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5

ARCHEOLOGICAL COMPARISONS

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UTILIZATION OF LITHIC RAW MATERIALS AT LE TROU MAGRITE

One of the clearest temporal trends in the Trou Magrite sequence is the increase in use of non-local flints (see Chapter 5 Appendix for lithic raw material descriptions, and Table 5.1 for principal raw material data). The most common of these flints is a shiny, fine-grain, slightly translucent, grey (dark or blueish grey) flint that patinates whitish grey. It has a chalk cortex. It is believed that this flint comes from the famous Maastrichtian (Upper Cretaceous) chalk limestone outcrops of the Spiennes area, near the city of Mons, about 70 km. west-northwest of le Trou Magrite (Caspar 1984; J-M. Léotard and D.Cahen, personal communications). Although attribution to Spiennes is not yet absolutely certain, we will hereafter refer to the high- quality, fine-grain, grey flint as "Spiennes flint". There is also a medium-grain flint that is matte, opaque, greyish in color and with a slightly rough surface. Its source is unspecific Cretaceous beds that are not local, although waterworn cortex indicates that it occurs secondarily in river beds. It patinates white. Generally the flints at le Trou Magrite are quite patinated. This confirms the observations of Ulrix-Closet (1975) and Otte (1979) on the old collections from this site.

Limestone was significantly used for artifact production at le Trou Magrite. The use of local non-flint materials at this site was first observed by Dupont (1873) and confirmed by Ulrix- Closet (1975). In fact, Dupont (1867:131) observes that use of limestone was more commonly used in the early ("Mammoth Age") levels than later ("Reindeer Age"). He even points out that in the later levels, humans developed techniques to economize the scarce flint resource, which was so difficult to procure (Dupont 1873:90).

There are two common limestone types in our collections from le Trou Magrite. First there is a medium-grain, "soft" limestone, which is grey-black in color. Second there is a fine- grain, hard, silicified limestone, which is black with white/yellowish flecks. It intergrades with what we called "black flint"a flint that occurs in the local limestone. Both limestones are matte, with rare inclusions and conchoidal fracture pattern, and both patinate grey. In fact, the two limestones tend to intergrade. There is a third limestone that is relatively common only in Stratum 5: crystallized limestone, also probably local. In the ensuing discussion, relative proportions of lithic types are given as two figures,

TABLE 5.1 :

TROU MAGRITE (1991-1992)
RELATIVE FREQUENCIES OF MAJOR LITHIC RAW MATERIALS

ARTIFACTS	FINE-GRAINED SPIENNES FLINT		MEDIUM-GRAIN FLINT		MEDIUM-GRAIN FLINT LIMESTONE		TOTAL n	
	% Count	% Wt.	% Count	% Wt.	% Count	% Wt.	% Count	% Wt.
STRATUM 2								
Plain Flakes	31.9	5.2	10.0	1.7	43.1	90.5	2,474	94,491
Cortical Flakes	57.3	35.2	17.4	13.6	9.1	26.7	164	988
Plain Blades	36.4	11.9	7.9	1.5	46.9	65.2	382	2,036
Cortical Blades	54.1	51.8	8.1	2.9	13.5	4.7	37	170
Bladelets	54.5	41.4	22.1	14.9	14.5	33.5	145	215
Cores	10.0	5.2	-	-	23.3	44.7	30	718
All Debris	44.0	8.7	2.5	28.2	28.2	84.9	5,205	107,926
All Tools	61.1	35.7	7.4	7.0	17.6	44.2	108	1,054
STRATUM 3								
Plain Flakes	18.2	3.2	2.1	0.2	61.2	92.6	1,488	45,158
Cortical Flakes	34.3	9.7	4.5	1.2	14.9	21.5	67	671
Plain Blades	19.1	9.0	2.9	0.5	58.8	77.7	136	792
Cortical Blades	50.0	9.0	12.5	1.0	25.0	6.0	11	87
Bladelets	63.2	57.0	7.4	4.7	20.6	32.7	68	107
Cores	100.0	100.0	-	-	-	-	1	76
All Debris	29.2	5.8	2.2	0.2	50.8	87.2	2,612	52,608
All Tools	37.5	21.5	4.8	3.2	33.7	50.2	104	1,263
STRATUM 4								
Plain Flakes	8.6	0.8	10.0	2.2	57.1	82.8	70	1,122
Cortical Flakes	-	-	-	-	-	-	-	-
Plain Blades	8.3	1.6	-	-	50.0	62.2	12	127
Cortical Blades	-	-	-	-	-	-	-	-
Bladelets	100.0	100.0	-	-	-	-	1	1
Cores	-	-	-	-	100.0	100.0	1	103
All Debris	13.5	1.5	6.4	1.6	48.9	72.3	141	1,754
All Tools	-	-	-	-	50.0	59.2	8	130
STRATUM 5								
Plain Flakes	16.3	3.6	-	-	22.4	8.3	8	33
Cortical Flakes	16.7	20.4	-	-	-	-	12	54
Plain Blades	-	-	-	-	42.9	58.3	7	72
Cortical Blades	-	-	-	-	-	-	1	4
Bladelets	-	-	50.0	20.0	-	-	2	5
Cores	-	-	-	-	20.0	3.1	5	484
All Debris	13.5	3.5	0.9	0.1	18.9	7.4	111	1,901

the percentage by count and the percentage by weight ("n/N"). This way one gets a quick idea of the size of the objects and of the significance of potential transport problems.

