TAPHONOMIC, CHRONOSTRATIGRAPHIC, PALEOENVIRONMENTAL AND ANTHROPOGENIC IMPLICATIONS OF THE UPPER PLEISTOCENE FAUNAS FROM LE TROU MAGRITE, BELGIUM

Achilles GAUTIER*, Jean-Marie CORDY**, Lawrence G. STRAUS*** and Marcel OTTE**

Summary

New excavations in the classic cave site of Magrite, near the confluence of the Lesse with the Meuse on the NE edge of the Ardennes in Namur Province, revealed remnant deposits spanning approximately the first 3/4 of the Upper Pleistocene and containing Mousterian and Aurignacian artifact assemblages. Oxygen isotope stages 5, 4 and 3 are represented by sediments of alluvial, colluvial, aeolian and cryogenic origins. With the exception of the basal, waterlain stratum, mammalian faunal remains are found in all levels, but are of diverse taphonomic sources: natural carnivore (e.g., cave bear) death in the cave, large-medium carnivore acquisition of ungulate carcasses, owl procurement and regurgitation of rodents, and human scavenging and hunting of ungulates. Gnaw and butchery marks and burning traces are present on bones throughout the sequence, although the evidences of human action are relatively more common in the Aurignacian levels than in the Mousterian ones. The microfaunal spectrum from a rich owl pellet lense within upper Stratum 5 (notably including Lagurus lagurus, Cricetulus migratorius, Ochotona pusilla *and* Lemmus lemmus*) is closely similar to a spectrum (Biozone V grey) at nearby Sclayn Cave attributed to Melisey II (=Oxygen Isotope Stage 5b, 95-85 ka bp). While carnivore remains are relatively abundant and diverse in the Mousterian levels and continue to be well represented in the Aurignacian levels (though they tend to be smaller species, such as foxes and badger), ungulate remains become much more abundant in the Aurignacian levels. These are dominated by reindeer, horse and ibex, testifying to*

Résumé

Implications taphonomiques, chronostratigraphiques, paléoenvironnementales et anthropogéniques des faunes du Pléistocène supérieur du Trou Magrite, Belgique.

De nouvelles fouilles menées sur le site classique du Trou Magrite, près de la confluence de la Lesse avec la Meuse, en bordure NE de l'Ardenne dans la Province de Namur, ont mis au jour des restes de dépôts couvrant environ les trois quarts du Pleistocène supérieur et contenant des industries moustériennes et aurignaciennes. Les stades isotopiques 5, 4 et 3 sont représentés par des sédiments d'origines alluviale, colluviale, éolienne et cryo-génique. À l'exception du dépôt alluvial de base, des restes de mammifères se trouvent dans toutes les couches, mais proviennent de sources taphonomiques diverses : mort naturelle de carnivores (ours des cavernes) dans la grotte, acquisition de carcasses d'ongulés par des carnivores (ours, loup, renard, blaireau), régurgitation en pelotes des restes de microfaune par des hiboux, et charognage ou chasse des ongulés par des hominidés. Des traces de rongement, de boucherie et de brûlure sont présentes en petites quantités sur des ossements à travers toute la séquence, bien que des témoignages d'action humaine soient relativement plus communs dans les couches aurignaciennes que dans les couches moustériennes. Le spectre microfaunique de la lentille de pelotes de régurgitation au sein de la Couche 5 supérieure (qui comprend notamment Lagurus lagurus, Cricetulus migratorius, Ochotona pusilla *et* Lemmus lemmus*) est très similaire au spectre de la Biozone V grise de la Grotte de Sclayn (Province de Namur) qui est attribuée à la*

Zusammenfassung

Taphonomische, chronostratigraphische, anthropogene und umweltbedingte Einflüsse auf die Faunen des jüngeren Pleistozäns der Höhle Trou Magrite, Belgien.

Die Ausgrabungen in der klassischen Höhlenstation von Magrite, in der Nähe des Zusammenflusses von Lesse und Meuse im Nordosten der Ardennen, Provinz Namur, erbrachten Kulturschichten, die das erste Dreiviertel des Jungpleistozäns abdecken. Sie enthalten Ensembles des Moustérien und des Aurignacien. Die Sauerstoffisotopenstadien 5, 4, und 3 werden durch Sedimente alluvialer, kolluvialer, äolischer und kryogener Herkunft repräsentiert. Mit Ausnahme der unteren, wasserbeeinflußten Schicht wurden in allen Lagen Knochen von Säugetieren gefunden, doch stammen sie aus unterschiedlichen taphonomischen Quellen: natürlicher Tod von Fleischfressern, z. B. Höhlenbären, in der Höhle, von großen bis mittelgroßen Raubsäugern eingeschleppte Beutetiere, von Eulen ausgewürgte Reste von Nagetieren (Gewölle), Überreste menschlicher Jagd- und Sammeltätigkeit. Fraß-, Schnitt- und Brandspuren kommen in der gesamten Schichtfolge vor, wenn auch Hinweise auf menschliche Tätigkeit in den Schichten des Aurignacien häufiger vorkommen, als in denen des Moustérien. Die Kleintierfauna aus einer reichhaltigen Linse von Eulengewölle mit Lagurus lagurus, Cricetulus migratorius, Ochotona pusilla *und* Lemmus lemmus *gleicht einem Spektrum (Biozone V grey) aus der nahegelegenen Höhle Sclayn, die der Stufe Melisey II (Sauerstoffisotopenstadium 5b, 95-85.000 bp) zugerechnet wird. Während die Überreste der Carnivoren in den Schichten des Moustérien*

* *Rijksuniversiteit Gent, Paleontologie/Geologie, Krigjslaan 281/ S8, 9000 Gent, Belgium.*

** *Université de Liège, Paléontologie/Préhistoire, Pl. du XX Août, 7 A1, 4000 Liège, Belgium.*

*** *University of New Mexico, Anthropology, Albuquerque, NM 87131, U.S.A.*

active human hunting. Badgers may have caused some reworking of deposits. Isolated mammoth and woolly rhino remains are found throughout, but may have been washed in or scavenged. The trace presence of boar in the Aurignacian levels testifies to the existence of a wooded microhabitat along the Lesse canyon, despite generally open, rigorous environmental conditions between 40-30 ka bp in Belgium. Tooth eruption and cementum analyses (the latter by A. Stutz, D. Liebermann and A. Spiess) point to Aurignacian hunting of reindeer, ibex and bison during the cold season, with no certain indicators of summer residence in the cave by humans. Reindeer is represented by all major anatomical units, suggesting that kills took place nearby (in the valley?) and that more or less whole carcasses were brought back to the cave for processing and consumption. Horse is less completely represented and may have been procured farther from the site. Immunological analyses (by M. Newman) reveal that a few Aurignacian endscrapers bear traces of bovine, lagomorph (hare or pika) and human protein (blood?), the latter possibly from cuts during tool use.

