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THE BOIS LAITERIE MAGDALENIAN LITHIC INDUSTRY

L. G. Straus and J. Orphal
with the assistance of A. Steffen

Introduction

The lithic assemblage from Bois Laiterie Cave contributes to the growing list of Magdalenian collections from the Meuse Basin of Belgium and adjacent areas of French Ardennes and Dutch Limburg that date to the traditional Bölling phase (plus late Dryas I at the earliest and early Dryas II at the latest), c.13,000-12,000 years ago (uncalibrated). Until recently, the technology of the period of Bölling recolonization of Belgium was known mainly from the 19th century excavations and publications by Edouard Dupont of such major cave sites as Chaleux and Goyet, located on tributaries of the upper Belgian Meuse, as well as from the early 20th century work of J.Hamal-Nandrin and J.Servais at Coléoptère on the Ourthe, a tributary of the lower Belgian Meuse (see Dewez,1987). While several collections from modern excavations of Upper Magdalenian deposits at such sites as Roc-la-Tour (near the Semois-Meuse confluence in France), Trou des Blaireaux (above the Meuse at Vaucelles near the French enclave of Givet), Trou Dasomme (near the Meuse-Lesse confluence upstream of Dinant) and Trou Walou (on the Vesdre, another tributary of the lower Belgian Meuse) are not yet fully published, the corpus of data has grown significantly with the publication of the new excavations of remnant cave deposits at Chaleux (Lesse valley) by Otte *et al.* (1994) and of the recently discovered open-air sites of Orp Est and West (Brabant) (Vermeersch *et al.*,1987; Vermeersch 1991), Kanne (Belgian Limburg) (Vermeersch *et al.*,1985), Mesch and Eyserheide (Dutch Limburg) (Rensink,1993). The purpose of this chapter is to describe the 12,600 BP Upper Magdalenian lithic assemblage from Bois Laiterie Cave, and to thereby add to the record a kind of occupational residue not yet well represented among the Magdalenian sites of the Meuse Basin: *i.e.*, materials from a small, uncomfortable cave with a poor solar orientation (north-facing), but with a strategic location dominating a critical gorge passageway between the Meuse canyon and the Meuse-Sambre interfluve plateau. Other small caves site, possibly analogous to Bois Laiterie, exist (*e.g.*, Trous Abris and Da Somme), but their materials are very scanty and are as yet only very summarily published (*e.g.*, Léotard, 1988 and 1993).

As argued earlier (see Straus and Martinez; Courty, this volume), there are no substantive reasons for stratigraphically subdividing the Magdalenian materials from Bois Laiterie Cave. The site can be considered to be single-component in nature. And while the artifacts in Strata YSS+BSC (plus a few outlier items of the same raw materials, technological and typological characteristics from right above and below this horizon) probably resulted from more than one actual episode of human use of the cave, they were probably deposited within a relatively short interval of time, perhaps by repeated, short-term, functionally-similar visits to the cave, as suggested by the three identical AMS-radiocarbon dates of 12,600 BP on materials from different parts of the cultural horizon within the cave. For this reason (and since any attempt at subdivision would reduce sample sizes to numbers that would make statistical analysis difficult or meaningless), we are treating the assemblages of lithic debris (cores+debitage) and tools as single entities, whose characteristics are

believed to represent the «averaged» residues of essentially redundant human uses of a limited-function site. The totals given here include small numbers of artifacts recovered by Ph.Lacroix in several small test pits he dug at the rear of the lower cave when he discovered the Magdalenian site in 1990. These were clearly all from YSS.

Overview of the Assemblages

We recovered (both in the course of excavation and during fine screening) a total of 3,369 lithic artifacts (not including manuports [psammite slabs or «plaquettes», water-worn cobbles, fire-cracked rocks]) (Tabs.4 and 5). Of these objects, 2,577 (76.5%) were found in Stratum YSS (yellowish-red sandy silt), including the localized grey lens (possible diffuse burning area) at the front of the cave. Another 699 (20.8%) lithic artifacts of identical morphological and raw material characteristics were found in underlying «Stratum» BSC (basal silty clay) toward the cave mouth and in its lateral facies, RS (red sand) toward the cave rear. Only 68 (2.0%) artifacts of Magdalenian appearance were found above YSS in sandy deposits (UGS [upper grey sand], LBS [light beige sand]) locally in contact with the base of the breccia adhering to the south and especially east walls of the cave. These latter include only four formal tools: backed, truncated and retouched blades and a backed bladelet.

It should be noted that *no* obvious Mesolithic or Neolithic types of lithics (*e.g.*, no geometric microliths or Montbani blades, or any artifacts made of Wommersom quartzitic sandstone, so characteristic of the central Belgian Mesolithic) were found either in these *in situ* deposits above YSS or during the screening of large amounts of mixed backdirt from the pothunter diggings into the post-Magdalenian deposits of the cave. Nor were ceramics or any other modern artifacts found in any of the intact strata of our excavations (including LBS or UGS, which sealed YSS).

Of the 3,369 lithic artifacts, 266 (7.9%) are retouched tools that can be classified into the standard descriptive Upper Paleolithic typology of D.de Sonneville-Bordes and J.Perrot. (Tool blanks that have more than one typological classification, but do not conform to any of the «composite tool» categories defined by that typology are counted more than once when we refer to tool types - but *not* when we refer to blank characteristics, such as dimensions and weight. Thus, of the 254 tool blanks, 11 have two separately counted tool types and one has three types.) The 3,115 unretouched debris (3 cores - not including one from the old backdirt - and 3,112 items of debitage) have been classified according to a technologically-oriented type list developed by Straus and students over the course of many Upper Paleolithic excavations throughout Western Europe. The ratio of debris to tools is 12 to 1, which is relatively low, as compared with other assemblages - such as the Middle and Upper Magdalenian Strata 5 and 4 of the Abri Dufaure, located near good flint sources in SW France, with ratios of 18-19 to 1 (Straus 1995), or Upper Magdalenian Level 24 of La Riera Cave, also located near some lithic sources in northern Spain, with a ratio of 15 to 1 (Straus and Clark 1986) - both collected with similar screening procedures and meshes. This fact (together with the scarcity of cores) immediately suggests that *much less than the complete lithic reduction sequence is represented* at Bois Laiterie Cave.

Lithic Raw Materials

Lithic raw materials represented among the Bois Laiterie assemblages were classified according to an *ad hoc* typology developed during the course of the South Belgium Prehistoric Project by Straus, J-M.Léotard, A.Martinez, R.Miller, M.Otte, E.Teheux, *et al.* This typology is described in Tab.6. There is some disagreement and much uncertainly among us as to the exact, specific sources of many of the lithic types represented at Bois Laiterie and there is some degree of overlap among some of the categories, suggesting that some of the distinctions may be somewhat arbitrary. Such is the case of the predominant flint(s) represented at Bois Laiterie: «types» 10, 11 and 12, which are all excellent-quality, homogeneous, fine-grain, nodular chalk flint of probable Cretaceous origin that intergrade in color, grain, degree of translucence, inclusions, and cortex. Type 18 is probably just a heavily patinated variety of one or more of these flints. Type 19 consists of probable variants of these types. The only other flint of any quantitative significance at the site is type 9, which is highly distinctive by its extraordinarily fine grain, homogeneity, opacity, black crystalline inclusions, shininess and excellent flaking characteristics. Other lithic materials are of absolutely negligible importance at Bois Laiterie.

By count, 95.6% of the debris are of flint types 10,11,12, 18 and 19 combined; by weight (a measure which is more significant relative to human transport considerations), 90.9% of the debris are of these five flint types, whose total combined weight is 1,975 gms (only 2 kg, or 4.4 pounds) (Tab.7). Among the tools, by count 88.6% are on these 5 flint types, and by weight, 86.3% - totalling only 636 gms (0.64 kg or 1.5 pounds).

Type 9 flint is the only other lithic raw material of any consequence (albeit in reality minimal) at Bois Laiterie: 3.2% by count and 5.7% by weight among the debris and 8.2% by count and 11.4% by weight among the tools. The fact that the percentages by weight far exceed (almost by twice) the percentages by count for this distinctive raw material, is interesting in comparison with the five other combined flint types, for which percentages based on count and on weight are almost identical for both debris and tools. This means that type 9 artifacts are on average heavier than the artifacts made on the combined five-flint group. Indeed, average weight of the 120 artifacts (tools + debris) on type 9 flint is 1.7 gms, whereas average weight of the 3204 artifacts made on types 10-12 + 18-19 flint is only 0.8 gms.

Although not yet confirmed by petrographic analysis, the «common» flint types (especially types 10 and 12, but also 11, 18 and 19) probably come from Upper Cretaceous (Maastrichtian) chalk limestone sources, either on the Hesbaye Plateau (Brabant, northern Namur and northern Liège provinces) to the north and northeast of Bois Laiterie or in the Mons Basin of Hainaut Province to the west (Caspar 1984). The closest known specific sources of flints that are similar (by visual inspection with the naked eye or with a hand lens, and by touch) to the «common» Bois Laiterie flints are Orp (on the Brabant-Namur border) and Spiennes (nears Mons). Both of these flint sources have not only Neolithic flint mines, but also Magdalenian sites (Vermeersch *et al.*,1987) or at least «terminal Paleolithic» in the case of Obourg-St.Macaire near Spiennes (Létocart,1970). The Orp locality is 39 km from Bois Laiterie via a route down the Meuse to its confluence with the Sambre at Namur and then further north up onto the Hesbaye Plateau. Spiennes is 63 km to the west of Bois Laiterie via a route over the Meuse-Sambre interfluve, up the Sambre valley and then across the Sambre-Escaut (Scheldt) interfluve (following the route of the modern Canal du Centre). There are no Cretaceous chalk limestone outcrops between Orp (at the western end of the Hesbaye «formation») and Spiennes (the Hainaut «formation») and there are none in the upper Meuse region

at all, which runs along the western edge of the Ardennes Plateau with its Devonian schists and narrow bands of Carboniferous limestone. That our flint types 10, 12 and 19 are at least sometimes the same thing, is demonstrated by inter-type refits at BL (see Straus and Martinez,this volume).

On the other hand, type 9 flint *may* be material of Secondary age redeposited in Tertiary deposits either in the area of Agimont-Doische (25-30 km upstream [south] along the Meuse) (E.Teheux,1994, and personal communication) or in the area of Charleville-Mézières (France) (c. 75 km up the Meuse from Bois Laiterie) (J-M.Léotard, personal communication). If the Agimont hypothesis is correct, then this flint would have been the marginally more «local» high-quality material - a possibility that squares with the heavier weight of the artifacts made of it. This hypothesis also would make sense in light of the presence of Magdalenian sites all the way up the Meuse from Goyet and Bois Laiterie to Roc-la-Tour in French Ardennes, via the Dinant-Lesse Valley site cluster (Chaleux, Frontal, Nutons, Abri, Magrite, Da Somme) and Trou des Blaireaux at Vaucelles near Doische. It is this southward axis that would lead eventually toward the Paris Basin, a major region of contemporaneous Upper Magdalenian settlement and the source of fossil shells found in several Belgian Magdalenian sites, including Bois Laiterie (Taborin,1994; see Lozouet and Gautier,this volume).

Nonetheless, the fact that the vast majority of flints at Bois Laiterie probably come from Cretaceous chalk sources suggests that the most significant, common contacts of Bois Laiterie human inhabitants were with the Hesbaye and/or Hainaut regions of Middle Belgium, at least during the times of the year when they were at Bois Laiterie or in the northern part of their annual range or territory and/or possibly coming from the chalk regions.

Lithic Debris: Cortical vs Non-cortical

The presence or absence of cortex on lithic artifacts is an important datum for the reconstruction of prehistoric operatory chains, including the significance of lithic transport and hence human mobility patterns. The Bois Laiterie assemblage is striking for its scarcity of cortical items - especially those with completely or mostly cortical dorsal surfaces.

There are 3,115 items of lithic debris (cores+debitage) attributable to the Magdalenian component at Bois Laiterie (Tab.8; Fig.1). Lithic debris weighs a total of 2,174 gm (2.2 kg), whereas retouched tools from the site total 737 gm (a high 34% of the debris weight). Among the debris, there are only three tiny cores (or perhaps mere core remnants; see below) and 23 chunks (angular debris >1 cm in length), of which only 8 have any cortex. Most chunks are very small.

In reality, the debris assemblage is essentially a light debitage assemblage, fully half of which is composed of trimming flakes (< 1 cm). Of the 1,555 trimming flakes, only 28 have cortical dorsal surfaces. Similarly, of the 265 small angular debris (shatter, < 1 cm), only 7 have any cortex. Fully 58.4% of the debris assemblage is composed of microdebitage (trimming flakes and shatter).

