d'age magdalenien provenant du Trou des Nutons et du Trou de Chaleux (vallée de la Lesse, Province de Namur). Bulletin de la Société Royale Belge d'Anthropologie et Préhistoire. **86**: 151-161.

Van Beneden, P.J. (1864a): Sur les fouilles faites dans le Trou des Nutons, près de Furfooz. Bulletin de l'Academie Royale des Sciences, Lettres et des Beaux-Arts de Belgique 2^e Series **XVIII**: 30-32.

Van Beneden, P.J. (1864b): Sur les fouilles faites dans le Trou des Nutons près de Furfooz. Bulletin de l'Academie Royale des Sciences, Lettres et des Beaux-Arts de Belgique 2^e Series **XVIII**: 228.

Van Beneden, P.J. & É. Dupont (1864): Sur les fouilles au Trou des Nutons, près de Furfooz. Bulletin de l'Academie Royale des Sciences, Lettres et des Beaux-Arts de Belgique 2^e Series **XVIII**: 387-389.

Van de Poel, B. (1978): La Région de Furfooz dans l'Espace et dans le Temps (Géologie, Géomorphologie et Préhistoire). Ardenne et Gaume Monograph N° 3.

Van Gelder, R.G. (1977): Mammalian hybrids and generic limits. American Museum Novitates **2635**: 1-25.

Van Noten, F. (1966): Meer: een Tjongervindplaats. Archéologie 1966. **2**: 78-79.

Van Noten, F. (1967): Een Tjongervindplaats te Meer. Archaeologica Belgica **98**: 5-25.

Van Noten, F. (1968a): Meer: Tjongervindplaats. Archéologie 1968 **2**: 82-83.

Van Noten, F. (1968b): Quelques outils Tjongeriens remarquables. Helinium **VIII**: 149-153.

Van Noten, F. (1969): De opgravingen 1969 op de Tjongervindplaats te Meer. Archéologie 1969 **2**: 74-75.

Van Noten, F. (1975): Meer II: Vedere opgravingen op de Tjongervindplaats. Archaeologica Belgica **172**: 5-37.

Van Noten, F. (1978): Les Chasseurs de Meer Dissertations Archaeologicae Gandenses XVIII. 2 Vols.

Van Noten, F. (1988): Meer II ou Les foyers qui s'éteignent doucement. In M. Otte (Ed.) De la Loire à l'Oder: les civilisations du Paléolithique final dans le nord-ouest européen. British Archaeological Reports International Series **444**(1): 235-242.

Van Noten, F & M. Otte (1981): Meer IV: Opgravingen 1980. Notae Praehistoricae **1**: 38-44.

Van Noten, F., Gysels, J., Nijs, K. & C. Vreysen (1985): De Tjongervindplaats Meer IV. Notae Praehistoricae **5**: 4-28.

Verheyleweghen, J. & F. Gullentops (1956): Le paléolithique final de culture périgordienne du gisement préhistorique de Lommel (Province de Limbourg - Belgique). Bulletin de la Société Royale Belge d'Anthropologie et Préhistoire **67**: 179-252.

Vermeersch, P.M. (1974): Epipaleolithicum en mesolithicum te Helchteren, Sonnisse Heide. Archaeologica Belgica **169**: 5-24.

Vermeersch, P.M. (1976): Un site Tjongerien à Harelbeke, Gavermeersen. Westvlaamse Archaeologica **4**: 33-71.

Vermeersch, P.M. (1979): Epipaleolithicum te Achel, De Waag. Overdruk uit Limburg **LVIII**(3): 117-129.

Vermeersch, P.M. & J. Carolus (1975): L'epipaleolithique de Zolder, Terlamen (Limbourg belge). Bulletin de la Société Royale Belge de Anthropologie et Préhistoire **86**: 163-175.

Villa, P., Courtin, J., Helmer, D., Shipman, P., Bouville, C., & E. Mahieu (1986): Un cas de cannibalisme au Néolithique. Boucherie et rejet de restes humaines et animaux dans la grotte de Fontbregoua à Salernes (Var). Gallia Préhistoire **294**: 143-71.

Walker, M.J. & M. San Nicolás Del Toro (in press): Disposal of the dead and dispersal of the living in pre-argaric S.E. Spain. Abrigo 2 de el Milano and a revision of the dynamics of culture change: "Little Big Men" and no growth in populations ? In. W.H. Waldren (Ed.) in prep.

Webb, R.E. (Ed.) (1988) Recent Developments in Environmental Analysis in Old and New World Archaeology. British Archaeological Reports. International Series **416**.

Webb, S. (1994): A Study of *Equus* represented by fossils from the Fossil-bearing Cave Sites in the Plymouth Area. MSc dissertation in Archaeology & Palaeoeconomy. University of Sheffield.

White, T. (1952): Observations on the Butchering Technique of some Aboriginal Peoples: no 1. American Antiquity **17**(4): 337-338.

White, T. (1953): Observations on the Butchering Technique of some Aboriginal Peoples: no 2. American Antiquity **19**(2): 160-164.

White, T. (1954): Observations on the Butchering Technique of some Aboriginal Peoples: nos 3, 4, 5 & 6. American Antiquity **19**(3): 254-264.

White, T. (1955): Observations on the Butchering Technique of some Aboriginal Peoples: nos 7, 8 & 9. American Antiquity **21**(2): 254-264.

Wiessner, P. (1983): Style and social information in Kalahari !San projectile points. American Antiquity **48**: 253-276.

Wiessner, P. (1984): Reconsidering the behavioural basis for style. Journal of Anthropological Archaeology **3**: 190-234.

Wiessner, P. (1990): Is there a unity to style ? In M.W. Conkey & C. Hastorf (Eds.): The uses of style in archaeology Cambridge University Press. Cambridge: 105-112.

Wilkinson, P.F. (1975): The relevance of musk ox exploitation to the study of prehistoric animal economies. In E.S. Higgs (Ed.) Palaeoeconomy. Cambridge University Press. Cambridge.

Wintle, A.G. (1991): Luminescence dating. In P.L. Smart & P.D. Frances (Eds.) Quaternary dating methods - a user's guide. Quaternary Research Association Technical Guide No. 4.

Wobst, M. (1977): Stylistic behaviour and information exchange. University of Michigan Museum of Archaeology Papers **61**: 217-242.

Tailpiece ~ A pen & ink sketch of the Grotte de Sy Verlaine by Moreels. MRAH archive