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Can you speak about tools productions strategies during the Middle Palaeolithic? Comparison of assemblage II and level C of Riencourt-lès-Bapaume site (Pas-de-Calais, France)

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1. The site of Riencourt-lès-Bapaume

The site of Riencourt-lès-Bapaume is situated in the northern part of France, more precisely in the Pas-de-Calais region, on the watershed of the Somme and Escaut basin. It was excavated in 1989 by A. Tuffreau during the extensive rescue campaigns on the TGV trajectory. This paper deals with the first extensive excavation, which has shown the advantage of opening large surfaces (10 000 m²). The site itself is subdivided into two excavation units, a northern and a southern unit (fig. 1).

The northern unit contains six different levels (Level H, the oldest, CA, C, B2, B1, the youngest), all of Weichselian age. The southern unit contains two other assemblages (Assemblage III and II).

The chronostratigraphy, which has been the subject of a detailed description in a preceding publication (Tuffreau & Van Vliet-Lanoé, in Tuffreau *et al.*, 1993), lies beyond the scope of this paper.

In the following, two of these assemblages will be compared in order to understand the tool production strategy: Assemblage II of the southern unit and a sample of level C originating from the northern unit.

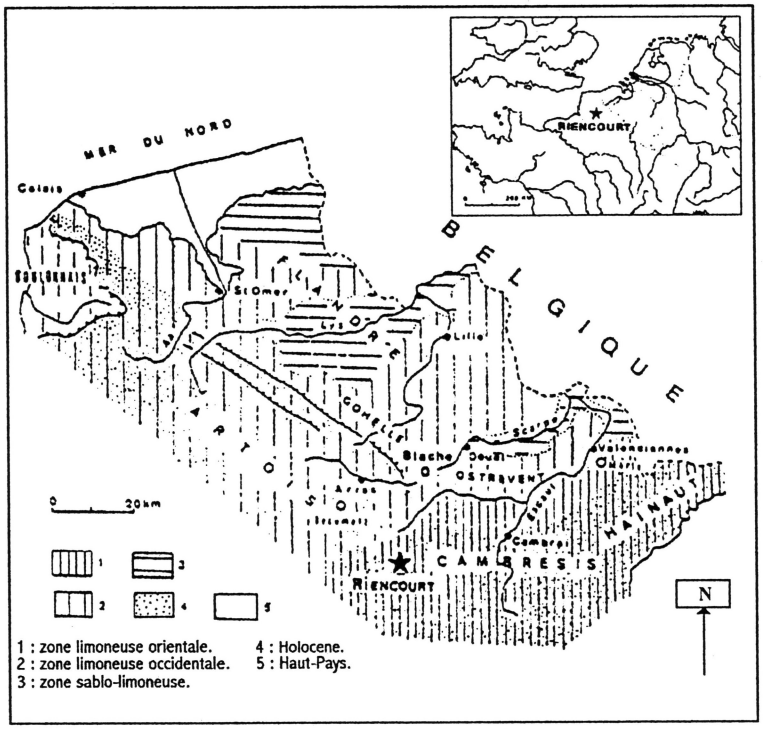

Fig. 1 – Localisation of Riencourt-lès-Bapaume site and presentation of geological context (from A. Tuffreau, in Tuffreau *et al.*, 1993).

Both these units show several Mousterian levels that are remarkable because of their quality, their abundance and their variegated techno-typological composition. Since these different occupational events are embedded chronostratigraphically, an interesting diachronical approach is allowed (fig. 2).

The artefacts of Assemblage II were associated with a grey forestic soil, they were geliflucted and pigmented and are dated in the Oxygen Isotopic Stage 5a (Beginning of the Weichsel glaciation). Those of level C were embedded in the upper part of a geliflucted loessic horizon, underneath a brown-grey humic soil. They

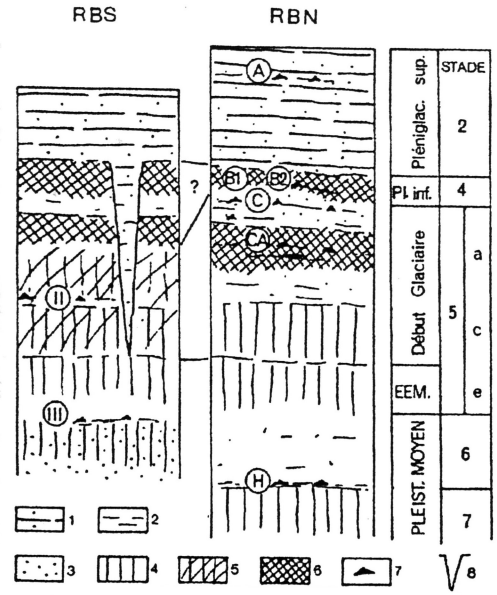

Fig. 2 – Schematic stratigraphy of Riencourt-lès-Bapaume site, RBS : southern unit; RBN : northern unit; 1. loess with thick beds; 2. Embedded loess; . Sand; 4. B horizon of washed soil; 5. Mowed B horizon of washed soil; 6. Humic soil; 7. Lithic industries; 8. Frost split (from Tuffreau *et al.*, 1993).

were traced back to the period between the end of OIS 5a and the beginning of OIS 4. Both artefact layers had a thickness of about 20 cm.