phase Melisey II (stade isotopique 5b, 95-85 kA bp). Quoique les restes de carnivores soient relativement abondants et divers dans les couches moustériennes et sont toujours bien représentés dans les couches aurignaciennes (où, néanmoins, ce sont des espèces plus petites, telles que des renards et le blaireau), des restes d'ongulés sont beaucoup plus nombreux dans les couches aurignaciennes. Ceux-ci sont dominés par le renne, le cheval et le bouquetin, qui témoignent d'une chasse humaine active. Les blaireaux auraient pu quelque peu remanier les dépôts. Des restes isolés de mammouth et de rhinocéros laineux se trouvent éparpillés dans toutes les couches, mais ils auraient pu être apportés par l'érosion karstique ou par le charognage depuis le plateau au-dessus de la grotte. La faible présence du sanglier dans les couches aurignaciennes indiquerait l'existence d'un microhabitat boisé le long de la gorge de la Lesse, en dépit de climats plutôt froids et secs et des végétations ouvertes entre 40-30 kA bp en Belgique. Des analyses de l'éruption et du cément dentaires (ces dernières par A. Stutz, D. Liebermann et A. Spiess) suggèrent la chasse aurignacienne des rennes, bisons et bouquetins pendant la saison froide, sans aucun indice sûr de résidence estivale humaine dans la grotte. Le renne est représenté par la plupart des éléments anatomiques majeurs, ce qui suggère que les abattages ont eu lieu tout près (dans la vallée ?) et que des carcasses plus ou moins complètes furent apportées à la grotte pour la boucherie et la consommation. Le cheval est bien moins complètement représenté et aurait pu avoir été tué plus loin de la grotte. Des analyses immunologiques (par M. Newman) révèlent que quelques grattoirs aurignaciens portent des résidus de protéine (sang ?) de boviné (bison ?), de lagomorphe (lièvre siffleur) et d'humain, ce dernier provenant de coupures accidentelles lors de l'emploi de l'outil.

relativ reichhaltig und vielfältig sind und auch in den Schichten des Aurignacien gut vertreten sind - hier mit einer Tendenz zu kleineren Arten wie Fuchs und Dachs - kommen Überreste von Huftieren im Aurignacien deutlich häufiger vor. Hierunter sind Rentier, Pferd und Steinbock führend, was auf eine Bejagung durch den Menschen hindeutet. Es ist möglich, daß die Dachse Teile der Ablagerungen umgearbeitet haben. Isolierte Überreste von Mammut und Wollnashorn wurden wiederholt aufgefunden, doch scheint es möglich, daß diese eingeschwemmt oder eingeschleppt worden sind. Das Vorkommen von Wildschwein in den Schichten des Aurignacien deutet auf das Bestehen bewaldeter Kleinstlebensräume im Bereich des Lesse-Tales hin. Untersuchungen von Zahndurchbruch und Zementanalysen (A. Stutz, D. Liebermann, und A. Spiess) deuten für das Aurignacien auf die Jagd auf Rentier, Steinbock und Wisent während der kalten Jahreszeit hin. Hinweise auf eine Sommerbelegung der Höhle fehlen. Das Rentier ist durch alle wichtigen anatomischen Teile vertreten, was darauf hindeutet, daß die Tötung in der Nähe (im Tal?) erfolgte und daß die mehr oder weniger vollständigen Kadaver zur Weiterverarbeitung in die Höhle gebracht wurden. Die Pferde sind weniger vollständig vertreten, was darauf zurückzuführen sein könnte, daß sie im weiteren Umfeld erlegt wurden. Immunologische Untersuchungen (M. Newman) belegen an einigen Kratzern Proteine (Blut ?) von Boviden, Hasenartigen (Hase oder Pfeifhase?) und Mensch, letztere möglicherweise durch eine Verletzung bei der Anwendung des Gerätes.

Key Words

Trou Magrite, Belgium, Upper Pleistocene, Mousterian, Aurignacian, Fauna.

Mots clés

Trou Magrite, Belgique, Pléistocène supérieur, Moustérien, Aurignacien, Faune.

Schlüsselworte

Trou Magrite, Belgien, Jungpleistozän, Moustérien, Aurignacien, Fauna.

Introduction

One of the reasons for "re-excavating" classic prehistoric sites is to acquire archeozoological data that may have been of only secondary analytical importance at the time of the original excavations often more than a century ago. This is not to say that the 19th century pioneers of prehistoric archeology were not interested in faunal remains. Quite the opposite is true. After all, the demonstration that now-extinct or extirpated species were associated with human or cultural remains was critical to the development of the notion and science of prehistory and several of the earliest chronological schemes for the subdivision of prehistoric times were based on indicator species for the various "stages". In these concerns and uses of faunal remains from Old Stone Age sites, eminent Belgian researchers, first Schmerling and then Dupont (Otte and Michel, 1984; Toussaint, 1992), were in the company of such pioneers as Boucher de Perthes, Tournal, Piette, Lartet, Nery Delgado, Sanz de Sautuola, McEnery and Pengelly (Cleyet-Merle, 1989; Delluc and Delluc, 1989; Delporte, 1987; Grayson, 1983; Madariaga, 1976; Zilhao, 1993). In terms of taxonomic identification, taphonomic intuition, and general chronological and paleoclimatic interpretation, these 19th century researchers (often very well-rounded natural scientists) were usually very close to the mark, even if the terminology has changed subsequently.

