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THE FAUNAL REMAINS OF TROU MAGRITE (Namur Province, Belgium)

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1. INTRODUCTION

The faunal material analyzed in this paper was collected during recent excavations (1991-1992) in the archeological deposits at the front of Trou Magrite. Trou Magrite is a large cave opening out onto a broad terrace and steep talus, half way up the SSW-facing limestone cliff-side of the Lesse River valley. It lies about 25 m above the valley floor at a point 3.5 km from the Lesse confluence with the Meuse, just upstream of Dinant. The deeply entrenched Lesse valley is a major avenue of communication between the Ardenne plateau and the Sambre-Meuse valley system and northern natural regions at lower altitude. The Lesse valley contains several important cave sites in NW-Europe, many of which, including Trou Magrite, were first archeologically excavated by Edouard Dupont (OTTE 1979; DEWEZ 1987). Preliminary results of the faunal analysis given in two previous papers dealing with the recent excavations (STRAUS *et al.*, 1992, 1993) are incomplete and contain minor errors. For detailed descriptions of the site and its archeology the reader is referred to the other contributions in this volume.

The faunal remains have been grouped according to the stratigraphical units recognized by the excavators and a short description of those yielding faunal remains follow.

Stratum 1 : Top soil and backdirt from previous excavations.

Stratum 1.1 : A pit filled with fine dark grey silt, containing some possibly Mesolithic artefacts, a Neolithic arrowhead and a few pot sherds of possibly Iron Age date.

Stratum 2 : Compact fine cryoclastic gravel, partly cemented by calcium carbonate; many bone remains and artefacts assignable to the late Aurignacian.

Stratum 3 : Cryoclastic gravel and larger blocks, in part cemented by calcium carbonate; a substantial amount of bone remains and an artefact assemblage assignable to the Aurignacian with leaf points.

Stratum 4 : Redeposited, colluvial, reddish-brown, clayey silt/loess with limestone blocks of which the upper part is calcified; few bones and artefacts, mostly perhaps attributable to the Middle Paleolithic. A depositional hiatus separates this deposit from the underlying one.

Stratum 5 : Redeposited loess, with water worn pebbles; the bone assemblage includes a substantial number of micromammal remains; a small artefact assemblage can be assigned to the Mousterian.

Stratum 6 consists of waterlaid sands, gravels and clays which are archeologically and paleontologically sterile.

2. THE FAUNAL COLLECTIONS

The qualitative and quantitative composition of the fauna is given in Table 7.1. Table 7.4 gives an inventory of the skeletal parts of the most frequently found animals. As can be seen in Table 7.1, the identification rate (ratio identified remains/total number of remains) in the Pleistocene strata is extremely low. Collection was done by handpicking *in situ* or sieving in a screen with mesh size 2.5-3 mm, and most remains consist of small fragments and splinters, as the bones have been subject to marked fragmentation and collagen destruction. A total of 12,519 osseous remains were found (not including the small rodents), but only 486 were identifiable. Among the identified remains, those of teeth and other dense skeletal elements predominate, and few remains have maximum lengths exceeding 6 cm. A few clusters of teeth demonstrate differential destruction of maxillar or mandibular bones leaving behind but the teeth they originally held. In the strata 1 and 1.1, the identification rate is much higher, as a result of reworking, the addition of Holocene remains and perhaps less complete sampling. The collection will be deposited in the reserves of the Service de Préhistoire in the University of Liège.

The first column in Table 7.1 is based on the faunal data provided by DUPONT (1867; 1871, list in text and table in the back of the book) and by RUTOT (1910). Unfortunately DUPONT does not give separate lists for the four fossiliferous horizons he distinguishes, but he mentions that horse and especially reindeer are more frequent in the upper horizons than in the lower ones. Also his three lists show differences in composition of the fauna. The list by RUTOT again differs somewhat from previous ones, perhaps because of a reanalysis by DUPONT of the collections (*ibid.* : 16, infrapaginal note). In the first column of Table 1, some finds have been added, resulting from two small test excavations in 1992 of the back of the cave, in deposits which appear to be backdirt of the older excavations. The faunal finds include : bear, hare, woolly rhinoceros, horse, ibex and a large cervid (either giant deer or moose). The RUTOT list includes a quite unexpected animal, hippopotamus, represented by an incisor fragment. Surprisingly one of the test pits yielded a tusk fragment also attributable to hippopotamus. In Belgium, fossils of this southern mammal have been recorded from fluvial deposits of the Last Interglacial but precise data are lacking. RUTOT (*ibid.*) suggests that people picked up a fossil hippo tusk and brought it to the cave.

3. IDENTIFICATION AND SYSTEMATICS

The identifications of the vertebrates found in 1991-92 were made with the aid of our comparative collection and various books and papers dealing with the diagnostic characters of Quaternary mammals (see references). As to the

Table 7.1 : Absolute frequencies (specimen counts) of animal remains in Trou Magrite