Of the 495 larger flakes (> 1 cm), only 80 have any cortex (and of these, only 9 have fully cortical dorsal surfaces). There are 387 non-cortical blades (> 2 cm) versus only 72 with any cortex and 259 non-cortical bladelets versus only 7 with any cortex. In total, only 6.5% of all the debris (and tool blanks) has any cortex (generally partial), versus 93.5% non-cortical. Among the microdebitage (trimming flakes and shatter, which is either produced at the locus of primary knapping or in the course of retouching/resharpening), only 1.9% have any cortex. Together with the

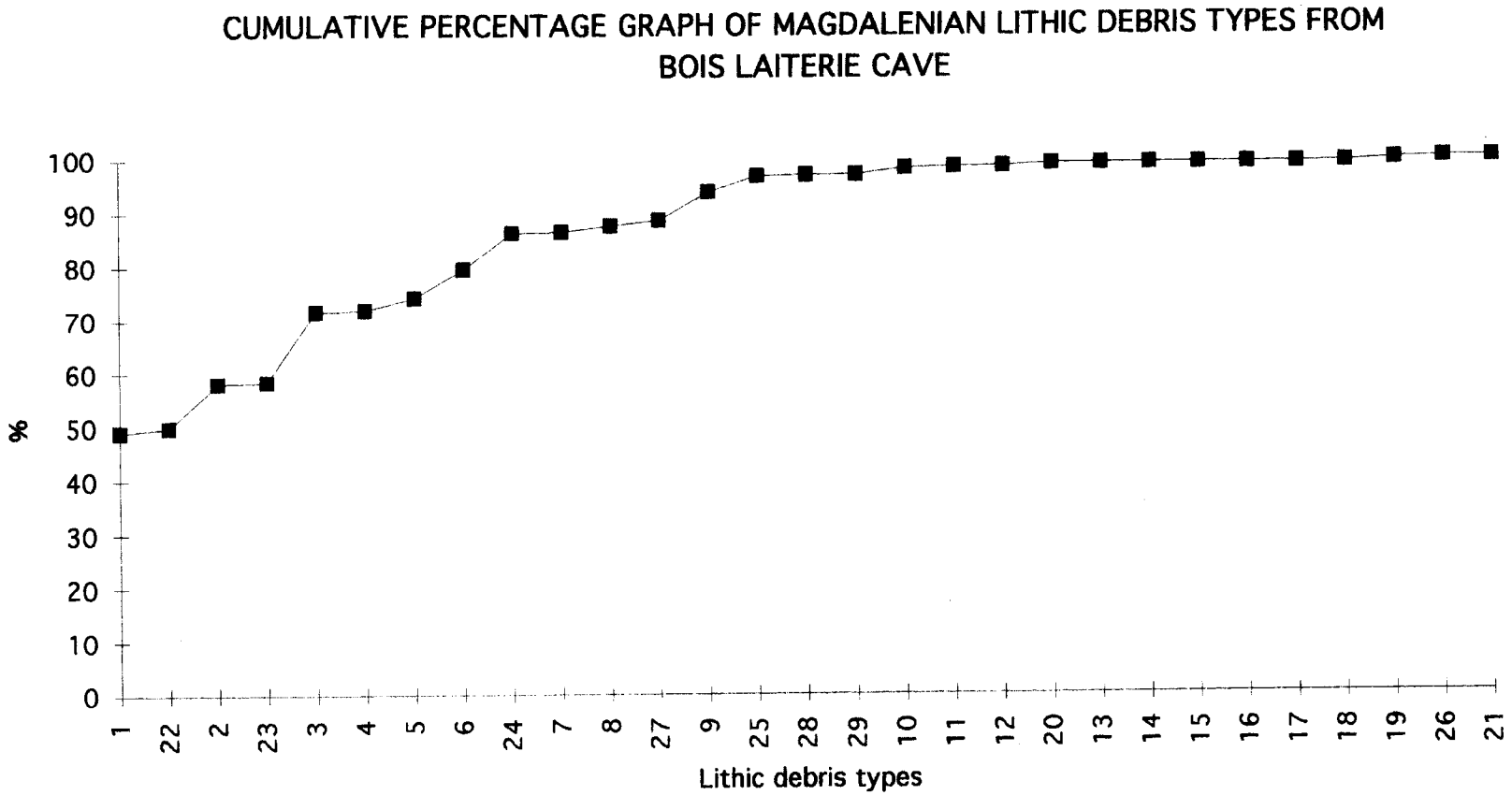

Fig.1- Cumulative percentage graph of combined Magdalenian lithic debris assemblage from Bois Laiterie Cave.

fact that trimming flakes outnumber shatter (small angular debris) by nearly 6 to 1, this would clearly point to final tool-shaping activities rather than to initial reduction at Bois Laiterie. (By contrast, in the Middle and Upper Magdalenian levels of l'Abri Dufaure, with much more evidence of complete reduction sequences, the ratios of trimming flakes to shatter are a much lower 4.3-4.6 to 1[Straus,1995].) Further indications of tool production from blanks (and/or resharpening of tools) at Bois Laiterie include the relatively high number of burin spalls (37, 1.2% of the debris total).

Not surprisingly (especially given the huge masses of non-cortical trimming flakes and small bladelets), the average weight of non-cortical debris is only 0.61 gm(!), while the average weight of the (few) cortical debris is more than three times as great, 2.0 gm. The average weight of all microdebitage (trimming flakes and shatter combined) is only 0.16 gm, a fact which gives a good idea of the diminutive size of much of the Bois Laiterie lithic assemblage.

Lithic Debris: Cores

As noted above, three small, exhausted cores were found in the Magdalenian horizon (all actually in Stratum YSS). In addition, one other core was found in backdirt from the pothunter diggings; it, by its morphological and raw material characteristics, is almost certainly from the Magdalenian - one of the very few lithics artifacts found by us in the old backdirt (n=18). All four cores are of excellent type 10 non-local chalk flint. Formally classified as 1 prismatic blade core, 1 prismatic blade core and 2 mixed cores, all were used for producing small laminar blanks and were reduced to the maximum (Fig.2). Length ranges between only 40-50 mm (average length=44.25 mm), width between 16-49 mm (average=33.0 mm), thickness between 11-20 mm (average=17.25 mm), and weight between 1 (!)-46 gm (average=24.5 gm). These really are the minimum expressions of the «nucleus» category - both quantitatively and in terms of size. Average weight of «chunks» is only 0.96 gm. - no larger than that of all flakes excluding trimming flakes (1.33 gm).

In addition to the scarcity of cores (and of «large» angular debris/chunks: 0.7 of the debris total), there are only 13 possible platform renewal flakes (0.4%) and only 12 crested blades (0.4%) - only 3 of which are bidirectional. Combined with the very low number of cortical debitage items and the light weight and small size of the artifacts in general, these facts clearly indicate that Bois Laiterie is far from the locus of primary reduction and that this is a transported assemblage. No hammerstones or antler billets were found. It is conceivable that light flaking and retouching could have been done with hardwood implements, since trees were present in the Bölling landscape of Wallonia.

Lithic Debris: Blades and Bladelets

The Bois Laiterie debris and tool assemblages are highly laminar. Here «blades» are defined as being at least twice as long as wide and > 2 cm long (and essentially parallel-sided); «bladelets» are 2 cm long or less. Most of our «blades» would be classified as «bladelets» by other researchers who use a cut-off value of 5 cm, for example.

Among the total debris at Bois Laiterie, 14.7% are blades by our definition and 8.6% are bladelets, for a total laminar index of 23.3%. If one eliminates microdebitage and cores from

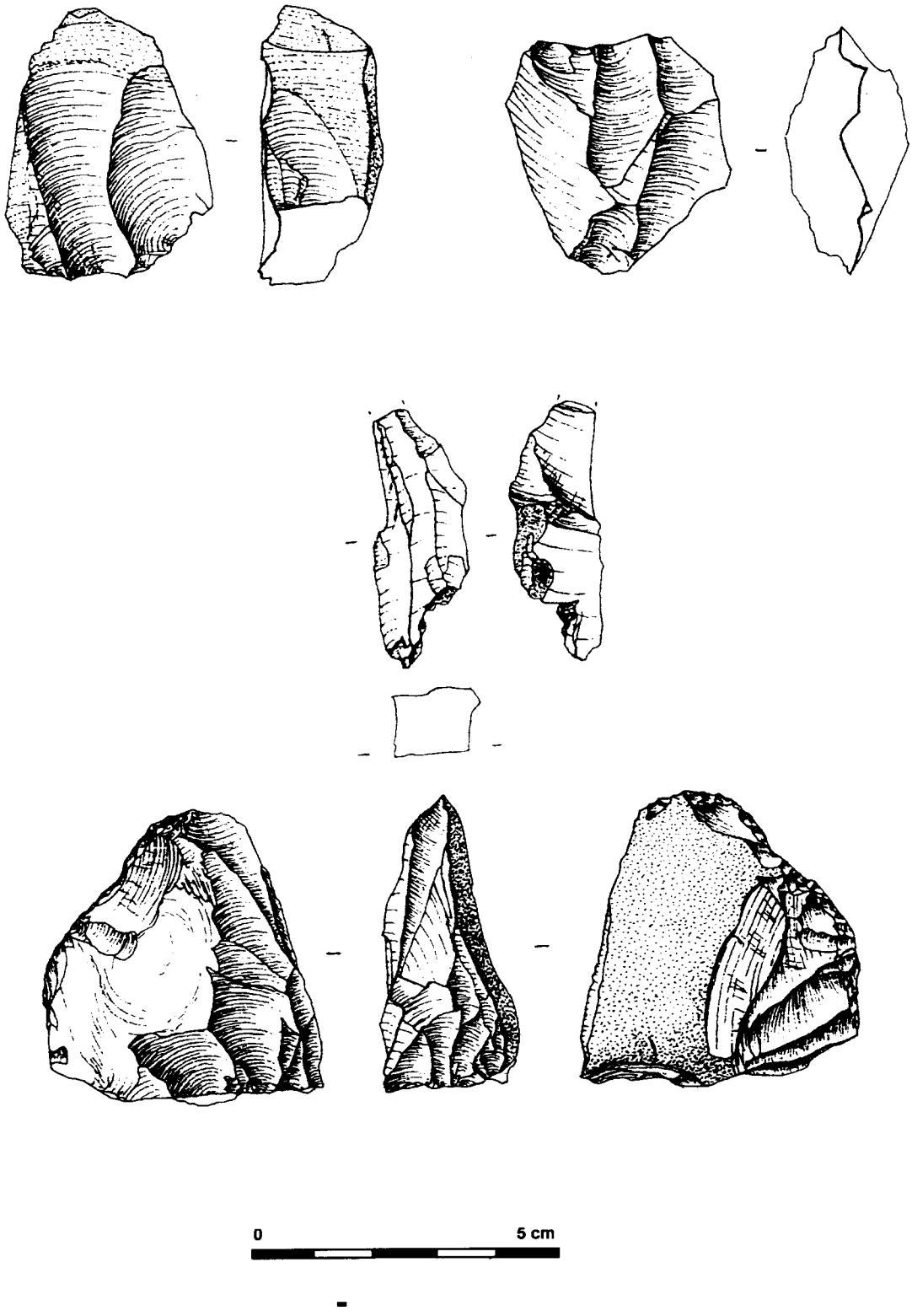

Fig. 2- Bois Laiterie (Magdalenian): cores.

consideration, leaving a total of 1,292 items of larger debitage, blades+bladelets make up 56.1%. Average weights of blades and bladelets are 1.95 gm and 0.54 gm, respectively; average weight of blades+bladelets combined is 1.43 gm.

In terms of the laminarity of the retouched tool assemblage, 68.1% of the tools are made on blades and 22.2% on bladelets, for a total of fully 90.3%. Nearly all the tools at Bois Laiterie were produced on small blades and bladelets - a leptolithic and laminar industry indeed. Flakes and chunks (8.7% of the assemblage) were simply not chosen to make formal tools and were just discarded with little if any (at least macroscopic) evidence of use.

Combined blade/bladelet size information is provided below (including both whole and fragementary items):

TABLE 1

Blades+Bladelets	N	Av. Length	Av. Width	Av. Thickness
Unretouched	405	27.57 mm	13.47 mm	3.64 mm
Used for Tools	219	30.79 mm	13.15 mm	4.24 mm

The difference in average lengths is statistically significant at the 0.05 level ($.01<p<.02$). The average length of *whole* unretouched blades+bladelets (n=95) is 37.82 mm and the average length of *tools* made on *whole* blades+bladelets (n=37) is 51.46 mm. The difference in average lengths of *whole* blades+bladelets is also statistically significant at the .05 level ($p<.001$). Clearly, longer blades/bladelets were selected for the manufacture of formal tools/weapon elements. Among unretouched whole blades+bladelets, in terms of length, 16.8% are <20 mm, 16.8% are 30-20 mm, 25.3% are 31-40 mm and 41.1% are >40 mm. But among the *tools* made on whole blades+ bladelets, fully 78.4% are >40 mm in length. The average length of *all* tools that are not backed blade(let)s (*e.g.*, endscrapers, burins, perforators, truncated and retouched pieces) is 35.43 mm.

The average width of whole unretouched blade(let)s (n=95) is 14.06 mm and that of tools on whole blade(let)s is 17.5 mm (statistically different at the .05 level [$.001<p<.01$]), whereas average thicknesses for the same same samples are 4.3 mm and 5.95 mm (statistically different at the .05 level [$.001<p<.01$]). Tools on whole blade(let)s are mainly in the single length mode of 51-60 mm, while the single length mode for unretouched whole blade(let)s is 31-40 mm, considerably smaller (Figs.3 and 4). In terms of width, tools on the sample of whole blade(let)s fall mostly in the two modes of 6-10 mm (our »backed bladelets») and 16-25 mm, whereas there is a single width mode of 11-15 mm for unretouched blade(let)s, precisely the group *not* much selected for tool manufacture (Figs.5 and 6). The thickness mode for tools on whole blade(let)s is 5-8 mm, but this mode for unretouched whole blade(let)s is < 4 mm (Figs.7 and 8). There seem to have been fairly standardized optimal blank sizes for the manufacture of tools/weapon elements on blade(let)s; other potential laminar blanks were often discarded unretouched.