However the archeozoological data from 19th century excavations are usually deficient by modern standards for a number of reasons: only larger remains and those most easily identifiable to species or genus were collected and/or curated, faunal remains were often described and/or curated by only very gross provenience units (generally very thick geological horizons or even just from the site as a whole, with no consideration of intrasite spatial or stratigraphic variability), conditions of curation have frequently been far from optimal (e.g., bone surface damage from improper conservation methods, selective or wholesale loss of collections), etc. Naturally, some modern analytical methods (e.g., radiocarbon dating, stable isotope analyses, dental cementum analysis) can sometimes be applied to specimens from old collections (recent examples from Belgium include A. Stutz's (1993) ongoing study of the seasonality of Paleolithic reindeer hunting and R. Charles' (1994) accelerator dating of humanly altered bones and antlers), it is usually impossible to obtain complete, accurate information on taphonomic issues, on anatomical part representation, on butchering techniques, or any observations requiring precise provenience data from old collections. Even if the original excavations and observations were remarkably good, more than a century of curation and its vicissitudes have taken their toll on most collections of fauna - generally more so than has been the case with that "favored" class of finds, artifacts.

One of the most important sites in the early development of Paleolithic prehistory in Western Europe was Le Trou Magrite in Namur Province, Belgium. Together with Montaigle, Chaleux and several other cave sites excavated by Edouard Dupont (1865, 1867, 1871) in the 1860's in the Meuse-Lesse-Sambre region of Namur and Dinant, Le Trou Magrite provided a key stratigraphic sequence. Specifically it helped to confirm the superposition of the early Upper Paleolithic Aurignacian archaeoculture above the Middle Paleolithic Mousterian (Breuil, 1907). However, despite the quality of Dupont's publications (excellent for the time) and despite further excavations by the Belgian Royal Institute of Natural Sciences early in the 20th century (that were not so well published), we lacked details of all sorts on Le Trou Magrite. This is why M. Otte proposed an attempted reexcavation to L. G. Straus, who, in 1991 and 1992, found and excavated about 20 m^2 of intact Aurignacian strata

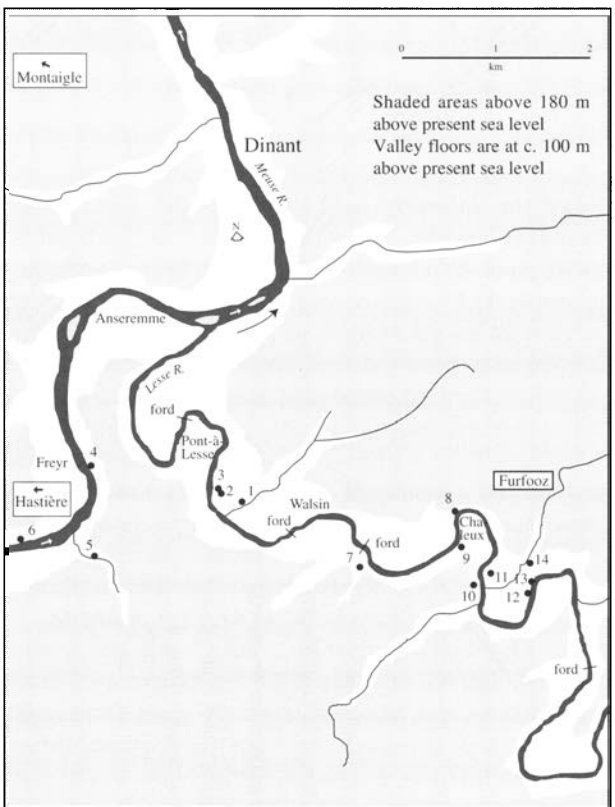

Fig. 1: Stone Age sites near the confluence of the Lesse and Meuse Rivers, near Dinant, Namur Province, Belgium. Le Trou Magrite is N° 1.