2. *Presentation of the assemblages*

2.1. *The state of preservation of the assemblages*

Since these two lithic assemblages both originate from open-air sites, they are influenced by similar conditions, environmental or other, such as site formation processes, climate and raw material procurement strategies. Thus it is not unlikely that the two lithic assemblages have several aspects in common.

The preservation of the artefacts is in fact remarkable. The raw material is unique and local and is known in the French literature as "silex sénonien", which is renowned for its knapping qualities. Assemblage II shows a variety of different patinas, lustrated or not, ranging from black to grey, sometimes even to orange and green. The artefacts from Level C on the other hand, range from black to grey.

2.2. *The techno-typological characteristics*

Assemblage II of the Riencourt-lès-Bapaume collection contains 1930 artefacts, among which 143 cores and 1461 debitage products (fig. 3). As the total excavated surface of the occupation level was 580 square meters, the density is rather low (ca. 3 pieces per square meter). T he resting fraction is essentially composed of debris, flakes resulting from gelifraction and numerous undetermined flake fragments inferior to 20 mm. The gelifraction affected more than 50 percent of the artefacts.

The Levallois debitage (Boëda, 1994) is characteristic for 30 percent of the assemblage and is dominated by the centripetal and unipolar method. Among those products typical for this reduction strategy, we observed flakes (77 percent), blades (7 percent), Levallois points (9 percent) and flakes "débordants" (7 percent). The other 70 percent of Assemblage II is generated during non-predetermined reduction processes, either unipolar, bipolar, centripetal or opportunistic. Cortical flakes are the most common category (55 percent), followed by blanks generated during the "plein débitage" (29 percent), flakes with a cortical

	II		C	
Total	**1930**		**18653**	
Cores	143	8,9 %	361	4,6 %
Debitage 's products	1461	91,1 %	7533	95,4 %
Total	1604	100 %	7894	100 %
Levallois débitage :	*29 %*		*22,4 %*	
Cores	50	3,1 %	102	1,3 %
Debitage 's products	415	25,9 %	1663	21,1 %
Blade débitage	-		*6,9 %*	
Cores	-	-	86	1,1 %
Debitage 's products	-	-	458	5,8 %
No Levallois débitage	*71 %*		*70,7 %*	
Cores	91	5,8 %	173	2,2 %
Debitage 's products	999	65,2 %	5412	68,6 %

Fig. 3 – Techno-typological characteristics of lithic industries of assemblage II and the sample of level C, Riencourt-lès-Bapaume

back (15 percent) and Kombewa-flakes (1 percent). All stages of the chaîne opératoire seem represented in the assemblage, which suggests an in situ progress of the on-site activities (Geneste, 1985).

The industry of level C is quantitatively richer than Assemblage II, the former containing more than 80 000 artefacts, recorded on a surface of 600 square meters. The studied sample (18 653 artefacts) equals a dense scatter of 40 square meters (squares 55AA to 59AH), on which 361 cores and 7 533 debitage products were counted. This corresponds with a density of 504 artefacts per square meter. The percentage of gelifraction is also very high: almost 60 percent of the assemblage is affected.

In this sample 22 percent is characterised by a Levallois debitage. The centripetal method is the most widely spread, but the unipolar and bipolar method is also present. The products derived from these reduction strategies include flakes (65 percent), blades (33 percent), Levallois pointes (1 percent) and "débordants" (1 percent). Furthermore, 71 percent of the sample is obtained via non-predetermined, non-Levallois reduction processes such as unipolar, bipolar and opportunistic methods. Cortical flakes are almost as numerous as flakes obtained during the "plein débitage" (resp. 44 and 45 percent), followed by flakes with a cortical back (11 percent). Seven percent of the assemblage also illustrates the existence of a blade debitage with a rather volumetric concept (7 percent), either unipolar or bipolar (Révillion & Tuffreau, 1994). The blades represent 84 percent of the products, whereas bladelets represent 16 percent. Similar to the other assemblage under study, all stages of the chaîne opératoire were identified on the site.

Even with similar contexts, we observe certain differences in the composition of the debitage of these two assemblages. The most important difference is the existence of volumetric blade reduction sequences in Level C, which was not attested in Assemblage II. Is this technological concept the reflection of a certain know-how, characteristic for the artisans of Level C ? Is it the expression of a specific culture ? Is it the consequence of some special activities and its need for specific blanks ? Even though such questions can be posed, they are left, up to this moment, unanswered. Nevertheless, by confronting the evidence of both assemblages, we try to rule out some possibilities and to corroborate some others.

3. *The toolkit*

3.1. *Typological characteristics*

The two assemblages' toolkits consist of numerous tools of exceptional quality. Assemblage II contains 356 tools (22.2 percent) and the sample of level C contains 386 tools (4.9 percent).