Average weight of blades is 1.95 gm, while average weight of backed, truncated and retouched blades is 2.62 gm; but the average weight of bladelets is 0.54 gm, practically identical to the average weight of backed and retouched bladelets at 0.51 gm. This would seem to suggest selection for very small (light, narrow, but not too thin) blanks (in turn slightly further reduced in size by retouch) for the purpose of making microlithic weapon elements, whereas other retouched blades

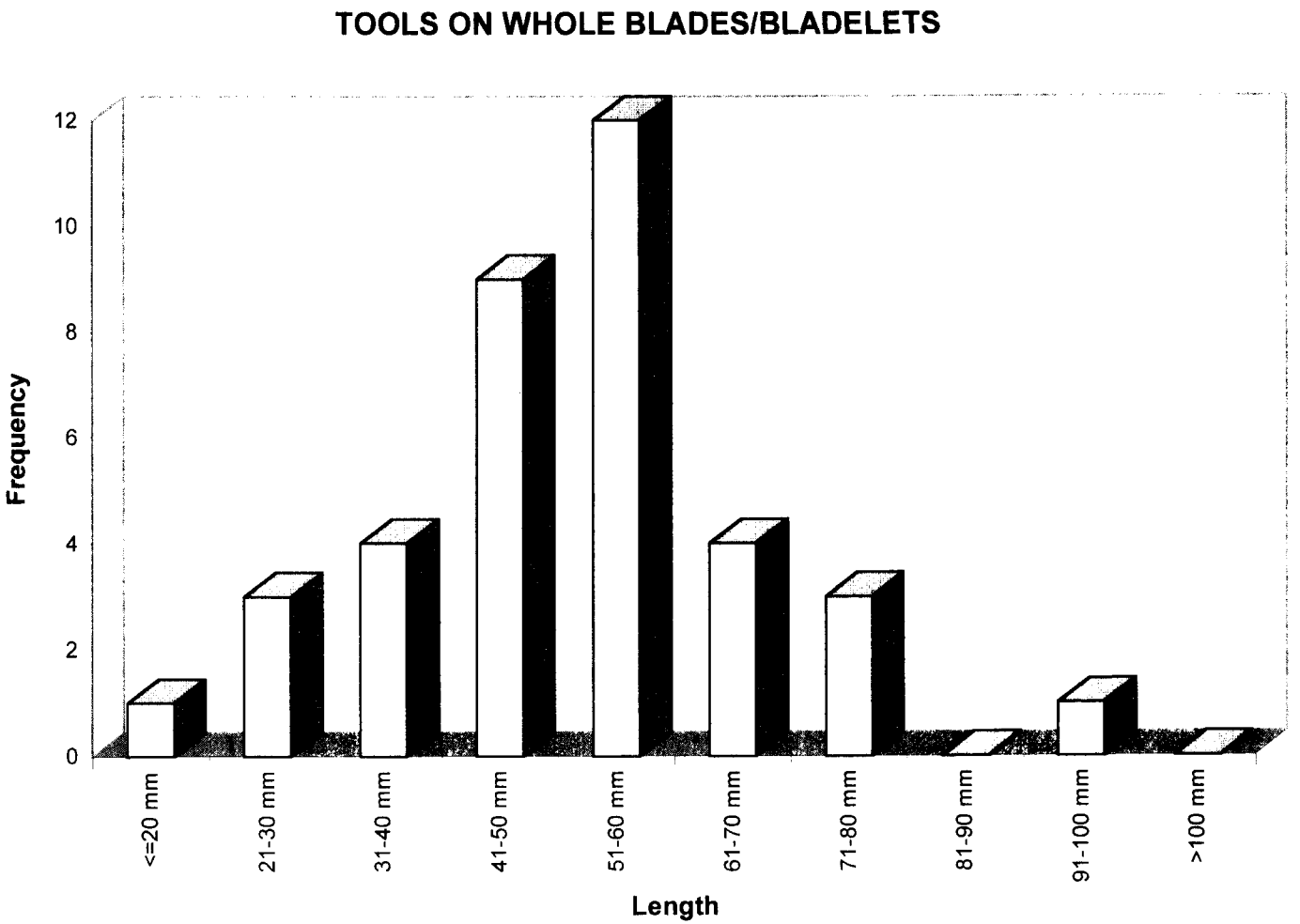

Fig.3- Histogram of lengths of tools made on whole blades and bladelets.

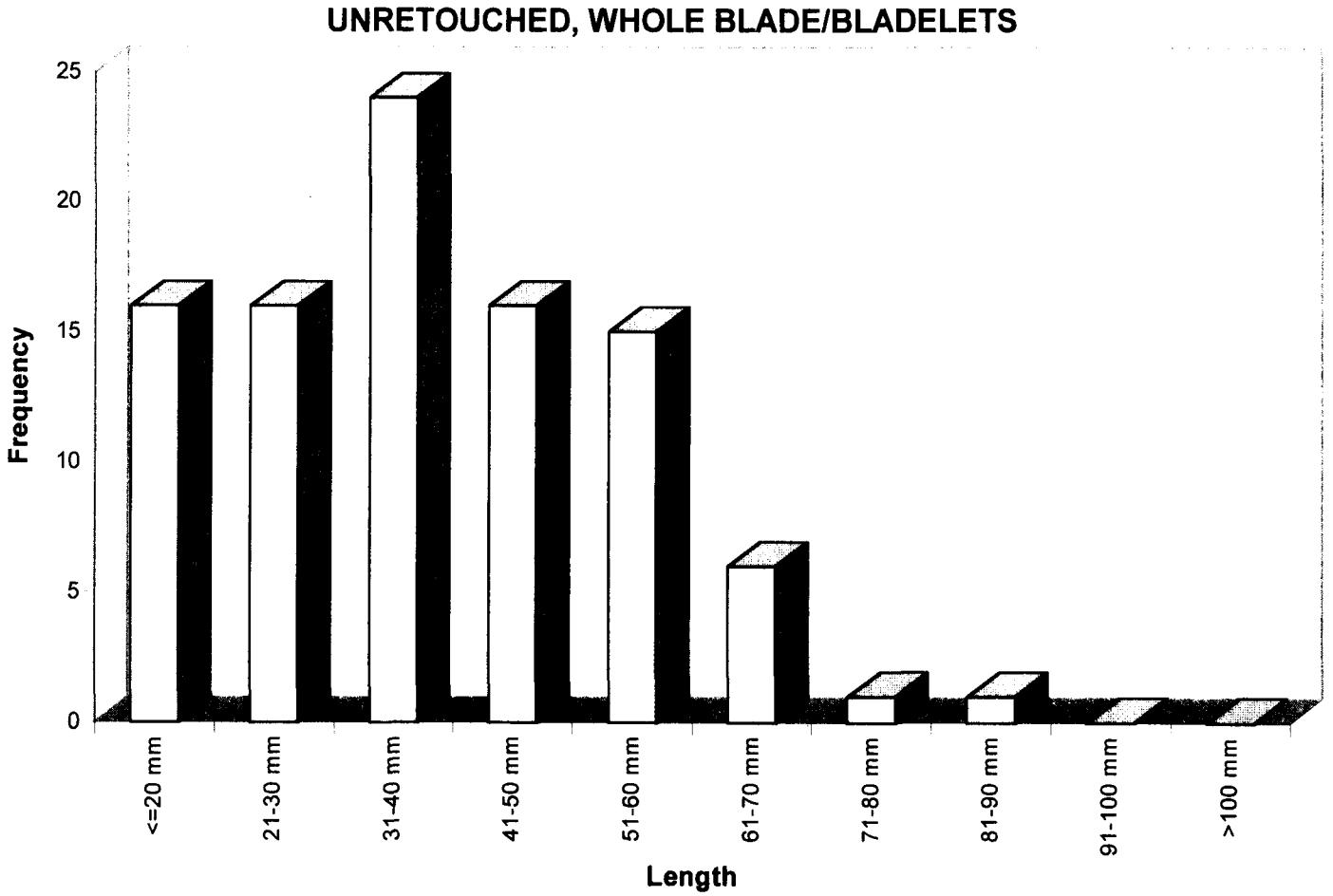

Fig.4- Histogram of lengths of unretouched whole blades and bladelets.

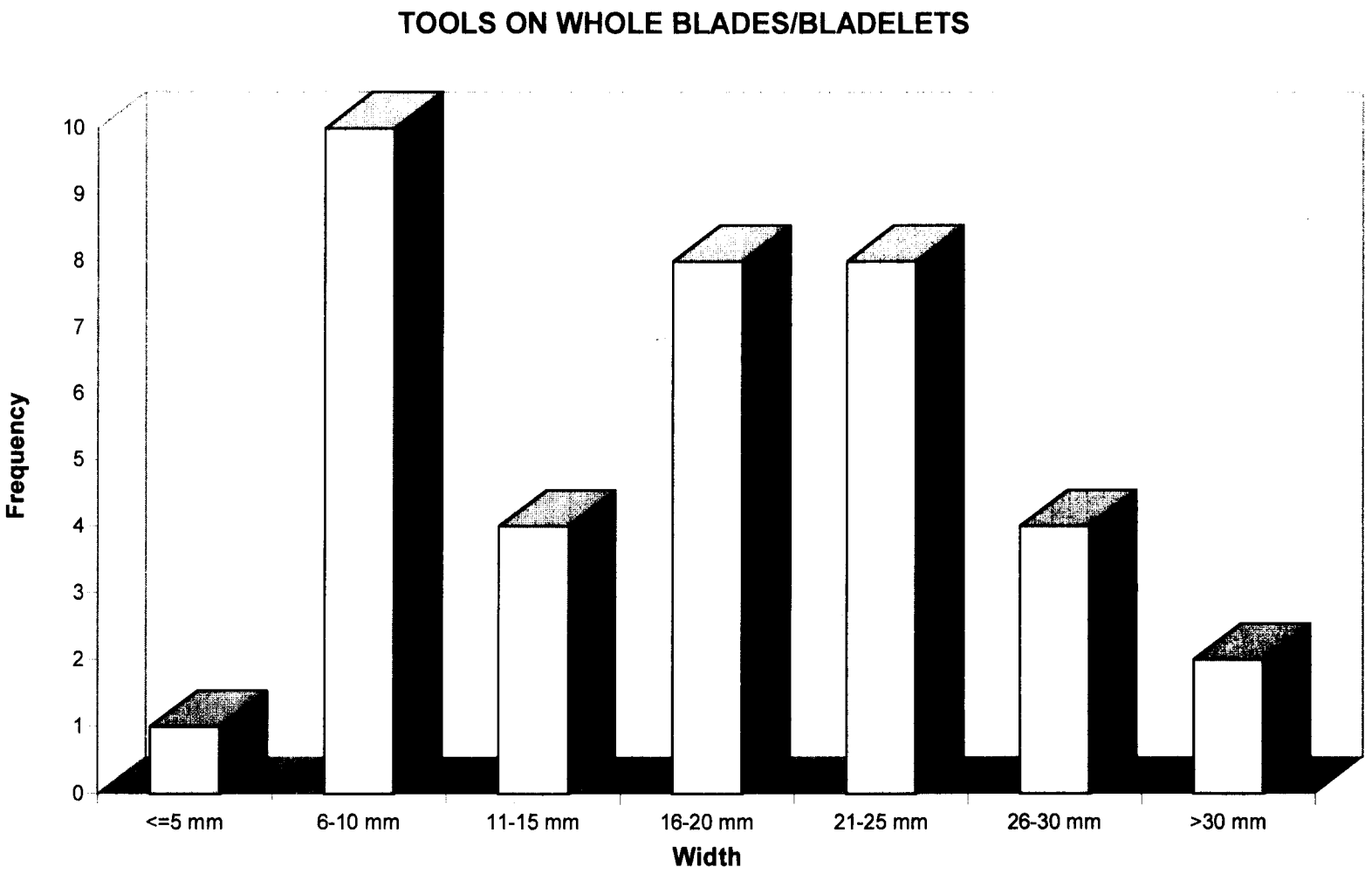

Fig.5- Histogram of widths of tools made on whole blades and bladelets.

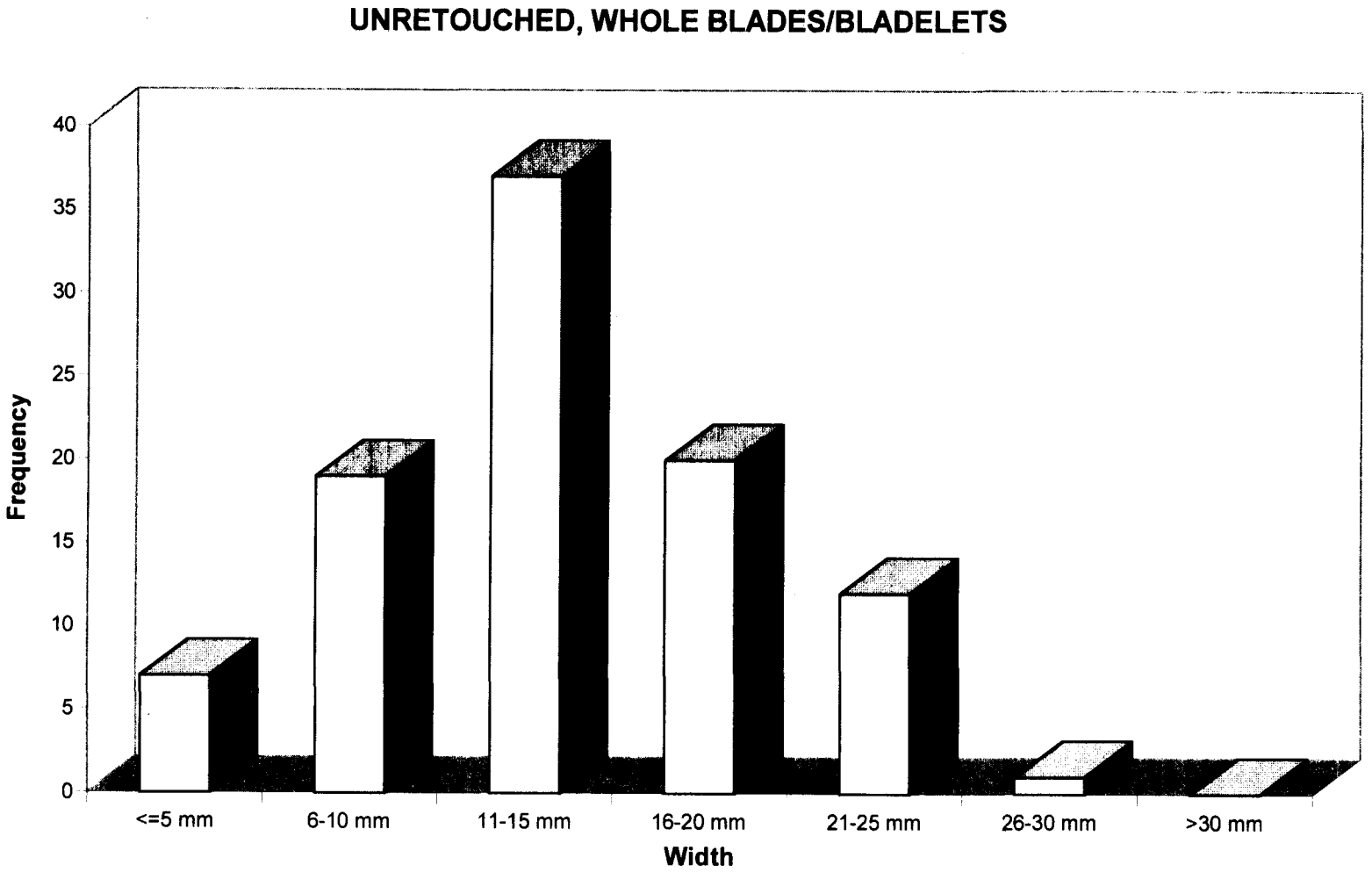

Fig.6- Histogram of widths of unretouched whole blades and bladelets.