In Stratum 5, the knapping debris (weighing a total of 1,901 gm.) principally includes medium-grain limestone (19/7), crystallized limestone (19/43) and Spiennes flint (14/4), while the tools included these types in the following relative amounts: 17/25, 33/15, 17/21. In Stratum 4 the debris (total weight=1,754 gm.) is mainly distributed among medium-grain limestone (49/72), Spiennes flint (14/2) and medium-grain flint (6/2). No tools are made on imported flint; 50% by count and 59% by weight are on medium-grain limestone. In general, imported flint is relatively scarce in the basal (Mousterian and transitional?) levels at le Trou Magrite.

The most interesting comparisons are between Strata 3 and 2 because the samples of artifacts are large and because typologically both levels can be assigned to the Aurignacian. The main raw material compositions of the debris and tools from these strata are summarized in Table 5.2.

TABLE 5.2a : Strata 3 & 2 Lithic raw materials of Knapping debris

	Spiennes Flint		Medium-Grain Flint		Medium-Grain Limestone	
	% by Count	% by Wt	% by Count	% by Wt	% by Count	% by Wt
St. 3	29	6	2	<1	51	87
St. 2	44	9	3	28	28	85

TABLE 5.2b: Strata 3 & 2 Lithic raw materials of retouched tools

	Spiennes Flint		Medium-Grain Flint		Medium-Grain Limestone	
	% by Count	% by Wt	% by Count	% by Wt	% by Count	% by Wt
St. 3	38	22	5	3	34	50
St. 2	61	36	7	7	18	44

Two trends are apparent: 1.) Flint is in general more abundant in Stratum 2 than in Stratum 3; 2.) Flint was differentially selected for the manufacture of formal tools in both levels, but especially so in Stratum 2. In addition, it is apparent that flint debris and tools are lighter (hence smaller) than limestone ones---a reflection, no doubt, of the imported nature of the flint and the local provenience of the limestone.

TABLE 5.3

TROU MAGRITE (1991-1992)

AVERAGE WEIGHTS (GRAMS)

OF COMMON DEBRIS TYPES FOR MAJOR RAW MATERIAL TYPES

	Spiennes FLINT		MEDIUM-GRAIN LIMESTONE	
Debris Type	Stratum 2	Stratum 3	Stratum 2	Stratum 3
Plain Flake	6.41	5.36	82.19	45.45
Plain blade :				
Whole/prox.	2.26	2.96	5.42	9.06
Mesial/distal	2.57	1.0	8.52	6.57
Plain bladelet	1.29	1.46	4.71	2.5
Flake core	18.5	-----	54.75	-----
Chunk :				
Non-cortical	23.46	3.5	35.23	16.67
Cortical	3.33	10.17	91.0	7.0

TABLE 5.4 :

TROU MAGRITE (1991-1992)

AVERAGE LENGTHS OF COMMON DEBRIS TYPES (mm) FOR MAJOR RAW MATERIAL TYPES

	STRATUM 2	
DEBRIS TYPES	SPIENNES FLINT	MEDIUM-GRAIN LIMESTONE
Plain Flake	18.8	30.0
Primary Decort. Flake	24.0	29.0
Secondary Decort. Flake	28.8	38.0
Whole/Prox. Plain Blade	26.7	42.2
Non-Cortical Chunk	28.8	41.4
Cortical Chunk	31.5	61.5
Flake Core	40.0	46.2
	STRATUM 3	
Plain Flake	20.3	25.4
Primary Decort. Flake	18.8	35.3
Secondary Decort. Flake	19.9	31.4
Whole/Prox. Plain Blade	28.9	36.7
Non-Cortical Chunk	24.0	33.5
Cortical Flake	30.7	-----
Flake Core	------	-----

Table 5.3 presents detail on the average weights of the main large debris (cores, chunks, flakes, blades, bladelets) for Spiennes flint and medium-grain limestone in Strata 3 and 2. Table 5.4 gives average lengths for these debris categories by the two main raw material types for the same two "Aurignacian" levels. Both tables show that the flint debris items are consistently smaller and especially lighter than the limestone ones. Again this is probably a reflection of the differential transportation problems affecting the imported flint and the local limestone. Relatively small pieces of flint were brought to le Trou Magrite and then reduced to the maximum. In Stratum 2 the hominids were clearly acquiring more Spiennes (and other good-quality) flint and working it heavily. Whether this was directly procured in logistical trips or during the course of an extended annual round, or via trade/exchange, cannot be determined confidently at this time.

Tables 5.5 and 5.6 present the data on the relative frequencies (in terms of counts and weights) of some of the major debris classes for Strata 3 and 2 respectively.

TABLE 5.5 : Stratum 3 Lithic raw material percentages for major debris types

Lithic Types	Spiennes Flint		Med-Grain Flint		Med-Grain Limestone	
Debris Types	% Count	%Weight	% Count	%Weight	% Count	%Weight
Plain flakes	18	3	2	<1	61	93
Cortic.flakes	34	10	5	1	15	22
Plain blades	19	9	3	1	59	78
Cortic.blades	36	10	9	1	18	7
Bladelets	63	57	7	-	21	33
Cores	11	13	-	5	33	22*

*Fine-grain + crystallized limestone (no medium-grain l.s.).

TABLE 5.6 : Stratum 2 lithic raw material percentages for major debris types

Lithic Types	Spiennes Flint		Med-Grain Flint		Med-Grain Limestone	
Debris Types	% Count	%Weight	% Count	%Weight	% Count	%Weight
Plain flakes	32	5	10	2	43	91
Cortic.flakes	57	35	17	14	9	27
Plain blades	36	12	8	2	47	65
Cortic.blades	54	52	8	3	14	5
Bladelets	55	41	22	15	15	34
Cores	10	5	-	-	23	45

Unfortunately it is very difficult to identify limestone cortical debitage with certainty, so the high relative frequencies of cortical flint may be overstated. It is notable that flint cores are far less well represented than limestone ones. This might suggest that flint transport tended to be in the form of flakes and blades for reasons of weight and bulk, whether in direct procurement or in exchange systems. There was a clear selection of flint for making bladelets, which, in any event, are relatively rare in these contexts. Flint increases from Stratum 3 to Stratum 2 in relative importance in all the major debris categories except bladelets and cores (which are affected by small sample sizes).