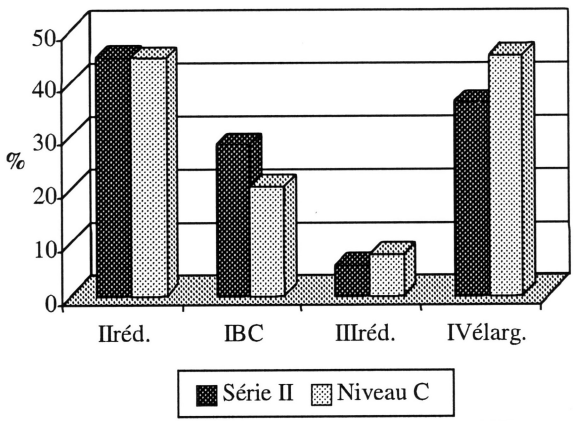

Fig. 4 – Typological characteristics of toolkit in the assemblage II and the sample of level C, Riencourt-lès-Bapaume.

Generally spoken, the typological composition (Bordes, 1961) of the two assemblages is rather similar (fig. 4). The Mousterian group dominates (thanks to the number of sidescrapers : 48 percent for Assemblage II and 62 % for Level C), but convergent tools are also present (a little more for Assemblage II with a lot of convergent sidescrapers, but less Mousterian points). The notched pieces and denticulates are also widely attested, certainly in level C. As far as the Upper-Palaeolithic tool types are concerned, they are relatively rare. The most common upper Palaeolithic tool type is the burin (90 percent for Level C and 70 percent for the Assemblage II). More rare are endscrapers and borers.

Even though the discrepancy between the two assemblages is visible in the debitage and in its methods, it is clearly not the case in the toolkit. Are blank production and tool composition two separate and autonomous goals ? Or otherwise : is it possible that the Neanderthal artisans of both occupations, needed similar tools in equal proportions, but that they did not have the same blanks to their disposal ? By studying the two assemblages, we hope to find a concrete answer to this particular question.

3.2. *The Tool' blanks*

In Assemblage II and in the sample of level C, there are certain relations between the different tool categories and blank types. Indeed, every tool category has one or more dominating blank types. Furthermore, some dimensional differences have been observed.

3.2.1. Technological characteristics by tool category

We observed that every tool type was preferentially shaped from one or more blank types. In the following, the different blank types are grouped in three distinctive categories in relation with the reduction strategy from which they are originating. First, blanks obtained via a non-Levallois debitage (undifferentiated cores, flake cores, cortical flake or plein debitage, flake with a cortical back). Second, blanks originating from a Levallois debitage (Levallois core, flake, blade, point and flake "débordant"). Third, those blanks that were derived from the volumetric blade debitage (Blades, no cores, no retouched bladelets). The observed tendencies are similar for both lithic assemblages (fig. 5).

The Mousterian toolkit was essentially shaped on blanks originating from a non-Levallois debitage (62 and 74 %), like flakes "de plein débitage", cortical flakes and flakes with a natural back. Blanks originating from the Levallois debitage served regularly for tool shaping (38 and 22 %), whereas blades were only chosen occasionally in Level C. In detail:

- the blank type for the sidescrapers is variegated and dominated by those originating from a non-Levallois debitage (fig. 7:1-2; fig. 9:1, 3, 6, 8-9).
- the blank type for the double sidescrapers are non-Levallois and Levallois in Level C, whereas undifferentiated flakes dominate assemblage II to a large extend (fig. 9: 5, 7).
- the blank type for the convergent sidescrapers is dominated by those originating from a Levallois debitage (namely points in Assemblage II) (fig. 7:3-5; fig. 9:2, 4).

The Upper-Palaeolithic tool types are exclusively trimmed on non-Levallois flakes (flakes "de plein debitage" or cortical flakes) or blades when present (17 %). No Levallois blanks have been used.

- the blanks used for the burins mainly originate from a non-Levallois debitage, but they are also shaped on blades in Level C (fig. 6:2, 4; fig. 8;7-8).
- the blanks used for the endscrapers (fig. 7:6; fig. 8:6, 9) and the only borer (fig. 6:5) of Assemblage II are characteristic for a non-Levallois debitage.

The blanks used for the notched pieces and the denticulates (fig. 6:1, 3, 6; fig. 9:2-4, 10) are the same, namely undifferentiated flakes "de plein débitage" or flakes with cortical remnants originating from a non-Levallois debitage (87 and 76 %). Levallois blanks were also used, but to a lesser degree (13 and 19 %). The same applies to blades in Level C (5 %). There are