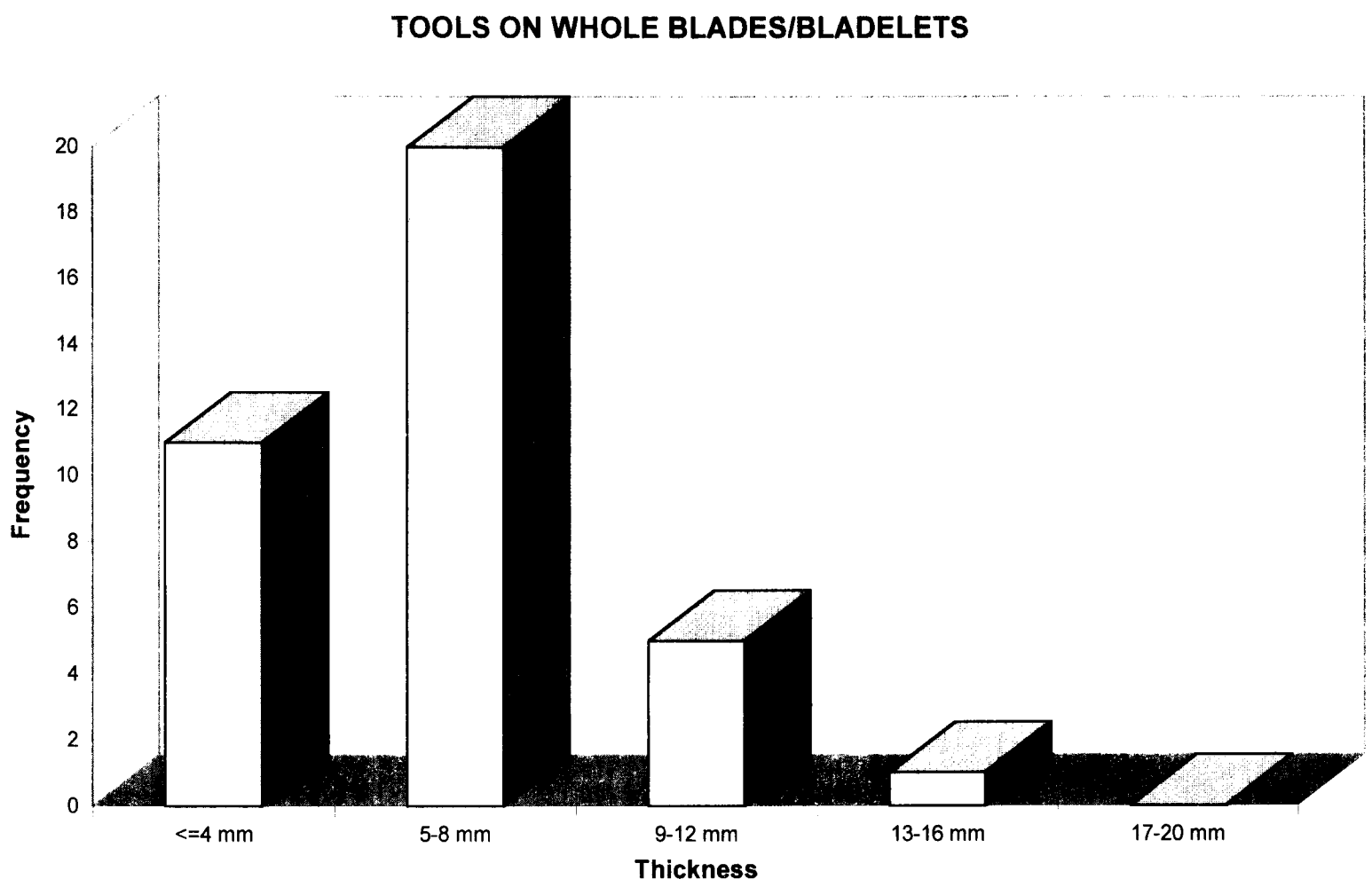

Fig.7- Histogram of thicknesses of tools on whole blades and bladelets.

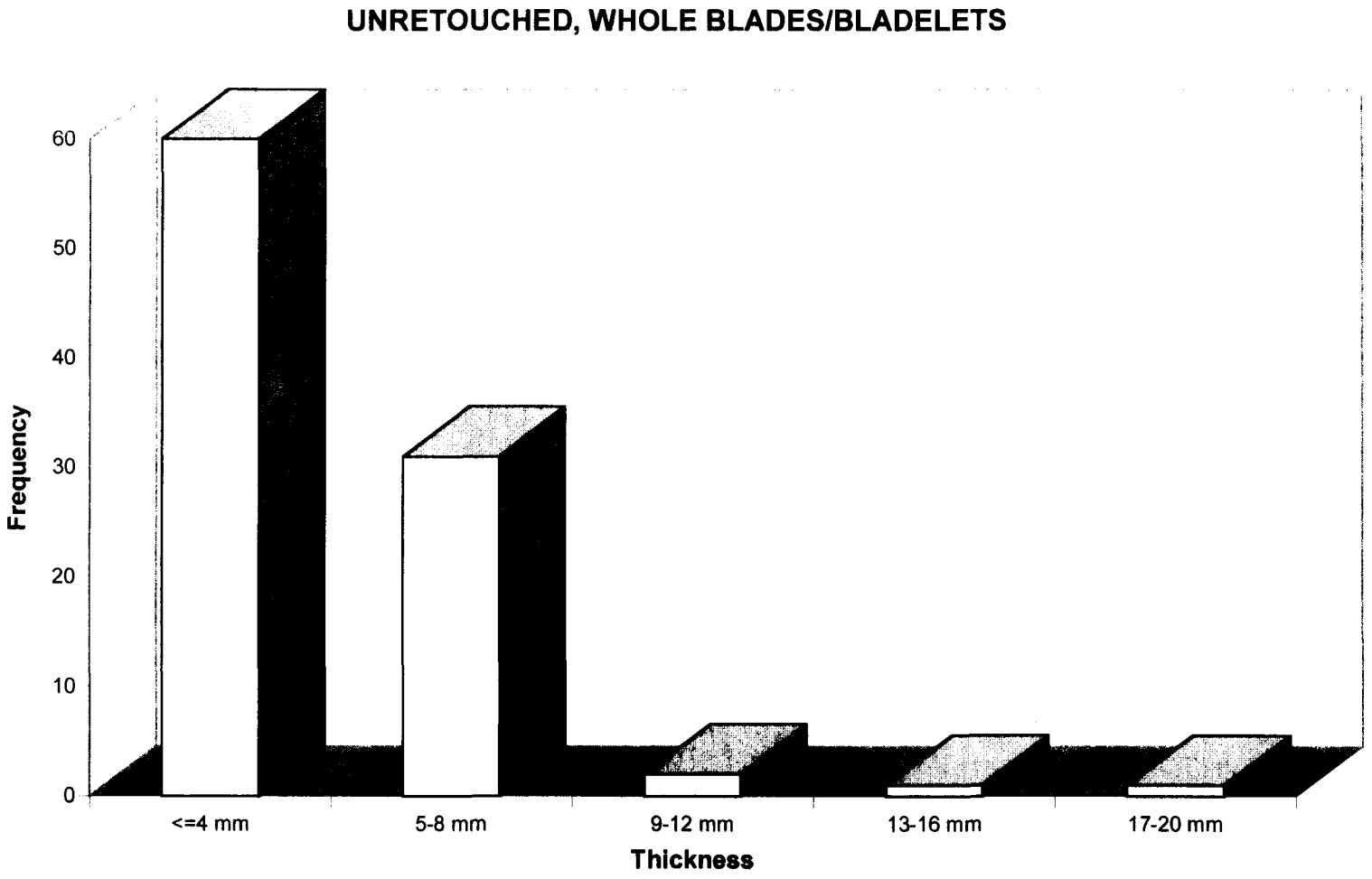

Fig.8- Histogram of thicknesses of unretouched whole blades and bladelets.

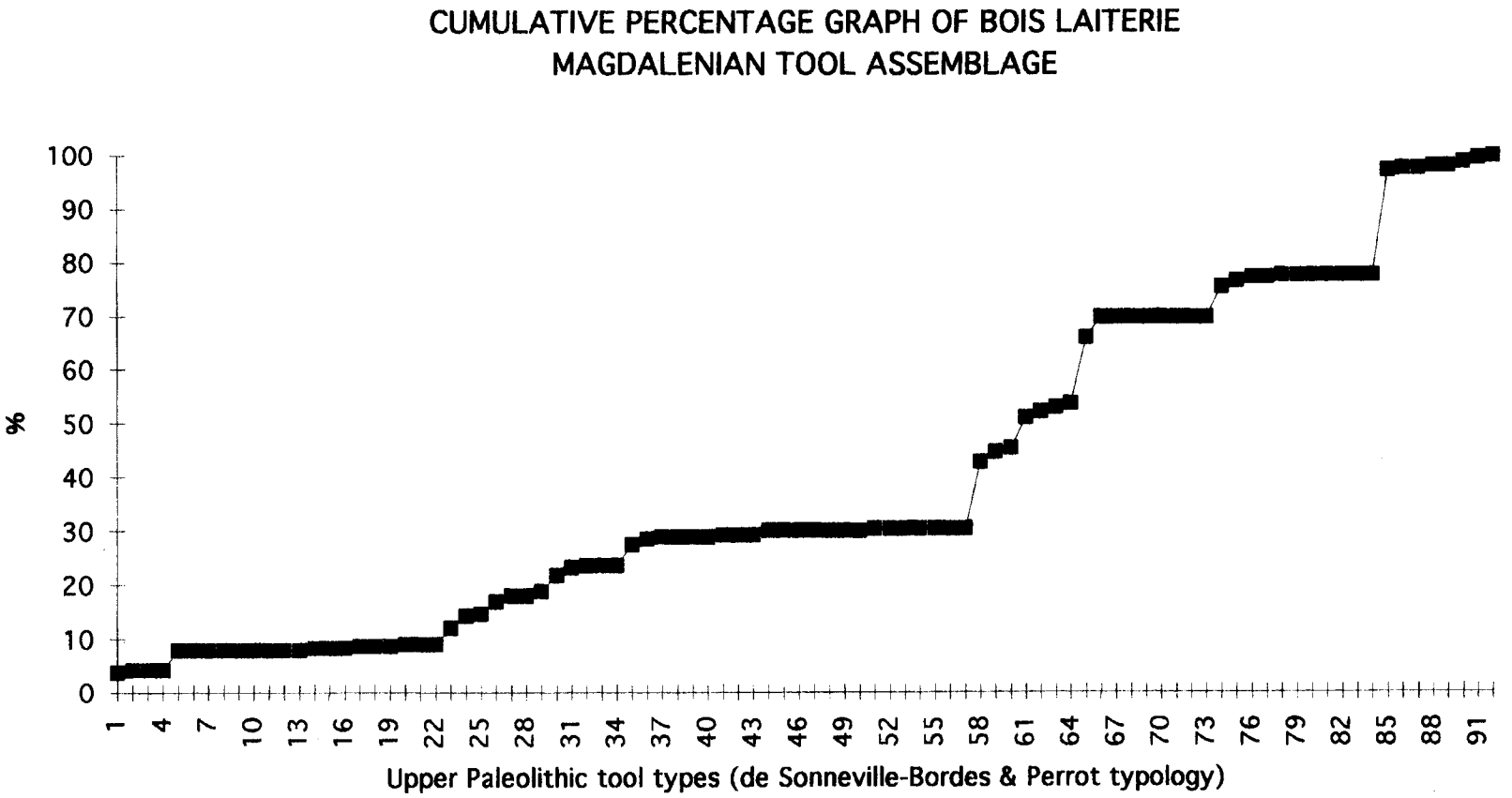

Fig.9- Cumulative percentage graph of the combined Bois Laiterie Magdalenian tool assemblage.

(possibly functionally used as knives, planes, etc.) were selectively made on larger (heavier, wider) blanks, as is suggested by the weight and dimensional data.

Overall, what the human users of Bois Laiterie wanted, sought and brought back to the cave (either themselves through direct or embedded procurement, or indirectly through exchanges with other groups) were small, laminar blanks, from which they selected a fairly narrow range of pieces for the fabrication of tools and especially weapons at the site. Neither cores nor large flakes or blades were often transported to Bois Laiterie, probably due to the long distances involved from the chalk flint source(s) in Hesbaye and/or Hainaut, and hence high transportation costs. Small blades, intergrading with our category of bladelets, were brought to the site (usually already fully decorticated) and then were transformed into tools/weapons. Hence the high amount and percentage of non-cortical trimming flakes (and burin spalls) - and very little primary debitage or cores. The fact that 6 of the 30 sets of lithic refits involve a total of 7 tools (2 truncations, 2 backed blades, a burin, a notch and a denticulate) is clearly indicative of this kind of on-site tool production from laminar blanks. All the refit sets which include a tool or two, are composed wholly or partly of blades. Fully 43 of all the 73 refitted items (59%) are blades+bladelets (most of the rest are plain and secondary decortication flakes).