DEBITAGE AND BLANK TYPES AT LE TROU MAGRITE

Differential depositional characteristics make it difficult to compare Strata 5 and 4 on the one hand (alluvial and colluvial deposition) with Strata 3 and 2 on the other hand (cryoclastic deposition). There may have been a winnowing effect, removing light debitage and leaving heavier cores and chunks in the strata where running water was a major force. Yet the Stratum 5 and 4 artifacts are not heavily rolled or battered, so it is also possible that the excavation trench simply did not correspond with Mousterian knapping areas, but rather with a dump zone among the blocks. The evidence from Strata 3 and 2 is much more clearly indicative of in situ activity areas (including lithic working) in the Trench C zone. Both the nature of the setting ("crevices" among blocks versus a more open level space) and of the hominid occupation also clearly influenced the composition of the lithic debris that were left behind. Table 5.7 summarized the relative frequencies of the major grouped categories of lithic debris per stratum.

TABLE 5.7 : Summary of Major lithic debris categories

Stratum	Microdébitage*	Flakes	Blades/Bladelets	Cores	Chunks
2	32.8	49.8	11.0	0.5	5.8
3	26.1	60.1	8.2	0.3	5.1
4	18.5	51.7	9.9	1.4#	18.4
5	6.3	55.4	9.1	4.5	23.6

*=trimming flakes + shatter
#: includes 1 pièce esquillée

With the caveats stated above, there are trends of increasing relative frequency of microdébitage and decreasing relative frequencies of cores and chunks through time. The percentage of flakes is fairly constant, around 55 %. The presence of blades in the basal strata is undeniable, although in absolute terms, their numbers in Strata 4 and 5 are very small. The relative frequency of blades does not increase in Stratum 3, if fact it actually decreases. Only in Stratum 2 do blades (plus a few bladelets) surpass 10% of the debris assemblage. Of note are the absence of crested blades and burin spalls in Strata 5 and 4, and their presence (albeit slight) in Strata 3 and 2. Finally, a comparison can be made of the kinds of blanks used to manufacture tools at le Trou Magrite (Table 5.8).

TABLE 5.8 : Relative frequencies of blank types used to make tools

Stratum	Flakes	Blades	Bladelets	Chunks	Number of tools*
2	72.2	22..2	0.9	4.6	108
3	80.5	9.7	-	9.7	104
4	50.0	30.0	-	20.0	10
5	57.1	14.3	-	28.6	7

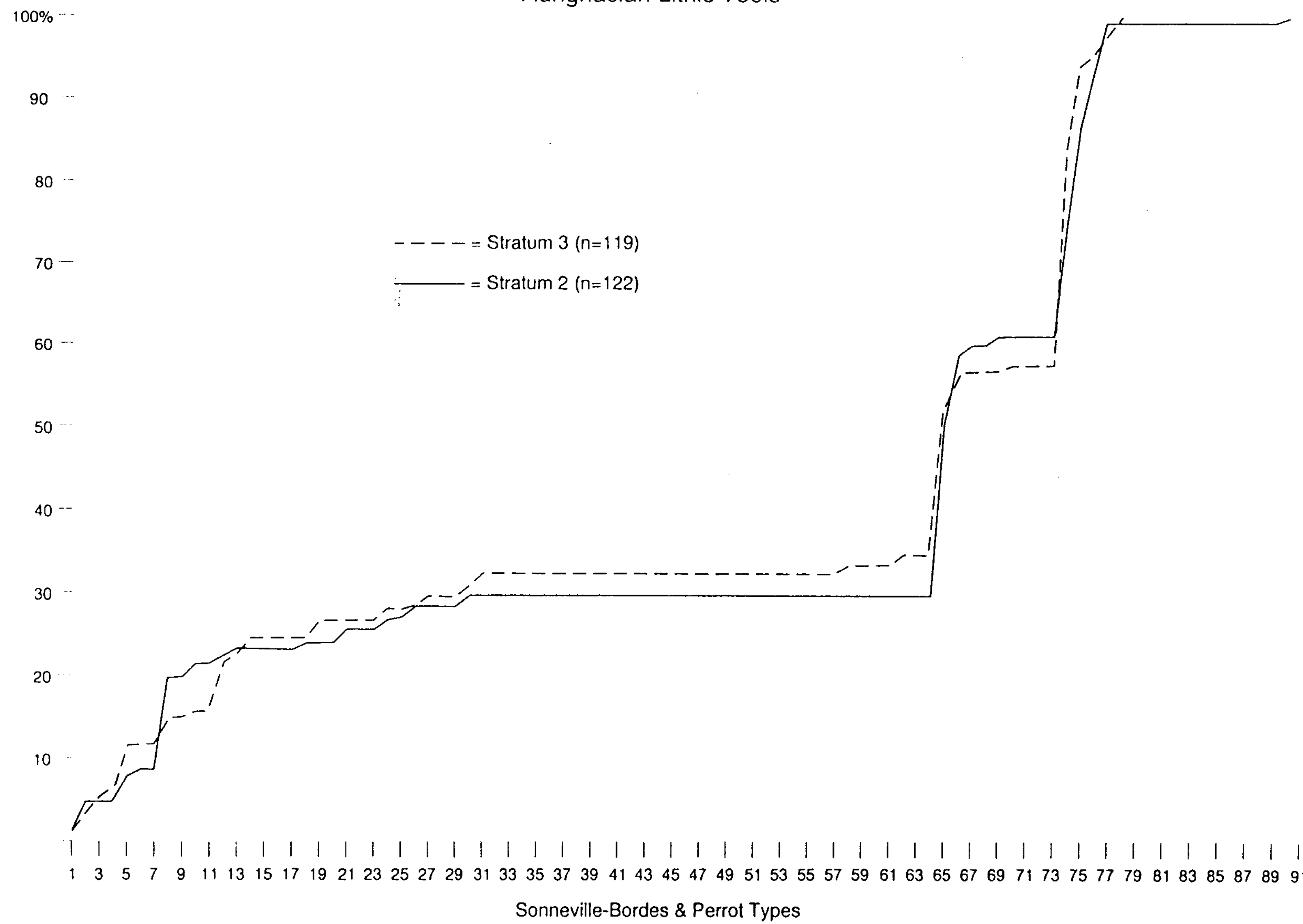
* Tools with multiple worked edges not listed as composite types in Sonneville-Bordes/Perrot typology are counted only once here.