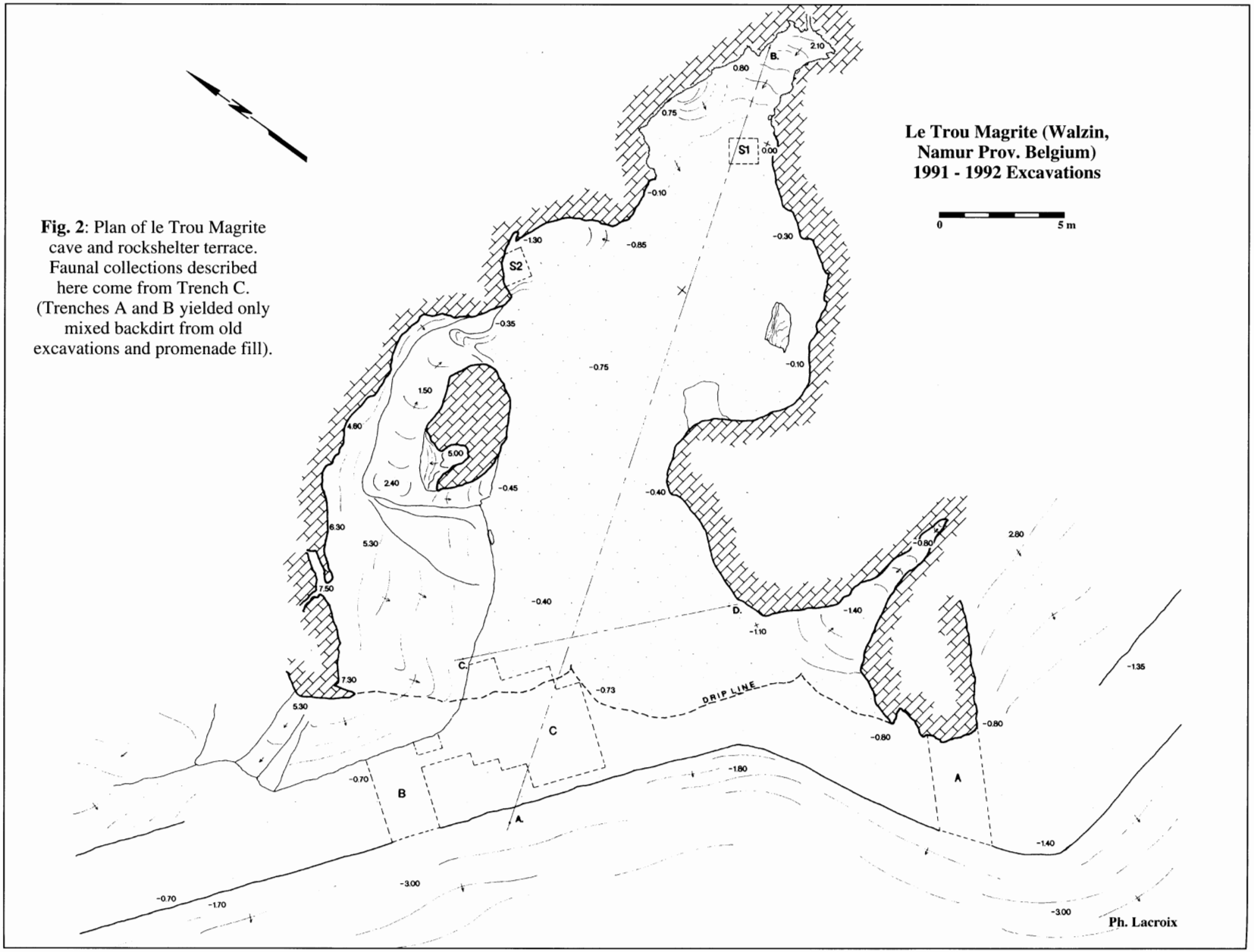

Fig. 2: Plan of le Trou Magrite cave and rockshelter terrace. Faunal collections described here come from Trench C. (Trenches A and B yielded only mixed backdirt from old excavations and promenade fill).

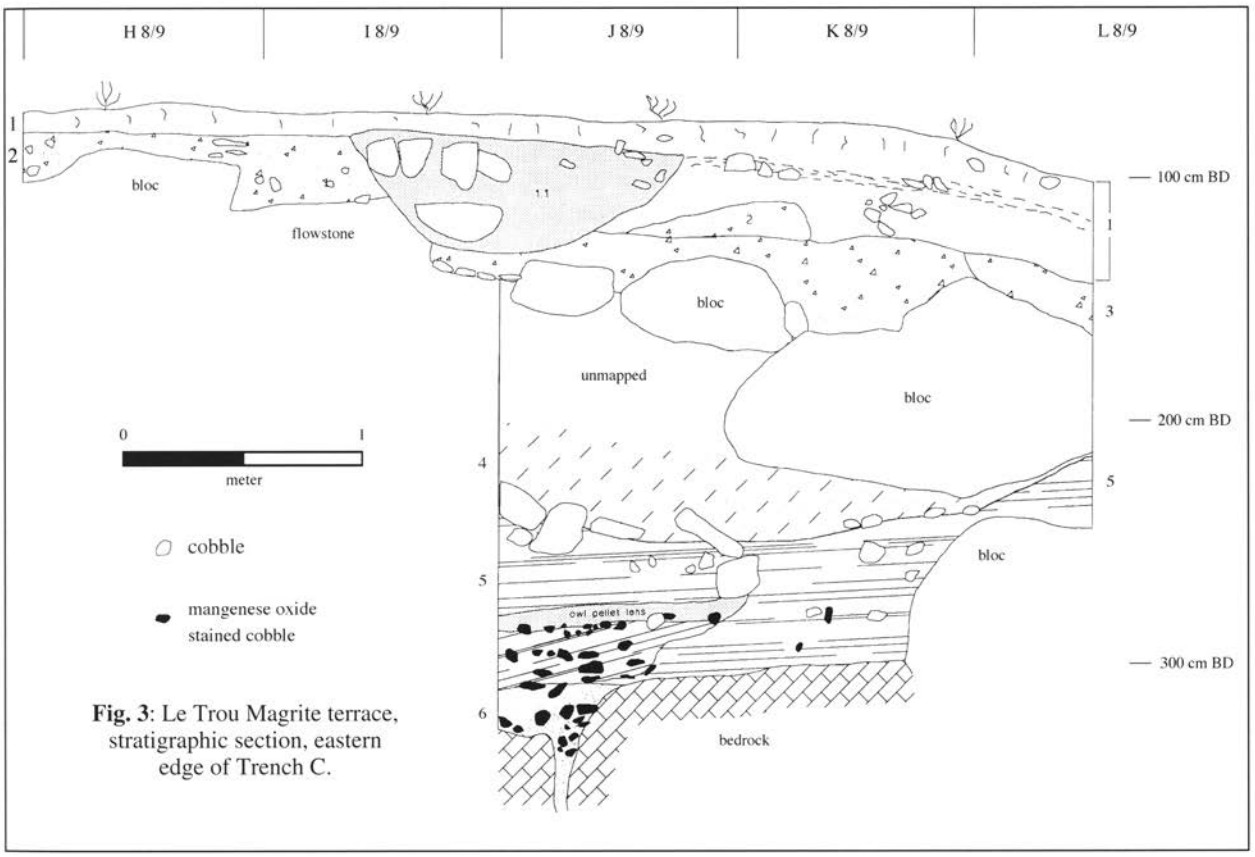

Fig. 3: Le Trou Magrite terrace, stratigraphic section, eastern edge of Trench C.

overlying a smaller accessible area of Mousterian-age deposits on the sheltered terrace in front of the cave mouth. This paper presents the most significant results of archeozoological analyses of finds from the new excavations, reported on in greater detail in the site monograph (Cordy, 1995; Gautier, 1995; Stutz *et al.*, 1995).

Le Trou Magrite is a cave that consists of a high outer rockshelter covering a large terrace, a lower and an upper mouth, a vestibule, a broad main chamber, and a small rear room at the base of a now-blocked chimney that was probably once open to the plateau above (fig. 1). The cave opens to the southwest onto the entrenched valley of the Lesse River, about 25 m above the present valley floor and about 3 km upstream of its confluence with the Meuse. In the confluence area, the Meuse and Lesse (which both drain the Ardennes) are at about 100 m above present sea level, while the rimrock of the Condroz Plateaux along the canyons of these rivers is at nearly 200 m above sea level (fig. 2). Access to the plateaux from the Trou Magrite area is, however, relatively easy and the Lesse can be crossed at several fords in the vicinity. Le Trou Magrite (and others of the numerous Paleolithic sites along the Lesse, such as Chaleux) has an ideal solar exposure for maximum warmth and the Lesse Valley is known as an exceptional microhabitat for Belgium, harboring temperate arboreal taxa both today and during the Würm Tardiglacial (Schutz, 1990; Baron Albert de Radzitzky, pers. comm.). (Unfortunately, despite extensive sampling, the Aurignacian and Mousterian deposits on Le Trou Magrite terrace proved to be palynologically sterile [C. Schutz, pers. comm.].)

From bottom to top, the stratigraphy revealed in the new excavations is as follows (fig. 3).

