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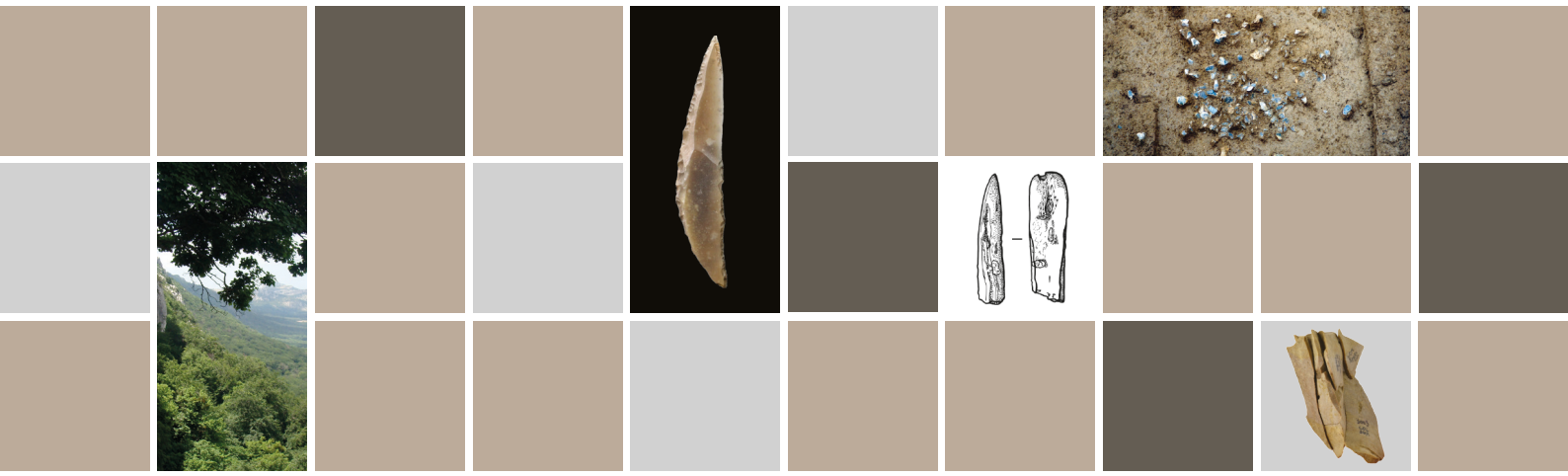
TECHNIQUES AND TERRITORIES

New Insights into Mesolithic Cultures



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VARIABILITY OF LITHIC FLAKING STRATEGIES:

Factors and Meaning

Frédéric SÉARA

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VARIABILITY OF LITHIC FLAKING STRATEGIES:

Factors and Meaning

Frédéric SÉARA

Abstract

Lithic flaking strategies were defined based on the study of large lithic assemblages from well-preserved sites, sometimes with flaking concentrations. In these contexts with good potential for the realization of complex refittings, I was able to obtain very significant results. This analysis method, often ignored in analyses of Mesolithic assemblages, revealed previously unknown features in both the spatial organization and technology of the assemblages studied. These data are integrated into a chrono-cultural framework that constitutes a solid reference base. The determination of raw material types and their origins, a research axis that is well established in the region, contributed greatly to our interpretations. It is thus possible to address the question of the potential relationship between procurement distances and flaking strategies. The variability of the flaking strategies represented by the most significant refitting groups, composed of nearly one hundred pieces, does not appear to be very significant. Four broad, unequally represented, strategies were defined and raise the question of their justification based on criteria of a very different nature.

Keywords

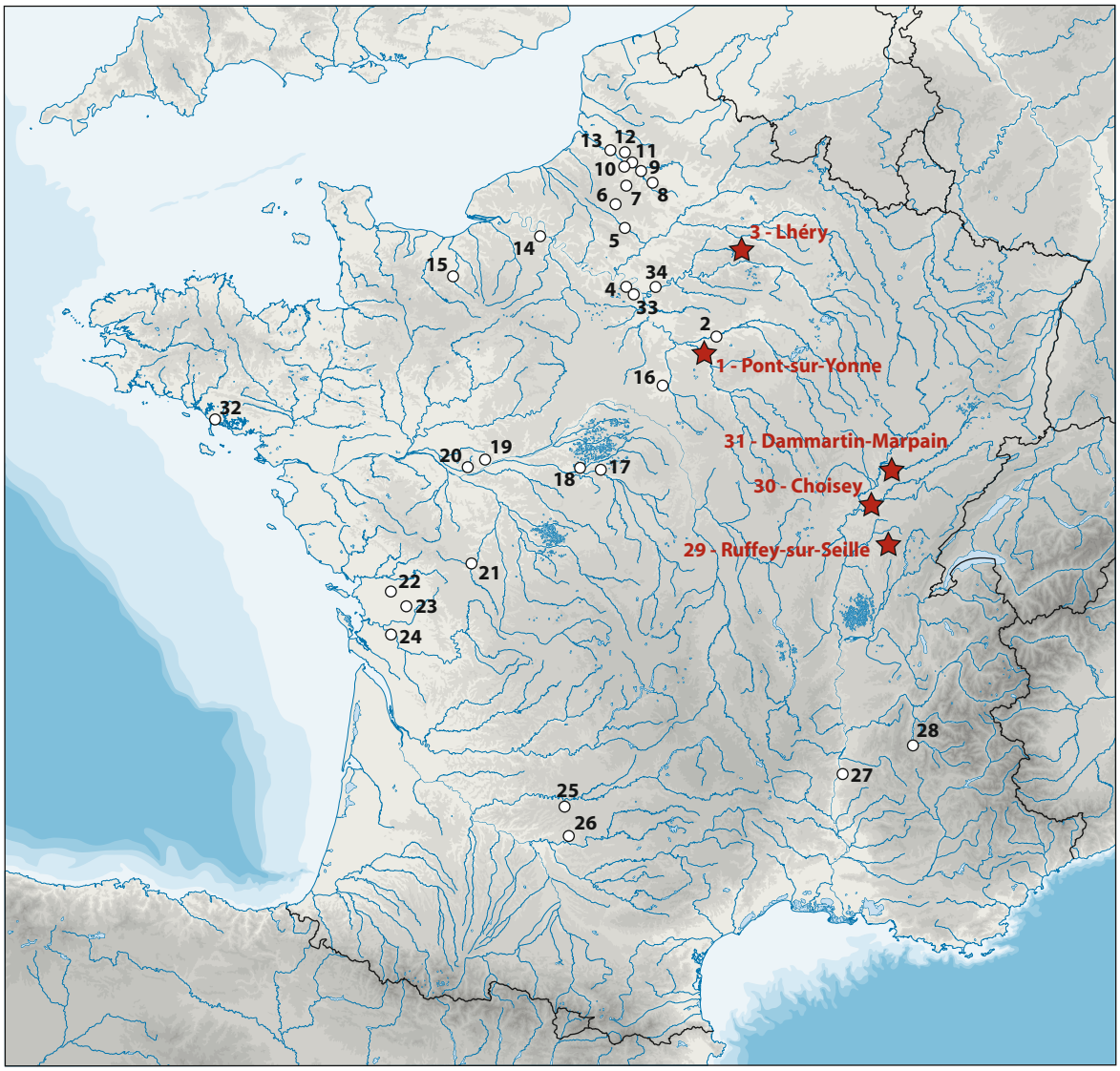
Eastern France, open-air sites, raw materials, refittings, lithic flaking strategies, First Mesolithic, Second Mesolithic.

Our ability to define the variability of Mesolithic lithic flaking strategies is dependent on the available data, which are admittedly highly variable themselves, depending on the region. They are variable not in their number, since Mesolithic occupations in all contexts are distributed in a rather homogeneous manner across the entire territory, but more so in terms of their nature, which more or less contributes advantageously to this theme.

Though most studies yield useful information, their partial nature, inherent to the conditions under which many assemblages were constituted, strongly limits our ability to define the lithic flaking strategies. We nonetheless have no intention to neglect these data, on the contrary, since they have now benefit from new information obtained through the now frequent analysis of well-preserved open-air sites.

1 - Study context and objectives

The sites of Ruffey-sur-Seille, Choisey (Séara *et al.*, 2002), Dammartin-Marpain in the Jura (Séara, 2008a, in press), Pont-sur-Yonne in the Yonne (Séara, 2008b) and Lhéry in the Marne (Bostyn, Séara, 2011) (figure 1) all share the common feature of having data that are well adapted to precise definitions of their flaking strategies (Pelegrin *et al.*, 1988). It is therefore also possible



1 Les Basses Veuves, Pont-sur-Yonne (Yonne)
2 Le Haut des Nachères, Noyen-sur-Seine (Seine-et-Marne)
3 La Presle, Lhéry (Marne)
4 Les Closeaux, Rueil-Malmaison (Hauts-de-Seine)
5 Le Marais de Merlemont, Warluis (Oise)
6 La Grippe, Lihus (Oise)
7 Le Marais, Conty (Somme)
8 Le Marais, Thennes (Somme)
9 Le Marais, Boves (Somme)
10 Les Baquets, Saleux (Somme)
11 Étouvie, Amiens (Somme)
12 Le Petit Marais, La Chaussée-Tirancourt (Somme)
13 Gravières, Hangest (Somme)
14 Les Varennes, Val-de-Reuil (Eure)
15 Déviation, Saint-Pierre-du-Bû (Calvados)
16 La Canne, Pannes (Loiret)
17 Le Chêne des Fouteaux, Saint-Romain-sur-Cher (Loir-et-Cher)
18 La Croix de Bagneux, Mareuil-sur-Cher (Loir-et-Cher)
19 La Guériverie, Langeais (Indre-et-Loire)
20 La Prairie d'Ingrandes, Ingrandes-de-Touraine (Indre-et-Loire)
21 L'Essart, Poitiers (Vienne)
22 La Grange, Surgères (Charente-Maritime)
23 La Grande Pièce, La Vergne (Charente-Maritime)
24 La Pierre-Saint-Louis, Geay (Charente-Maritime)
25 Al Poux, Fontanes (Lot)
26 Le Camp de Jouannet, Réalville (Tarn-et-Garonne)
27 Le Gournier, Montélimar (Drôme)
28 Blachette-Sud, Sinard (Isère)
29 A Daupharde, Ruffey-sur-Seille (Jura)
30 Aux Champins, Choisey (Jura)
31 Prairie du Milieu, Dammartin-Marpain (Jura)
32 La Croix Audran, Carnac (Morbihan)
33 Rue Farman, Paris (Hauts-de-Seine)
34 La Haute-Île, Neuilly-sur-Marne (Seine-Saint-Denis)

Figure 1 - Locations of the main open-air sites recently excavated and the sites studied (Séara, © Inrap).

to address their representativity and variability while beginning to consider the role played by certain determinant or supposed factors. The goal of continuing research will be to seek correlations between the chronological, cultural, lithological frameworks and the function and durations of occupations. (figure 2).

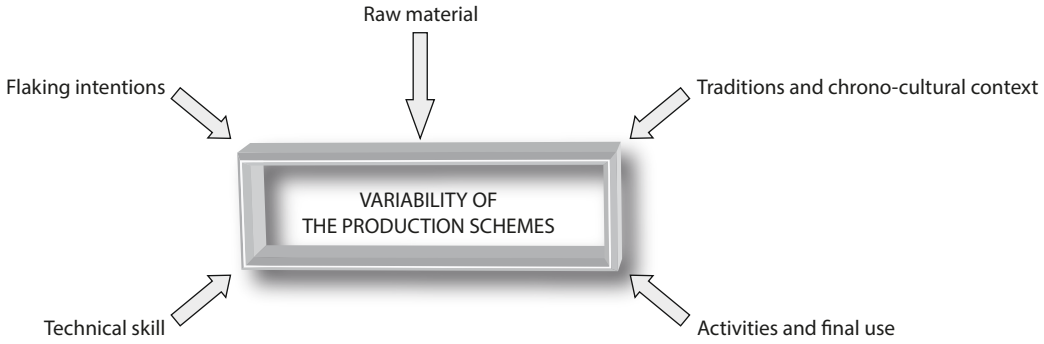


Figure 2 - Factors considered in the evaluation of the variability of lithic flaking strategies (Séara, © Inrap).

In addition to the vast geographic zone concerned by these sites, covering part of eastern France, western France in the Paris Basin and the south of the Tardenois, the radiometric framework, with the recent contribution of dates obtained at the Dammartin-Marpain occupations, constitutes a solid reference base (figure 3). Despite this, breaks still exist in the initial phases of the Early Mesolithic and in the Late Mesolithic. In the regions of Eastern France, the cultural framework defined based on clearly homogeneous assemblages reveals an alternation between Beuronian and Sauveterrian influences, this latter playing a much more significant role than was recently thought (Thévenin, 2008).