The numbers of tools in Strata 5 and 4 are too small to make any kind of meaningful comparison for the basal levels. One can note, however, that flakes are dominant, but chunks (large angular debris) and even blades were used to make the tools of these levels. The striking and more significant differences lie between Strata 3 and 2, both classifiable on typological grounds as "Aurignacian". The tools of the older level are almost all made on flakes, with very few on blades and none on bladelets. In Stratum 2, while flake blanks remain dominant, there is a more than 100% increase in blade (and bladelet) blanks. While the blades of Strata 5 and 4 are mostly made on limestone (and almost none are made on imported flint), there are many flint blades in the upper pair of levels and their relative number and weight increase from Stratum 3 to Stratum 2, as the number and weight of limestone blades decrease. Flint was increasingly being selected, including for the manufacture of blade blanks used to make tools. While none of the Trou Magrite assemblages is very laminar and while tools were always mainly made on blades and chunks, probably for raw material economization reasons, Stratum 2 does stand out. As imported flint became more abundant, blades increased, even though flakes were still used so as to not waste this high-value resource. And the flint débitage items were always small in average size and weight. The Spiennes flint blades from both levels are on average quite short (29 mm. for Stratum 3; 27 mm. for Stratum 2) and while the limestone blades are somewhat longer (37 mm. and 42 mm. respectively), they too are generally broad. But there is a clear technological difference between Strata 3 and 2. This difference may have been conditioned by greater access to high-quality flint, presumably from the sources around Spiennes.

STRATA 3 & 2 TOOL TYPOLOGICAL COMPARISONS

While Strata 3 and 2 are typlogically very similar (Table 5.9; Figure 5.1), there are interesting and probably correlated differences in raw material and blank utilization. Although typologically "Upper Paleolithic" (and having at least one crested blade), Stratum 3 shares several characteristics in terms of raw

Figure 5.1 TROU MAGRITE, 1991-92
Aurignacian Lithic Tools



Of the 75 identified bones and teeth (3.2%, out of a total of 2,328 large mammal remains), 22 (29.3%) are of carnivores: foxes, cave bears and especially weasels. The foxes include the common and/or arctic species. There are 33 remains of hare (possibly including arctic hare) and 2 of pika. The few identifiable ungulate remains (mainly teeth or very dense bone fragments) are of woolly rhino, horse and reindeer (5 each) and 1 of ibex (see Gautier, this volume). Most of the rest of the faunal remains are obviously tiny, unidentifiable splinters, weighing on average 0.8 gm. the smallest average bone weight for any level at the site. Given the scarcity of evidence of hominid activity, it is likely that many/most of these animals died naturally in the cave or were the prey of carnivores. The rhino, horse and reindeer could be exceptions, although it is possible that their few, isolated remains had washed into the cave from the plateau via the chimney at the rear of le Trou Magrite. Bone surface condition is too poor to judge exact taphonomic processes, but running water and carnivore activity are possibilities. Carnivore gnaw marks are present on at least 4 bones; cut marks and evidence of burning are virtually absent (1 each). The lithic (1,989 gm.) to faunal (1,881 gm.) weight ratio is 1.1 to 1, indicative of the very slight human presence in the site.

The lense of nearly solid rodent bones in the upper middle part of Stratum 5 is clear testimony to the intensive, continuous use of the cave mouth as a roost by owls during part of the time that Stratum 5 was formed. This must have been a time when hominids visited the cave little or not at all. No artifacts were found in the pasty, blotchy white rodent bone lense. This owl regurgitation layer is also clear proof that the cave roof overhang had extended at least this far southwestward toward the talus in Stratum 5 times.

The artifacts in Stratum 5 are extremely few (only 115 altogether) and scattered, with no hint of any occupation surfaces. The artifacts occur singly or in very small "clusters" amidst the blocks that forced reduction of the excavation area to a mere 8 squares (and in reality much less than 8 sq.m. of loess and sand). Many may be in at least slightly secondary position. But one hint of at least local intactness is the existence (in square J8) of two secondary decortication flakes that refit.

The paleontological and archeological materials suggest that hominids were only occasional visitors to le Trou Magrite at this time and that, at least at the front of the cave, these visits were quite ephemeral.