Retouched Tools: Typology

The 266 formal, retouched tools and weapon elements (Tab.9; Fig.9) include items made on 254 blanks, since there are 11 that have two different tool types on the same blank and one that has three. The tools are distributed among the major groups as follows:

TABLE 2

Endscrapers (IG):	8.27%	Total Burins (IB):	13.16%
Dihedral Burins (IBd):	6.77%	Truncation Burins(IBt):	5.26%
Perforators (IP):	7.89%	Truncated Pieces (IT):	9.04%
Backed Bladelets(Ibb):	19.92%	Backed Pieces and Points*:	35.34%
Denticulates+Notches:	6.77%	Continuously Retouched Pieces:	16.17%

* types 51, 58, 59, 85, 86, 91 on the de Sonneville-Bordes and Perrot list (includes backed bladelets)

Representative lithic tools from the Magdalenian of Bois Laiterie are shown in Figs.10-17. In terms of supposedly temporal/regional diagnostics, it should be noted that the assemblage contains two Azilian (curved back) points (Photo 1), a microgravette point and several Lacan (oblique, concave truncation) burins. The high percentages of burins, truncations, perforators and backed pieces are completely normal in a Tardiglacial, Magdalenian context. The relatively low percentage of endscrapers (IG<IB) and the absence of sidescrapers (there is just one item classifiable as a «raclette») *might* be indicative of rather little (albeit some [see Jardón,this volume) hidescraping activity at the site. On the other hand, the high percentages of burins might be suggestive of relatively significant antler-working (as might be the high percentages of continuously retouched pieces [16.2%] and notches [5.6%], both of which might have been used for shaving or planing sagaie blanks removed by burin grooving from cervid antlers?) Some of the sturdier pieces classified as «perforators» might also have been used to groove out antler splinters (there are no true *zinken*).

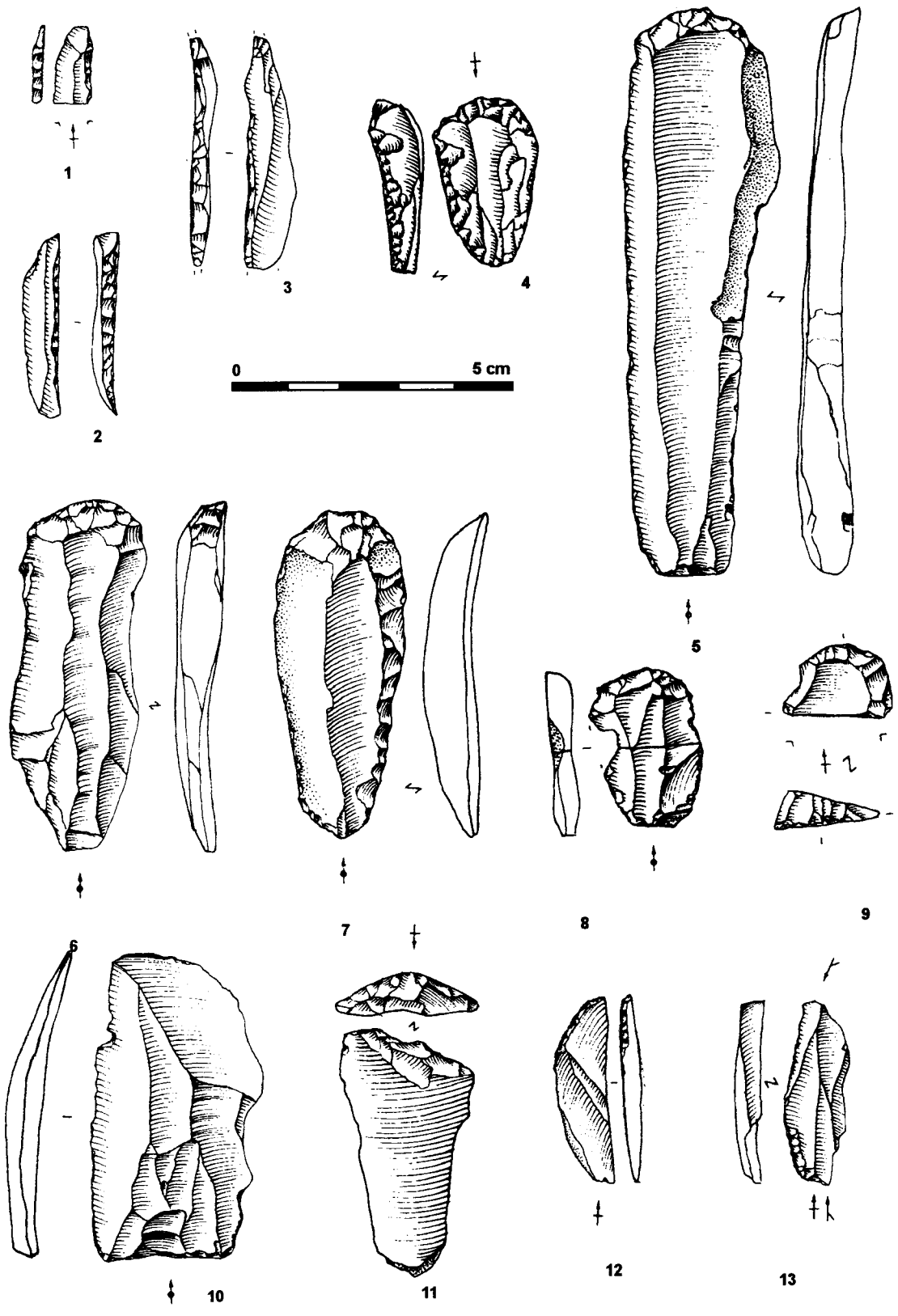

Fig.10- Bois Laiterie (Magdalenian): 1-3, backed bladelets; 4-9, endscrapers; 10, blade; 11, basal truncation; 12, piece with convex truncation; 13, mixed burin.

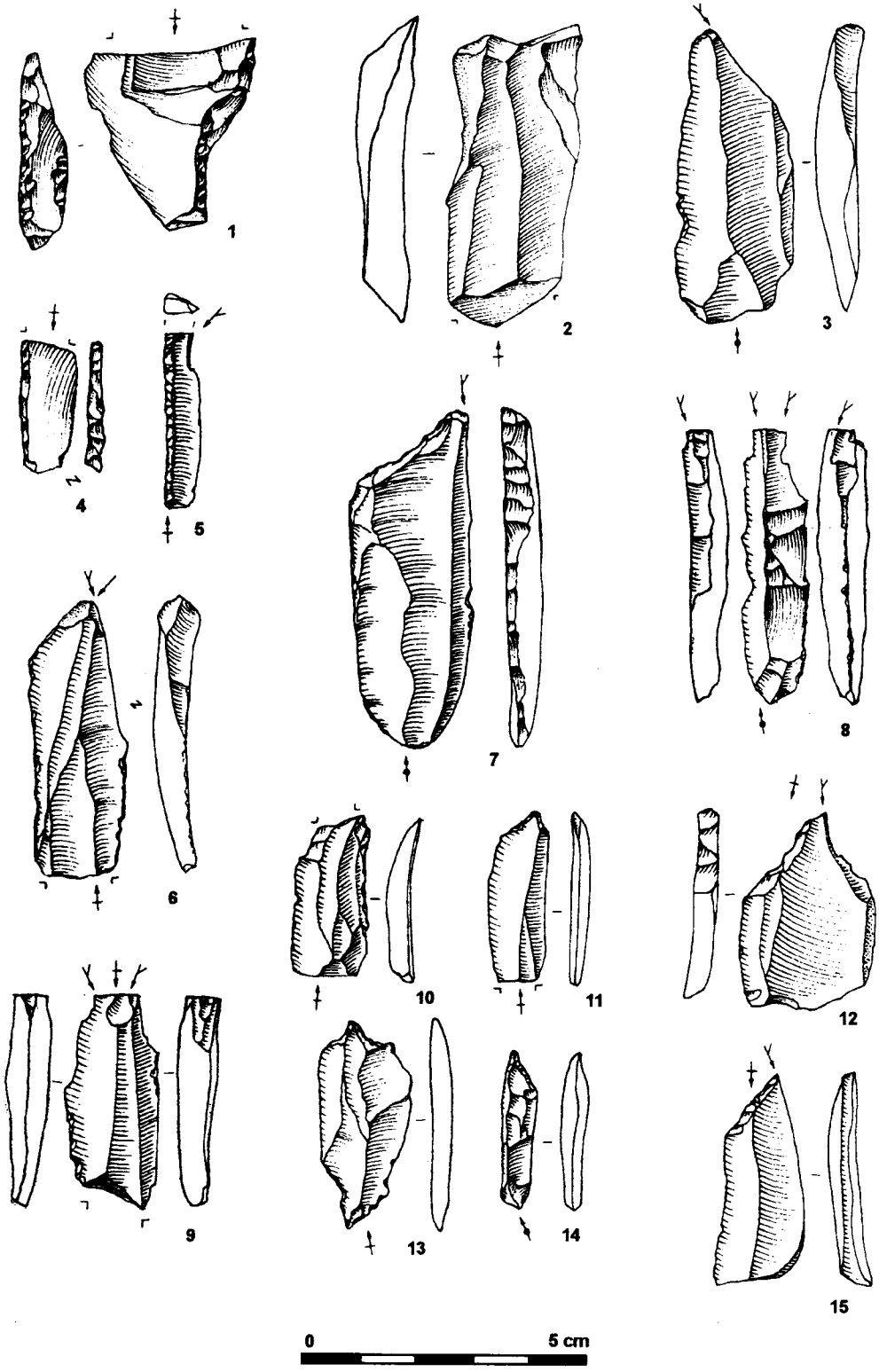

Fig.11- Bois Laiterie (Magdalenian): 1, shouldered piece; 2, blade; 3, transverse burin; 4-5, backed bladelets; 6, dihedral burin; 7, 12, Lacan burins; 8-9, double burins on break; 10, 11, 13, 14, perforators; 15, burin on oblique truncation.

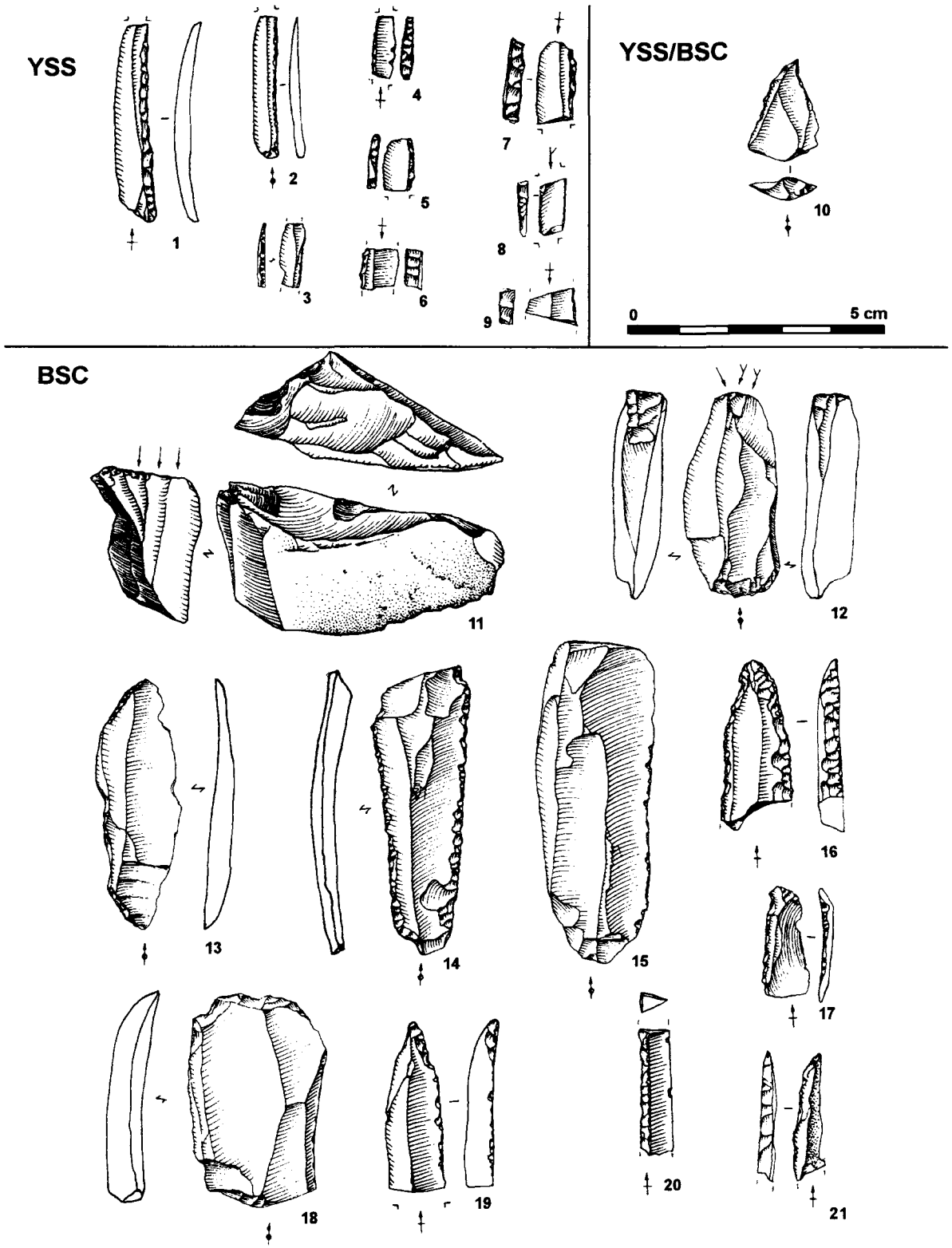

Fig.12- Bois Laiterie (Magdalenian): 1-9, 17, 20, backed bladelets; 10, piece with lateral truncation; 11, core; 12, dihedral burin; 13, bi-truncated piece, 14, retouched blade; 15, utilized blade, 16, pointed blade; 18, endscraper; 19, perforator; 21, microgravette point.