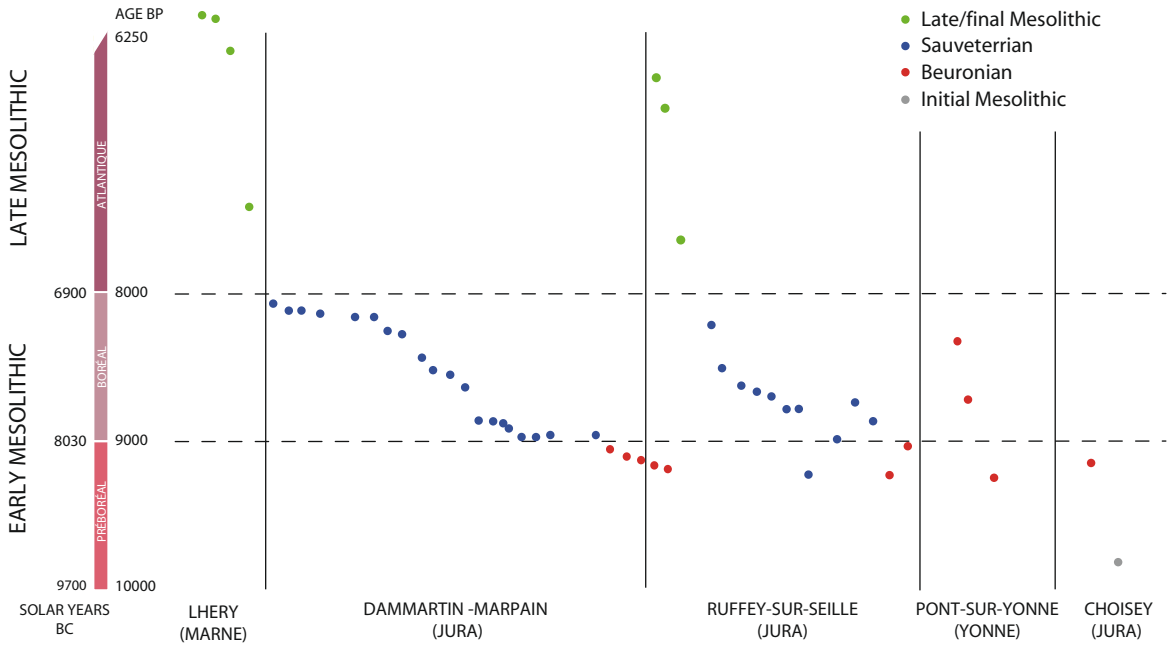


Figure 3 - Chronological and cultural framework defined base of the sites of Ruffey-sur-Seille, Choisey, Dammartin-Marpain, Pont-sur-Yonne and Lhéry (Séara, © Inrap).

2 - Defining lithic flaking strategies

The great majority of studies of flaking techniques have concerned all of the flaking products, but with a particular focus on cores, whose features reflect only the final phases of their reduction sequence (Walczak, 1998; Souffi, 2004). The technical criteria thus identified contribute to the definition of flaking strategies, most often influenced by a more or less conscious degree of subjectivity. While this approach can be justified by the formation processes of assemblages, or the contexts of some sites, the homogeneity of the assemblages must still be evaluated before they are analyzed and the plethoric approach often taken appears to be no more than a last resort solution that masks the central question. The solutions thus reached generally emphasize the technical poverty and monotony of the flaking strategies, therefore legitimizing the secondary status accorded to this analysis domain and favoring the notion of flaking style (Rozoy, 1978). Meanwhile, this approach does take into account the recent contribution of open-air sites located in valley bottoms, at least in the northern half of France. In addition to enabling new research perspectives, these sites have shown in a surprising manner that, as for other periods, very significant lithic refittings can greatly contribute to technological studies of Mesolithic assemblages (Fagnart *et al.*, 2008).

For the Mesolithic, technological analyses accompanied by refittings were still rare in the 1990's; one of the first realized in our regions was that by Isabelle Ketterer at the site of Hangest Gravière II Nord (Ketterer, 1992, 1997; Ducrocq, 2001). This study showed that it would have been possible to obtain a high rate of associated pieces and significant groups of refittings, but the excavation of sediments moved during construction work did not enable an identification of the taphonomic conditions of the sites. While her success at finding refittings demonstrated the homogeneity and integrity of the assemblage, it is above all thanks to the motivation and will of this researcher to conduct this type of work that these results were obtained.

At the beginning of our study, we considered refittings mostly in terms of their contribution to our understanding of the formation processes and spatial organization of the occupations (Ciezsla, 1987; Séara, 2006). From this perspective, different scales were defined, sometimes very broad, such as at the site of Lhéry, where 4.7% of the 42 000 pieces recovered from a surface of nearly 1 000 m^2 were integrated into a group of refittings (Bostyn, Séara, 2011) (figure 4).

Specific questions linked to this same research question required analyses that took intermediate scales into account. In this manner, at Ruffey-sur-Seille one of the occupation sectors of the Early Mesolithic revealed a rather complex spatial organization (Séara, 2006) (figure 5).

The locus or unit of activities, as we defined it (Séara, 2008a), is also adapted to goal of analyzing spatial processes, while also yielding significant information on the lithic manufacturing processes. In this manner, at Pont-sur-Yonne, 26.7% of the 1 161 pieces recovered from a small, Early Mesolithic, occupation sector could be integrated into several refitting groups (figure 6).

The most efficient scale for recording the different aspects of flaking at a site is the flaking locus. These features are not common and are found in the form of compact or more or less scattered concentrations (figure 7). These different configurations do not result from specific and differential taphonomic processes since the two can coexist, such as at Dammartin-Marpain and Pont-sur-Yonne. They are more likely the consequence of sorting and collecting actions, during which the by-products left behind are scattered (Séara, 2008a). Though their number is generally small, only one at Ruffey-sur-Seille, two at Choisey, four at Pont-sur-Yonne, and five at Dammartin-Marpain, they are being found more and more often. Even though they concentrate sometimes incomplete flaking processes, the data yielded by sometimes large refitting groups have proven essential to understanding flaking strategies, whose technical complexity would not otherwise have been evident.

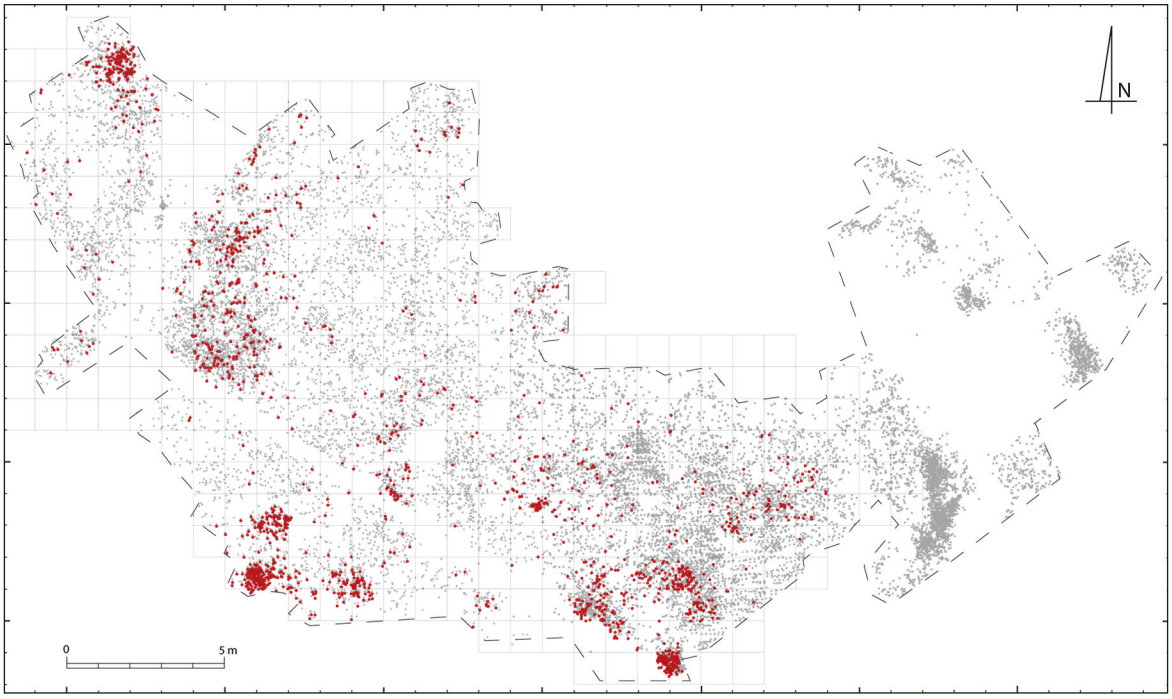


Figure 4 - Site of Lhéry, spatial distribution of the lithic pieces integrated in to a refitting group (Séara, © Inrap).

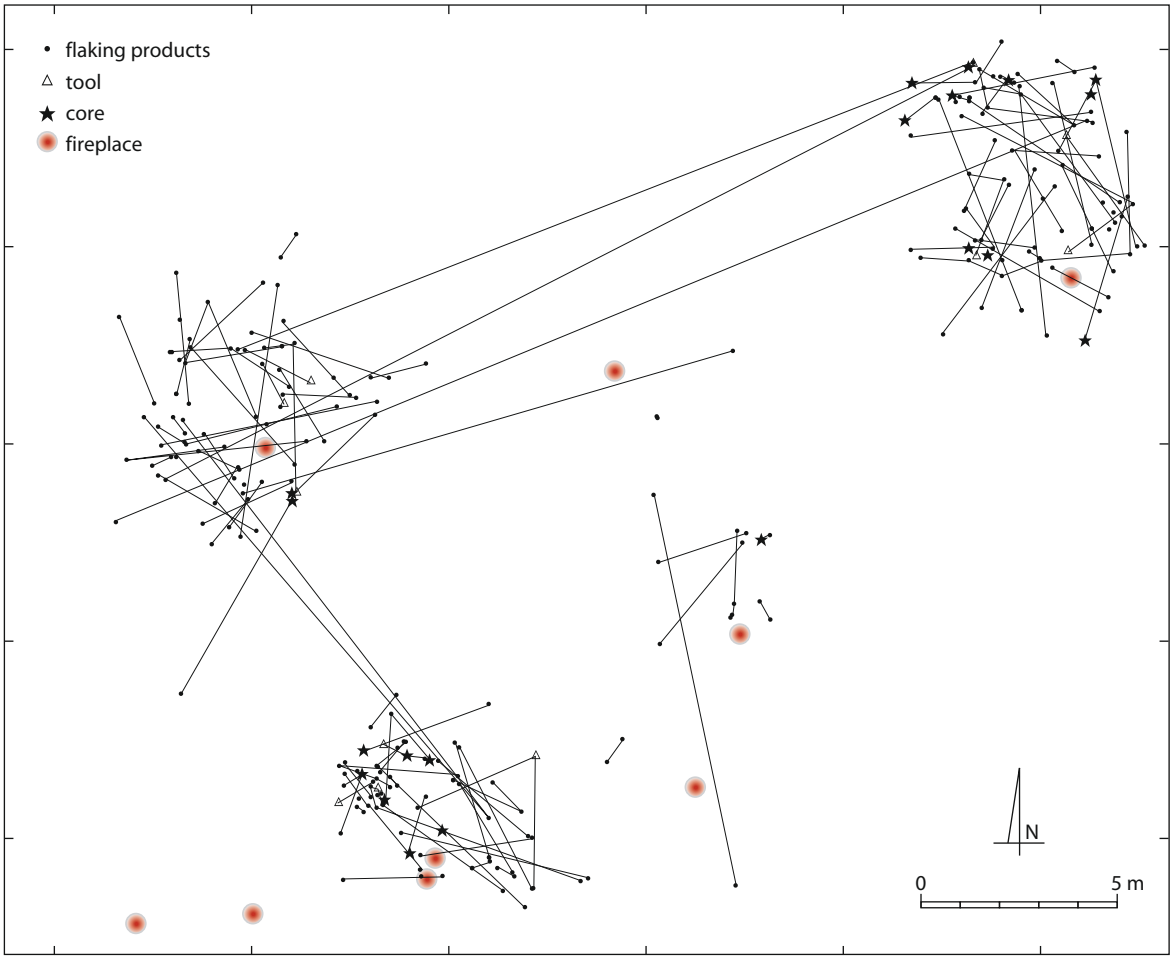


Figure 5 - Linking of three Early Mesolithic loci at Ruffey-sur-Seille through lithic refittings (Séara, © Inrap).