Stratum 6: 20-50 cm thick. Horizontally bedded dark brown gravel, coarse sand and medium-large water-worn cobbles generally stained with manganese oxide. Archaeologically and paleontologically sterile.

Stratum 5: 30-80 cm total thickness. Horizontally bedded beige-brown loess silt with éboulis blocks, some water-worn cobbles and patches of sand and clay. Whitish-beige, gritty loess, 10 cm-thick lens in upper-middle part, extraordinarily rich in microfaunal remains. Rare Mousterian artifacts and macromammalian remains scattered throughout the stratum with no apparent concentrations.

Stratum 4: 40-150 cm total thickness, with four natural subdivisions. Horizontally bedded yellowish brown clayey or sandy silt matrix with numerous, often very large

(> 1 m) roof-fall blocks. Locally brecciated. Some water-worn cobbles in upper-middle part. Rare Mousterian (?) artifacts and macro-mammalian remains scattered throughout interstices among blocks.

Stratum 3: 10-35 cm. Yellowish-beige angular-subangular gravels with large (10-30 cm) éboulis blocs and slabs, and minimal interstitial silt. Bedding slopes toward talus edge. Locally brecciated. Dense layers and patches of archaeological and faunal remains, the former typologically attributable to the Aurignacian. Radiocarbon dates of 41,300 ± 1690 bp (CAMS-10352) and > 33,800 bp (GX-18539), both on well-preserved bone collagen: the former an accelerator date done on aspartic acid and the latter a conventional one done on total gelatin. Stratum 3 grades into Stratum 2, but is separated from Stratum 4 by an abrupt unconformity, implying a significant depositional hiatus.

Stratum 2: 20-45 cm. Yellowish beige small (2 cm) angular gravels with some larger (4-5 cm) blocks and scant interstitial silt. Locally brecciated. Dense layers of cultural and faunal remains, the former typologically attributable to the Aurignacian. Radiocarbon dates of 34,225 ± 1925 bp (GX-18537) and 30,100 ± 2200 bp (GX-18538), both on bone gelatin. The top of Stratum 2 may have been removed (along with the Gravettian, Magdalenian and Mesolithic levels, known to have existed elsewhere in the cave), when the terrace deposits were leveled ca. 1830 (i.e., before Dupont's excavations).

Stratum 1.1: Base of an intrusive pit containing Neolithic, as well as possibly Mesolithic and Iron Age artifacts.

Stratum 1: Humic layer and backdirt from earlier excavations.

Site formation processes

Study of the stratigraphic sections and analyses of sediment samples by P. Haesaerts (in press) indicate a variety of basic processes in the deposition of Le Trou Magrite strata. Stratum 6 was clearly formed by high velocity running water from the karstic system, the source of the cobbles having been ancient terraces on the plateau above the cave. Stratum 5 represents a more complex mix of alluvial and colluvial (re-)deposition of materials including sand and aeolian loess. Colluvially redeposited loess and, especially toward the top, cryoclastic éboulis make up Stratum 4, indicating colder but at least episodically humid conditions. Strata 3 and 2 are the products of intensive cryoclastic activity, under cold but often somewhat humid conditions.

A total of 5618 remains of microfauna were identified by Cordy. Gautier studied 12,519 macrofaunal remains, of which only 486 were identifiable, which is a clear indication of the highly fragmented nature of Le Trou Magrite assemblages.

Major taphonomic agents during Stratum 5 times were nocturnal raptorial birds, probably owls, although their remains have not been identified at Le Trou Magrite. The densely packed, pasty whitish lense of micromammalian remains (mostly rodents) in upper-middle Stratum 5 is characteristic of owl regurgitation pellet deposits under roosting areas at cave mouths. (Note that the vast number and size of blocks in Strata 4 and 3 show that, before they fell, the cave roof had earlier extended outward several meters beyond its present location, namely a position at the cliffward end of our excavation.) In addition to rodents, Stratum 5 yielded remains of a fish, snow and/or common hare and pika that may also have been transported to the cave by large owls (e.g., eagle owl, *Bubo bubo* [see Andrews, 1990]). Weasel is also well represented.

The Stratum 5 macrofauna (tab. 1) is very scarce, but carnivores are relatively well represented: arctic and possibly common fox and cave bear. The only plausible human game are 5 remains each of reindeer and horse and 1 of ibex. Woolly rhino is represented by 5 remains, but these could conceivably have been the results of scavenging or were washed down from the plateau via the chimney. The

Table 1: Mammalian faunas from le Trou Magrite palaeolithic strata.

Strata	**2**	**3**	**4**	**5**
Taxa				
Lepus capensis/timidus	1	1		32
Ochotona pusilla			1	17*
Marmotta marmotta?		1		
Sciurus vulgaris	1		1	
Alopex lagopus	2			1
Vulpes vulpes	1	2	2	
Alopex/Vulpes	4	2	1	1
Canis lupus	3			
Mustela nivalis				15
Meles meles	4	1(?)	3	
Ursus spelaeus	7(?)			5
Elephas primigenius	3	1	1	
Coelodonta antiquitatis	7	1	1	5
Equus cf. *germanicus*	39	17	1	5
Sus scrofa	8	2		
Rangifer tarandus	91	36	3	5
Rupicapra rupicapra		1	1	
Capra ibex	31	10	2	1
Bison priscus/Bos primigenius	1	1		
TOTALS	203	76	17	87

N.B. Not included are finds from Strata 1 and 1.1, birds, fish, rodents, amphibians or molluscs identified by Gautier.
*: includes 15 pika remains identified by Cordy.

picture in Stratum 4 is similar, although gone are the rodents. Fox and badger are the only carnivores, but the latter may have been a relatively recent intrusive (a filled burrow containing a few badger remains was observed archaeologically) and may have been the source of single remains of squirrel - a highly unlikely Upper Pleistocene species - in Strata 4, 2 and 1. Woolly rhino and mammoth are each represented by one remain, as are horse and chamois. There are respectively 3 and 2 remains of reindeer and ibex. These are at best scanty indicators of possible hominid (probably Neandertal) subsistence. What is notable in both Strata 4 and 5, however, is the lack of hyena (or other large true carnivores), although hyena was found in the old excavations (and in their backdirt, our Stratum 1). Hyena coprolites were not found in the recent excavations.