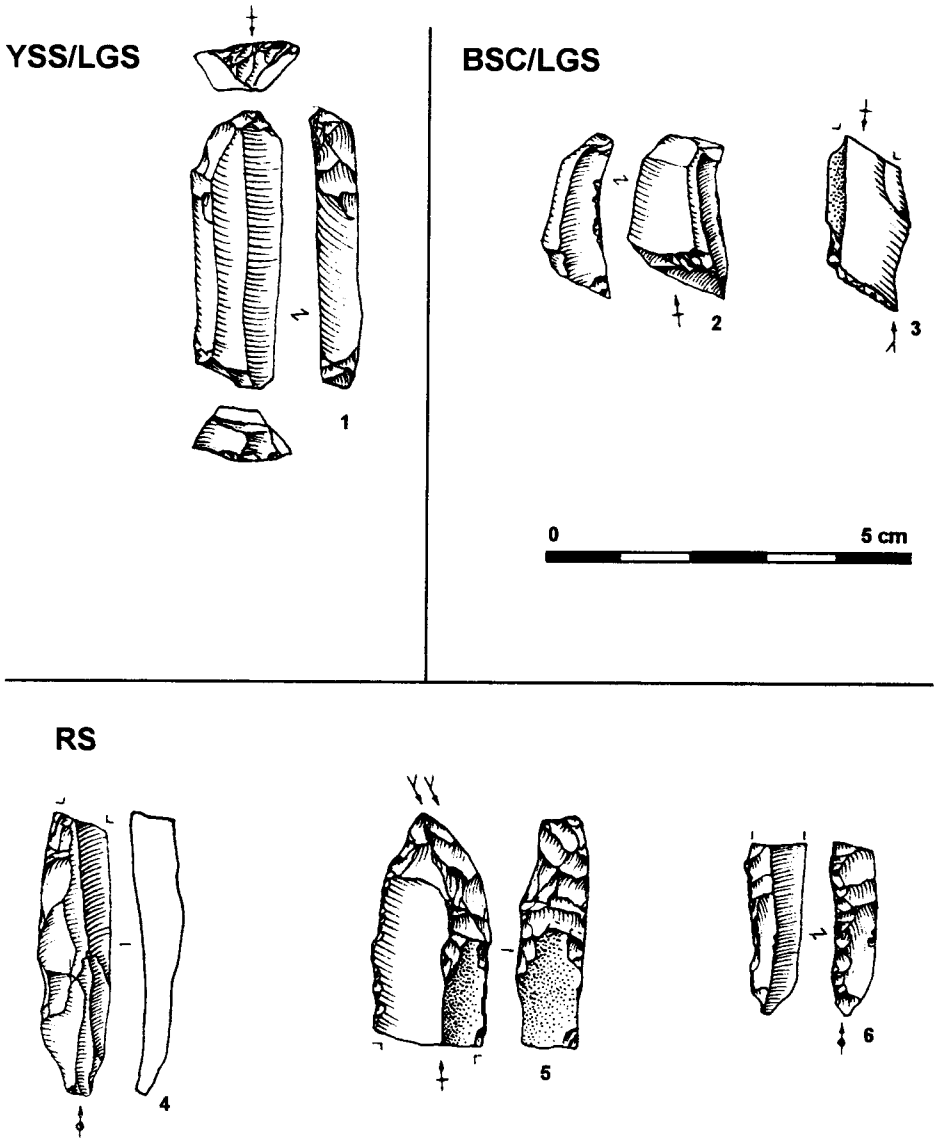

Fig.13- Bois Laiterie (Magdalenian): 1-2, endscrapers; 3, burin on truncation; 4, blade; 5, bec; 6, backed blade.

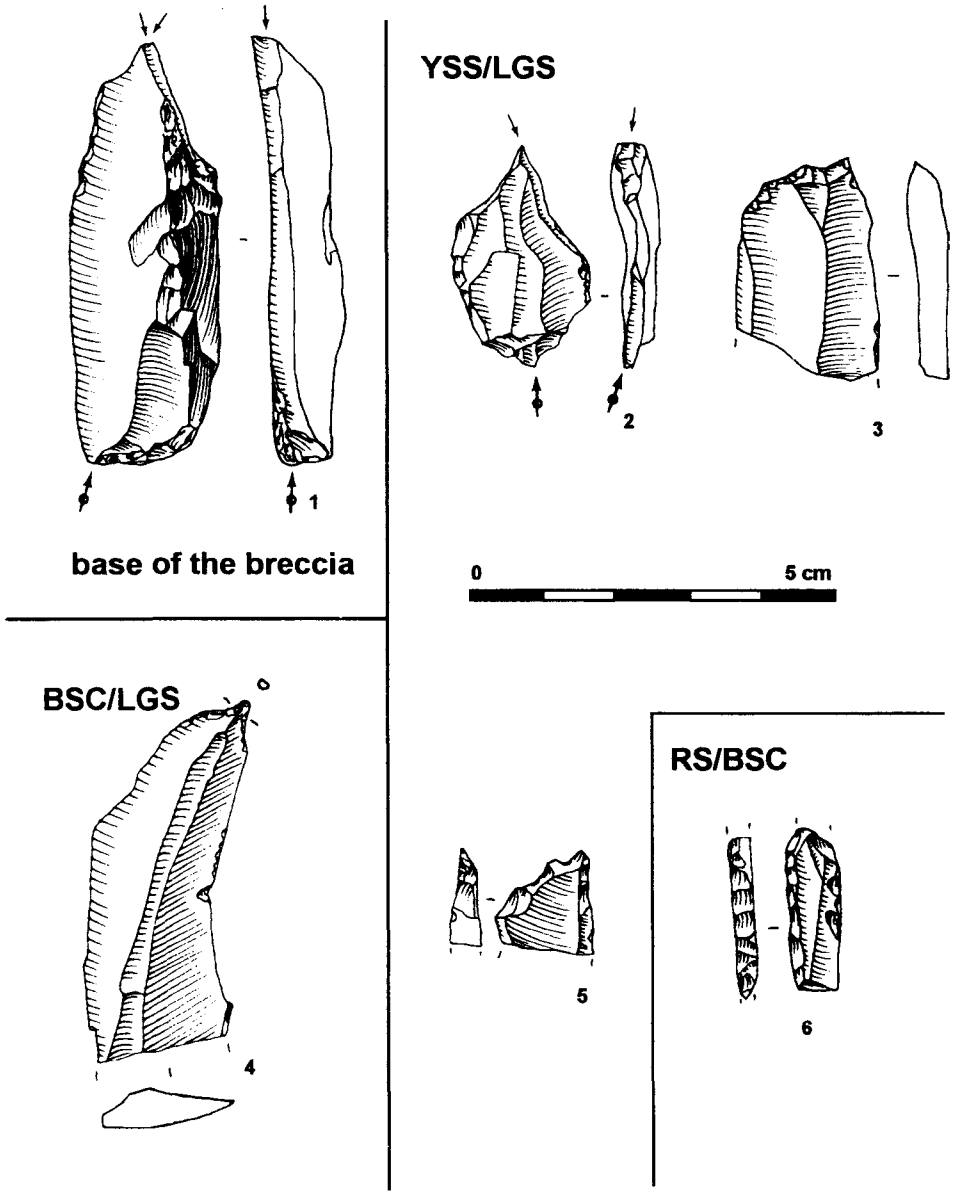

Fig.14- Bois Laiterie (Magdalenian): 1, endscraper-burin; 2, burin on oblique retouched truncation; 3, perforator; 4, microperforator; 5, denticulated piece; 6, blade with abrupt retouch.

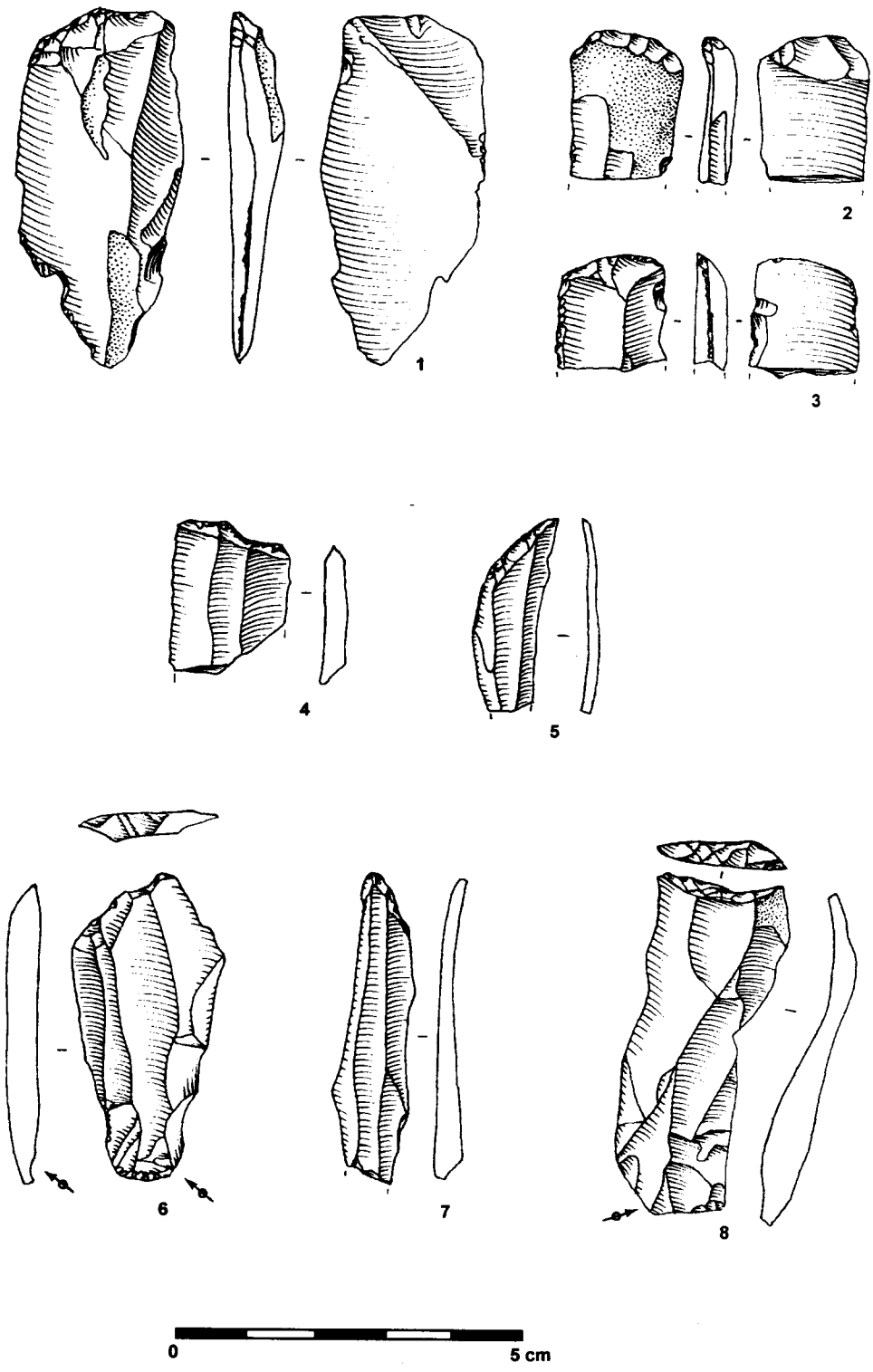

Fig.15- Bois Laiterie (Magdalenian): 1-3, endscrapers; 4-7, pieces with oblique truncations; 8, piece with concave truncation.

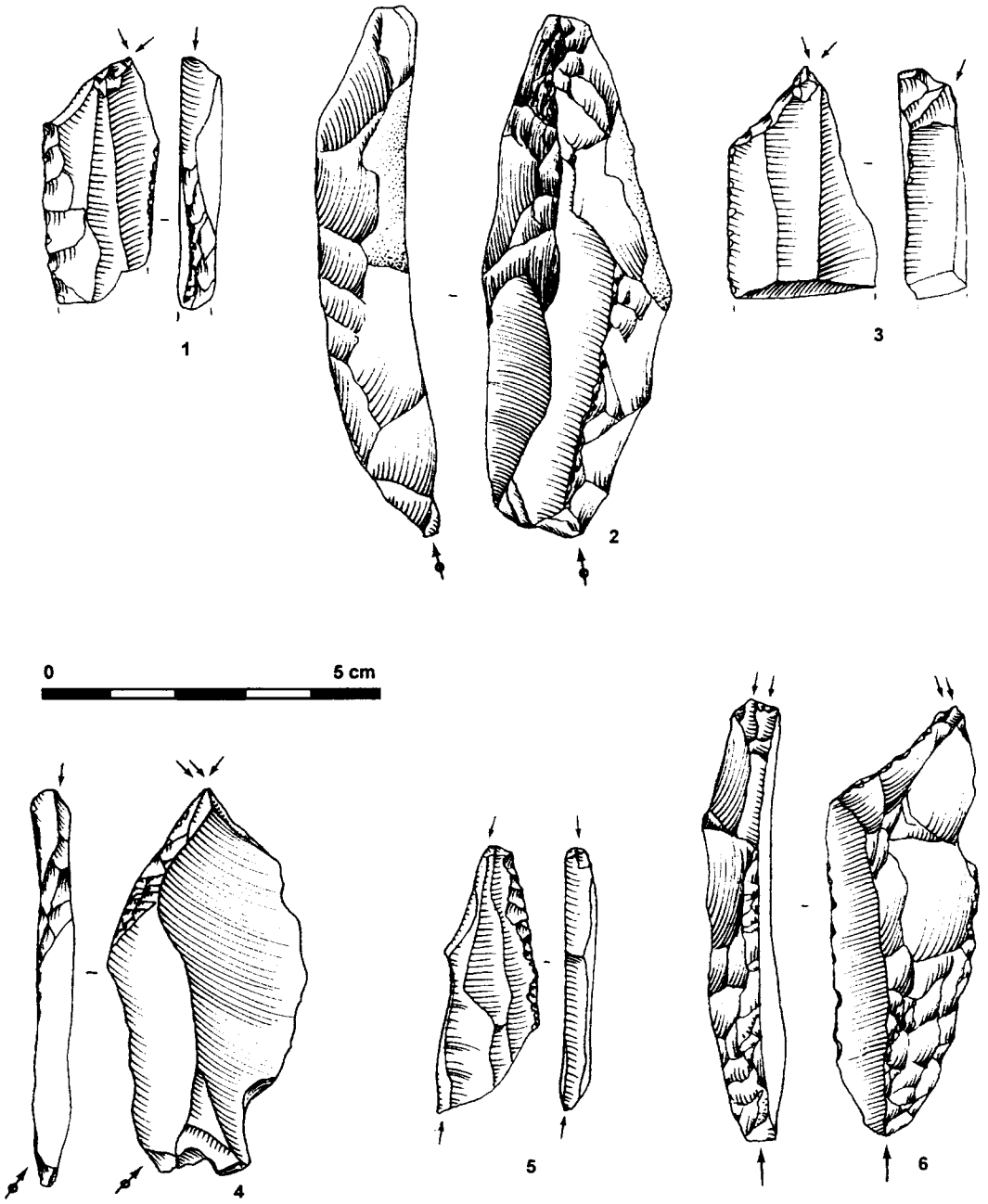

Fig.16- Bois Laiterie (Magdalenian): 1, 4, dihedral burin; 2, multiple dihedral burin; 3, Lacan burin; 5, multiple mixed burin; 6, burin on retouched truncation.