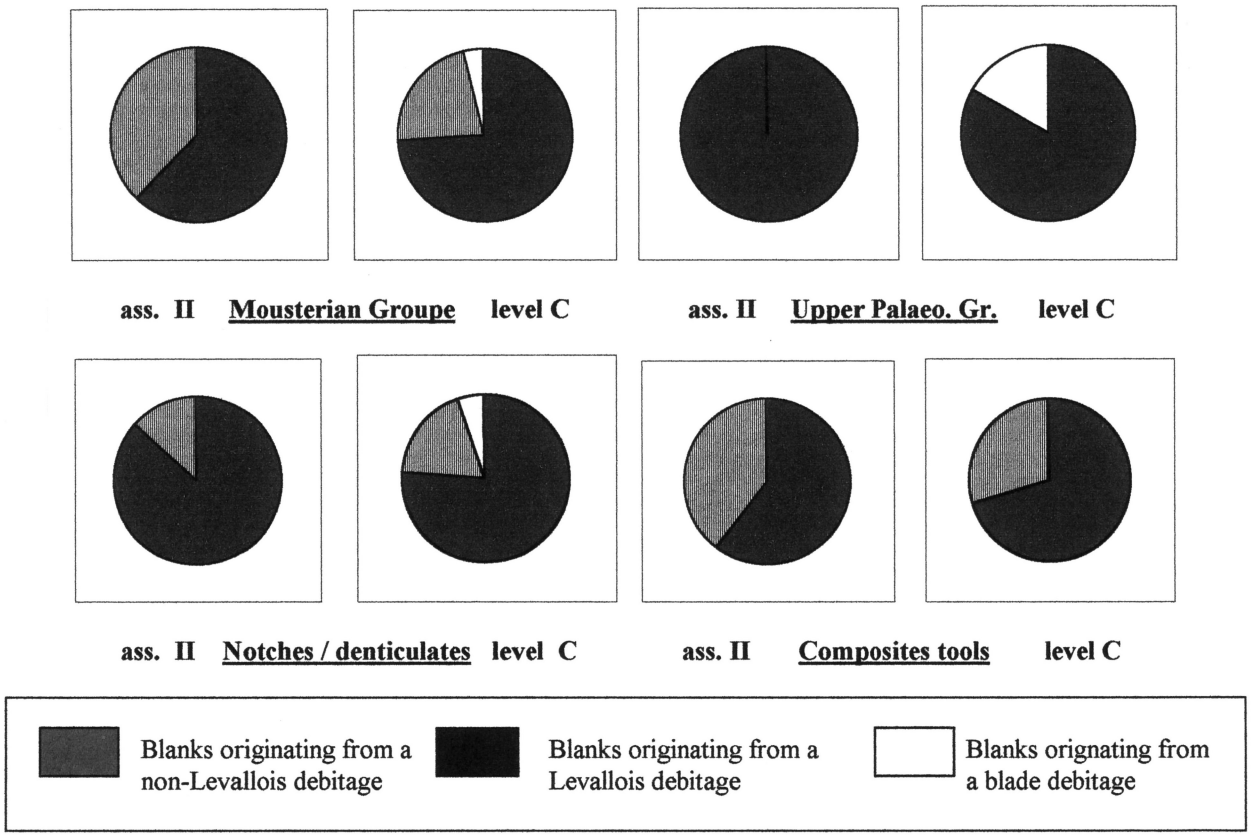

Fig. 5 – Debitage types of blanks according to main tools categories, assemblage II, sample of level C, Riencourt-lès-Bapaume.