Animal	Assemblage	(a)	1	1.1	2	3	4	5	Total
Landsnails									
<i>Pomatias elegans</i>		?	1	-	4	1	-	-	6
<i>Clausilia dubia</i>		?	-	-	1?	-	-	-	1?
<i>Discus rotundatus</i>		?	-	1	14	-	-	-	15
<i>Oxychilus cellarium</i>		?	1	-	3	-	-	-	4
<i>Fruticicola fruticum</i>		?	1	-	-	-	-	-	1
<i>Monacha cantina</i>		?	-	-	-	-	1	-	1
<i>Zenobiella incarnata</i>		?	-	-	1	-	-	-	1
<i>Helicodonta obvolvata</i>		?	-	1	-	-	-	-	1
<i>Helicogona lapicida</i>		?	1	-	2	-	-	-	3
<i>Helix pomatia</i>		?	1	-	-	-	-	-	1
Fish		+	-	-	-	-	-	1	1
Amphibians		-	-	3	2	-	-	-	5
Birds									
Wild duck (? <i>Anas platyrhynchos</i>)		+	-	-	-	-	-	-	-
Ptarmigan (<i>Lagopus mutus</i>)		+	-	-	-	-	-	-	-
Black grouse (<i>Lyrurus tetrix</i>)		+	-	-	-	-	-	-	-
Capercaillie (<i>Tetrus urogallus</i>)		+	1	-	-	-	-	-	1
Partridge (<i>Perdix perdix</i>)		-	-	1	-	2	-	-	3
Jackdaw (<i>Corvus monedula</i>)		-	1	-	-	-	-	-	1
Not identified		+	3	-	1	-	-	1	5
Insectivores									
Mole (<i>Talpa europaea</i>)		-	-	1	-	-	-	-	1
Hedgehog (<i>Erinaceus europaeus</i>)		+	-	-	-	-	-	-	-
Lagomorphs									
Snowhare (<i>Lepus timidus</i>)		+	-	-	-	-	-	1?	1?
Common hare (<i>L. Capensis</i>)		-	1	-	-	-	-	-	1
Hare (<i>L. timidus/L. capensis</i>)		-	3	-	1	1	-	32	37
Pika (<i>Ochotona pusilla</i>)		-	-	-	-	-	1	2	3
Rabbit (<i>Oryctolagus cuniculus</i>)		-	10	-	-	-	-	-	10
Rodents									
Marmot (<i>Marmotta marmotta</i> ?)		+	-	1	-	1	-	-	2
Squirrel (<i>Sciurus vulgaris</i>)		-	1	-	1	-	1	-	3
Common hamster (<i>Cricetus cricetus</i>)		+	-	-	-	-	-	-	-
Beaver (<i>Castor fiber</i>)		+	-	-	-	-	-	-	-
Small rodents (<i>Rodentia</i> spp.) (b)		+	RR	RR	RR	RR	-	FF	FF
Carnivores									
Arctic fox (<i>Alopex lagopus</i>)		+	-	-	2	-	-	1	3
Common fox (<i>Vulpes vulpes</i>)		+	-	-	1	2	2	-	5
Fox (<i>A. lagopus/V. vulpes</i>)		-	1	-	4	2	1	1	9
Wolf (<i>Canis lupus</i>)		+	1?	2	3	-	-	-	6
Wild cat (<i>Felis silvestris</i>)		+	2	-	-	-	-	-	2
Lynx (<i>Lynx lynx</i>)		+	-	-	-	-	-	-	-
Cave lion (<i>Felis leo spelaea</i>)		+	-	-	-	-	-	-	-
Weasel (<i>Mustela nivalis</i>)		+	-	-	-	-	-	15(c)	15
Stoat (<i>M. erminea</i>)		+	-	-	-	-	-	-	-
polecat (<i>M. putorius</i>)		+	-	-	-	-	-	-	-
Beach marten (<i>Martes foina</i>)		+	-	-	-	-	-	-	-
Badger (<i>Meles meles</i>)		+	3	1	4	1?	3	-	12
Cave bear (<i>Ursus spelaeus</i>)		+	1?	-	7?	-	-	5	13
Brown bear (<i>U. arctos</i>)		+	-	-	-	-	-	-	-
Cave hyena (<i>Crocota crocuta spelaea</i>)		+	4	1?	-	-	-	-	5
Proboscideans									
Mammoth (<i>Elephas primigenius</i>)		+	-	-	3	1	1	-	5
Perissodactyls									
Woolly rhinoceros (<i>Coelodonta antiquitatis</i>)		+	3	-	7	1	1	5	17
Horse (<i>Equus cf. germanicus</i>)		+	13	1?	39	17	1	5	76
Artiodactyls									
Hippopotamus (<i>Hippopotamus</i> sp.)		+	-	-	-	-	-	-	-
Wild boar (<i>Sus scrofa</i>)		+	5?	-	8	2(d)	-	-	15
Roe deer (<i>Capreolus capreolus</i>)		+	-	-	-	-	-	-	-
Reindeer (<i>Rangifer tarandus</i>)		+	11	-	91	36	3	5	146
Red deer (<i>Cervus elaphus</i>)		+	1?	-	-	-	-	-	1?
Giant deer/moose (<i>Megaceros giganteus/Alces alces</i>)		+	-	-	-	-	-	-	-
Chamois (<i>Rupicapra rupicapra</i>)		+	-	-	-	1	1	-	2
Ibex (<i>Capra ibex</i>)		+	12	2	31	10	2	1	58
Steppe wisent/wild cattle (<i>Bison priscus/B. primigenius</i>)		+	-	-	1	1	-	-	2
Domestic animals									
Cat (<i>Felis silvestris f. catus</i>)		+	1	-	-	-	-	-	1
Dog (<i>Canis lupus f. familiaris</i>)		+	-	-	-	-	-	-	-
Pig (<i>Sus scrofa f. domestica</i>)		-	1	4?	-	-	-	-	5
Sheep/goat (<i>Ovis ammon f. aries/Capra aegagrus f. hircus</i>)		+	2	10	-	-	-	-	12
Cattle (<i>Bos primigenius f. taurus</i>)		+	2	-	-	-	-	-	2
Total identified bones (e)			83	27	206	78	17	75	486
not identified bones			120	6627	2768	265	2253		12033
Total bones (e)			203	6833	2846	282	2328		12519

(a) finds known from the older excavations (DUPONT 1867, 1871; RUTOT 1910) and a few finds of unknown original provenance collected during the recent excavation (see text); (b) see CORDY (this volume); (c) corresponding to a few individuals; (d) co-articulating; (e) not including the small rodents.

terrestrial mollusks, they were labeled with the aid of our comparative collections of recent Belgian snails and ADAM (1960), but Dr. J. DE CONINCK (Ghent) verified and completed some of our identifications. A few comments on the vertebrates follow.