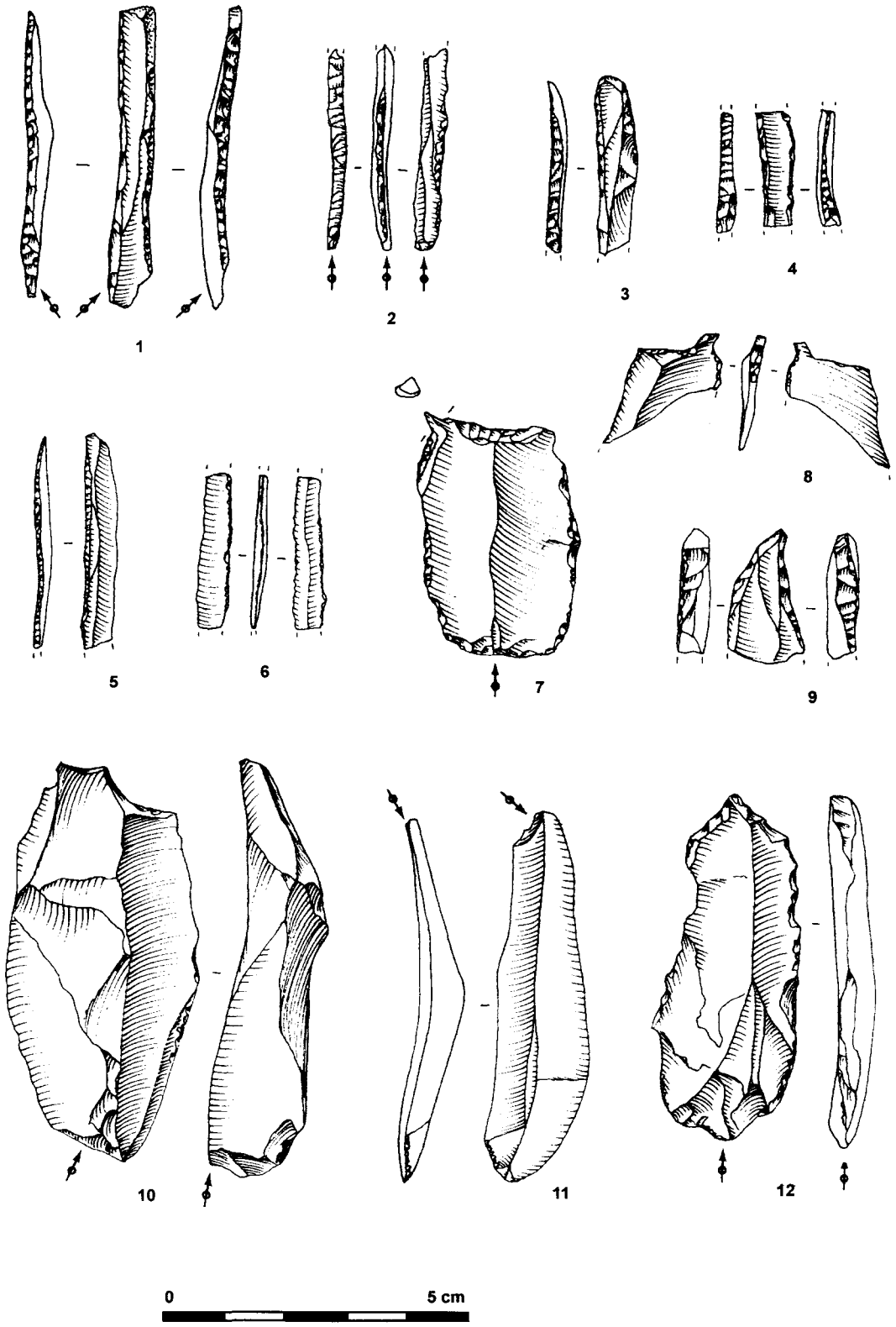

Fig.17- Bois Laiterie (Magdalenian): 1-5, backed bladelets; 6, Dufour bladelet; 10, atypical perforator; 7-9, 11-12, perforators.

Average backed blade(let) dulled edge angle is 76.8 deg. (n=75;SD=7.4;range=55-95°); average endscraper edge angle is 68.2 deg.(n=15; SD=12.6; range=48-95°). Only edges of heavily patinated pieces not selected for microwear analysis were measured. Both distributions are unimodal and normal, with modes at 73° and 63° respectively.

The Bois Laiterie tools are truly leptolithic (light-weight), both highly portable and indicative of intensive economization of the scarce, «expensive» flint resource. Weights of the main tool classes are given as follows:

TABLE 3

CLASS	AV.WEIGHT	N
Backed and retouched bladelets	0.51 gm	56
Backed, truncated and retouched blades	2.62	95
Burins and perforators	4.79	56
Endscrapers	6.17	22
Other tools	2.57	23
All tools(excluding backed and retouched blade[let]s)	4.56	101
All tools	3.93	252

These artifacts (with a few notable exceptions) are extraordinarily small and light, and testify to Bois Laiterie's geographical position far from sources of good flint. The blades of appropriate size that were brought to this cave (either directly or indirectly from the Hainaut or Hesbaye sources) were used to the maximum for the fabrication of classic but «microlithic» Magdalenian tool types. This would be expected of backed bladelets of course, but the «microlithization» is true as well especially of burins, endscrapers, truncated and retouched blades, with the only relative large, heavy tools being a few of the endscrapers that drive up the weight average for that particular (underrepresented) class.

It should be observed that there are no Hamburgian (shouldered), Ahrensburgian (tanged) or Creswellian (angled back) points at Bois Laiterie. There are, however, several micro-perforators and a multiple perforator, reminiscent of several such artifacts from Chaleux and other upper Belgian Meuse Magdalenian sites.

But the notable aspect of this assemblage - and one which makes it quite similar to Chaleux and many other Magdalenian sites in France and Spain - is the high number and percentage of backed bladelets and backed micro-points (56 items, 21.1%). In addition to these probable elements from multi-component weapons, Bois Laiterie has yielded several fragments of antler sagaies (see López-Bayón *et al.*,this volume). Four are large, proximal, single-bevel base fragments (two with diagonally striated bevels) and one is a possible distal (tip) fragment. There are also a grooved bone point (?) fragment and three bone needle fragments (one eyed and another grooved).

Other Items of Material Culture

In addition to the chipped stone lithics, there is one artifact of ground stone that was found at the left rear (southeast) corner of the cave: a small, circular, perforated piece of dark brown

sandstone. The hole in the center of this well-smoothed, semi-symmetrical object is bored from one surface only and has a V-shaped profile. While a conventional interpretation of this object could be as a «pendant», alternative «practical» explanations could also be proferred, such as an implement for sharpening antler sagaie tips (analogous to a pencil sharpener) or as a (net or fishing line?) weight, etc. (see M. Lejeune,this volume).

In addition, and as at other Belgian Meuse Basin sites of penecontemporaneous Bölling age (Chaleux, Frontal, Da Somme, Goyet, Verlaine and Coléoptère [Rensink 1993, p.144]), Bois Laiterie has yielded eight non-local fossil shells, probably from the Paris Basin (see Lozouet and Gautier,this volume). Only four of these fossils are perforated, probably deliberately, but all are clearly manuports. Their presence at Bois Laiterie - especially that of a very large, possibly perforated specimen of *Campanile* - might argue for occupations of the site which were not strictly limited to hunting alone. The abandonment of these presumably prized fossils in this small site is frankly enigmatic. While small numbers (of the same order of magnitude as at Bois Laiterie) of non-local fossils were found (by E.Dupont and others) at most of the rest of the above-mentioned sites, Chaleux yielded 54 during Dupont's 19th century excavations (Dupont, 1873, p.158) and 7 more during the 1985-88 excavations (Otte *et al.*, 1994,p.152), clearly suggesting (along with many other indicators) that it was a very different kind of site: multifunctional, longer-term, larger-scale, etc. Chaleux seems to have been the «stockpile» for these imported,exotic items, from which they were «redistributed» out to several of the other Upper Magdalenian of the Belgian uplands. Thus, these fossils (among which *Campanile* is a prominent genus), which link the Belgian Magdalenian «territory» to the Paris Basin (and presumably to the contemporaneous human inhabitants and well-known sites of that region) by means of long-distance visits and/or exchanges across the apparently «empty marchlands» of Champagne, also link the Belgian sites to one another, probably through residential and logistical moves (seasonal and non-seasonal) and through short-distance visits. Curiously, all the Belgian shells come from *cave* sites; none have yet been found in the open-air sites of Middle Belgium or Dutch Limburg. This fact could be seen as support for the argument that the two groups of sites were not directly related or connected socially.

Other manuports at BL consist essentially of psammite slabs and fragments thereof: a total of 788. Altogether, they weigh more than 122 kg. These slabs (on average 14.8 mm thick) are of strictly local origin; small pieces can be picked up today all over the ground surface of the wooded hilltop directly above Bois Laiterie Cave. Directly opposite the confluence on the Burnot stream on the right bank of the Meuse there is an enormous exposure of bedded psammite of Devonian age that currently exfoliates in slabs along the exposed face of the same syncline that forms the Bois Laiterie hill on the left bank of the Meuse. Psammite is a kind of brown-reddish brown micaceous schist that often has manganese oxide stains or specks.

This material is also known to outcrop along the Lesse valley, whence it was procured closeby for paving purposes by the Magdalenian residents of Chaleux and the other sites around Furfooz. Psammite slabs were also engraved especially at Chaleux, but also at nearby Frontal, at Trou Da Somme near the Lesse-Meuse confluence, at Goyet not far from Bois Laiterie, and at Roc-la-Tour 70 km up the Meuse from the Lesse confluence (Lejeune,1987,1993; Rozoy,1990). (Schist or slate slabs were also engraved at Chaleux and at Roc-la-Tour, at which site Rozoy [1990] counted about 6,000 slab fragments of greater than 2 cm in size - clearly principally used for paving, but of which around 10% had engravings. This is a situation reminiscent of the pene-contemporaneous middle German Rhineland sites of Gönnersdorf and Andernach[Bosinski,1982]).

The distribution and limited paving function of the Bois Laiterie psammite slabs are discussed elsewhere (Miller and López Bayón; Straus and Martinez, this volume), as are the ochre stains and few possibly non-representational, utilitarian «engraved lines» or cutting marks (Lejeune, this volume).

In addition to the psammite slabs, the Bois Laiterie Magdalenian horizon yielded 33 unmodified cobbles and pebbles (which could have washed/rolled in from the hilltop above the site via the upper cave mouth) and one chunk of limestone with possible evidence of burning (plus a few other much less probable pieces of fire-cracked rock). There is simply little evidence for much preparation of the site by the bringing of non-organic materials into the site for construction purposes or by the digging of pits for hearths, storage, posts, etc. The plaquettes represent the paving of a relatively minor area even of this small cave, with no unequivocal evidence of their (secondary) use as media for artistic expression as in the other sites of the upper Meuse valley.

Conclusions

Altogether, the Bois Laiterie Magdalenian artifacts include 3 lithic points, 91 backed bladelets/small backed blades, 3 retouched/denticulated bladelets and 5-6 osseous points. Assuming, quite arbitrarily for the sake of argument, that a composite weapon tip might have 4-6 stone edge or barb segments and that all the recovered backed blade(let)s and retouched bladelets were indeed used as weapon elements, the 94 items could have come from 15-23 composite weapons. Added to the Azilian and Micrograveltte points and the sagaies, this could mean a complement of some 23-32 abandoned (or retooled) weapons at Bois Laiterie. While it cannot be said that «domestic» (manufacturing / maintenance / processing) activities were absent from Bois Laiterie (witness the abundance of burins and the presence of perforators, truncated and retouched blades, endscrapers, needles and «ornaments», as well as the evidence for limited slab paving of the site surface), the definite emphasis would seem to have been on hunting and on preparation of hunting weapons on imported lithic materials, as well as on antler. A fairly limited hunting focus for Bois Laiterie Cave would be altogether in keeping with the site's strategic location versus its small size and uncomfortable nature. This is simply not a cave that could accomodate large-scale or long-term human occupations, but it would be ideal for the interception of game moving between the Meuse valley and the Meuse-Sambre interfluve plateau via the narrow,deep, steep-sided Burnot tributary gorge. Everything in the lithic raw materials, in the composition of the lithic debris, in the characteristics of the lithic retouched tool assemblage and in the osseous artifact assemblage points in the direction of a fairly specialized site, principally focused on hunting and short-term activities closely related to hunting.