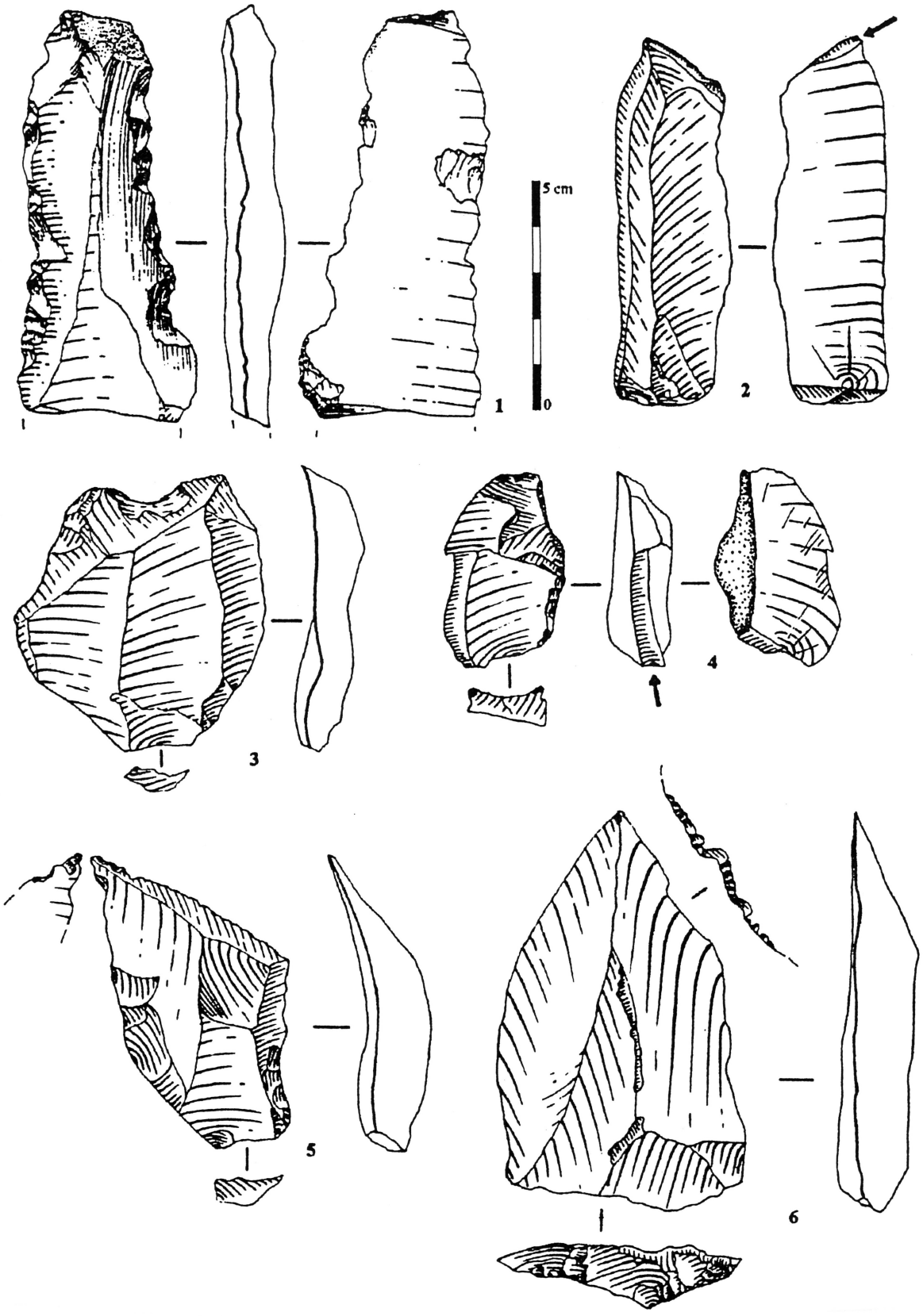

Fig. 6 – Riencourt-lès-Bapaume, assemblage II : 1. Denticulate on blade; 2. Burin on blade; 3. Notch on Levallois flake; 4. Burin on cortical back flake; 5. Perforator on flake; 6. Notch on Levallois point (drawing n° 1 by G. Leroy).

no significant differences between these two tool groups. Moreover, the blanks are morphologically similar to those from the Mousterian group. The blanks however mainly originate from a non-Levallois debitage.

As far as the composite tools are concerned (fig. 7:7; fig. 9:1), there is a clear predominance of blanks originating from a non-Levallois reduction process (60 et 70 %), mainly flakes "de plein débitage" and flakes with cortical remnants. Levallois blanks were also used (40 and 30 %).