The vertebrate fauna contains fish, amphibians and birds, but most of the osseous remains are derived from mammals. Fish is represented by one small vertebra in layer 5; no doubt it pertains to a freshwater species. Some long bones represent amphibians, frogs or toads, but the material is too fragmentary and not distinctive enough for further identification. The bird remains also are rather fragmentary and were not identifiable with the comparative material at my disposal, except for a humerus of jackdaw (*Corvus monedula*) in stratum 1. The identifications were completed by Mr. Johan Deville during his stay as an Erasmus student in the archeozoological laboratory of the Universidad Autonoma de Madrid (Prof. A. Morales), where an extensive comparative collection of birds is available.

Most of the larger lagomorph remains could not be identified to species, but one lower incisor from stratum 5 has a rather squarish cross section and may represent a snow hare (*Lepus timidus*). In layer 1, one bone of hare, which show the same preservation as those of the rabbit, represents of necessity the common hare (*L. capensis*). The marmot is very probably the so-called alpine marmot, most commonly found in the Pleistocene of Western Europe, but two incisor fragments and one jugal tooth are the only elements representing this large rodent; the color of the incisor fragments is orange, as is usual in the alpine marmot. As to the squirrel, a mandible with jugal teeth (stratum 4) and two fragments of a right humerus in stratum 1 and 2, probably derived of the same bone, testify to the presence of this arboreal rodent not frequently found as a fossil. The remains of smaller rodents include maxillae, mandibles, loose teeth as well as postcranial bones; the cranial elements found are dealt with in a separate paper (CORDY, this volume). Some remains of fox were separated into Arctic fox (*Alopex lagopus*) and common fox (*Vulpes vulpes*) on the basis of their difference in size, but most could not be attributed. The ursid remains consist mainly of tooth fragments and represent most likely the bear very frequently encountered in European Upper Pleistocene cave faunas, *Ursus spelaeus* (the cave bear).

As is well known, the scholars dealing with the Pleistocene equids of Eurasia have different views on the history and systematics of this difficult group (see for example FORSTEN 1988, AZZAROLI 1990, EISENMANN 1990). The material from Trou Magrite consists mainly of fragmented teeth and a few postcranial fragments (see Table 7.4), no doubt representing a true horse of medium size. In strata 4 and 5, some sturdy splint bones could be derived from individuals measuring about 150 cm at the withers. A navicular from stratum 3 with a transverse diameter of 60 mm is also derived from a large animal. An upper M1/2 found in stratum 5 has an occlusal length, taken following EISENMANN and collaborators (1988), of about 28.2 mm; in stratum 2 a comparable jugal tooth measures 26.0 mm. These few vague osteometric data point to a horse which can be labeled *Equus cf. germanicus* following EISENMANN (1990). According to this specialist, *E. germanicus* is the typical

European horse from about 100.000 to 15.000 B.P. CORDY (1976) identified *E. caballus* cf. *gallicus* in the Aurignacian fauna of the Trou du Renard at Furfooz. This would be a somewhat smaller and later form than typical *E. germanicus*, but EISENMANN (*ibid.*) includes *E. gallicus* in *E. germanicus*. There is evidence that the *germanicus*-horses not only underwent size decrease through the course of time, but also that geographical size gradients existed, which still have to be unraveled (GAUTIER in preparation).

The cervid remains appear all referable to reindeer (*Rangifer tarandus*) but among the caprid remains two lower molars show clearly the diagnostic features of chamois (*Rupicapra rupicapra*). Some other poorly preserved remains attributed to ibex (*Capra ibex*) could also represent the same ruminant. Recently CREGUT-BONNOURE (1992a, b) has described different dental morphotypes of Upper Pleistocene ibexes from southern France, which she arranges in two lineages related to *C. ibex* and *C. pyrenaica* considered as separate species. A upper third molar from stratum 2 in Trou Magrite has a marked metastylar wing and the distal interstylar surface is distinctly broader than the mesial one, as in the *ibex* lineage established by CREGUT-BONNOURE. The larger bovid remains consist of two large teeth. On paleosynecological grounds and size, I would refer them to steppe wisent (*Bison priscus*): wild cattle prefers lush grazing and is therefore an interstadial and interglacial ruminant. The domestic fauna was recognizable on the basis of small size, lesser bone density and different preservation, but the definite attribution of some of the caprid and suid remains in strata 1 and 1.1 was difficult. Possibly too many caprid and suid remains from these strata have been accorded wild status, where in fact they represent domestic pig and goat.

Since the collection consists of much fragmented material, the search for *post mortem*-modifications due to living agents did not provide reliable results. No clear evidence of butchering marks, gnawing by rodents or the activity of hyena (gnawing, crushing, etching by gastric acid, etc.) occurs; hyena coprolites were also not present. However, some remains show breakage patterns one associated normally with bone smashing for marrow extraction. As a whole, the collection has little potential for the elaborate and detailed analyses archeozoologists sometimes subject their study material. The following evaluation is of necessity based on simple comparisons in the light of our general knowledge of Paleolithic cave faunas and the analyst's personal experience with various faunal contexts.