The faunal assemblages from Strata 3 and 2 are substantially greater than those of Strata 5 and 4, although the former deposits are far less thick. Despite the fact that the taxonomic compositions of the lower and upper sets of strata are similar, the relative proportions of carnivores are smaller in Strata 3 and 2 than in Strata 5 and 4. Common and/or arctic fox (and badger) are present in both Strata 3 and 2; the latter also has traces of wolf and (cave?) bear. Ungulate remains are relatively diverse and abundant in both strata. Reindeer is the dominant species in Strata 3 and 2 (NISP = 36 and 91 respectively), followed by horse (NISP = 17 and 39) and ibex (NISP = 10 and 31). There are traces of bovine (probably bison), boar, rhino, mammoth, hare and birds in both strata and chamois and marmot in Stratum 3 only. The abundance of horse and reindeer in the upper strata corresponds with Dupont's otherwise non-specific observations.

Systematic preliminary inspection by the excavation team revealed only very slight evidence for butchering in Strata 5 and 4 (burnt bones: 1 and 0 respectively; possibly cut-marked bones: 1 and 2) and slightly more (in absolute and relative terms) in Strata 3 and 2 (burnt: 2 and 16 respectively; possibly cut-marked: 6 and 11). However, traces of gnawing, while few, are found fairly consistently throughout (from Stratum 5 to 2: n = 4, 2, 5, 28). And the identification rate (identified remains/total remains) is fairly constant (except for Stratum 4, whose faunal assemblage is small but characterized by large, often identified bones/teeth): Stratum 5: 3.2%, Stratum 4: 6.0%, Stratum 3: 2.7%, Stratum 2: 3.0%. These facts suggest that there may not have been major differences in terms of the taphonomic role of large carnivores between the lower and upper strata at Le Trou Magrite.

Chronostratigraphic contributions of the faunas

The most significant chronostatigraphic information derived from the new faunal collections from Le Trou Magrite is Cordy's interpretation of the rodent assemblage from upper and upper-middle Stratum 5. Table 2 lists the microfauna by Stratum 5 subdivisions, though they are considered to be the same. The spectrum is heavily dominated (73-74%) by *Microtus gregalis*, followed by *M. oeconomus* (21-24%). Along with these voles, is found the collared lemming (*Dicrostonyx gulielmi torquatus*), the grey lemming (*Lagurus lagurus*), the Norway lemming (*Lemmus lemmus*), the migratory hamster (*Cricetulus migratorius*), the pika (*Ochotona pusilla)* and possibly the short-tailed vole (*M. agrestis*). Significantly absent from these very large samples are the genera *Apodemus*, *Clethrionomys, Arvicola* and perhaps the *Microtus arvalis-agrestis* group. Also totally absent are Insectivora and Chiroptera.

Le Trou Magrite Stratum 5 microfaunal spectrum is essentially and uniquely identical in all respects to that of Strata V grey/4 in Sclayn Cave (Biozone 4), 30 km north of

Table 2: Microfauna from le Trou Magrite stratum 5.

Stratum 5 Subdivision:	**Upper**		**Upper Middle**		**Lower Middle**	**Lower**
Taxa	**N**	**%**	**N**	**%**	**N**	**N**
Lagurus lagurus	1	0.11	6	0.13		
Cricetulus migratorius	6	0.68	3	0.06		
Ochotona pusilla	3	0.21	12	0.15		
Dicrostonyx gulielmi	10	1.1	94	2.0		1*
Lemmus lemmus			3	0.06		
Microtus gregalis	339*	74.3	1212*	73.1	5*	4*
Microtus oeconomus	95*	20.8	400*	24.1		1*
Microtus agrestis?	13*	2.8	6*	0.4		
(*Microtus* sp.	414	—-	2988	—-)		
TOTALS	881		4724		5	6

Le Trou Magrite. The Sclayn horizon is attributed to the Melisey II climatic downturn within the Last Interglacial *sensu lato* or early Würm (Cordy, 1992). This episode has been correlated in the Grande Pile pollen core in northeastern France to oxygen isotope stage 5b (Woillard and Mook, 1982), now dated to ca. 90-95 ka bp (Martinson *et al.*, 1987).

An interesting additional indication that the base of Le Trou Magrite sequence (alluvial Stratum 6) pertains to the Last Interglacial *sensu stricto* is the finding of a fragment of hippopotamus tusk from mixed backdirt fill in a small sondage we dug at the rear of the cave vestibule. This object confirms A. Rutot's (1910) identification of a hippo incisor from Le Trou Magrite. In Belgium, fossils of this southern mammal have been recorded from fluviatile deposits of the Last Interglacial, but precise data are lacking. The macrofauna from the other strata are not particularly illuminating in terms of chronology, other than to confirm general Upper Pleistocene Age, antedating the local extinction of reindeer, bison, woolly rhino and mammoth. The few measurable horse remains from Strata 5, 4, 3 and 2 all point to *Equus* cf. *germanicus* following Eisenmann (1991). Such horses were typical in Europe in the period from about 100-15 ka bp.

Paleoenvironmental evidence

The Stratum 5 microfauna (rodents and pika) is very informative as the enviroments within an owl's predation radius of the cave (in the case of *Bubo bubo*, up to 10 km [Andrews, 1990]). The existence of steppic environments is suggested by *Ochotona, Cricetulus migratorius* and *Lagurus*, and dry, continental conditions by *Microtus gregalis*. However *Microtus oeconomus* is indicative of more humid continental habitats, and polar-subpolar conditions are indicated by *Lemmus* and *Dicrostonyx*. The overall spectrum attests to a continental climate, very cold in winter, but not as cold as during a glacial maximum or stadial. Thus, conditions were generally dry, with open, steppe vegetation on the plateaux. However the Lesse Valley itself of course represented a linear humid microhabitat. It is probable that colluviation resulted from snow melt, so some seasonal precipitation still occurred in stage 5b times.

Macrofaunal data are few from Strata 5 and 4, but do not belie the impression of cold conditions, though certainly not maximal pleniglacial ones for a region as far north as the Lesse (50°). Vegetation was generally open, but with enough annual moisture to support the kinds of herbaceous cover needed to feed large and medium-size ungulates ranging from mammoth to reindeer, whether under the conditions of stage 5b or early stage 4.