CHRONOSTRATIGRAPHIC POSITION

The macrofauna referred to above are suggestive of cold climatic conditions during the formation of at least parts of Stratum 5. However, the sandy silt matrix was apparently redeposited, washed in by water through the karstic system, implying at least periodic high local humidity (see Haesaerts, this volume). The archeology provides little chronological evidence, since the Mousterian artifacts could date to early oxygen isotope stage 3, stage 4 or stage 5.

AMS radiocarbon dating was attempted on a bone sample, but original protein from bone collagen was essentially absent, so the determination is meaningless.

The microfaunal spectrum from the owl pellet lens in upper middle Stratum 5 provides some interesting clues as to the age of this Stratum. In his careful analysis of the extremely rich rodent assemblage, Cordy (this volume; see also 1992) finds several detailed, unique similarities with the microfauna of Couches Vg/4 in nearby Sclayn Cave. The Sclayn deposit (bracketted by radiometric dates) is assigned to the Melisey II pollen zone of the Grande Pile core in NE France. This pollen zone is well correlated with oxygen isotope stage 5b, dated to ca.95-85 kya. The rodents include a number of cold steppe forms (various lemmings, pika, Nordic vole, etc.). Cordy extrapolates the existence of generally dry, cold, open steppe environments, but with considerable winter snowfall and significant spring snow melt causing runoff and redeposition of fine sediments.

The only hint of semi-credible palynological information on vegetation and environment in the Trou Magrite sequence comes from two samples at the middle of Stratum 5, with pollen sums of 50 and 58 pollens and spores, and 5 and 10 taxa respectively.

Both samples are overwhelmingly dominated by Cyperaceae (sedges) and Pteridophytes (ferns). Despite the local humidity indicated by the ferns, trees are not represented (except for 1 pine pollen) and Poaceae (grasses) are relatively abundant. The presence of 2 pollens of Selaginella (a fern) is indicative of a cold climate (Cl.Schutz, personal communication). Despite all the necessary caveats about small sample sizes, these results seem to confirm the geomorphological and paleontological evidence of a cold, arctic steppe environment, but with local/seasonal humidity during the time of at least mid-Stratum 5 formation.

Underlying Stratum 6 was formed by even more dynamic (at times violent) water flow through the Trou Magrite karstic system, with coarse sands, water-worn gravels, pebbles and very large cobbles. Haesaerts (this volume) believes that these sediments derive from ancient fluvial terrace deposits atop the plateau, and were washed into the cave through the chimney by strong currents. This high humidity could pertain to one of the wetter phases of oxygen isotope stage 5, such as 5e or 5c. As noted above, this deposit is archeologically and paleontologically sterile.

If these interpretations are correct, the base of the Trou Magrite entrance infilling would date back to oxygen isotope stage 5. Then there seems to have been a significant hiatus, but its exact temporal extent and placement are uncertain. Stratum 4, with evidence of a cold climate and at least periodic, local humidity, alternating with dry conditions, might date to oxygen isotope stage 4. It was definitely truncated by a major episode of erosion, followed by precipitation of calcium carbonate that cemented part of the remaining Stratum 4 deposit. Strata 3 and 2 represent a major change in fundamental deposition, from waterlain to cryoclastic. Formed principally by extensive gelivation, these levels represent much colder overall conditions than the underlying strata. Strata 3 and 2 date to late oxygen isotope stage 3. They were later partially cemented with materials (heavy use of local limestone) and débitage (very high percentage of flakes, few cores) with Strata 4 and 5. Although it has higher percentages of so-called Aurignacian tool types and burins than Stratum 2, in a few respects, Stratum 3 actually "looks" more Mousterian than the two basal levels: lower percentage of blades, lower percentage of blades used as tool blanks, higher percentage of flakes used as blanks), but not much should be made of this due to the small sizes of the samples from Strata 5 and 4. However, both Strata 3 and 2 do have significant numbers of notches, denticulates, sidescrapers and raclettes: 42% and 38% respectively. And the laminar index of even Stratum 2, at around 30,000 years ago, is quite low, no doubt as a result of the site's distance from good flint sources.

TABLE 5.9 : Principal tool group indices for strata 3 & 2

Stratum	E/S	Burin	Perforator	Composite tools	Backed+Trunc.	GM	GA
2	22.9	0.8	3.2	2.4	-	37.7	4.0
3	24.3	4.1	2.5	1.7	1.6	42.1	8.4

E/S=Endscraper
GM=Mousterian tools (sidescrapers, denticulates, notches, raclettes)
GA=Aurignacian tools (Aurignacian blades, keeled & nosed endscrapers)

Both Strata 2 and 3 are rich in endscrapers, Mousterian-type tools and continuously retouched pieces (29% and 22% respectively). Both are poor in burins, perforators. Both have a few foliate point fragments: 2 unifaces in Stratum 2 and 1 biface in Stratum 3. In this last aspect, they share a characteristic of several Early Upper Paleolithic assemblages in Belgium: both ones classified as Aurignacian and others classified as Gravettian sensu lato.