4. TAPHONOMY

The faunal assemblages found belong to the typical, polygenetic occurrences known from many caves and illustrated by SUTCLIFFE (1970). Such assemblages can generally not be divided exhaustively in the various taphonomic groups, *i.e.* groups of remains with comparable death-to-burial-history one normally finds in archeological sites (GAUTIER 1987). These generally include consumption refuse, workshop refuse and reworked, penecontemporaneous and late intrusives; the latter categories refer to those

remains which are not the intentional result of human behaviour or were brought to a site by agents other than man. In the case of Trou Magrite, the attributions to the various taphonomic groups is hampered by the small size and low number of the remains.

The assemblages of strata 4 and 5 are very limited, so we will concentrate on the Aurignacian strata, which do moreover present evidence of quite intensive human occupation. As to the mixed upper strata (1 and 1.1), the contents are very comparable with those of the immediately underlying ones, as shown by the predominance of horse, reindeer and ibex. In the cave, remnants of strata have been recorded attributable to the Gravettian and the Magdalenian (DEWEZ 1987). The Pleistocene faunal contents of strata 1 and 1.1 may therefore represent a mixture of Aurignacian and later Upper Paleolithic phases. To the reworked Pleistocene material, Holocene elements of various age have been added either as a direct result of human activity or by other means. These include livestock remains and others of wild animals, the preservation of which indicates recent age, such as those of jackdaw (*Corvus monedula*) and common hare (*Lepus capensis*); these species can still be seen in the region. A datable very late addition is the rabbit, which reached Belgium probably in Medieval times only; the domestic cat is likely also a quite recent addition (GAUTIER 1990).

Since few remains of larger carnivores, especially the cave hyena, and no clear traces of carnivore activity occur, I am confident that most of the herbivore game, especially in strata 2 and 3, represents consumption refuse left by people. The penecontemporaneous intrusives include no doubt most of the landsnails, the single fish find from stratum 5, the frogs or toads, and the micromammals. In stratum 5, the latter occur in a kind of lense, no doubt derived from regurgitation pellets produced by an owl or owls roosting at the cave entrance. In the same layer, we note a high number of hare remains, and perhaps these animals also arrived in the cave through the action of a larger raptorial bird such as the eagle owl (*Bubo bubo*) (ANDREWS 1990:189). Birds and larger rodents may have been killed and collected by people, but could also have reached the cave by their own means or as prey of various non-human predators. Paleolithic humans did sometimes include marmot on their menu and PATOU (1987) has provided means, based on the frequency of age categories, skeletal elements etc., to establish whether the marmot remains in a site represent individuals that lived on the site, prey of non-human predators or small game of people. Unfortunately, the few marmot remains from Trou Magrite, already inventoried in a previous paragraph, do not allow the application of the proposed taphonomic analysis.

Cave bear and cave hyena used caves very regularly; therefore, it is likely that their remains are penecontemporaneous intrusives. Various other carnivores may have visited or lived on the site for various reasons, but some may have been killed, especially for the particular raw materials they could provide. In stratum 4, the excavators found badger remains in what was left of a burrow obviously made by the animal, proving that this individual lived on the site. Badgers may occupy a same burrow for many generations and thus contribute appreciably to the disturbance and bioturbation of archeological deposits (GAUTIER 1987). In the Trou Magrite, they may be responsible for the odd distribution of the squirrel remains. This arboreal rodent is not frequently

found in archeological sites; apparently it avoids well the predators that could introduce its remains into such contexts. Moreover the prevalence of open (not wooded) biotopes during glacial times restricted the number of potential squirrel fossils (CHALINE 1972). In our site, the Interpleniglacial stratum 4 yielded a mandible of the species; a humerus fragment comes from stratum 2 and combines probably with another humerus fragment in the reworked stratum 1. Most likely, the few squirrel remains come originally from stratum 4.

Table 7.2 : Simplified table of possible and actual game brought to the cave by people(a).

Game Animal	Assemblage	R(b)	2	3	4	5
bird(s)		5/?	1/1	2/1	-	1/1
hare		3/1	1/1	1/1	1/1	33/4
marmot		1/1	-	1/1	-	-
fox		1	7	4	3	1
wolf		3/1	3/1	-	-	-
wild cat		2/1	-	-	-	-
woolly rhinoceros(?)		3/1	7/1	1/1	-	5/1
horse		14/1	39/2	17/1	1/1	5/1
mammoth(?)		-	3/1	1/1	-	-
wild boar		5?/1?	8/2	2/1	-	-
reindeer		11/1	91/7	36/1	3/1	5/1
red deer		1?/1?	-	-	-	-
chamois		-	-	1/1	1/1	-
ibex		14/1	31/1	10/1	2/1	1/1
large bovid (probably steppe wisent)		-	1	1	-	-

a : the first number gives the specimen count, the second the minimum number of individuals (see text); b : R = reworked material, stratum 1 and 1.1.

Table 7.2 summarizes in a simplified form the assemblages which I think could have been caused by the direct activity of people. Other animals listed in the first column of Table 7.1, but not found in the new excavations, should probably be added, such as beaver or roe deer. The beaver is a eurythermic aquatic species which may have built its dams across the Lesse; roe deer may have

shared localized wooded areas with wild boar.

For those interested, minimum numbers of (hunted) individuals (MNI) have been added in Table 7.2. These are derived from all the material that could be combined into individual skeletons, based on size and age. This technique, only applicable for small samples, gives higher MNI-estimates than the pairing techniques generally used, but as known, in the majority of cases MNI's represent but a very small fraction of the real numbers of animal carcasses or parts brought to a site (GAUTIER 1984). In our case, very low MNI's were obtained, because of the restricted and very fragmentary nature of the samples. Reindeer in strata 2 and 3 are represented by some 7 and 13 individuals, while horses, which are the second most important group according to the specimen counts, have been reduced to a few individuals. The marked fragmentation which turns the teeth and bones of larger animals more often into poorly characterized fragments seems to be the main cause of the discrepancy. In what follows, I will discuss only specimen counts.