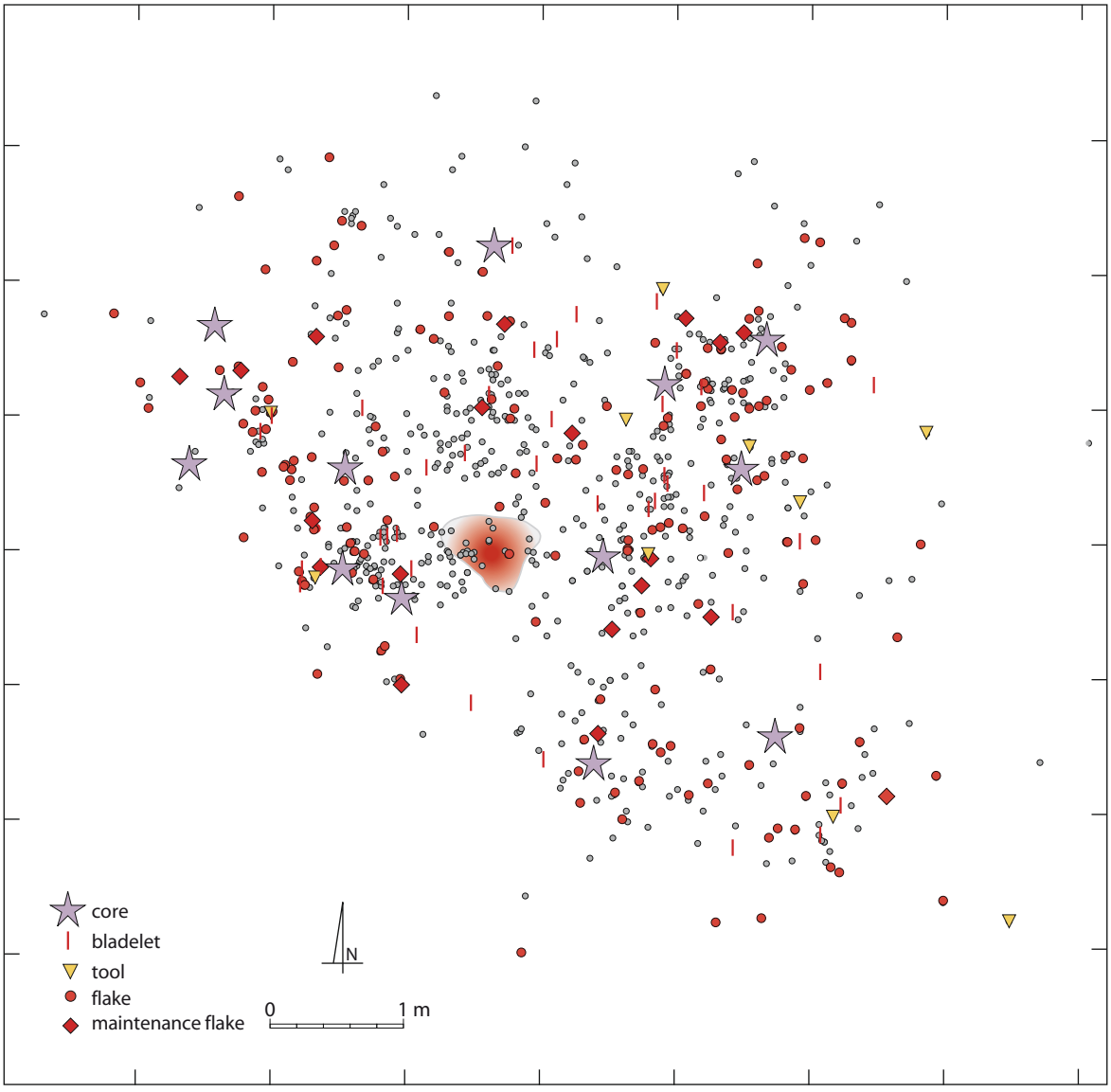


Figure 6 - The distribution of lithic artefact categories within a refitting group in the Early Mesolithic at Pont-sur-Yonne (Séara, © Inrap).

A - Ruffey-sur-Seille, Early Mesolithic

B - Pont-sur-Yonne, Middle Mesolithic

C - Dammartin-Marpain, Middle Mesolithic

D - Lhéry, Final Mesolithic

Figure 7 - Flaking station (Séara, © Inrap).

3 - The role of raw materials

Before counting the different flaking strategies and evaluating their representativity, it is important to consider the variables associated with the raw materials, including the morphology of the initial block and the quality of the material. Thanks to the presence of some unworked pieces, or with just a few removals detached when the block was tested, along with some refitting groups, we have rather precise data on this question. At the Jura sites, the diverse local materials were mostly collected in the form of small blocks that were easy to flake (figure 8). These were local Bathonian, Bajocian, Callovian and Dogger cherts (Affolter, 2003; Bourgeois, 2002; Cupillard *et al.*, 1995; Cupillard, 1998). The origins of the flint used were more distant, such as that of the Upper Cretaceous Cesancey flint, originating from the southern Jura region, and the Oligocene flint from the Haute-Saône Tertiary basin. Except for this latter, the blocks selected were generally small.

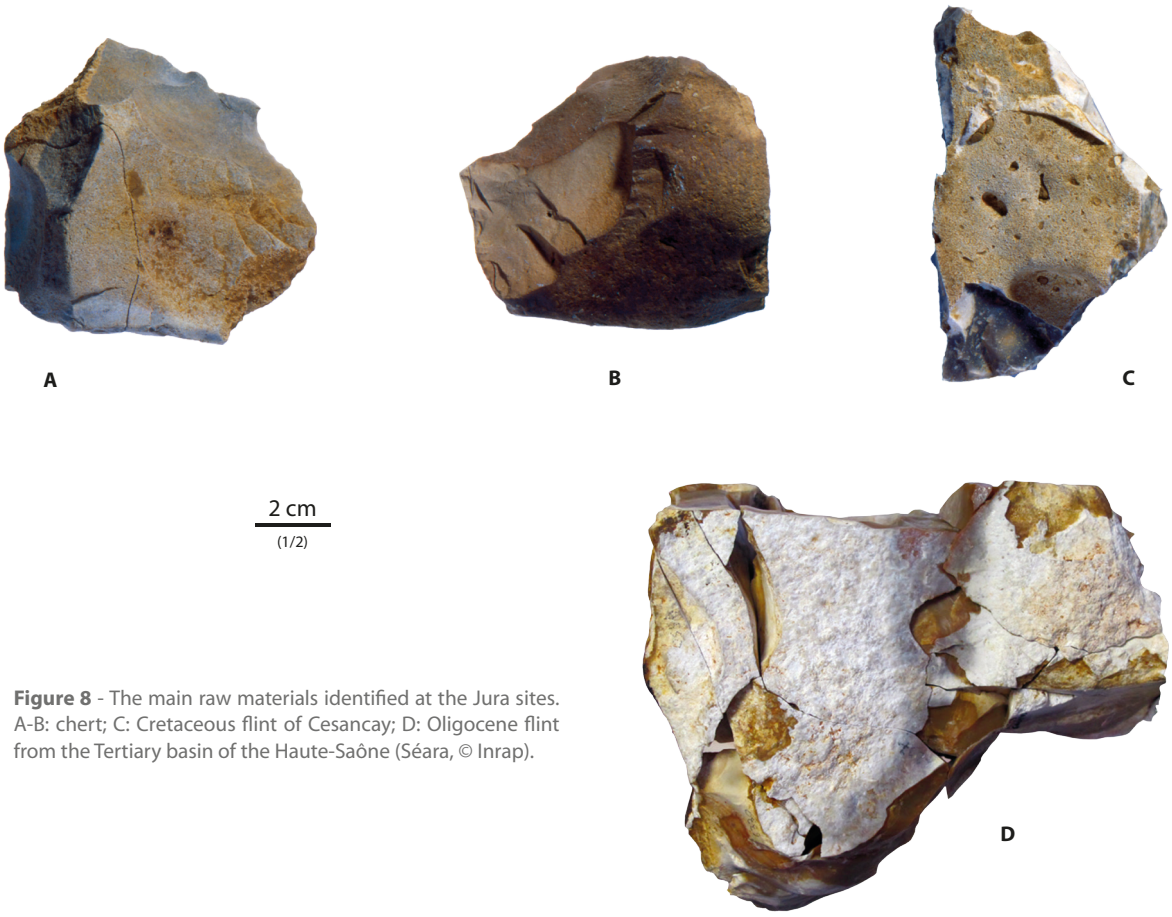


Figure 8 - The main raw materials identified at the Jura sites. A-B: chert; C: Cretaceous flint of Cesancay; D: Oligocene flint from the Tertiary basin of the Haute-Saône (Séara, © Inrap).

Other materials with a more distant origin are present, but in small proportions. At Dammartin-Marpain, the most distant known origin is that of Olten in Switzerland, 170 km away (Affolter *et al.*, 2010) (figure 9). This same origin was identified at Choisey. Though we have only partial data on the form in which the distant raw materials were imported, some nearly complete refitting groups, such as that of the bladelet production in Olten flint at Choisey, indicate that small blocks were imported (figure 9). While the factor of distance could modify some flaking strategies, the small quantity of distant materials in the assemblages studied does not enable this type of observation. In general, local resources were favored.

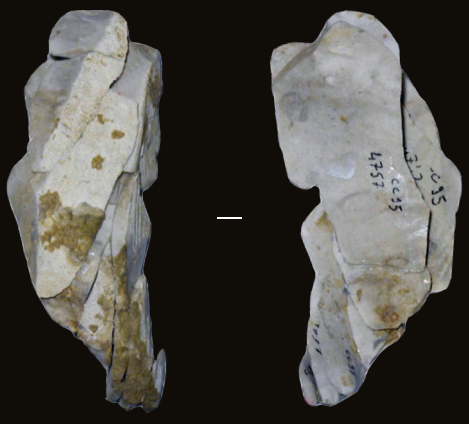
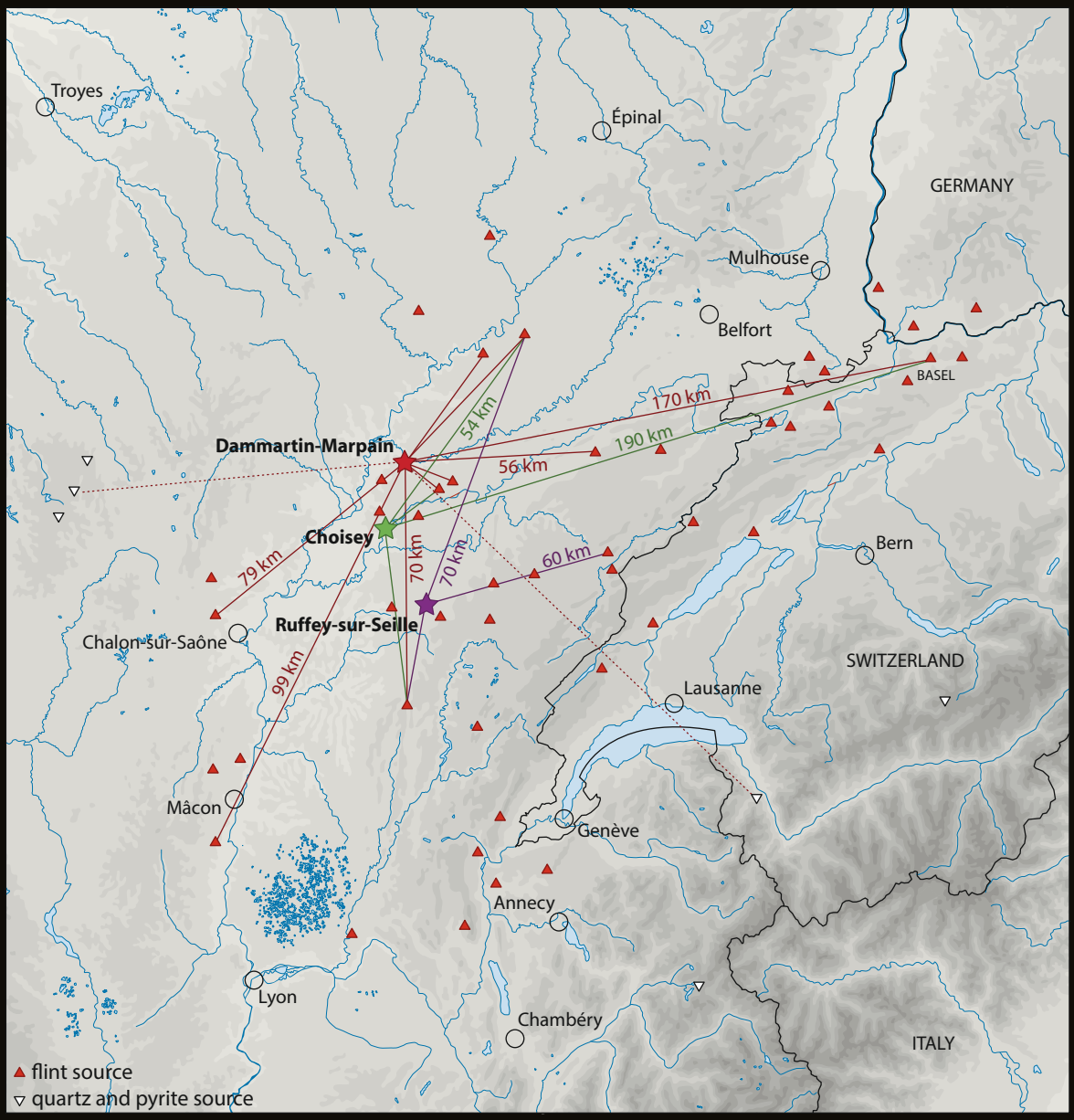


Figure 9 - Top: Kimmeridgien flint from Olten (Switzerland), bladelet assemblage in the process of being refitted; Bottom: map of the main known procurement sources for the sites of Ruffey-sur-Seille, Choisey and Dammartin-Marpain (Séara, © Inrap).