THE OLD "AURIGNACIAN" COLLECTIONS FROM LE TROU MAGRITE

M.Otte, in his thesis on the Early Upper Paleolithic of Belgium, analyzed the extant collections (principally those of Dupont and Rutot at the Institut Royal des Sciences Naturelles de Belgique (IRSNB), plus smaller collections of Loe and of subsequent amateur excavators)(Otte 1979). Unfortunately the collections conserve no indications of stratigraphic provenience that would permit objective differentiation materials from the the Aurignacian and Gravettian levels as presently defined. Otte separated the lithic and osseous artifacts that are traditionally thought to be typical of each period and then characterized the Aurignacian and Gravettian components of le Trou Magrite (obviously a circular procedure, but unavoidable under the circumstances). Even so, Otte admits that very many of the 916 stone tools and 114 bone/antler/ivory/tooth artifacts cannot reasonably be attributed to one or the other of the components. (There are even some Magdalenian tools mixed in with the IRSNB collections---adding to the confusion and to the hypothetical nature of many of the cultural attributions of artifacts from this site [Dewez 1979:161].) Even further complicating the situation is the fact that Otte (1979) believes that more than one Aurignacian facies is represented in the old Trou Magrite collections (see Dewez 1985:121). Otte (1979) notes that there are two types of blades among the 58 surviving in the IRSNB collections: short, wide ones with thick bulbs presumed to be Aurignacian and long, narrow ones with diffuse bulbs and small butts presumed to be Gravettian. The blades from the new excavations correspond to the former type.

Apparently, limestone artifacts from the EUP deposits at le Trou Magrite were not saved, as Otte (1979:119) only mentions flints (fine and coarser grain, usually patinated white. The fine grain flint comes from Upper Cretaceous chalk deposits, while the coarser grain flint (our "medium-grain" type) has cobble cortex and may come from conglomerates or river beds.

The artifacts from the old Trou Magrite collections that Otte (1979) considers to be Aurignacian are keeled and nosed endscrapers, busked and keeled burins and a split-base sagaie. There are also numerous Aurignacian-type blades (invasive scalariform retouch), some of which have been worked into burins and endscrapers. And there are lozange shaped "Aurignac" sagaies, ivory rods and an ivory ring fragment, like those of the Aurignacian of Spy.

By analogy with Spy, le Trou du Renard and la Grotte de la Princesse, Otte attributes the dihedral, flat, busked, and keeled burins in the Trou Magrite collections to the Aurignacian. Otte (1979:169) tentatively assigned the 7 unifacial foliate points with invasive flat retouch in the old collections to the Gravettian (probably because the tanged Font-Robert points have similar invasive retouch). However, in the conclusions of his thesis, he observes that one of the "facies" of the Belgian Aurignacian (represented at Spy and Goyet) also contains unifacial and bifacial foliate points (Otte 1979:603). Otte, based on the very large samples (including whole points) from Spy and Maisières, distinguishes two types of foliates, whose stratigraphic positions are relatively clear at Spy and very well controlled at Maisières-Canal. Since the few points from the new excavations at le Trou Magrite are small fragments, it is impossible to place them securely within Otte's typology, especially since the two types appear to overlap. However Otte's Aurignacian type seems to be made on thicker, more massive blanks and is characterized by marginal, often scalariform retouch that can be unifacial, bifacial or inverse. The Gravettian/ "Maisièrian" type seems to be made on more elongated blades, with flatter, more invasive retouch always only on the dorsal surface and a special burination-like method of distal resharpening. By and large, and especially since one of the newly discovered Trou Magrite points (from Stratum 3) is bifacially worked, Otte's description of the Aurignacian foliates seems to better fit the 1991-92 finds. It should be noted that several other pieces with invasive retouch, while classified by us as other types, might also be included in the foliate category.

The remarkable characteristic of the new Trou Magrite collections (from both Strata 2 and 3) is the virtual absence of burins. Burins (285) and burins spalls (257) are extremely common and classic in forms. The burins outnumber endscrapers by more than 2 to 1 in the lumped IRSNB collections from le Trou

Magrite. How many of them come from the lower part of Dupont's EUP bed is, of course, unknown and unknowable with certainly. Some classic Aurignacian types are, however, among them: notably the abundant keeled and busked burins such as those illustrated by Otte (1979: Figures 36-38). Nothing like these were found in the new excavations.

Burins are quite abundant in other old Belgian Aurignacian collections, often outnumbering endscrapers. The problem with the main Aurignacian collections studied by Otte (e.g., Goyet, Spy) is that there were other levels in the same sites, but the collections had not been kept separate or that the levels had been at least partially mixed in excavation. Otte includes numerous burin types besides keeled and busked burins in his listings for the Aurignacian, including both dihedral and truncation burin categories. In at least three cases of single-component Aurignacian sites (le Trou du Diable à Hastiéres, Grotte de la Princesse à Marche-les-Dames and la Grotte de la Cave à Ben-Ahin), it seems clear that relatively abundant burins including those on truncation can be associated with classic Aurignacian endscrapers, blades and osseous artifacts. Burins in fact outnumber endscrapers at these three sites. At another site, le Trou du Renard à Furfooz, there is no Gravettian layer overlying the Aurignacian and the Magdalenian collection was kept separate (Otte 1979). Here too burins outnumber endscrapers in the small Aurignacian lithic assemblage and there are many burin spalls. However most of the burins are busked or carinated, with no truncation burins. There are no classic Aurignacian osseous artifacts and curiously the "Aurignacian" level has recently been dated on bone collagen to 24,530+470 BP (Otte 1979:102), which would place it squarely in the Gravettian time range.

Despite the problems discussed above, it would seem that burins of a variety of types (and not just busked and carinated burins) are common or even very frequent elements of the Aurignacian lithic industry in Belgium. Their near-absence from two strata dated to the Aurignacian timespan in Trench C at le Trou Magrite is surprising, especially since they seem to have been abundant in the areas of the cave dug by Dupont and Rutot. The only plausible explanation for this contrast would be to evoke an argument for activity area differentiation between the cave and the front of the terrace. Perhaps whatever activities were conducted with burins (bone/antler/ivory-working, etc.?) were done (and the worn burins then discarded) in the sheltered part of the cave, not in the area exposed to the elements beyond the dripline. Note that Trench C was virtually bereft of osseous artifacts (or even debris from their manufacture), while the old collections from the cave are very rich in bone/antler/ivory/ tooth artifacts and fabrication debris. This fact, together with the extreme scarcity of burin spalls in Trench C, supports the hypothesis of an activity area differentiation between the covered and uncovered areas of the Trou Magrite site during Aurignacian time. Finally, special sturdy types of "perforators" that have also shown by microwear studies to have been often used in boneworking, are present in the old collections from the cave (Otte 1979), but absent from the front terrace area.