5. PALEOECOLOGY

The landsnails are concentrated in stratum 2 and the overlying reworked deposits. Stratum 3 shows clear evidence of marked cryoclastic activity with large block having fallen down from the cave ceiling. This change in topography of the cave probably allowed plants and landsnails to colonize the excavated locus. The arrival of frogs or toads on the locus may be explainable in a comparable way. The assemblage of mollusks of stratum 2 contains several species also found in the layers with mixed Aurignacian and post-Paleolithic artefacts excavated on the terrace of the Grotte de la "Princesse" (DE CONINCK 1981). All the molluscan species found in stratum 2 occur today in Belgium, but have a wide distribution in Europe (ADAM 1960) and the warm microclimate of calcareous substrata no doubt permits many, if not all, to live in quite cold conditions (HUBENDICK 1948). The few finds of the lower strata add nothing to the foregoing. In the reworked strata, we note the presence of *Helicodonta obvoluta* and *Helix pomatia*, which have a more southern distribution than the other species encountered; these snails may represent the minimal post-Paleolithic component of the snail assemblages in the reworked strata.

Some climatic parameters for the Aurignacian strata can be estimated on the basis of data for recent species such as marmot, wild boar, reindeer, chamois and ibex, summarized by HOKR (1951) and BONIFAY (1982). The average January temperature would have been between -10 and -20°C, while the July average could have been as high as around 16°C, if we assume that reindeer lived permanently in the region. CORDY (1976) arrived at the same estimates for the Aurignacian level of Trou du Renard at Furfooz, which produced a comparable faunal assemblage, with the addition of saiga antelope (*Saiga tatarica*). The annual precipitation would have been between 300 and 500 mm. Except for the reindeer, all the mammals cited avoid regions with permafrost (HOKR *ibid.*). Moreover, the mobility of wild boar, chamois and ibex is impeded by a thick snow cover; in the case of ibex, its thickness should not exceed 40 cm

(WENIGER 1982). If reindeer were not permanently present and came in winter in from the north or from the south in summer, the summers and winters respectively may have been warmer than estimated, because reindeer in general prefers lower temperatures than the other species. As to horses, the Mongolian horses (*Equus przewalskii*) surviving in the wild, tolerate extreme conditions, with very high summer and very low winter temperatures differing as much as 75°C. The precipitation in their arid homeland does not exceed 100 mm; moreover nine tenths of it occurs in summer (MOHR & VOLF 1984). The former range of these horses and their extinct European relatives as well as the distribution of feral horses, indicate that horses lived and live generally well in less extreme conditions, but great speed and stamina make horses very mobile herd animals (WENIGER 1982); this mobility and capacity for long distance migrations increase no doubt their ecological tolerance.

Marmots prefer open, preferably rather flat, terrain providing possibilities to establish the burrows for their colonies. Fossil marmots are very often found in cave faunas, among others because they may build their intricate burrows in cave deposits (ABEL 1935:407-415). All Belgian finds come from caves, with the exception of a recent find at the Upper Paleolithic site of Huccorgne, where a more or less complete skeleton was collected apparently from a burrow in loess deposits (GAUTIER unpublished data). The wild ruminants of Trou Magrite also prefer biotopes with restricted tree cover and their diet includes grasses, herbs, shrubs and, in the case of reindeer, even lichens. The latter lives preferentially in very open biotopes, while present day ibex and chamois prefer rocky, accidented terrain. Horses are typical grazers, but may include some herbs and shrubs in their diet; they seem to prefer flat to gently hilly terrain. Unlike ruminants, horses have a monasacculated stomach, allowing for rapid digestion of low quality food, but requiring regular intake. As a result, horse can inhabit areas with poor vegetation, but must maintain low population densities (OLSEN 1989:317) and are, as already said, probably rather mobile. The wild boar is a typical omnivore, including in its diet nuts, fruits, herbs, bulbs and other subterranean plant parts, small mammals etc. It prefers to live in deciduous forests with shrub in the vicinity of lakes, marshes and grassland. However, it adapts to very dry conditions, in which case the animals may show evidence of dwarfing (FAURE & GUÉRIN 1983). The suid remains of Trou Magrite are of normal size. As to the two birds identified, partridge is an indicator of open biotopes, while capercaillie would prefer slopes wooded with conifers; both species still occur in many regions of Europe, including Scandinavia (PETERSON *et al.* 1962).

Our knowledge of the ecological requirements of the extinct components of the assemblages is less direct. KUBIAK (1982) summarized the morphological characters of the mammoth and their inferred significance for the adaptation of this specialized proboscidean to cold and open biotopes, with a diet including grasses, sedges, mosses, the twigs of willows and other trees, perhaps even pine. Various features of the woolly rhinoceros indicate a comparable specialisation and essentially grazing habits (KURTÉN 1968). The steppe bison can be compared with the modern European and American bisons, but its large size made it probably more tolerant of colder climates. The present European bisons form a relict group adapted to forest and some American bison live in the boreal forest.

The large size of the steppe bison points to its probable preference for open grazing grounds; it may also have led to and permitted more extensive migrations.