At Ruffey-sur-Seille and Dammartin-Marpain, evidence for the morphology of the raw material blocks and their manner of introduction into the site is remarkably preserved in the deposits of blocks with different configurations. At Ruffey-sur-Seille, a large assemblage of 22 Upper Cretaceous flint blocks, all tested, was found (Séara *et al.*, 2002), while at Dammartin-Marpain, there are smaller deposits composed of small chert blocks, this time not tested and always located in the sectors with few remains, suggesting that they were being saved for future use (figure 10).

A - Ruffey-sur-Seille, Cretaceous flint

B - Dammartin-Marpain, Bajocian chert

C - Dammartin-Marpain, Bajocian chert

Figure 10 - Block deposits (Séara, © Inrap).

At Pont-sur-Yonne, the very different petrographic context is very different and clearly more homogeneous than this part of the Paris Basin where small, more or less regular nodules of a highly variable quality, with a rolled cortex, were selected (figure 11). These elements originate from the coarse alluvial sediments of the Yonne. Elongated pieces with a small section and chalky cortex, slightly flaked, or not at all, were also collected. The cortical surface indicates a different procurement source, probably from chalk outcrops that appear to be local (Séara, 2008a).

Figure 11 - The morphology of flint blocks from the Early Mesolithic occupation at de Pont-sur-Yonne (Séara, © Inrap).

The site of Lhéry, near Reims, is located in a zone with the Lhéry-Romigny Tertiary flint, known for its quality. Alongside small blocks, there are rather large slabs weighing several kilograms. To enable bladelet manufacturing, these pieces were intentionally fractured using intermediary flint pieces as "wedges to split stone" (Bostyn, Séara, 2011) (figure 12).

Analysis of the raw material selection criteria seem to indicate that the main aim was to obtain volumes that would enable direct and immediate flaking with little preparation each time it was possible for the Mesolithic artisans. While in this study region, this observation is particularly true for the Early Mesolithic, in the Late Mesolithic, blocks of a better quality were used, without necessarily implying a signification of the procurement systems.

Figure 12 - Tertiary flint block from the Lhéry sector and outcrop conditions (Séara, © Inrap).

4 - Flaking strategies

Even if most of the strategies identified are based on refittings, certain core types can still contribute information to this question (Séara *et al.*, 2002).

A - Choisey (Jura)

The site of Choisey yielded an assemblage of discoid cores with radial removals on one or two surfaces (figure 13). The functional intention of the short and robust flakes obtained is difficult to determine, be it as a weapon element, or for direct use. It is also difficult to know whether this strategy is associated with an initial configured conception, or a particularly thorough reduction sequence. The small number of refittings does not allow us to answer this question, but could be the consequence of a particularly complete form of exploitation that yielded small pieces, which were thus very difficult to refitting.

Given the large number of refitting groups, the question of the diversity of flaking strategies can be best understood based on the most complete ones.

A few rather complete refittings are associated with bipolar bladelet manufacturing, such as a small group composed of 14 pieces in Cretaceous flint from the Early Mesolithic at Choisey (figure 13[A]). No preliminary preparation was necessary with this strategy, which yielded small, regular bladelets. This dominant strategy at Choisey shows the attention paid to selecting blocks that did not require significant preparation before the full debitage phase.

B - Pont-sur-Yonne (Yonne)

A nearly direct reduction of blocks was also observed in the Early Mesolithic assemblage of Pont-sur-Yonne. A few tubular nodules were flaked, but their low longitudinal convexity, like the example in figure 14[A], required flaking that tended to be oblique, favoring on of the extremities of the piece. An attempt to rework the core from a second striking platform yielded a few flakes with hinge terminations.

Flaking was difficult in this case because the length of the core was too long relative to the section, which was the main reason this type of volume was not often employed.

Surprisingly, flaking was much more successful and efficient with the direct flaking of much smaller nodules, which are abundantly present in the area near the site (figure 14[B]). Most often associated exclusively with small bladelet manufacturing, this strategy reduced to its simplest form, provides only a few blank types.

Another flaking strategy is distinguished by the initial shaping phase required by the more massive morphology of the original blocks (figure 15). This piece is a rather good illustration, indicating that after the detachment of relatively thick flakes in order to create the conditions necessary to facilitate further flaking, there was a progression toward to the detachment of bladelets or short blades. The striking platform was created in the initial phases and did not evolve afterward.

In addition to the multiple flaking directions involved in this strategy, and therefore higher skill level than that associated with the direct flaking strategies, it has the specificity of yielding a greater variety of blank types, including flakes of different sizes, most of which precede the bladelet production. The refitting group shown in figure 16 shows that the bladelet production is not represented, nor is the core, which was probably exported to be flaked elsewhere (figure 16). This is thus a good illustration of the segmentation of a reduction sequence in the context of Mesolithic occupations. One of the originalities of this sequence is that is provided the blanks for

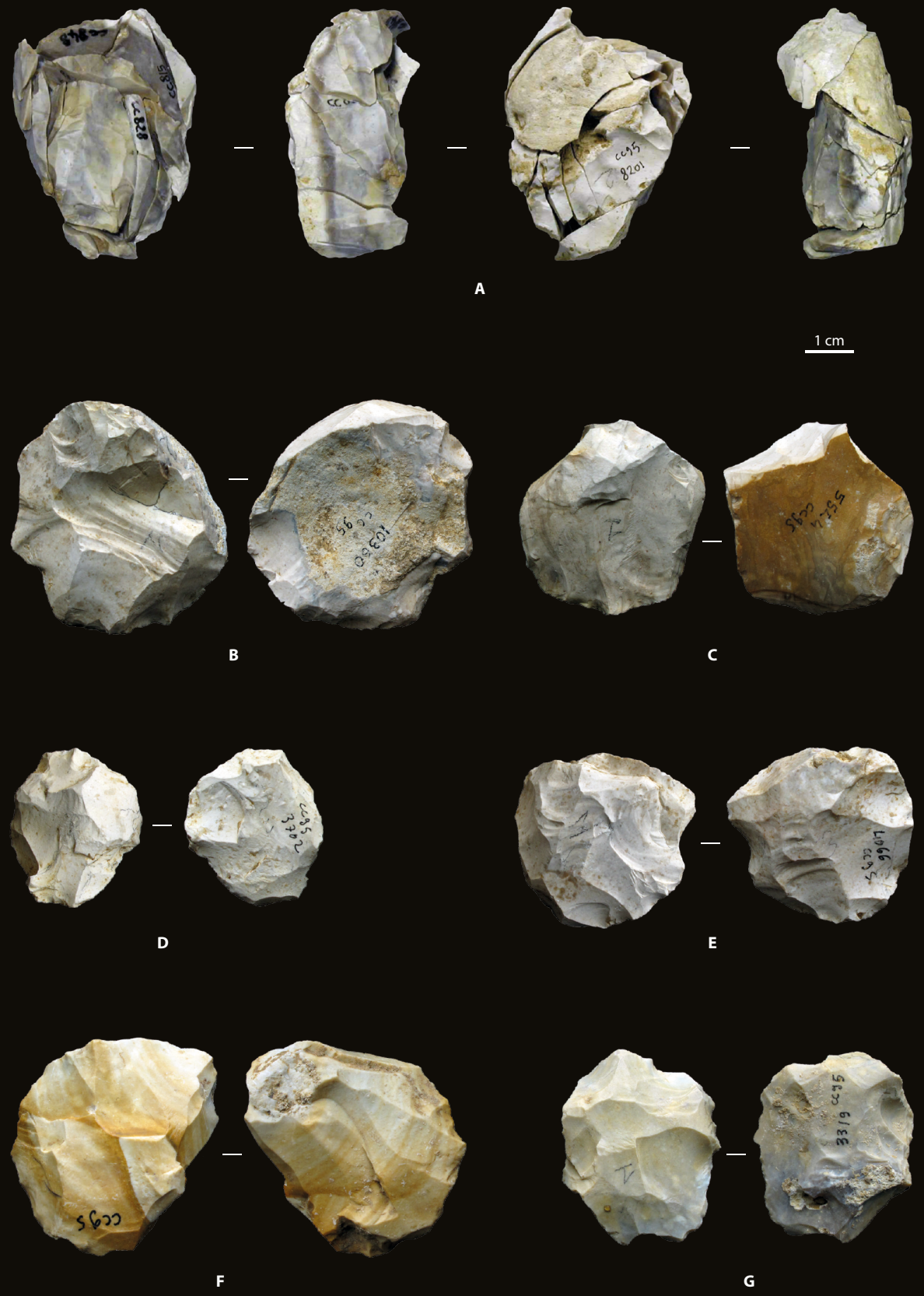


Figure 13 - Choisey, Early Mesolithic. A: refitting group a block used for bladelet manufacturing; B-G: discoid cores (Séara, © Inrap).

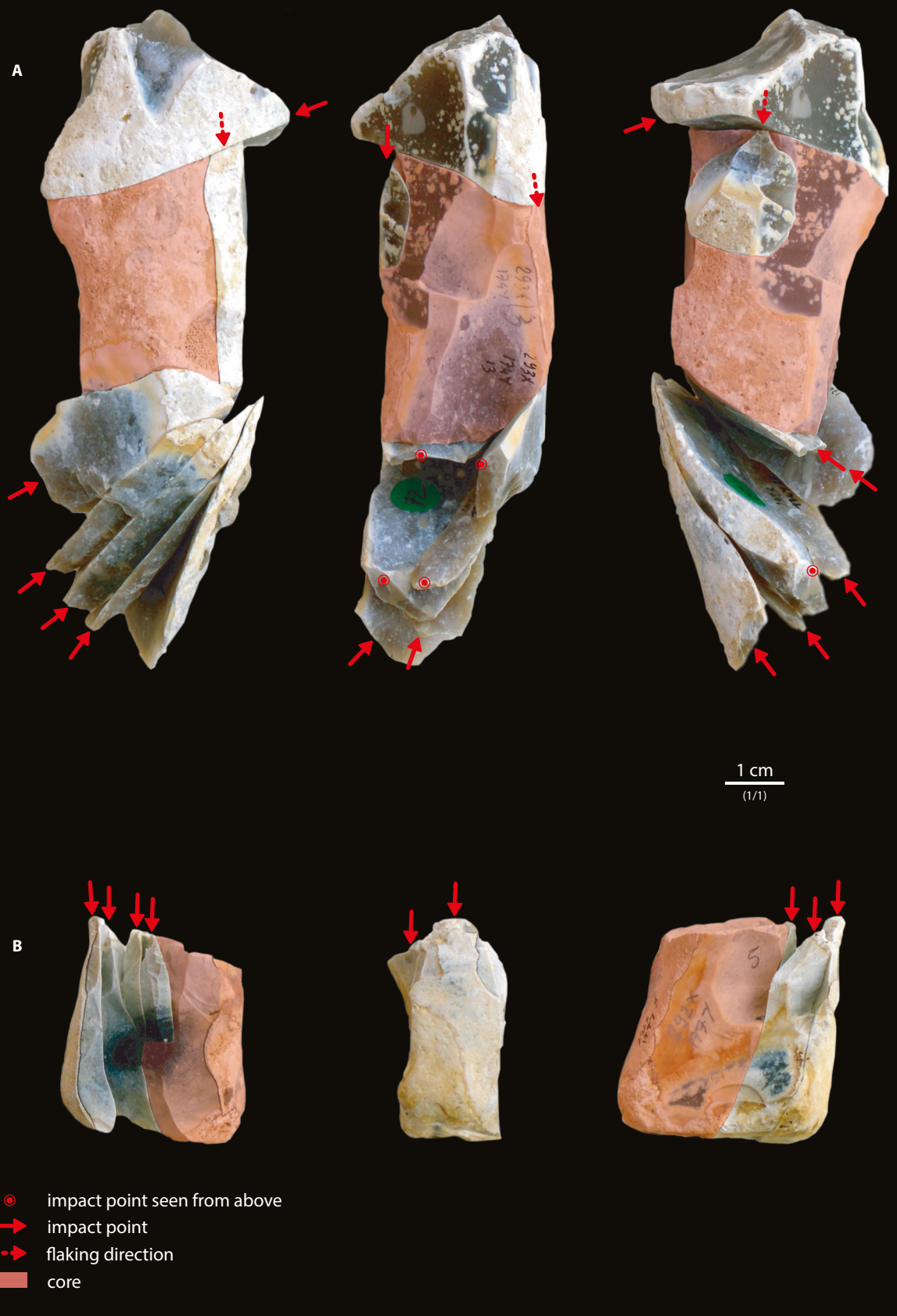


Figure 14 - Pont-sur-Yonne, Early Mesolithic. A: refitting group of a tubular nodule used for bladelet manufacturing; B: refitting group of a small block used for bladelet manufacturing (Séara, © Inrap).