On the other hand, if we can assume that endscrapers were used to scrape hides (which microwear analyses have consistently shown in numerous cases), such an activity, requiring a large, open space, might well have taken place in front of the cave, where it would not interfere with residential, cooking and manufacturing activites within the sheltered areas. This would explain the high frequency of endscrapers (as well as of side- scrapers, raclettes, and continuously retouched pieces, many of which may functionally have been cutting and scraping tools) in Trench C. Likewise, woodworking would require a great deal of unencumbered open space (albeit close to the living site), hence, perhaps, the relatively large numbers of denticulates and notches in the Trench C area.

COMPARISON AND CORRELATION WITH E.DUPONT'S STRATIGRAPHIC SCHEME

E.Dupont published his stratigraphic descriptions and designations for le Trou Magrite in several articles and books between 1867 and 1874. Despite some contradictions and occasional lack of clarity, these are remarkable documents for their time. Dupont not only was an astute observer of stratigraphy at individual sites, but he also did some perspicacious correlation of deposits among caves, based on geological and paleontological characteristics. He established a regional sequence in Wallonia that paralleled the classic sequence of southern France: Mousterian, Aurignacian, Gravettian and Magdalenian.

Dupont's various descriptions of the sequence for le Trou Magrite have been admirably pieced together, synthesized, reconciled and reconstructed by M.Dewez (1985). It is clear that Dupont found remnants of a Magdalenian at the base of his uppermost bed, called "C" by Dewez: "l'argile à blocaux", which had largely been removed by the promenade construction and cave entry clearance before Dupont's research. The bed below "C" (Dewez's B) is Dupont's "depot argilo-sableux". Dupont divided this into 4 "fossiferous levels", beginning with No.1 at the top. Parts of levels B1 and even B2 had also been removed by the 1830's construction. Bed B measured 2.5 m. thick according to Dupont, although he does not say where he made this measurement (in the cave rear chamber, vestibule or entrance area).

Dewez correlates the uppermost fossiferous level of Bed B (B1) with the Gravettian/Maisiérian component. B2 he assigns to an late Aurignacian, B3 to a typical Aurignacian (in line with Otte's idea that there are more than one Aurignacian facies at le Trou Magrite), and B4 to the Mousterian.

The base of Dupont's sequence was called "cailloux roulés ardennais" (rolled Ardennes cobbles) (Dewez's A), which measured 1 m. thick and was archeologically and paleontologically sterile.

Correlations to our strata seem apparent:

B2=Stratum 2, late Aurignacian;
B3=Stratum 3, early Aurignacian;
B4=Strata 5+4, Mousterian (+Middle-Upper Paleolithic transition?)
A=Stratum 6, sterile.

Note that the total depth of our stratigraphy is 2.5 m., whereas Dupont's total (presumably in the cave interior) was 3.5 m. below the "argile à blocaux". However, given the fact that the 1830's work had removed not only the "argile à blocaux", but also the first fossiliferous level of the "argilo-sableux" bed and part of the second in most of the cave, the remaining deposit thickness would be closer to ours. As noted above, we found no remnant of the Gravettian level (B1) and observed that the top of our Stratum 2 had been cut into and levelled by promenade construction. As cited by Dewez (1985:118-119), Dupont clearly states that the "Reindeer Age" (i.e., Magdalenian) materials came from the base of the "argile-à-blocaux" (pace Ulrix-Closet 1975: 40, who cites an unpublished note in which Rutot argued that the Magdalenian had been in the topmost of the fossiliferous levels: B1). Otte (1979:168) had also reached the conclusion that the Magdalenian level had been in the "argile à blocaux".

One possible complication with the correlation suggested above is the fact that Ulrix-Closet (1975:46) argues for the exsistence of two Mousterian occupations at le Trou Magrite: Mousterian of Acheulean Tradition at the base, followed by a Quina Charentian. This conclusion is based on typological considerations-not on any stratigraphic distinctions existing in the IRSNB collections. Hence, there are arguments for subdividing the Aurignacian on the one hand (Otte 1979), and the Mousterian on the other hand.

In addition, Dupont (1873:88) states that the lower fossiliferous levels (i.e., B3+B4) yielded "triangular flints" and "antler points" like those from Montaigle: "Mammoth Age", a mixture of Mousterian and Aurignacian in modern terms. Dupont further observes that the contents of his four fossiliferous levels intergrade, that is to say, he saw no abrupt breaks between levels, although the artifacts (and fauna) of the topmost level are quite different from those of the bottom level. He saw change as having come gradually, leading to notable changes in technology by the time of the latest level, namely, the Gravettian, with its long, narrow blades, "peeled like an onion" from "circular" (i.e., prismatic) cores (Dupont 1873:90-a description accompanied by a figure of a Font-Robert point and a narrow, elongated, denticulated blade).