On the basis on the foregoing observations, we can sketch the region around Trou Magrite during the Aurignacian as a steppic environment without permafrost and with restricted snowcover in winter. Wooded areas existed in valleys such as that of the Lesse and perhaps in other special azonal situations. In this landscape, animal species met and lived which today have more northerly, more continental or high altitude ranges, together with some temperate taxa. This fits in the recently developed concept of the mammoth steppe (see for example GUTHRIE, 1984), the open and cold landscape that stretched over large parts of northern unglaciated Eurasia and Alaska during the Last Glacial and in which plant and animal species now living in separate biotic zones cohabited and for which no modern analog exists. Within this mammoth steppe, temporal, regional and local factors created conditions of diversity and mosaic partitioning. Many more data are necessary if we want to reconstruct precise vegetational history in the deeply entrenched valleys of the region around Trou Magrite.

6. HUNTING AROUND TROU MAGRITE

The faunal spectra and their taphonomic evaluation suggest that the Aurignacians of Trou Magrite hunted mainly reindeer, horse and ibex. The quantitative data on these animals are repeated in Table 7.3. This table indicates that the game bags of strata 2 and 3 are basically the same, suggesting the persistence of comparable local faunas and human habits of game procurement during the Aurignacian occupations of the cave. In earlier periods, these same animals may have been on the menu of Neandertal.

Table 7.3 : Major game animals in Trou Magrite (NISP).

	R(a)		2		3		4	5
	n	%	n	%	n	%	n	n
reindeer	11	28.2	91	56.5	36	57.1	3	5
horse	14	35.9	39	24.2	17	27.0	1	5
ibex	14	35.9	31	19.3	10	15.9	2	1
total	39	-	161	-	63	-	6	11

(a) R = reworked, strata 1 and 1.1.

According to the data available in the literature (for example WENIGER 1982), reindeer live in herds of 10 to 50 animals, but larger mixed herds have been counted. During their annual migrations, herds of more than 1,000 heads may form. Horses live in small herds of 5-20 heads, but do not concentrate in larger aggregates during their annual migrations. Most likely both animals were attacked when they passed through the Lesse valley, perhaps during their yearly migrations in spring or fall or while sheltering in the valley in winter. Ibex is the third important game animal, no doubt living on the rocky valley slopes and the plateau. This herbivore forms normally herds of some 3 to 40 animals, with restricted mobility. In winter the animals descend to lower altitudes, but distances between winter and summer grounds do not exceed 30 km.

The Aurignacians no doubt had access to other game (see Table 7.2), but these animals were probably hunted only on an opportunistic basis : game birds, hare, marmot, several carnivores, wild boar, probably steppe wisent and others not recorded in the faunal samples studied here but known from the older excavations within the cave (beaver, roe deer, giant deer or moose etc.). In Table 7.2, mammoth and rhinoceros are also listed as possible game. GUÉRIN and FAURE (1983) have argued convincingly that the means Paleolithic men had at their disposal were far from sufficient to deal with adult rhinoceroses in good health. Therefore, only defenseless individuals, either juveniles, wounded, diseased or moribund adults, would have been attacked; moreover scavenging of carcasses may have occurred. The evidence for hunting mammoth and related heavy-weights has been reviewed recently by HAYNES (1991), with the conclusion that the available data are at best tenuous. Again the opportunistic dispatching of handicapped animals and scavenging can explain most of the remains of mammoth among the consumption refuse of our distant ancestors. In the Trou Magrite assemblages studied here, both pachyderms are represented respectively by fragments of jugal teeth and possibly a rib (rhinoceros) and by fragments of jugal teeth and tusk (mammoth). Tusks could have been brought to the cave as raw material for artefact making, and the rib may be a remnant of a butchered rhinoceros. However, why people would have brought jugal teeth, cranial fragments or parts of heads of rhino or mammoth to the cave is difficult to understand. I feel we should look for other taphonomic agents to account for the remains of both pachyderms, and I wonder if they are not remnants of animals that fell down the chimney located at the rear of the present Trou Magrite. In general, too little attention is paid to this way of introducing large mammals into cave systems.

Immunological analysis of organic residues on some lithic artefacts from strata 2 and 3 suggest that respectively a bovine, a lagomorph, and a rodent immunologically related with guinea-pig have been skinned or butchered with the implements (NEWMAN, this volume). Likely candidates are the large bovid (steppe wisent ?) and hare, both present in stratum 3. Perhaps beaver may be added; as already noted this larger rodent is recorded in the older faunal collection.

Table 7.4 gives the intraskeletal distributions of the three major game species. As noted in the introduction, the original thanatocoenoses have suffered severely from differential destruction caused by the degradation of the collagen.

Table 7.4 : Skeletal distribution of the major mammals in Trou Magrite.

Assemblage ----- Skeletal element	Reindeer						Horse						Ibex					
	1	2	3	4	5	T	1	2	3	4	5	T	1(a)	2	3	4	5	T
skull	-	-	-	-	-	-	1	-	1	-	-	-	-	1	-	-	-	1
mandible(b)	-	5	1	-	-	6	-	-	-	-	-	-	-	1	-	-	-	1
loose tooth/ teethfragment	3	23	20	-	1	47	11	38	15	-	4	69	6	23	10	1	-	40
rib	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
scapula	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
humerus	-	3	1	-	-	4	1	-	1	-	-	2	1	1	-	-	-	2
radius	1	6	-	-	-	7	1	-	-	-	-	1	1	-	-	-	-	1
cubitus	-	2	2	-	1	5	-	-	-	-	-	-	-	-	-	-	-	-
innominate bone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
femur	1	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
tibia	-	4	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-
carpals/ tarsals etc.(c)	1	7	-	1	1	10	-	-	1	-	-	1	2	-	-	-	-	2
sesamoids	-	1	-	-	1	2	-	-	-	-	-	-	1	-	-	-	-	1
metapodials	2	36	10	2	-	50	-	-	-	1	1	2	-	1	-	-	-	1
Ph. 1	-	1	1	-	-	2	-	-	-	-	-	-	1	2	-	1	-	4
Ph. 2	2	-	1	-	-	3	-	-	-	-	-	-	1	2	-	-	-	4
Ph. 3	-	1	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-
Totals	11	91	36	3	5	146	13	39	17	1	5	76	14	31	10	2	1	58

(a) includes material from assemblage 1.1; (b) series of teeth of one jaw were counted as jaws; (c) includes patella and malleolar bone.