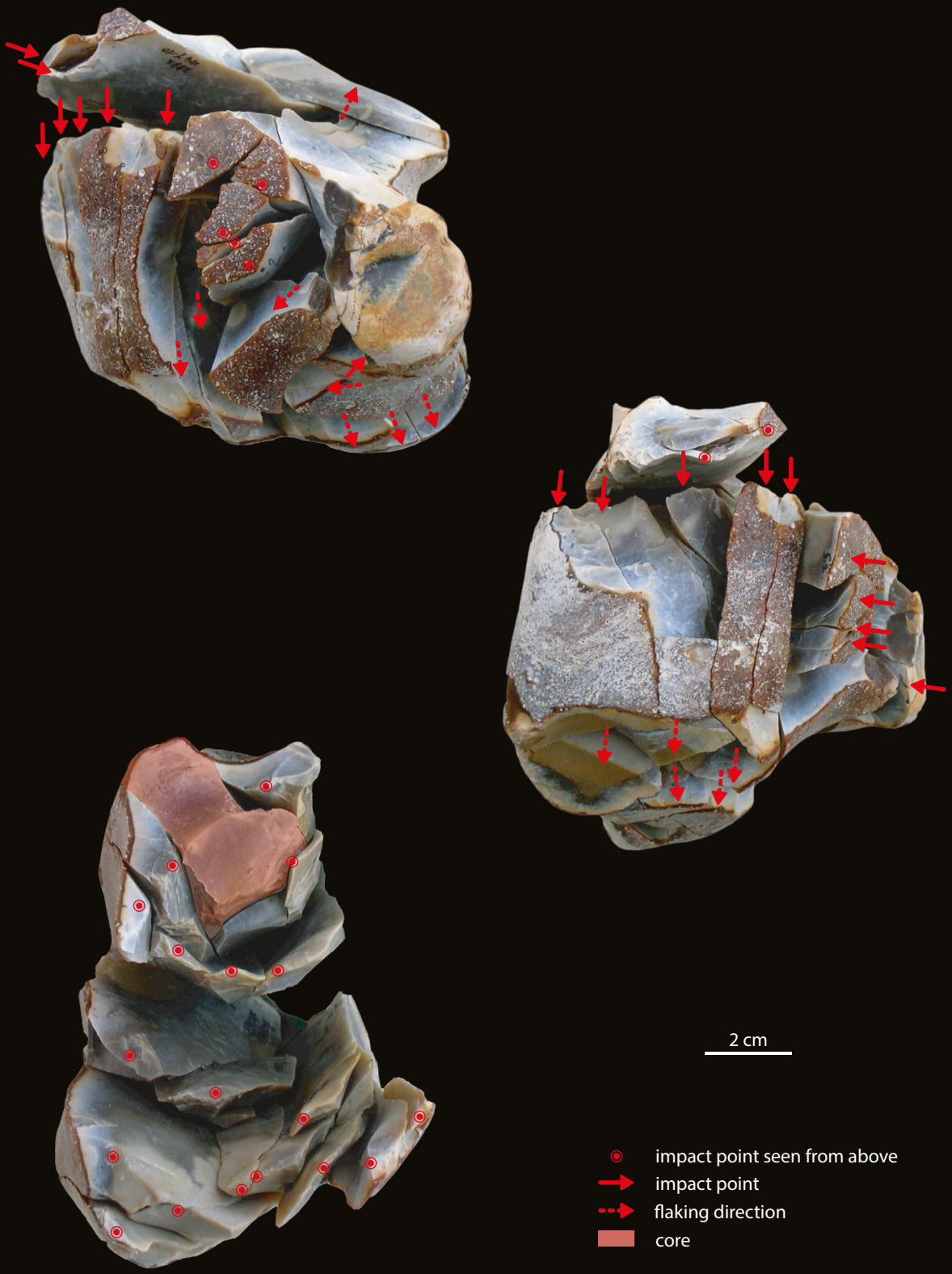


Figure 15 - Pont-sur-Yonne, Early Mesolithic. Refitting group of a nodule used for bladelet manufacturing, attesting to an initial preparation phase (Séara, © Inrap).

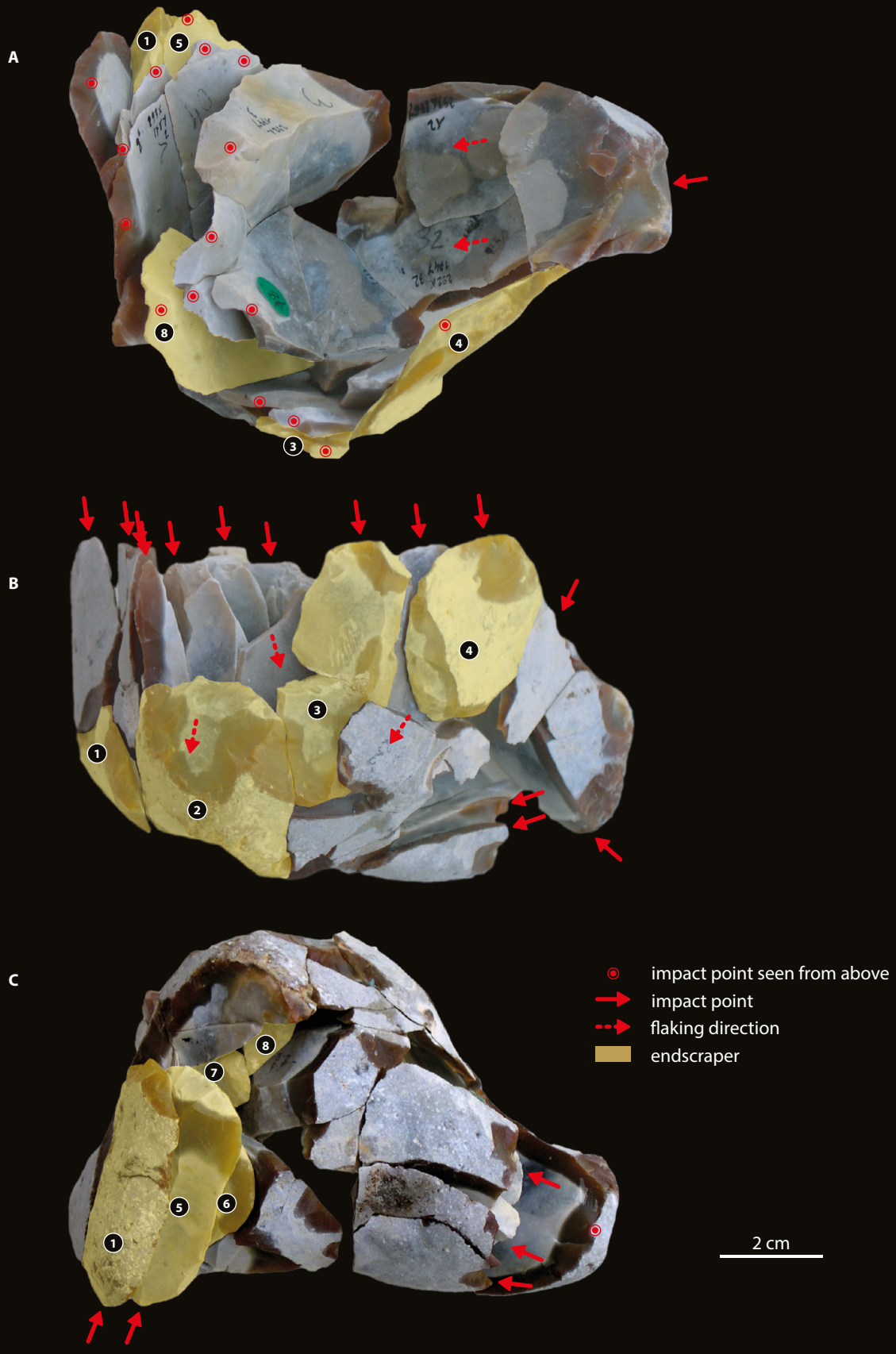


Figure 16 - Pont-sur-Yonne, Early Mesolithic. Refitting group associated with the initial preparation phase. Eight flakes from this phase were transformed into endscrapers (Séara, © Inrap).

eight endscrapers. This flaking sequence has the advantage of integrating the manufacturing of flakes and bladelets. The care taken in the initial phases, in addition to their technical implications, also served to obtain specific blanks. The bladelets or short blades produced are relatively regular and some of them were also transformed into domestic tools, as in refitting group 1 (figure 17), including an endscraper. The domestic tools, well represented in this case, remind us of their tendency to be represented in Early Mesolithic industries (Lang, 1997; Lang, Sicard 2008; Ducrocq, 2001) (figure 17).

The last flaking strategy identified at Pont-sur-Yonne consists of a small flaking assemblage, unique at the site, and similar to the flaking strategy identified based on the discoid cores at Choisey (figure 17B). The few refittinged elements are very irregular bladelets, or even flakes, whose function could not be determined by the usewear analysis realized by Jean-Paul Caspar.

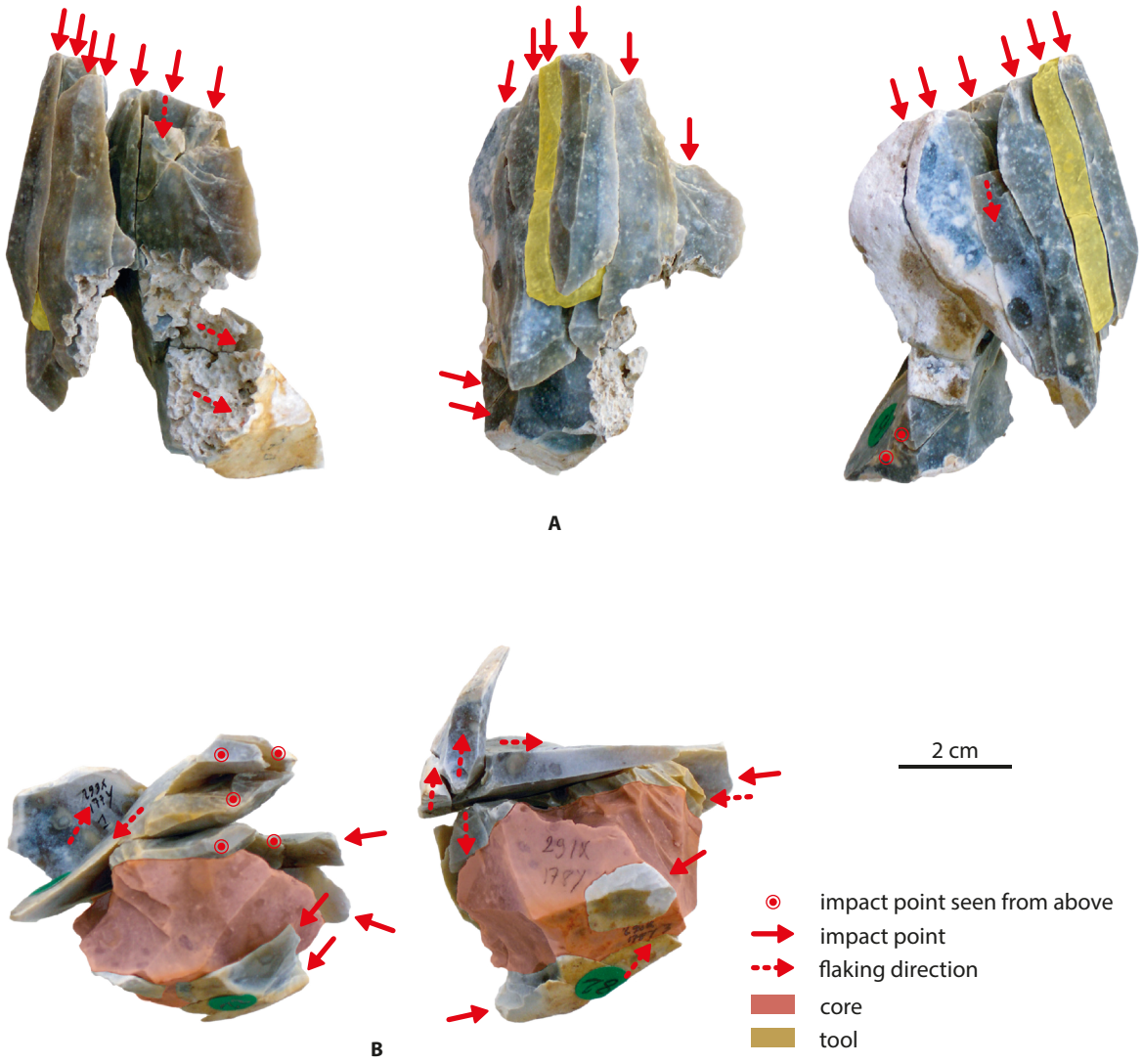


Figure 17 - Pont-sur-Yonne, Early Mesolithic. A: bladelet refitting groups with one retouched into an endscraper; B: refitting group showing discoid flaking (Séara, © Inrap).