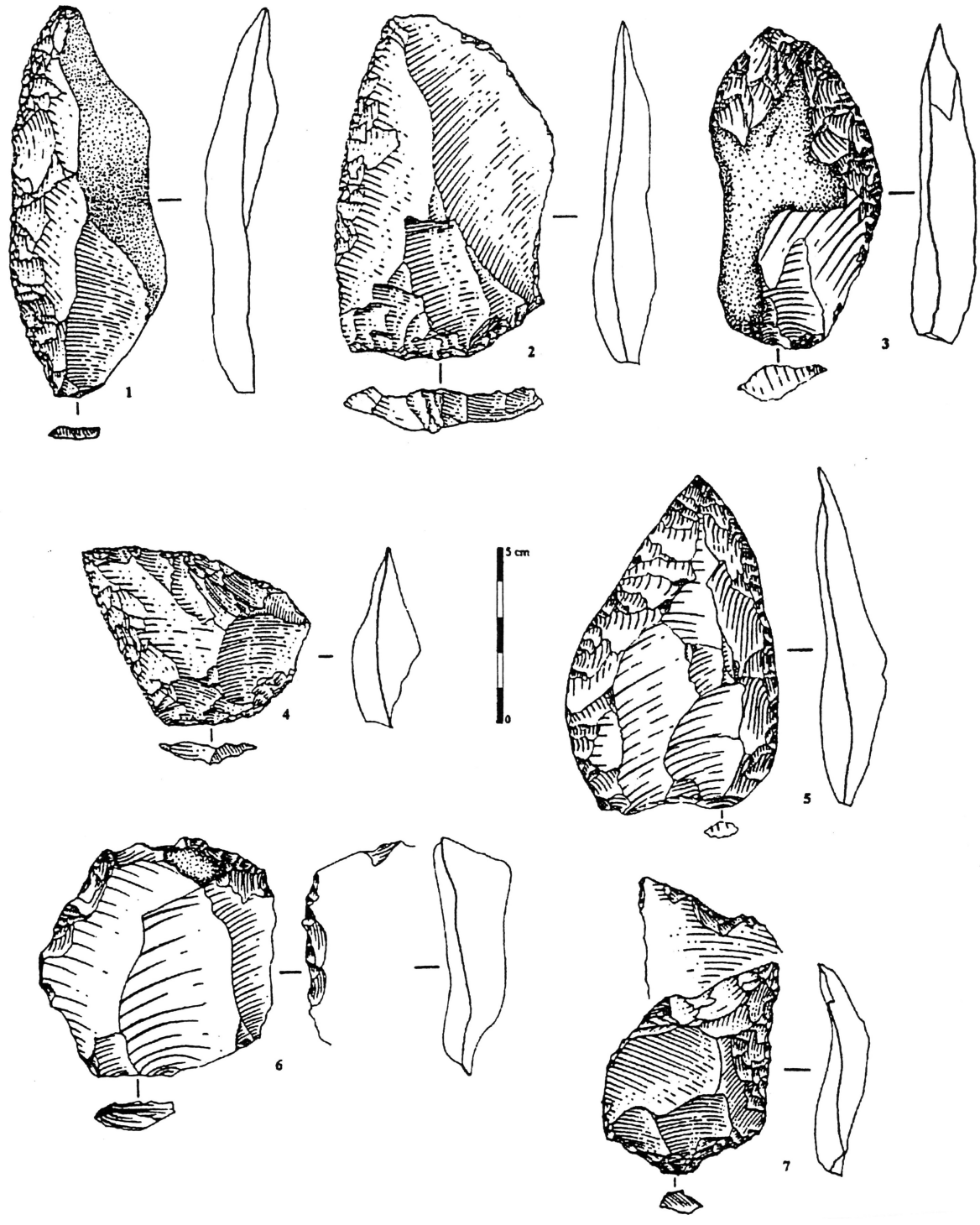

Fig. 7 – Riencourt-lès-Bapaume, assemblage II : 1. Simple sidescraper on flake; 2. Simple sidescraper on Levallois flake; 3. Convergent scraper on flake; 4. Scraper on flake; 5. Mousterian point on Levallois flake; 6. Endscraper on Levallois flake; 7. Composite tool on flake. (drawings n° 1, 2, 4 and 7 by G. Leroy).

At any rate, blanks originating from a non-Levallois debitage are prevalent in all tool categories. Levallois blanks are also relatively frequent, certainly among the tools of the Mousterian and composite tools. They are however absent among the upper Palaeolithic tool types. The blades are only occasionally retouched, excepting for tools of type III where they are rather abundant.

3.2.2. Dimensional characteristics by tool category

When comparing the measurement data, we observed clear tendencies for every tool type. The two assemblages under study show similar tendencies.

Points in common:

Regardless, the tools of the Mousterian group are the largest ones. Among them, the sidescrapers are the longest. Contrary to those used for the endscrapers and the borers, the blanks used for the burins are elongated. The notched pieces and denticulates are both trimmed on rectangular blanks, but the blanks used for the denticulates are larger and thicker. The notches present on the distal end are shaped on quadrangular blanks. The composite tools are shaped on large blanks, sometimes broad and thin.

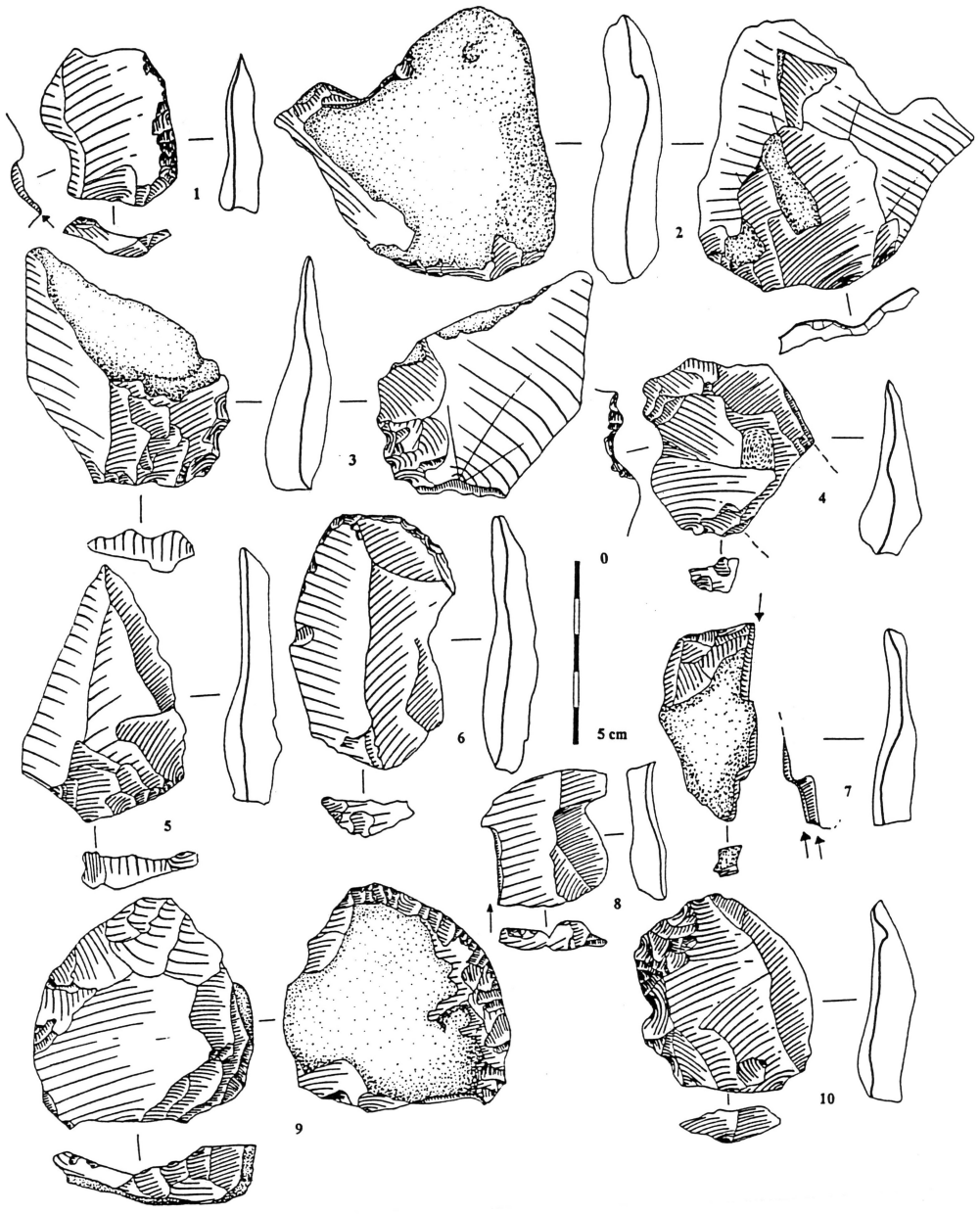

Fig. 8 – Riencourt-lès-Bapaume, level C : 1. Composite tool on flake; 2. Notch on core; 3. Denticulate on flake; 4. Notch on flake; 5. Levallois point; 6. Endscraper on flake; 7-8. Burins on flake; 9. Endscraper on core; 10. Denticulate on Levallois flake.