People no doubt smashed up bones for the extraction of the marrow, but other taphonomic agents (weathering, trampling, rock fall, weight of overburden) contributed to the marked fragmentation and ensuing degradation leaving behind mainly teeth and other dense remains. Anyhow, the anatomical spectrum of the reindeer remains suggests that complete animals were originally brought to the cave, since various elements pertaining to both the head and the postcranial body have been recognised. The very high number of metapodial remains is in part due to the fact that these elements are easily recognised (the identification factor of BOUCHUD 1970). Reindeer weigh about 100 to 150 kg and, no doubt, the smaller ibex, weighing 40 to 120 kg, could also be brought whole to the site; indeed this herbivore is also represented by skull and various postcranial elements, including distal leg bones.

In the distribution of the equid remains, teeth clearly dominate, suggesting that at least heads were brought to the cave. The few postcranial elements found in strata 2 and 3 include elements of the foreleg (humerus, radius) and a tarsal (navicular). The severe fragmentation has no doubt rendered irrerecognisable most postcranial remains and the small identifiable residue is therefore difficult to interpret. However, equid cannonbones and phalanges are generally not smashed up for marrow extraction and do not fragment easily. Their virtual absence may therefore indicate that terminal leg elements were not included in what was brought to the cave and that some butchering was done at the kill sites. The foregoing appears reasonable, for horses weighing a few hundred kg are considerably heavier than reindeer or ibex. The fact that the butchered horse carcasses would still include the head when they arrived at the site, is intriguing, but perhaps the brain and tongue were special treats.

The macro-archeozoological analysis cannot tell us much about seasonality or the annual round of the Trou Magrite Aurignacians, again because the material is too scarce and the ageing on the basis of tooth wear too imprecise. The few well enough preserved reindeer teeth from stratum 2 may represent a fawn of two or three months old, two animals about two and half years old, some eight animals in their prime and two older individuals; these age estimates given are based on the replacement and wear data provided for reindeer by BOUCHUD (1966). In stratum 3, fewer teeth are in good enough condition for ageing, but three fawns appear to be present, respectively about four, six and fifteen months old, three prime individuals and a quite old one. The ages attributed to the fawns suggest killing in the last third of the year, i.e. mainly in autumn since reindeer calve from May to July, with a peak in June (WENIGER 1982). Cementum analyses of two mandibles of prime individuals from stratum 2 yielded unambiguous results : winter-late winter kills (STUTZ *et al.*, this volume). Cementum "winters" are the period of arrested growth of the tissue, beginning in fall and lasting until spring. The combined evidence therefore suggests that the Aurignacians hunted reindeer mainly in that period.

The few well enough preserved horse teeth all seem to be derived from adults, except for an upper milkmolar fragment in stratum 1. Among the teeth attributed to ibex, no milk molars seem to be present. Also, cementum and dentine analysis of one tooth from stratum 2 yielded discordant results. The animal would have been killed between late spring and fall according to the thick

section method, or between winter and early spring according to the thin section method. A bison tooth from stratum 3 gave a winter cementum reading (STUTZ *et al.*, this volume).

The admittedly scarce data on seasonality suggest that Aurignacians used the cave as a cold season residential site from which reindeer were hunted when passing through the entrenched Lesse Valley during their migrations early and late in the cold season; animals sheltering in the valley may also have been available in the same season. Something comparable could have happened with respect to horse, although on a much smaller scale. In fact, the aged reindeer remains fit in a catastrophic mortality age distribution and may indicate ambushing of reindeer herds. The absence of juvenile horses suggests more selective hunting of this larger species. As to ibex, hunting parties may have come to bag this non-migratory herbivore in the warm season.

7. COMPARISONS WITH OTHER BELGIAN SITES.

In addition to Trou Magrite, some 11 cave sites in Belgium present evidence of occupation by Aurignacian people; open air sites have not yet been recognized (OTTE 1979 : 582, fig. 248). The list of the fauna from these occurrences (*ibid.* : 600) is basically the same as the one given in the first column of Table 7.1. This list, based on excavations which were not followed by a detailed archeozoological analysis, provides us only with a general idea of the game world with which the Aurignacians were acquainted.

CORDY (1974, 1976) reanalysed the Aurignacian faunas excavated in the Grotte Princesse Pauline at Marche-les-Dames and in the Trou du Renard at Furfooz. His temperature estimates made on the basis of the assemblage in the latter cave have already been discussed. The assemblage of the Grotte Princesse Pauline comprises willow grouse (*Lagopus lagopus*), hare, cave bear, fox, mammoth, rhinoceros, horse, red deer, reindeer and ibex. Cave bear dominates (71.5%) and the frequency of juveniles is very high (97%). Traces left by flint tools would be visible on some ursid bones and two mandibles show evidence of exposure to fire. The foregoing led to the hypothesis that Aurignacians came to the Grotte Princesse Pauline and hunted hibernating bears, especially the vulnerable cubs (CORDY 1974). However, the jaws may have been exposed to fire accidentally and the few cut marks found could have resulted from trampling (BEHRENSMEYER *et al.* 1986; OLSEN and SHIPMAN, 1988). It seems more likely that the Grotte Princesse Pauline was used by hibernating bears, as well as by people hunting mainly horse, ibex and reindeer. An antler fragment of the latter herbivore found in the cave, seems to be derived from an individual whose antlers were not completely calcified. This would mean the animal was killed at the end of the spring or in summer (CORDY *ibid.*). Excavations of the terrace in front of the Grotte Princesse Pauline provided evidence of post-Paleolithic and Aurignacian occupations, but the faunal samples of the latter contexts are mixed (GAUTIER 1981). The following list gives the faunal elements found in the terrace deposits which are or could be Aurignacian : various birds and

micromammals including Norway lemming (*Lemmus lemmus*), fox, cave bear, badger, mammoth, rhinoceros and ibex; among the macromammals only the cave bear is well represented.