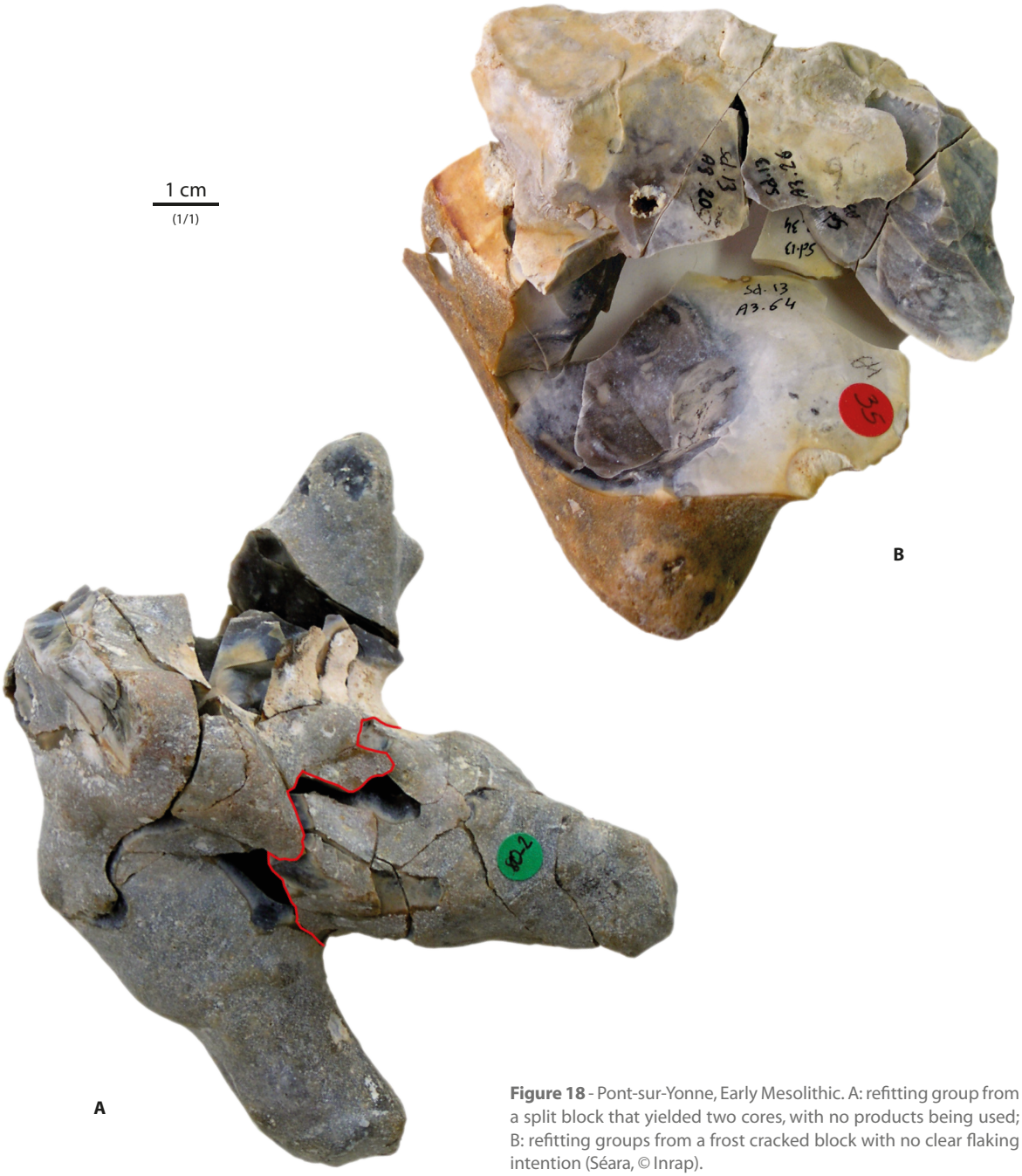


Figure 18 - Pont-sur-Yonne, Early Mesolithic. A: refitting group from a split block that yielded two cores, with no products being used; B: refitting groups from a frost cracked block with no clear flaking intention (Séara, © Inrap).

A few refitting groups can be distinguished, not due to a specific flaking strategy, but more because of the conditions and end result of their flaking process. A split block was used for two flaking sequences that yielded thick flakes, none of which were used (figure 18A). Similar flaking scenarios have been found in association with the Middle Mesolithic occupation, as shown by the reduction of a frost cracked block that yielded only thick and irregular blanks, which were also not used (figure 18B). Though some of these specific features can themselves be the reason for these abnormal assemblages, it is also possible that they could reflect a lower skill level, or even the activities of apprentices. It is also possible that some types of activities required blanks to be obtained rapidly, therefore explaining the much more opportunistic selection of blocks.

C - Dammartin-Marpain (Jura)

The site of Dammartin-Marpain, excavated between 2008 and 2009, has already yielded very significant refitting groups that recall the strategies previously described (Séara, Roncin, in press; Affolter *et al.*, 2010). For example, one of these refittings shows a flaking process constrained by the small width of the block (figure 19A). The full flaking phase was initiated immediately after the creation of the striking platform. Several repairs to this striking platform reduced the length of the block, which resulting meant that only a small number of bladelets could be obtained. The most frequent strategy, involving a direct initiation of flaking, is well illustrated by this example in Callovian chert. This core, which had no striking platform, yielded bladelets, but which were particularly thick (figure 19B). The striking platform of the last example, on a flake, was created by the successive detachment of transverse flakes, truncating in a way, this large support in order to rather inefficiently detach bladelets (figure 19C).

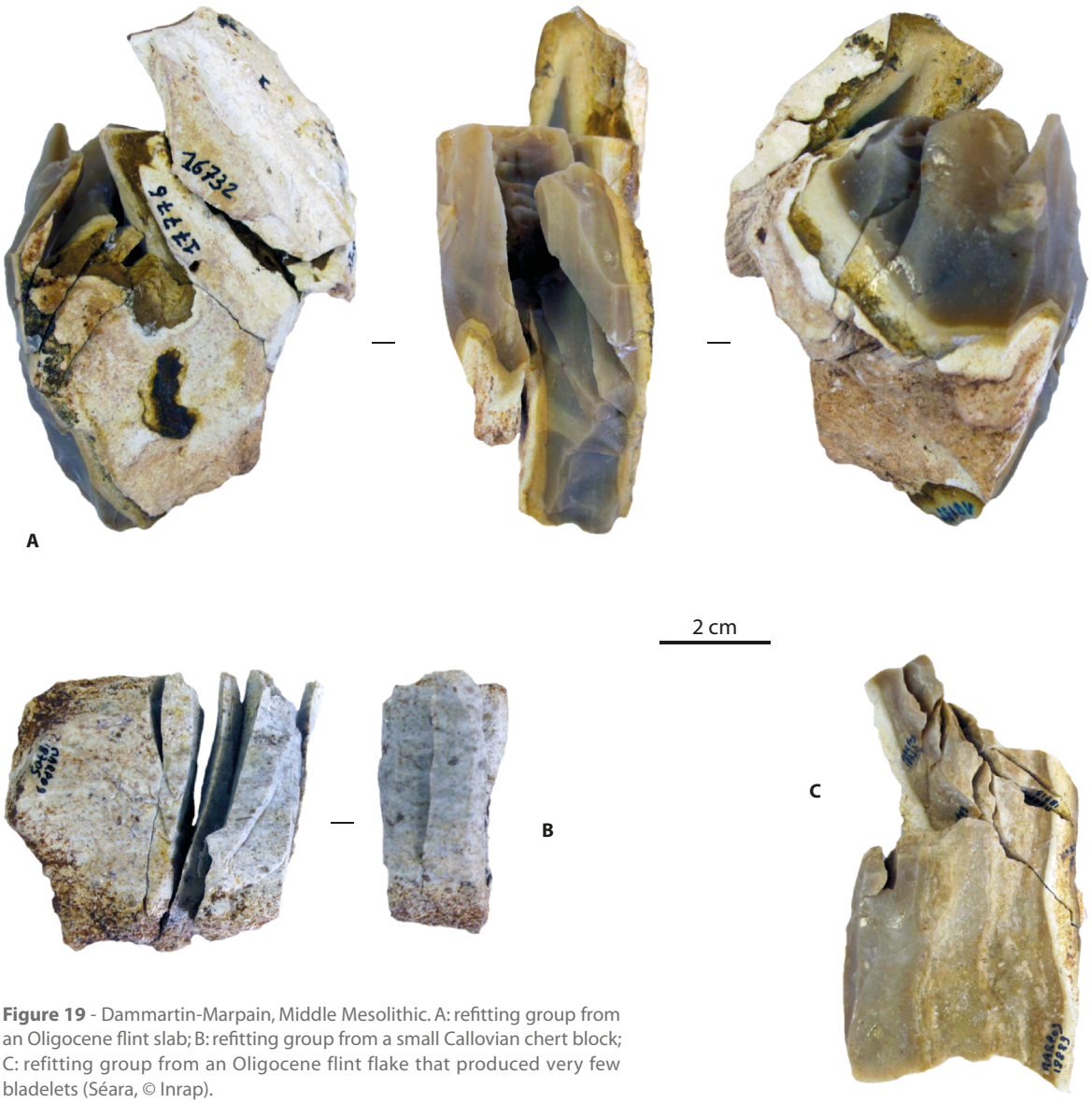


Figure 19 - Dammartin-Marpain, Middle Mesolithic. A: refitting group from an Oligocene flint slab; B: refitting group from a small Callovian chert block; C: refitting group from an Oligocene flint flake that produced very few bladelets (Séara, © Inrap).

The realization of detailed refittings, facilitated by the existence of flaking stations, revealed a specific strategy. According to our current knowledge, it is associated only with flint slabs from the Tertiary basin of the Haute-Saône, and more precisely, with pieces that are thicker than usual. This refitting group shows the flaking of a slab of flint from the Tertiary basin, which was broken into six groups through the use of its natural cleavage. The entire groups consists of 91 pieces weighing 740 g. The ensemble yielded seven cores, all of which are associated with bladelet manufacturing. All of the bladelets were collected (figure 20A).

This specific management is adapted to the morphology of the block and implies a difficult fracturation phase, dictated by the aim to manufacture bladelets. It reflects an intention to employ in the best manner possible, large and small slabs from a relatively long distance and of good quality. Once the slabs were segmented into smaller pieces, these pieces were reduced in the usual manner and their productivity was highly variable.

This same strategy is observed in another, also complete, refitting group from a locus located 40m from the preceding one. It represents the same principle of segmentation and the most of bladelets produced were also collected (figure 20B).