Differences :

The double sidescrapers of Level C are long and thin, whereas those of Assemblage II are more elongated. The convergent tools on the contrary are large and elongated in Level C and long in Assemblage II. The tools of the Upper-Palaeolithic type are thicker than those in Assemblage II.

It appears that the presence of blades in Level C did not have an influence on the particular tool composition. Apparently, they would have been replaced by Levallois blanks or by elongated non-Levallois blanks in Assemblage II. Nevertheless, we observed a certain association between the blades and the burins.

The relation of a blank type with a tool type seems to be corroborated by numerous similarities between these two lithic assemblages. We observed indeed preferential associations between certain blank and tool types as well on a technological as on a dimensional level, the former and the latter being closely connected. This situation inherently suggests that the blanks must have been chosen by the artisans in function of preconceived morphological selection criteria's.

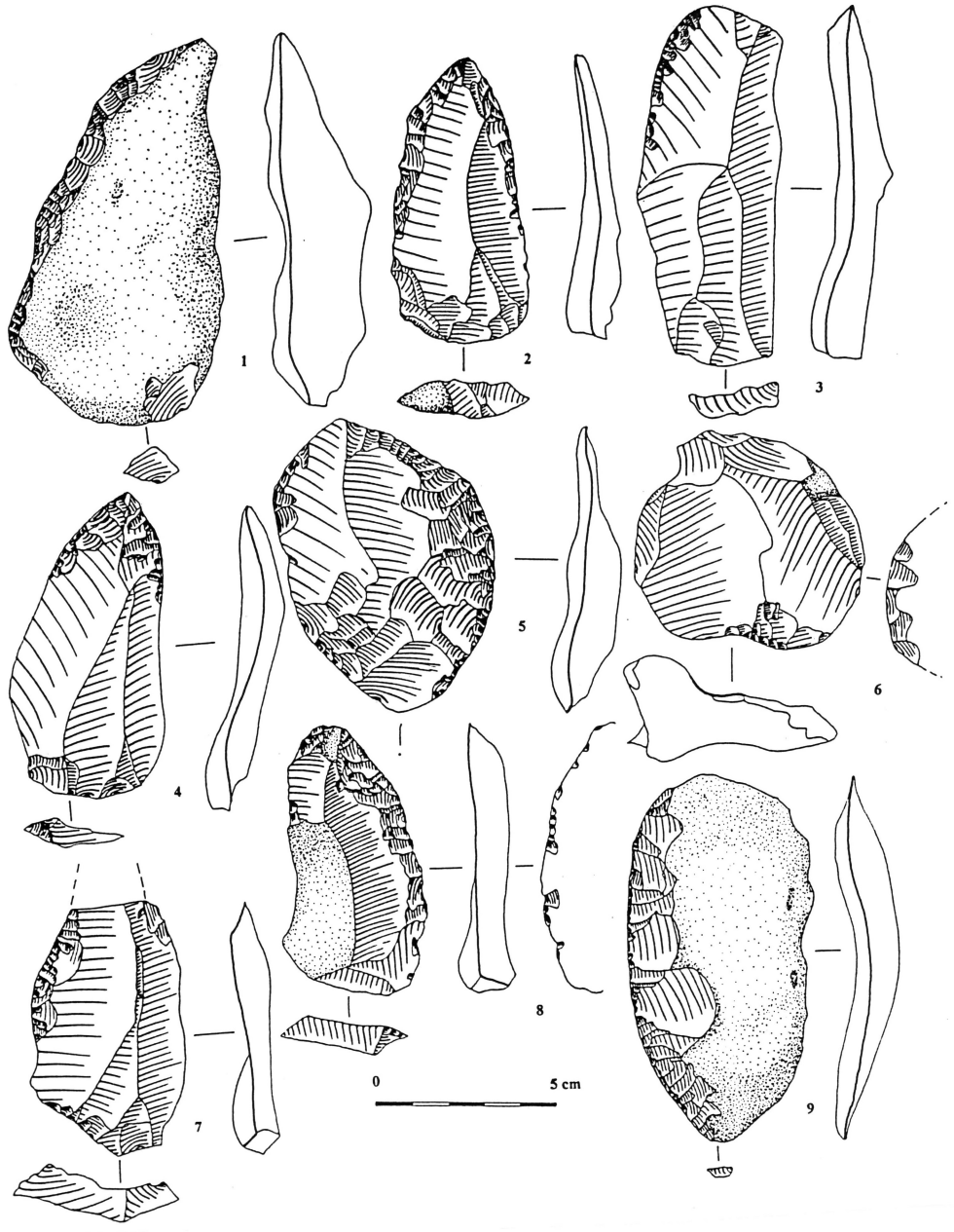

Fig. 9 – Riencourt-lès-Bapaume, level C : 1, 9. Simple scrapers on flake; 2. Convergent scraper on Levallois flake; 3. Simple sidescraper on blade; 4. Convergent scraper on Levallois point; 5, 7. Double scrapers on flake; 6. Simple scraper on core; 8. Simple sidescraper on cortical back flake.