The revision of the Aurignacian fauna excavated in the Trou du Renard provided the following list : hare, cave bear, fox, cave hyena, badger, a mustelid, rhinoceros, horse, wild boar, red deer, reindeer, ibex and saiga antelope (CORDY 1976). In a recent paper, KAHLKE (1992) argues that the saiga antelope expanded into Western Europe only during the very late Pleistocene (Dryas). He was apparently not aware of the Belgian saiga record attributed to the Aurignacian; a re-investigation of the find is called for. Anyhow, well represented are cave bear, horse, reindeer and ibex. RAHIR (1914) wrote in his report on the excavations that horse and reindeer predominate, particularly the latter. Apparently the Aurignacians of the Trou du Renard concentrated on the same game species as those of Trou Magrite and presumably those of the Grotte Princesse Pauline.

Preliminary results of excavations in the Trou Walou Trooz (DEWEZ *et al.* 1993) in the valley of the Magne River, a tributary of the Vesdre, reveal the presence during the Aurignacian (layer C6c) of the cave bear, hyena, wolf, fox, red deer, reindeer, roe deer, large bovids, mammoth, woolly rhinoceros and horse (SIMONET 1993). Most prominent are cave bear (55.5%) and reindeer (20.5%) but strangely enough the assemblage contains but two remains which were apparently not identifiable. The Aurignacians hunted reindeer and the other cervids but the large bovid and horse are thought to belong essentially to the taphonomic category of remains due to hyena activity, for etching traces caused by the passage through the digestive tract of carnivores would occur almost exclusively on bones of the latter. The antler remains of reindeer and red deer suggest occupation of the cave between early winter and early summer. The landscape is described as steppic with limited extensions of wood, the climate as cold but temperate.

8. SUMMARY AND CONCLUSIONS

The recent excavation in the archeological deposits at the front of Trou Magrite in the Lesse Valley yielded faunal remains of which the inventory is presented in Table 7.1 together with a list of finds known from the older excavations. Most of the recent finds are attributable to the Aurignacian occupations evidenced by strata 2 and 3. Upper Paleolithic remains mixed with Holocene elements occur in the top stratum (strata 1 and 1.1), while the sediments underlying the Aurignacian levels contain a Middle Paleolithic faunal assemblage (strata 4 and 5). As is often the case in caves, the intrusive faunal component is generally considerable, comprising mainly landsnails, amphibians, small mammals which were prey of various predators, these predators themselves and other visitors to the cave. The anthropogenetic component comprises the various animals people had access to and which they brought to the cave, complete or partially. The penecontemporaneous faunal spectra in strata 2 and 3 point to an open environment without permafrost and with

restricted snow cover (less than 40 cm) and annual precipitation (300-500 mm). Wooded areas existed no doubt in valleys such as that of the Lesse and other azonal situations. This picture fits in with the recently developed concept of the mammoth steppe, the open, dry and cold steppic landscape that would have stretched over large parts of unglaciated Eurasia and Alaska during the Last Glacial. Micromammals are well represented in the lowest Middle Paleolithic layer (stratum 5), of which the ecostratigraphical significance is discussed elsewhere (CORDY, this volume). The game bag of the Aurignacians included mainly reindeer, horse and ibex (Table 7.3), other animals were no doubt taken in a more opportunistic, haphazard fashion (Table 7.2). Such opportunistic hunting or scavenging may have given people limited access to mammoth and rhinoceros, but the remains of these pachyderms may as well derive from animals that fell down the chimney in the back of the cave. The Middle Paleolithic game bag seems to have contained a comparable animal spectrum, but the evidence is very restricted. The marked fragmentation and low number of the game remains preclude an in-depth analysis of differential transport of game, but people probably brought complete carcasses of reindeer to their dwelling, while those of horses arrived there without terminal leg elements, but with the heads. Ibexes may also have been brought to the cave complete. The data regarding the ageing of reindeer fawns from the Aurignacian strata on the basis of tooth eruption and wear can be combined with cementum analysis for the same species and lead to a scenario in which Trou Magrite would be a cold-season residential site from which reindeer moving through or in the valley were hunted. Horses may have been hunted in the same manner, but as these herbivores do not congregate in large herds (and are much more mobile than reindeer), they occur much less frequently in the game bag. One tooth of ibex provides discordant histological evidence : the animal may have been killed in the colder period of the year or during the warm season; maybe people visited the site in summer to hunt this non-migratory herbivore. Aurignacian faunas from several Belgian caves have not been studied following modern archeozoological methods. However, their combined not quantified faunal spectrum does not show fundamental differences from the one known from Trou Magrite. The faunal finds from the Grotte Princesse Pauline (Marche-les-Dames) and from the Trou du Renard (Furfooz) and the Trou Walou Trooz received better treatment and could indicate that the Aurignacians of these sites also regarded reindeer, horse and ibex as their main quarry.

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