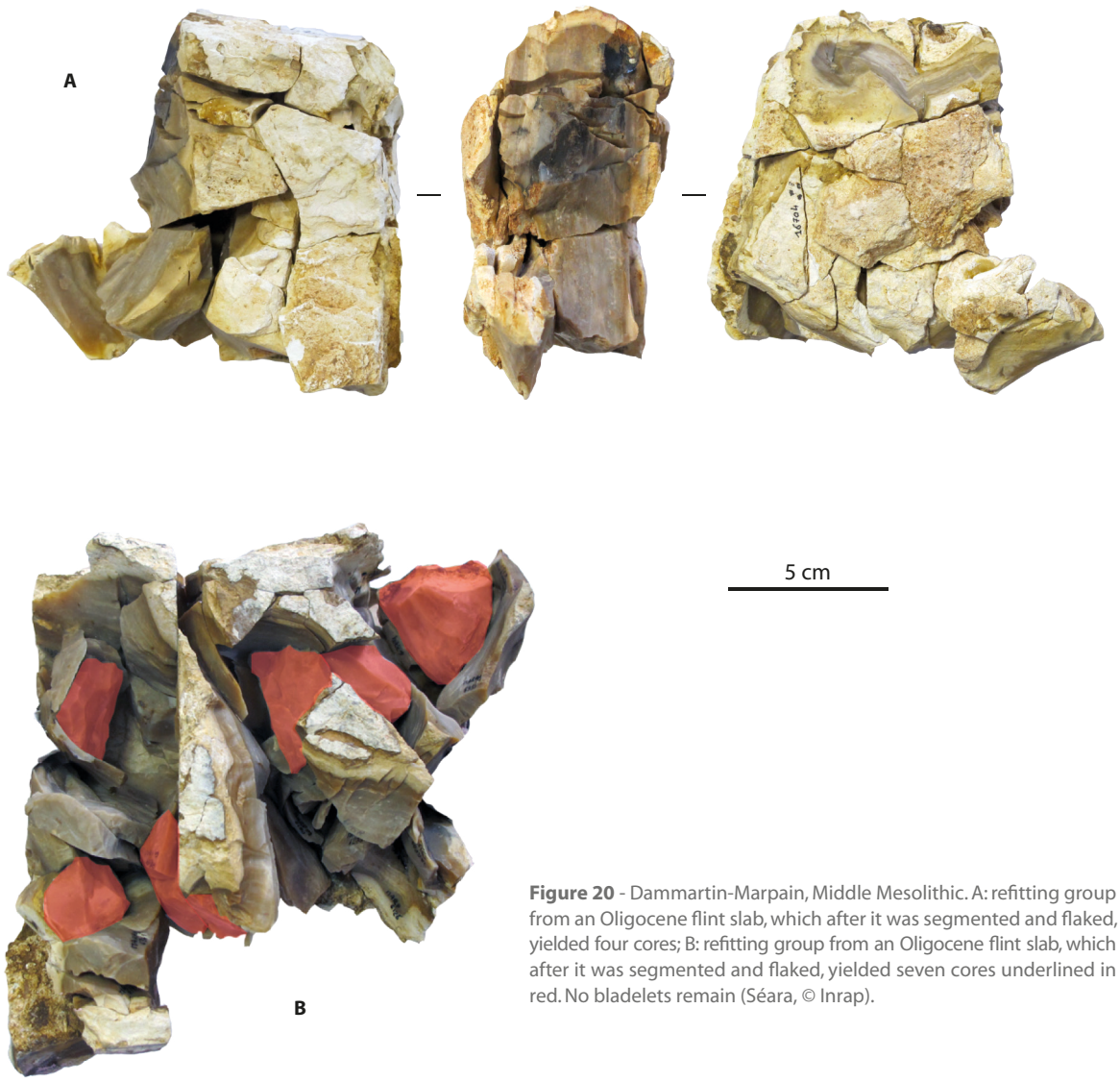


Figure 20 - Dammartin-Marpain, Middle Mesolithic. A: refitting group from an Oligocene flint slab, which after it was segmented and flaked, yielded four cores; B: refitting group from an Oligocene flint slab, which after it was segmented and flaked, yielded seven cores underlined in red. No bladelets remain (Séara, © Inrap).

D - Ruffey-sur-Seille (Jura)

The analysis of refitting groups from the site of Ruffey-sur-Seille shows the same types of strategies as those already described. The use of small blocks that did not require extensive preparation is also very frequent, as is seen in the Sauveterrian pieces 1, 2 and 3 in figure 21.

For the Late Mesolithic, the data yielded by refittings are much less numerous (Deschamps, 2000). The use of indirect percussion does not appear to have an effect on the morphological criteria that dictated the selection of blocks, as seen with core 5 in figure 21. The flaking strategy corresponds to blocks whose quality and form are adapted to a nearly direct exploitation. On the contrary, we observe a difference in the care taken in the maintenance of the striking platform and the base of the core, as shown by refitting group 4 in figure 21.

E - Lhéry (Marne)

A rich and informative set of data were obtained from the site of Lhéry (Marne), excavated in 2001 (Bostyn, Séara, 2011). The analysis of the cores clearly showed the use of indirect percussion, characterized by very straight and regular flake scars, with a frequent and deep distal hinge termination (figure 22). Though unidirectional flaking is dominant, different combinations of striking platforms are present: opposed, favoring flaking of the back; or perpendicular and favoring flaking of the base of the core, for example.

However, these cores, situated at the end of the *chaîne opératoire* (reduction sequence), provide only a very partial image of the flaking strategies. The very complete refitting groups were obtained enable us to understand the technical management of these cores.

The first refitting groups weighs 4 335 g and is composed of 50 pieces (figure 23). After a roughing-out phase, one of the resulting large flakes was transformed into a large bipolar flake, intermediary piece, or wedge to split the block into two groups. Each of the latter were used to manufacture bladelets, leaving behind two cores.

The second refitting group weighs 6 325 g and is composed of 83 pieces. It is associated with this same action of segmenting a large flint slab. The use of indirect percussion is relatively certain for group 16 B, with a core that has a smooth striking platform and deep bulb scars (figure 24).

Refitting R50 is the most complete, with 98 pieces and a weight of 9 000 g (figure 25). This block was first roughed out by the detachment of large flakes with a stone hammer. This phase led to the separation of pieces from ice cracked surfaces, two of which were used for bladelet manufacturing. The block was then broken four times, resulting in seven bladelet manufacturing groups. This block is associated with nine cores.

The segmentation of blocks observed at Lhéry is similar in many ways to some of the features identified at Dammartin-Marpain, in both the general conception of the flaking strategy and in the use of rather large Tertiary flint slabs. The main difference is that at Lhéry, bipolar flakes were used as intermediary pieces to fracture the blocks into segments. The data tend to show that this strategy does not have a chronological basis, but rather that its use responded to the specific constraints of this type of raw material volume for the manufacturing of bladelets.

Figure 21 - Ruffey-sur-Seille. A: refitting group of a chert bladelet core from the Middle Sauveterrian; B: refitting group of a bladelet core in Cretaceous flint from the Early Sauveterrian, C: refitting group of a bladelet core in Beuronian A flint; D: refitting group of a bladelet core from the Late Mesolithic; E: chert bladelet core from the Late Mesolithic regularly fluted (Séara, © Inrap).

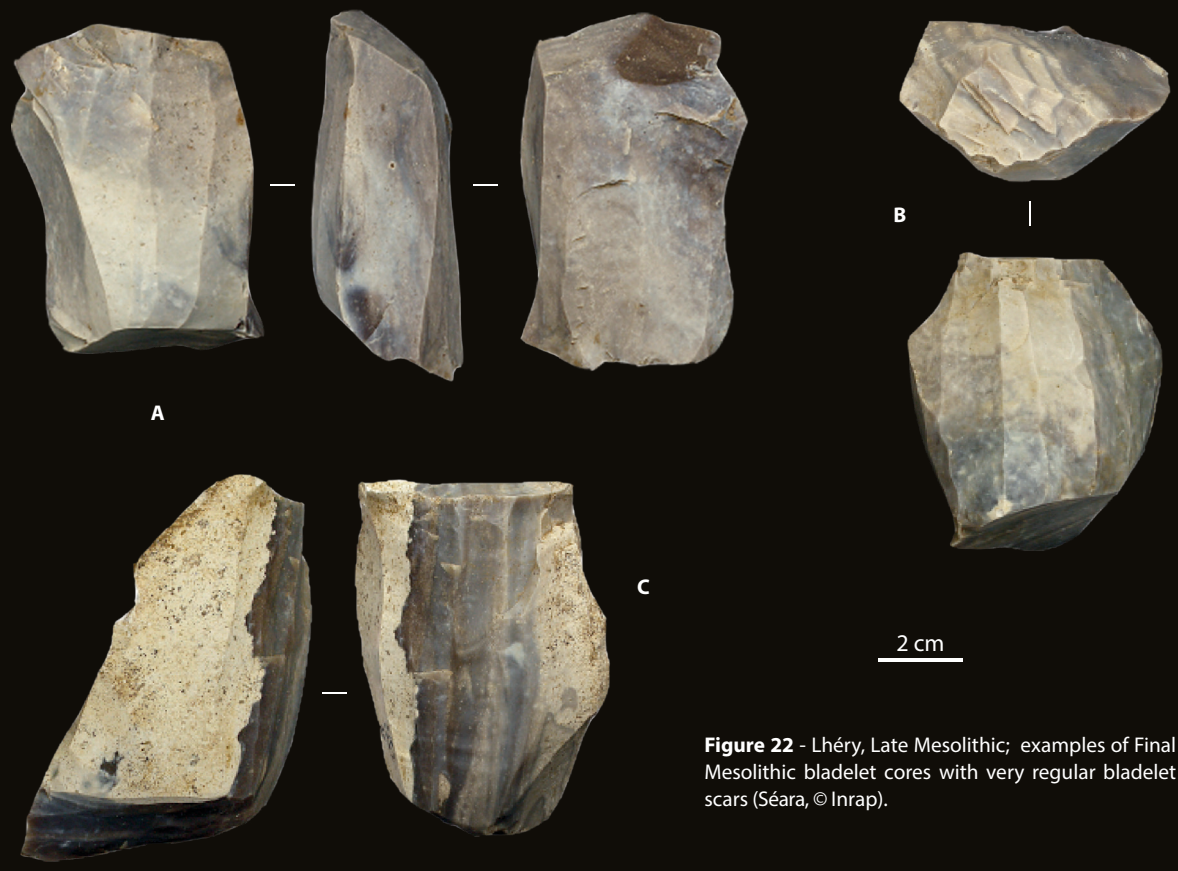


Figure 22 - Lhéry, Late Mesolithic; examples of Final Mesolithic bladelet cores with very regular bladelet scars (Séara, © Inrap).

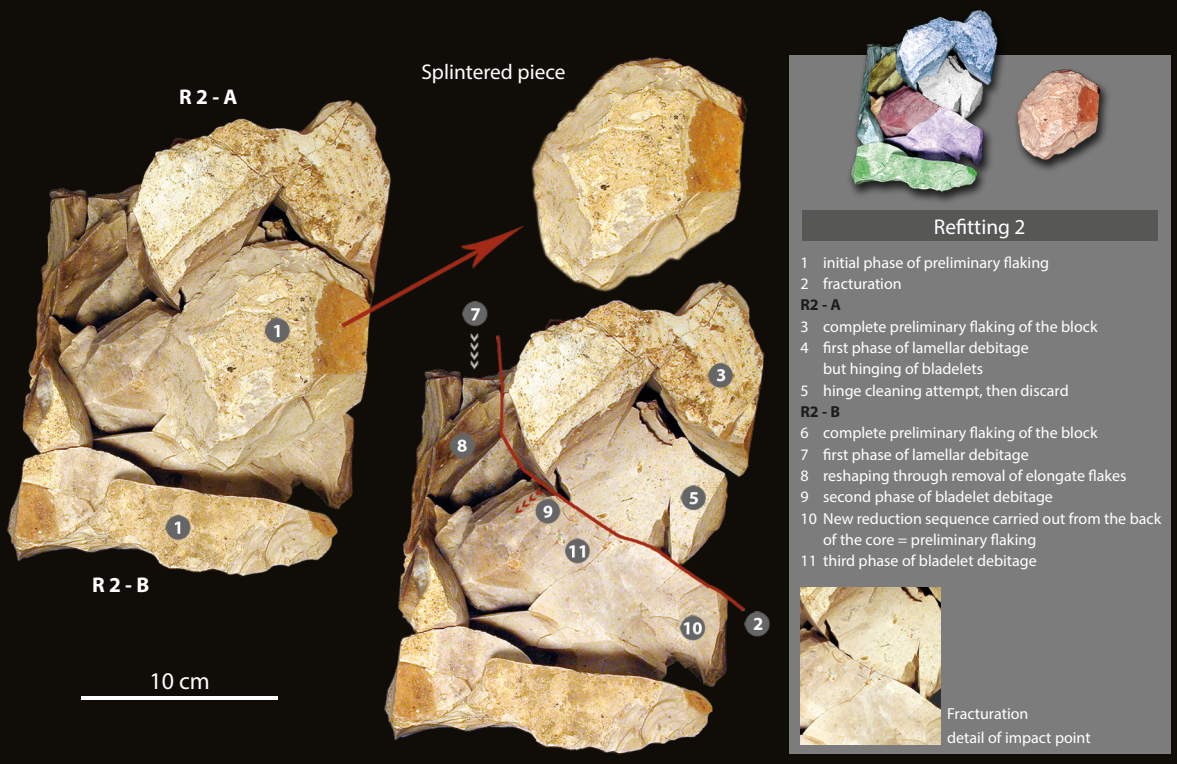


Figure 23 - Lhéry, Final Mesolithic. Refitting group from a Tertiary flint slab whose breakage indicates its use as a large bipolar flake. The small blocks thus obtained were used for bladelet manufacturing by indirect percussion (Bossut, © Inrap).