3.3. The retouch

The localisation of the retouch :

In both assemblages the retouch is principally situated on the lateral side of the blanks. In Assemblage II, however, we noticed a clear predominance of lateral retouches on the right hand side on all tool type except on denticulates.

Is there a relationship between the retouch type and the angle of cutting edges ?

In both assemblages, different retouch types have been used in the tool shaping process. This process entailed more or less drastic transformations of the blank, which we can trace by evaluating the angle of the cutting edges. By comparing the data of both assemblages, we grouped the type of retouch in the following way :

- clactonian and scalariform retouches have a tendency to alter the lateral side of the blank considerably (consequently, steep and abrupt edges dominate).
- scaled, subparallel and parallel retouches alter the blanks to a lesser degree (consequently, less steep edges dominate).

Is there a relationship between the tool and the retouch type ?

The data being studied, it seems that there is indeed such a relationship in the two assemblages. Therefore, every tool category is associated with one or more specific retouch types. In Assemblage II, the subparallel retouch dominates on the other retouch types: it was observed on most of the tools. Although the dominant retouch type is different (scaled retouches), we attested nearly the same association in the Level C sample.

The extent of the retouches:

In Assemblage II and in the Level C sample, the retouch is essentially marginal. Generally, the blanks are merely modified by retouching. It seems that the initial morphology of the blanks corresponded with the artisans expectation. If so, the chances that

Level II				
	Length of retouch (mm)	*Descending order*		*Blank surface (mm²)*
Mousterian Point	112	1	2	2763
Convergent scraper	98	2	5	2224
Double scraper	84	3	4	2242
Composite tool	67	4	3	2676
Simple scraper	49	5	1	3013
Others scrapers	48	6	7	1930
Denticulate	43	7	6	1981
Perforator	27,3	8	8	1650
Burin	25,1	9	10	1375
Endscraper	20	10	11	1350
Notched	16	11	9	1448

Fig. 10 – Proportional relations between length of retouches and blank surface, in Assemblage II, Riencourt-lès-Bapaume.

Level C				
	Length of retouch (mm)	*Descending order*		*Blank surface (mm²)*
Double scraper	106,5	1	2	2767
Convergent scraper	76	2	3	2608
Mousterian Point	55	3	5	1955
Simple scraper	46	4	4	2470
Others scrapers	42	5	1	2770
Composite tool	42	5	6	1884
Denticulate	38	7	7	1841
Endscraper	33,5	8	10	1350
Burin	32,5	9	8	1385
Notched	13	10	9	1378

Fig. 11 – Proportional relations between length of retouch and blank surfaces, in the sample of level C, Riencourt-lès-Bapaume.

the tool making process is controlled by opportunism are highly reduced. Bearing this in mind, several hypotheses can be formulated concerning this supposed "pre-adaptation" of the blank: either the artisans shaped a tool type in function of the blanks morphology which was hand-held, either, they selected their blanks with an intention predetermined by the future tool to shape, either it proves that the artisans were capable to anticipate and that they oriented their blank production towards the tool shaping from the beginning of the reduction process.

The dimensional characteristics of the retouches:

The length of the retouches is rather variable in Assemblage II (fig. 10) and in the sample of Level C (fig. 11). This is also illustrated by the different limit values per tool. In the two assemblages under study, retouches on the sidescrapers are the longest, followed by the composite tools, denticulates, Upper-Palaeolithic tool types and notched pieces.

We also noticed a proportional relationship between the length of the retouches and the blank its surface. The largest pieces have been used as blanks for the longest tools (essentially sidescrapers) whereas the smallest ones are associated with the shortest tools (e.g. burins and notched pieces). It is possible that Neanderthal man adapted the length of tools to the surface of the hand-held blanks. But it is also possible that the dimension was a selection criteria for the blanks. This could illustrate the inefficient capacities of Neanderthal men during their tools production.

4. General conclusion

The lithic industries of Assemblage II and Level C of Riencourt-lès-Bapaume are characterised by similar environmental conditions such as the occupation form and its emplacement, the climatic situation and the raw material sources. Despite these similarities, we observed however a differentiation in debitage. We were able to recognise, for instance, the existence of a volumetric blade reduction process in Level C. Furthermore, the tool composition of the studied assemblages is very comparable. Nonetheless, variations in the prevailing retouch and blank type were met with. We observed however some constants in tool production strategies. We were capable to establish several relationships between :

- blank type and tool category
- retouch type, retouch angles and the tool size
- retouch length and the tool surface

The intentionality of the tool making process of the Neanderthal artisans seems well established for the two Mousterian assemblages of the Riencourt-lès-Bapaume collection. The only matter yet to establish is at what time this intentionality interferes with the tool making process. But that is yet another story...

5. Acknowledgements

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