The picture does not change significantly in Strata 3 and 2, with open steppe-tundra (the so-called, now-extinct Pleistocene "mammoth steppe" biome) populated by reindeer, horse, mammoth, bison, woolly rhino and fox living on the Lesse Valley floor and especially on the plateaux above. Marmot and partridge (both present in Stratum 3) also prefer open vegetation. Ibex (and, to a lesser extent, chamois) would have preferred to steep, rocky cliffs and slopes of the valley. However, a few elements require us to modify this picture (probably given the larger faunal samples from the upper strata). Boar is represented by two co-articulating remains in Stratum 3 and 8 remains from two individuals in Stratum 2. This suid is a woodland or shrubland species, living usually in the vicinity of water bodies. The Trou Magrite individuals are of normal Pleistocene size (not dwarfed) and so must have had adequate arboreal habitat and water, logically in gallery woods along the sheltered Lesse.

Human subsistence activities

Virtually nothing can be said about human subsistence activities during Stratum 5 or 4 times, since macrofaunal remains are so few. No species is represented by more than 5 NISP or 1 MNI. It can be hypothesized that Neandertals hunted and/or scavenged the occasional horse, reindeer and ibex, and that they possibly scavenged from rhino and mammoth carcasses. That they at least processed some animal parts is suggested by the admittedly few apparent cut marks. Evidence of *in situ* hominid activity of all sorts on the terrace at Le Trou Magrite is very slight in any event. There are no traces of hearths and burnt bones are very scarce. Artifacts are few (110 knapping debris and 7 retouched tools in Stratum 5; 141 and 10 respectively in Stratum 4) and scattered, with no distinct lenses or concentrations (other than the fact that artifacts are per force found in the spaces among blocks). These facts suggest only brief, ephemeral "visits" to the site during the Middle Paleolithic, while that cave was mainly inhabited by raptors, bears and some small carnivores.

More light can be shed on aspects of Aurignacian subsistence at Le Trou Magrite. In Stratum 3 the ungulate remains found in the 220 m excavation area (representing a small portion of the terrace area, and an especially small portion of the entire inhabitable cave area) pertain mimimally to 13 individual reindeer, and only one each of horse, ibex, boar, bison, chamois, rhino and mammoth (of whom only the first three species are represented by more than one bone or tooth; boar by only two co-articulating bones). The pachyderm remains (jugal teeth, tusk and rib) may have been brought to the cave by humans as oddities or as raw material for carving, or they may have been washed

Table 3: Distribution of anatomical elements of major game species from the aurignacian strata of le Trou Magrite.

	REINDEER		HORSE		IBEX	
Strata:	2	3	2	3	2	3
Element						
Cranium			1		1	
Mandible	5	1			1	
Loose tooth	23	20	38	15	23	10
Rib	1					
Scapula						
Humerus	3	1		1	1	
Radius	6				1	
Ulna	2	2				
Pelvis	1					
Femur						
Tibia	4					
Carpal, Tarsal	7			1		
Sesamoid	1					
Metapodial	36	10			1	
Phalange 1	1	1			2	
Phalange 2		1			2	
Phalange 3	1					
TOTALS:	91	36	39	17	32	10

down the chimney at the rear of Le Trou Magrite; they need not represent even scavanged food. Marmot, hare and fox may have been procured by humans, but they could also have inhabited the cave or, in the first two cases, been brought in by carnivores.

In Stratum 2 the MNI of reindeer is only seven, but there are at least two individuals each of horse and boar, with one each of ibex (despite a high NISP of 31), mammoth, rhino and bison (the latter represented by only one remain). Hare is again represented by one bone. The wolf is not likely to have been human prey, but fox (NISP = 7) could possibly have been taken for its pelt. In terms of the overall spectra and especially the triad of principal ungulate game species, the two Aurignacian stata are virtually identical in composition: reindeer remains make up 57% of the total remains of reindeer + horse + ibex in Stratum 3 and 57% in Stratum 2; horse remains make up 27% and 24% respectively; ibex remains make up 16% and 19% respectively. These facts suggest a high degree of regularity in the locally available resources and in subsistence practices over the possibly ≤ 10,000 year period represented by Strata 3 and 2.

Table 3 gives the anatomical element distributions for the three major game species. The original thanatocoenoses have suffered severely from differential destruction. Humans no doubt smashed bones for the extraction of marow, but other taphonomic agents (weathering, trampling, weight of overburden) contributed to marked fragmentation and subsequent degradation, leaving behind mainly teeth and other dense remains. Nonetheless, the anatomical composition of the preserved reindeer remains suggests that complete animals were originally brought to the cave, since various elements pertaining both to the head and to the postcranium (including distal leg bones) are present in relatively high numbers. This is also true for the smaller ibex (40-120 kg versus 100-150 kg for reindeer). The high numbers of reindeer metapodials may be in part due to the fact that, even fragmented, these elements are easily recognizable.

In contrast, in the distribution of equid remains, teeth clearly dominate, suggesting that at least heads were brough to the cave. The few postcranial elements found in Strata 2 and 3 include bones of the foreleg (humerus, radius) and a navicular. Severe fragmentation has no doubt rendered most horse postcrania unrecognizable and the small identifiable residue is therefore difficult to interpret. However, equid cannonbones and phalanges were generally not smashed for marrow extraction and do not break easily. Their virtual absence here may therefore indicate that distal leg elements were not among the horse parts brought back to the cave and that some butchering was done at the kill sites. This makes sense, since even Pleistocene horses were considerable heavier than reindeer or ibex. Perhaps horse heads were transported to the cave for the brains and tongues.

Organic residue analysis by cross-over immunoelectrophoresis was attempted on 12 retouched lithic artifacts from Strata 5, 3 and 2 at Le Trou Magrite by M. Newman

(1995). Most tests were negative, but two endscrapers (1 each from Strata 2 and 3) gave evidence of human protein (blood?). Another endscraper from Stratum 3 yielded organic residue of either a bovine or a lagomorph, and a retouched flake from Stratum 2 showed bovine residue. Interestingly, there were no positive reactions to cervid, equid or ovicaprid antisera, but the few positive results suggest first, that humans may have occasionally cut themselves while using stone tools (to process animal carcasses or hides) and second, that they actually did process some of the species represented by the bones, possibly including hare.

In order to determine seasonality of kills, seven teeth (1 from Stratum 3 and 6 from Stratum 2) were submitted for cementum analysis by Stutz, Lieberman and Spiess (1995). The bison from Stratum 3 was killed in winter. From Stratum 2, two reindeer individuals were killed in winter-late winter and one ibex was killed in winter-late spring according to the thin section method (but late spring-fall according to the thick section method).