The stratigraphy, radiocarbon dates and refits suggest a relatively short occupation or closely spaced series of redundant occupations of Bois Laiterie Cave by small parties - presumably hunting parties. Nonetheless, humans used the cave long and/or often enough to make the minimal investment in infrastructure (a modicum of comfort on a plastic, presumably humid, clayey-silty substratum), namely the paving of a small area of the cave (especially along its eastern, downslope edge) with psammite slabs that were obtainable in the immediate surroundings of the site. No hint of pits or dug-out hearths was found, although there are clear «latent» traces of burning areas at the f ront of the cave and on the narrow terrace just outside the cave mouth.

In sum, the artifact assemblages, in conjunction with a variety of other classes of data and logical observations, all lead to the conclusion that Bois Laiterie served as a fairly specialized, limited-function, short-term site (perhaps a logistical «location» or «field camp» *in sensu* L.R. Binford [1983]). Its probable relationship to a major residential site or base camp such as Chaleux is not merely hypothetical because of the presence of the fossil shells. Here not only the mute stones, but also the silent shells truly speak to us across 13 millennia. If only we can learn to decode their speech correctly...

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TABLE 4

Frequencies and Percentages of Magdalenian Lithic Debris Types from Bois Laiterie Cave,Belgium (1990, 1994-95)*

Strata / Debris type	Breccia Base, LBS, UGS	YSS, grey lens	BSC, RC
1: non-cortical trimming flake	38	1049	437
2: non-cortical shatter	2	204	52
3: plain flake	7	346	62
4: primary decortication flake	1	8	
5: secondary decortication flake	4	55	10
6: plain/whole/ proximal blade	2	138	22
7: primary whole/ proximal bladelet		6	1
8: secondary whole/ proximal decortication blade	1	28	5
9: plain whole/ proximal bladelet	7	139	16
10: burin spall	1	32	4
11: unidirectional crested blade		9	
12: bidirectional crested blade		1	1
13: flake core			
14: prismatic blade core		1	
15: pyramidal blade core			
16: prismatic bladelet core		1	
17: pyramidal bladelet core			
18: mixed core		1	
19: non-cortical chunk	1	13	1
20: platform renewal flake		10	3
21: pièce esquillée			
22: cortical trimming flake		25	3
23: cortical shatter		6	1
24: broken plain blade	4	181	20
25: broken plain bladelet	2	76	17
26: cortical chunk		6	2
27: medial/ distal cortical blade		23	6
28: media/ distal cortical bladelet		4	
29: whole/ proximal cortical bladelet		3	
Total:	70	2365	663

*Table does not include 16 lithic debris from backdirt and one (1) from Stratum GBS.

TABLE 5

Frequencies of Upper Paleolithic Tool Types (de Sonneville-Bordes and Perrot Typology) from Bois Laiterie Cave, Belgium (1990, 1994-95)*

Strata / Tool types	Breccia Base, LBS, UGS	YSS, grey lens	BSC, RS
1: simple endscraper		10	
2: atypical endscraper			1
5: endscraper on retouched flake/ blade		10	
14: shouldered endscraper		1	
17: endscraper - burin		1	
20: perforator - truncated piece		1	
23: perforator		6	2
24: bec		5	1
25: multiple perforator/ bec		1	
26: miroperforator		6	
27: straight dihedral burin		3	
29: angle dihedral burin		2	
30: angle on break burin		8	
31: multiple dihedral burin		4	
32: busked burin		1	
35: burin on oblique retouched truncation		10	
36: burin on concave retouched truncation		3	
37: burin on convex retouched truncation		1	
41: multiple mixed burin		1	
44: flat-face burin		2	
51: micrograveTte			1
58: completely backed blade	1	25	7
59: partially backed blade		3	2
60: straight truncated pieces	1	1	
61: oblique truncated piece		14	1
62: concave truncated piece		3	
63: convex truncated piece		2	
64: bitruncated piece		2	
65: piece with continuous retouch / 1 side	1	27	3
66: piece with continuous retouch / 2 sides		9	1
74: notch		13	2
75: denticulate		3	
76: splintered piece		2	
78: raclette		1	
85: backed bladelet	1	59	11
86: truncated backed bladelet		1	
88: denticulated bladelet			1
90: retouched (Dufour) bladelet)		1	1
91: Azilian point		1	1
92: other		1	
Total:	4	224	36

* Tool blanks (N=254) with multiple typological classifications are counted more than once. Table does not include two (2) classified tools (2 pieces with continuous retouch / 1 side) from backdirt.

TABLE 6. SOUTH BELGIUM LITHIC RAW MATERIAL LIST

Prepared by: J-M.Leotard, A.Martinez, R.Miller, L.G.Straus and E.Teheux.
(Used for le Trou Magrite, Huccorgne, Bois Laiterie and Abri du Pape, 1991-95)

ID	Description
9	Very fine grain, highly homogeneous, flint, white to gray with tiny black flecks, smooth uniform surface, opaque, crystalline inclusions, conchoidal fracture, pattern shiny. Source Tertiary deposits near Doisch Agimont (South Belgium) or Charleville (North France).
10.	Fine-grain flint: fine grain; shiny, smooth surface; opaque to slightly translucent; light brown or blue-gray original color; patinates white; chalk cortex; some white, ovoid inclusions ; conchoidal fracture pattern. Source: Cretaceous of Hesbaye and/or Spiennes. Intergrades with 11 and 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. Intergrades with 10 and 12.
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. Intergrades with 10 and 11.
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: like 12, except very matte; with some rare inclusions. Source: in local limestone.
16	Black flint: very fine grain; opaque; homogeneous; no inclusions; conchoidal fracture; orangeish chalk cortex, smooth and shiny. Source: possibly Obourg or, at Huccorgne, a local (Hesbaye) Cenomanian flint (like "Brandon" flint).
17	Light gray flint: fine grain; good quality; opaque; matte; grayish-white inclusions; chalk cortex, not water-worn; generally homogeneous; conchoidal fracture; (Cretaceous?). Source unknown.
18	Patinated "Hesbaye" yellow, medium-grain.
19	Other flint.
20	Chert - general, non-cortical: fine to medium grain; matte or shiny, smooth surface; opaque to slightly translucent; wide color range; does not patinate; cortex absent; inclusions rare; mainly orthogonal fracture pattern. Cretaceous. Source unknown.
20	Chert with unworn cortex: Same as above, but with unworn cortex. Occurs in Cretaceous geological beds.
20	Chert with water-worn cortex: Same as above, but with water-worn cortex. Cretaceous. Found in river beds.
30	Phtanite: medium-grain; matter or shiny surface; opaque; jet black to grayish black; does not patinate; gray cortex with occasional metal adhesions; no inclusions; conchoidal fracture pattern. 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.

TABLE 6, continued

41	Fine-grain limestone: fine grain; hard, matte surface; opaque; black with white-yellow flecks; light tray 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, matter surface; opaque; gray-white mottled; does not patinate; cortex impossible to distinguish; occasional inclusions; mainly conchoidal fracture pattern; mild reaction with acid ("limy 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. Possible source: Paris Basin; occurs as river cobbles.
52	Quartz crystal: fine to medium grain; shiny surface; translucent to opaque ("Mild quartz") milky-white to yellow; does not patinate; cortex unworn; no inclusions; orthoconchoidal to planar fracture pattern. Occurs in geological beds (incl. in the local limestone).
53	Sandstone.
54	Brussels sandstone.
55	Psammite: light brown with manganese oxide stains; medium-course grain (looks like quartzite); opaque; occurs in Meuse valley at Rivière and Lesse river valley at Gendron railroad. station in form of tabular plaquettes. Sandstone with quartz grains and mica inclusions.
56	Calcite.
57	Light olive green-gray micaceous schist; psammite-like (w/o manganese oxide specks) Badly eroded surfaces. Exfoliates in sheets along bedding planes with raised lumps; lamellar structure.
58	Red-brown (iron color) micaceous schist; dense, uniform, tabular, uneroded surface. Like 57, but denser, heavier and less eroded. (58 and 57 may be variants of 55).
90	Ochre/hematite.
99	Other stones.

TABLE 7

Bois Laiterie Magdalenian Lithic Raw Materials (Artifacts)*

Raw material type	DEBRIS				TOOLS			
	N	%	weight	%	N	%	weight	%
3	1	0.03	1	0.05				
7					1	0.39	3	0.41
9	99	3.18	123	5.66	21	8.27	84	11.40
10	2476	79.44	1388	63.85	181	71.26	495	67.16
11	11	0.35	20	0.92	1	0.39	3	0.41
12	426	13.67	523	24.06	36	14.17	126	17.10
13	2	0.06	2	0.09				
14	1	0.03	1	0.05				
15	4	0.13	6	0.28				
17	13	0.42	25	1.15	3	1.18	3	0.41
18	4	0.13	4	0.18				
19	61	1.96	40	1.84	7	2.76	12	1.63
20	5	0.16	4	0.18	2	0.79	2	0.27
25	1	0.03	11	0.51				
41	1	0.03	3	0.14				
42	1	0.03	0.1	0.00				
50	2	0.06	10	0.46	2	0.79	9	1.22
55	1	0.03	9	0.41				
56	1	0.03	1	0.05				
90	3	0.10	2	0.09				
99	4	.013	1	0.05				
Total	3117	100	2174	100	254	100	737	100

* Tools with multiple typological classifications are only counted as one (1) blank.

TABLE 8

Magdalenian Lithic Debris
from Bois Laiterie Cave, Belgium (1990, 1994-95):

All Strata Combined

Debris type	N	%	Cum %
1: non-cortical trimming flake	1527	48.99	48.99
22: cortical trimming flake	28	0.90	49.89
2: non-cortical shatter	258	8.28	58.16
23: cortical shatter	7	0.22	58.39
3: plain flake	415	13.31	71.70
4: primary decortication flake	9	0.29	71.99
5: secondary decortication flake	71	2.28	74.27
6: plain/ whole proximal blade	166	5.33	79.60
24: broken plain blade	209	6.71	86.30
7: primary/ whole proximal decortication blade	7	0.22	86.53
8: secondary/ whole proximal decortication blade	35	1.12	87.65
27: medial / distal cortical blade	30	0.96	88.61
9: plain / whole proximal bladelet	164	5.26	93.87
25: broken plain bladelet	95	3.05	96.92
28: medial / distal cortical bladelet	4	0.13	97.05
29: whole / proximal cortical bladelet	3	0.10	97.14
10: burin spall	37	1.19	98.33
11: unidirectional crested blade	9	0.29	98.62
12: bidirectional crested blade	3	0.10	98.72
20: platform renewal flake	13	0.42	99.13
13: flake core	-	-	99.13
14: prismatic blade core	1	0.03	99.17
15: pyramidal blade core	-	-	99.17
16: prismatic blade core	1	0.03	99.20
17: pyramidal bladelet core	-	-	99.20
18: mixed core	2	0.06	99.26
19: non-cortical chunk	15	0.48	99.74
26: cortical chunk	8	0.26	100
21: pièce equillée	-	-	100
Total	3117	100	100

TABLE 9

Frequencies and Percentages of Upper Palaeolithic Tool Types (De Soneville-Bordes and Perrot Typology) from Combined Magdalenian Strata at Bois Laiterie Cave, Belgium (1990, 1994-95)*

Tool type	N	%	Cum %
1: simple endscraper	10	3.76	3.76
2: atypical enscraper	1	0.38	4.14
5: endscraper on retouched flake / blade	10	3.76	7.89
14: shouldered endscraper	1	0.38	8.27
17: endscraper - burin	1	0.38	8.65
20: perforator - truncated piece	1	0.38	9.02
23: perforator	8	3.01	12.03
24: bec	6	2.26	14.29
25:multiple perforator / bec	1	0.38	14.66
26: microperforator	6	2.26	16.92
27: straight duhedral burin	3	1.13	18.05
29: angle dihedral burin	2	0.75	18.80
30: angle on break burin	8	3.01	21.80
31: multiple dihedral burin	4	1.50	23.31
32: busked burin	1	0.38	23.68
35: burin on oblique retouched truncation	10	3.76	27.44
36: burin on concave retouched truncation	3	1.13	28.57
37: burin on convex retouched truncation	1	0.38	28.95
41: multiple mixed burin	1	0.38	29.32
44: flat-face burin	2	0.75	30.08
51: micrograveTte	1	0.38	30.45
58: completely backed blade	33	12.41	42.86
59: partially backed blade	5	1.88	44.74
60: straight truncated piece	2	0.75	45.49
61: oblique truncated piece	15	5.64	51.13
62: concave truncated piece	3	1.13	52.26
63: convex truncated piece	2	0.75	53.01
64: bitruncated piece	2	0.75	53.76
65: piece with continuous retouch / 1 side	33	12.41	66.17
66: piece with continuous retouch / 2 sides	10	3.76	69.92
74: notch	15	5.64	75.56
75: denticulate	3	1.13	76.69
76: splintered piece	2	0.75	77.44
78: raclette	1	0.38	77.82
85: backed bladelet	52	19.55	97.37
86: truncated backed bladelet	1	0.38	97.74
88: denticulated bladelet	1	0.38	98.12
90: retouched (Dufour) bladelet	2	0.75	98.87
91: Azilian point	2	0.75	99.62
92: others	1	0.38	100
Total	266	100	100

* Tool blanks (N=254) with multiple typological classifications are counted more than once.

Photo 1 - "Azilian" (curved back) point.