Dupont's description of gradual change and intergradation between the Mousterian and Gravettian corresponds well with the nature of our Aurignacian assemblages: many Mousterian artifacts, short blades, heavy use of local limestone, few leptolithic and bone tools. In fact, while our Stratum 5 seems to be "purely" Mousterian, there are hints that Stratum 4 represents a transition to Upper Paleolithic technology. Keeping in mind that Dupont's uppermost fossiliferous level (B1) is missing in the Trench C area, our Stratum 3 can also be seen as "transitional", especially in terms of the slight manufacture and use of blades. Our Stratum 2 is even more "Upper Paleolithic" in its technological characteristics. And, based on the "Gravettian" artifacts published by Otte (1979), it is clear that the leptolithization process continued in B1, as heralded by Dupont. In sum, the Dewez (1985) reconstruction of Dupont's Trou Magrite stratigraphy squares well with the sequence uncovered in 1991-92, although it can never be positively ascertained as to whether B4 equals our Strata 5+4 or B2 equals our Strata 3+2. We favor the former scenario (Dewez's). Hence, the famous pair of works of mobile art (the engraved antler and the "Venus" figurine) from

Dupont's third fossiliferous (B3) level probably correspond to our Stratum 3, early Aurignacian, as convincingly argued by Dewez (1985) on both stratigraphic and comparative stylistic grounds. This would make these art objects, at >34 kya and possibly as old as ca.38-41 kya, among the oldest in Europe or the world, as old or older than those of the early Aurignacian at Das Geissenklösterle, Hohlenstein-Stadel and Vogelherd in SW Germany, which date to around 36-30 kya (Hahn 1986, 1988; personal communication; Bosinski 1982).

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APPENDIX

LITHIC RAW MATERIAL LIST

J.M. Leotard, A.E. Martinez, L.G. Straus
New List (1992-1993)

10. Fine-grain flint: fine grain; shiny, smooth surface; opaque to slightly translucent; blue-gray original color; patinates white; chalk cortex; inclusions rare; conchoidal fracture pattern. Source: Cretaceous of Hesbaye and Spiennes. Intergrades with 12.

11. Fine-grain flint: fine grain; shiny, smooth surface; opaque to slightly translucent; brown-yellow color; patinates white; chalk cortex; occasional inclusions; conchoidal fracture pattern. Source: Cretaceous of North Belgium.

12. Medium-grain flint: medium grain; matte, slightly rough surface; opaque; occasional inclusions; gray color, patinates white; water worn cortex; conchoidal fracture pattern. Source: Cretaceous, occurs in river beds.

13. Fine-grain flint: fine grain; shiny, smooth surface; opaque; dark brown color with occasional yellow bands; does not patinate; water worn cortex; inclusions rare; conchoidal fracture pattern. Source: Tertiary of North Belgium.

14. "Pseudo" flint: fine grain; shiny, orthogonal surface; translucent to slightly opaque; light brown to dark gray, mottled; does not patinate; water worn cortex; inclusions rare conchoidal fracture pattern. Age and source unknown.

15. Black flint: See 12, except very matte; with some rare inclusions. Source: in local limestone.

16. Black flint: very fine grain; opaque; homogeneous; no inclusions; conchoidal fracture; orange-ish chalk cortex, smooth and shiny. Source: possibly Obourg or, at Huccorgne, a local (Hesbaye) Cenomanian flint (like "Brandon" flint).

18. Patinated "Hesbaye".

19. Other flint.

20. Chert - general, non-cortical: fine to medium grain; matte or shiny, smooth surface; opaque to slightly translucent; wide color range; dies not patinate; cortex absent; inclusions rare; mainly orthogonal fracture pattern. Cretaceous, source unknown.

Chert with unworn cortex: Same as above, but with unworn cortex. Occurs in Cretaceous geological beds.

Chert with water worn cortex: Same as above, but with water worn cortex. Cretaceous. Found in river beds.

30. Phtanite: medium-grain; matte or shiny surface; opaque; jet black to grayish black; does not patinate; gray cortex with occasional metal adhesions; no inclusions; conchoidal fracture pattern. Source: Cretaceous. Occurs in geological bed at Ottignies, Central Belgium.

40. Medium-grain limestone: medium grain; soft, matte surface; opaque; gray-black; patinates gray; cortex impossible to distinguish; inclusions rare; conchoidal fracture pattern; violent reaction with acid.

41. Fine-grain limestone: fine grain; hard, matte surface; opaque; black with white-yellow flecks; light gray patina; cortex impossible to distinguish; inclusions rare; conchoidal fracture pattern; mild reaction with acid. Silicified limestone. Cretaceous. Intergrades with 15.

42. Crystallized limestone: fine to medium grain; hard, matte surface; opaque; gray-white, mottled; does not patinate; cortex impossible to distinguish; occasional inclusions; mainly conchoidal fracture pattern; mild reaction with acid ("limey chert"). Cretaceous.

50. Medium-grain quartzite (includes quartzitic sandstone): medium grain; matte to shiny surface; opaque; wide color range; does not patinate; cortex water worn; no inclusions; conchoidal fracture pattern. Occurs as cobbles in river beds.

51. Fine-grain quartzite/siltstone: fine grain; matte surface; opaque; tan-brown color with occasional bands; does not patinate; cortex water worn; manganese inclusions; conchoidal fracture pattern. Source: Paris Basin; occurs as river cobbles.

52. Quartz crystal: fine to medium grain; shiny surface; translucent to opaque ("milk quartz"); milky-white to yellow; does not patinate; cortex unworn; no inclusions; ortho-conchoidal to planar fracture pattern. Occurs in geological beds (included in the local limestone).

53. Sandstone.

54. Brussels sandstone.

55. Psammite: light brown with manganese oxide stains; medium-coarse grain (looks like quartzite); opaque; occurs in Lesse river valley and at Gendron railroad station. In the form of tabular plaquettes. Sandstone with quartz grains and mica inclusions.

56. Calcite.

90. Ochre/hematite.

99. Other stones.