Few of the Trou Magrite reindeer remains can be aged. However Stratum 2 yielded a fawn of possibly 2-3 months (i.e., killed in late summer-fall), two animals about 2.5 years old (possibly killed in winter therefore), eight prime age adults and two old ones. In Stratum 3 there are three fawns aged respectively about 4, 6 and 15 months (i.e., killed in fall and winter), three prime adults and one very old reindeer. The admittedly sparse evidence nonetheless might suggest a catastrophic mortality pattern, such as would arise from the ambush hunting of bands of reindeer moving through the entrenched Lesse Valley, mainly in fall, winter or early spring. In contrast, the few well preserved horse teeth all derive from adults, possibly indicating a more selective hunting strategy for this larger species. Deciduous teeth of ibex are also absent.

The bulk of the evidence points to cold season killing of reindeer, bison and possibly ibex—with scant evidence of summer kills. Hence, during the Aurignacian, Le Trou Magrite may have mainly been used as a cold season residential site, while not excluding occasional warm season visits. Use of the cave for repeated, relatively long-term, multi-purpose stays is also suggested by the quantity and diversity of lithic cores, debitage (2614 in Stratum 3 and 5204 in Stratum 2) and finished tools, representing all stages of the manufacturing process ("chaîne opératoire"). The tools (119 in Stratum 3 and 122 plus 2 antler sagaies in Stratum 2) are highly varied and probably represent a variety of subsistence (procurement and processing), manufacturing and maintenance activities. In short, the artifacts are not suggestive of simply limited-activity hunting camps. The ivory and antler works of art discovered at Le Trou Magrite by Dupont may actually have come from a deposit stratigraphically corresponding to our Stratum 3 (Dewez, 1985).

Comparisons

Only one other recently excavated Aurignacian faunal assemblage has been studied from Wallonia: Le Trou Walou, Couche C6C, dated to 30 ka bp (Gilot, 1993; Simonet, 1993). The total macromammalian assemblage is very small (NISP = 180, of which 100 remains [56%] are of cave bear, four of common fox and one each of wolf and hyena). The identified ungulate subset (NISP = 70) is dominated by reindeer (37), followed by red deer (17), horse (8), bovines (4), mammoth (2) and one remain each of woolly rhino and roe deer. This assemblage is ecologically quite diverse, with a dominance of cold, open steppe-tundra forms, together with temperate and woodland species. Although boar is absent and red and roe deer are both present, the presence of "warmer", more wooded habitat taxa in association with reindeer, mammoth and rhino at Le Trou Walou is certainly reminiscent of the situation at Le Trou Magrite. The Vesdre Valley (a tribuary of the Meuse, like the Lesse, but 70 km to the east-northeast) probably had limited, sheltered, wooded microhabitats while the surrounding hills and plateaux were open during the intermediate (neither interglacial nor maximum stadial) conditions of oxygen isotope stage 3. The faunal data seem, in fact, "warmer" than the pollen data for this level, which indicate only a few pine and hazel pollens, but with a dramatic increase in arboreal pollens immediately above C6C (Heim, 1993). The carnivore fauna suggests a greater presence and role especially for cave bear at this site than at Le Trou Magrite. Interestingly, a few reindeer and red deer antler data suggest human occupation at least been early winter and early summer, with no late summer or fall indicators.

Old faunal collections from Aurignacian deposits from other caves in Wallonia add other points of comparison. La Grotte de la Princesse Pauline at Marche-les-Dames (on the Meuse Valley) yielded willow grouse, hare, cave bear, fox, mammoth, rhinoceros, horse, red deer, reindeer and ibex (Cordy, 1974). As at Le Trou Walou, cave bear dominates (72%); almost all are juveniles, suggesting natural deaths during hibernation. One reindeer antler was incompletely calcified, tenuously suggesting a kill in late spring or in summer, but that would depend on the animal's sex. Animals of possible Aurignacian age from a recent excavation of mixed deposits on the terrace in front of Princesse Pauline cave included Norway lemming, fox, badger, mammoth, rhino, ibex and especially cave bear (Gautier, 1981). Cordy (1976) also restudied Aurignacian fauna from old excavations in le

Trou du Renard, not far from Le Trou Magrite. The medium and large mammals include hare, cave bear, fox, cave hyena, badger, a mustelid, rhino, horse, boar, red deer, reindeer, ibex and saiga antelope, with horse and reindeer having been said to be the main forms (Rahir, 1914). Again this is a mixture of open steppe-tundra animals with others that would have survived in the sheltered, somewhat wooded microhabitats of the valley. Mixed Aurignacian and Gravettian deposits from old excavation in nearby Trou Reuviau yielded one mandible of a reindeer killed in winter-early spring and another killed in summer-fall (Stutz *et al.,* 1995).

Open-air Aurignacian sites are so far unknown in Belgium. Thus we cannot yet test the hypothesis of winter residence in the caves of the hill and plateau country south and east of the Meuse and summertime movements out onto the low plains of middle and northern Belgium for hunting. This scenario would seem, however, to be plausible. Shortly after the time of the last Aurignacian occupations of Le Trous Magrite and Walou there are major open air sites with Gravettian types of lithic assemblages: Maisières-Canal and Huccorgne, both dated < 30 ka bp (albeit with a high degree of incoherence within each date series). Interestingly, there continue to be "Aurignacian" occupations in the caves after this time, if the 26-24 ka bp dates from Princesse Pauline, Spy, Trou du Renard and Halleux are correct (Gilot, 1984).

Conclusions

The limited faunal assemblages from the new excavations in Le Trou Magrite have provided significant chronological indications especially for the lower part of the stratigraphy, valuable paleoenvironmental data, and evidence for a variety of taphonomic agents and uses of the cave through time, with a major increase in the human role in Aurignacian vis à vis Mousterian times. Together with the artifact assemblages, the macromammalian assemblages give intriguing hints concerning the nature and seasonal timing of the human occupations of this cave in a favored microhabitat during the millennia before the Last Glacial Maximum and eventual abandonment of the territory of Belgium. A century and a quarter after Dupont's seminal excavations, Le Trou Magrite still contributes to our detailed understanding of landscapes, animals and humans on the northern edge of the Ardennes.

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