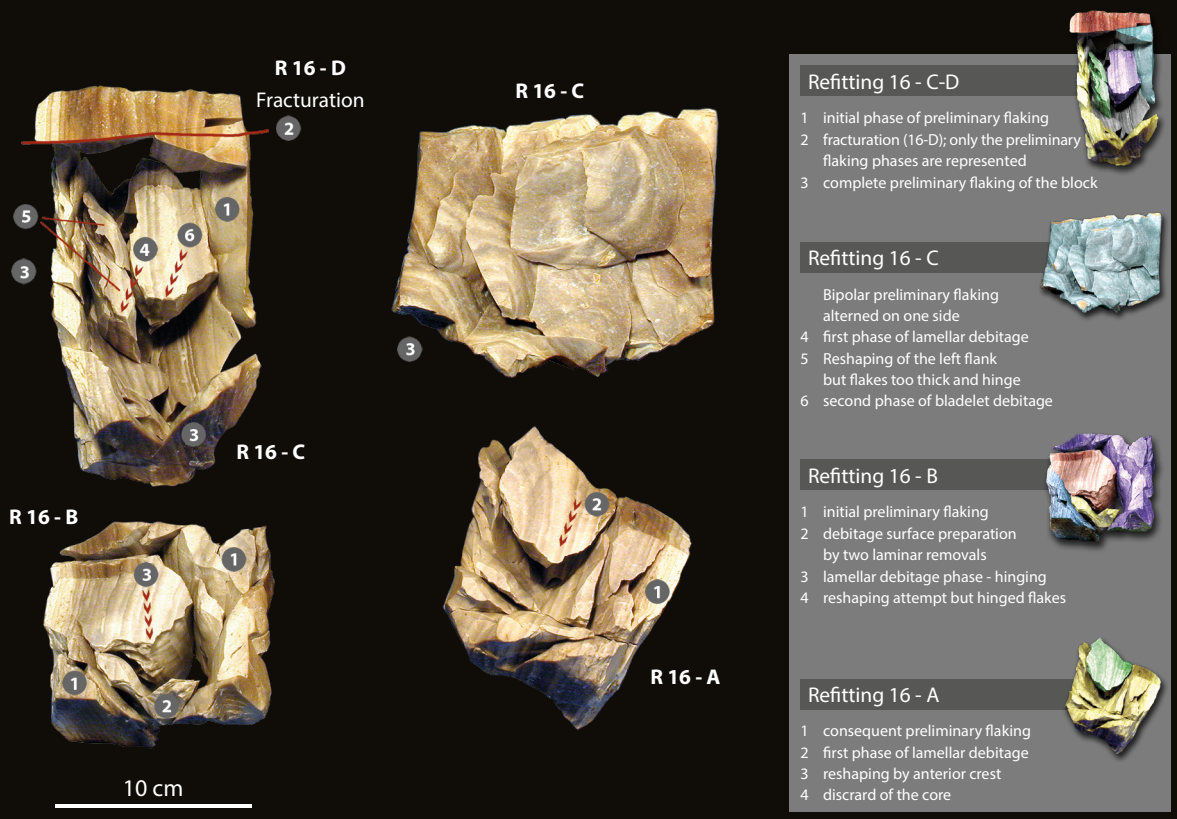


Figure 24 - Lhéry, Final Mesolithic. Refitting group from a Tertiary flint slab show the care taken in the initial preparation phase, was well as in the full flaking phase (Bossut, © Inrap).

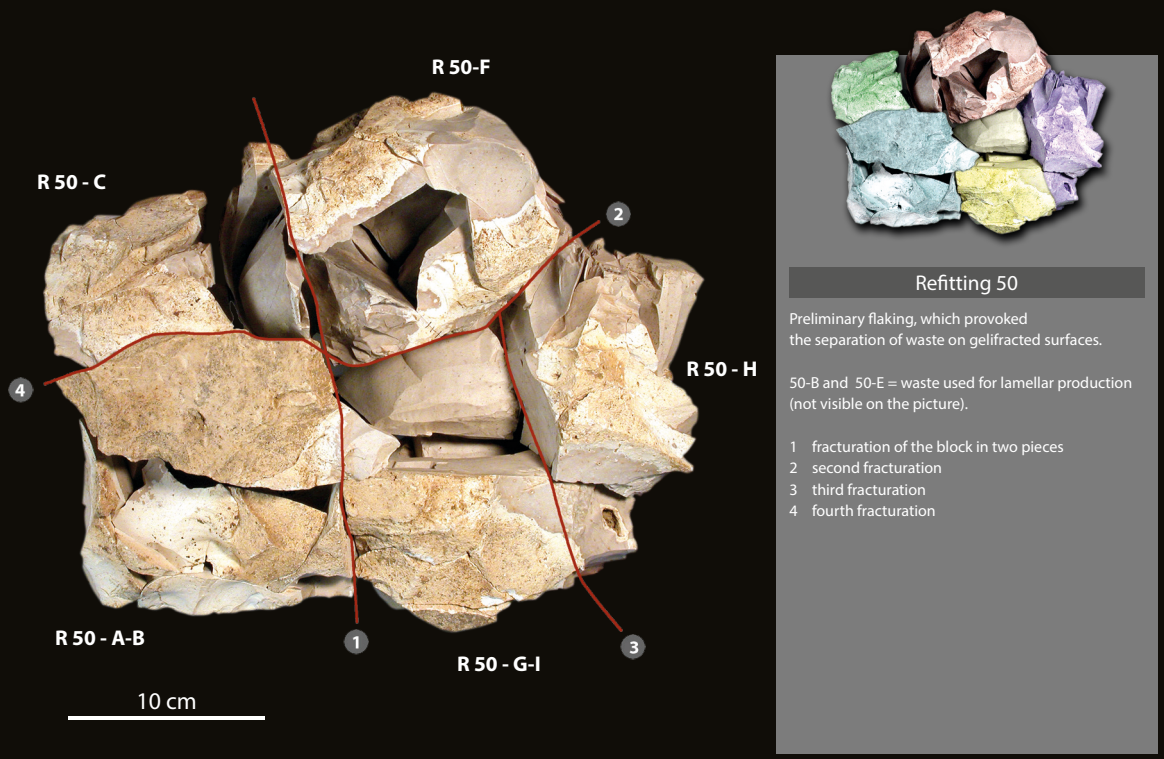


Figure 25 - Lhéry, Final Mesolithic. Refitting group from a Tertiary flint slab weighing more than 9 kg, showing that the segmenting of blocks is integrated into the flaking strategy (Bossut, © Inrap).

5 - Low variability in the lithic flaking strategies

Despite the unequal nature of the data associated with the Early and Late Mesolithic, the numerous refitting groups from many sites, enable us to precisely and efficiently identify the lithic flaking strategies. The four broad strategies that we distinguished are accompanied by more or less numerous variants that should be taken into account before attempting any explanations (figure 26). While the variability of the flaking strategies seems certain, this work of inventory and description, across a rather large geographic area and in association with a rather broad chronological framework, made it appear much less significant than we first imagined.

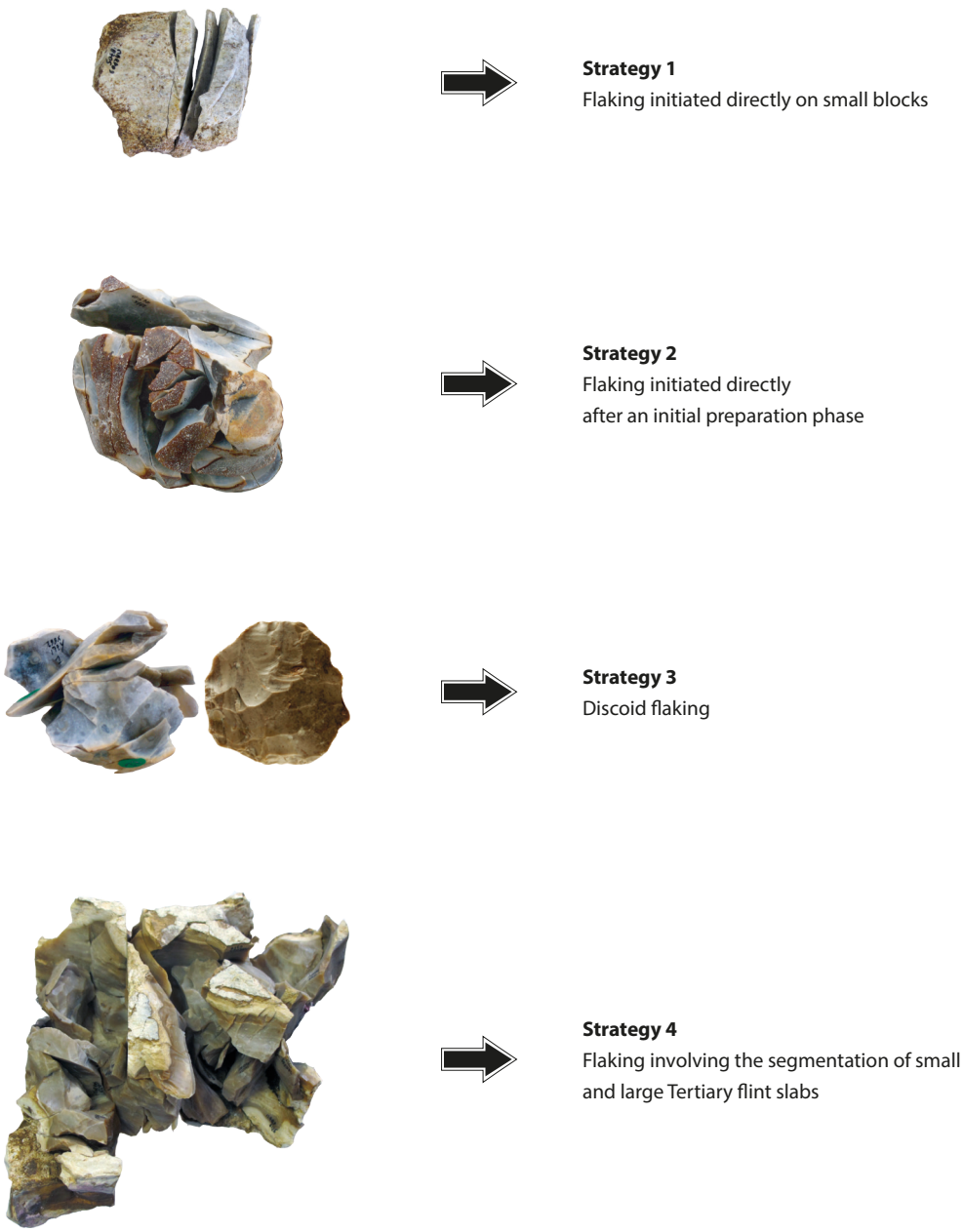


Figure 26 - Main flaking strategies identified through analysis of the assemblages from Ruffey-sur-seille, Choisey, Pont-sur-Yonne, Dammartin-Marpain and Lhéry (Séara, © Inrap).

Once we have completed this first phase of inventorying, which should be extended with the arrival of new discoveries and studies, we will be able to investigate the features, representativity and implications of these strategies (figure 27). It is difficult to make a chrono-cultural attribution since they are correlated with very different chronological and cultural contexts. Only the discoid flaking strategy, despite its low representativity, could be specifically associated with the Early Mesolithic. On the contrary, the selection criteria for blocks and the manufacturing intentions, all correlated with the nature of activities, could explain the presence, or dominance, of some flaking strategies. We will thus favor this orientation since, beyond the identification of strategies, it is their paleo-ethnographic dimension that is most interesting. No specific strategy for flake manufacturing was observed. The specific strategy that included a rather careful phase of block roughing-out and preparation, yielding flakes that served as the blanks of some tools, enabled the fulfillment of specific functional needs linked to certain activities and site functions. To then imagine that the block selection could reflect the specific function of some sites is plausible, but still not possible to assert with certainty.

	Raw material	Estimated skill-level	Flaking intentions	Final use	Representativity	Chrono-cultural implication
	Main criterion: block morphology	Medium to high	Bladelets	Direct use, weapon elements	Very high	All periods and cultures
	The criteria of morphology and quality have the same importance. Massive nature of the blocks	Good	Bladelets and flakes	Direct use, weapon elements and domestic tools	High	All periods Mostly associated with the Beuronian for the Early Mesolithic
	No clear criterion. Only flint	High	Irregular bladelets and short flakes	Undetermined. Direct use?	Low	Early Mesolithic, Beuronian
	Main criterion of the quality and flaking of large and small, thick slabs in Tertiary flint	Very high	Bladelets	Direct use, weapon elements, a few domestic tools	Medium	Early and Late Mesolithic

Figure 27 - Evaluation of the factors, the representativity and the implications of the different strategies (Séara, © Inrap).

Many questions have been raised, uncertain observations have been made, and future directions have been drawn. The numerous refittings realized, some of which are quite remarkable, have provided significant information on lithic flaking strategies during the Mesolithic. Thanks to this, a practice has been rehabilitated, one that was too rapidly discarded, often out of convenience, from the analysis procedures applied to Mesolithic assemblages. It is clear that we must consider the lessons learned from recent experiences in this domain, which underline the necessity to perform a preliminary evaluation of the homogeneity of an assemblage. These latter will determine the capacity to which refittings can provide information and the degree to which we can draw upon them in our interpretations. Of course the need to augment the relative data incite us to include refitting analysis, but the level of investment must be adjusted to clearly defined research questions. Though this practice is sometimes unrewarding, we should the very significant results obtained in a short amount of time, without which the existence of some flaking strategies would have totally escaped us.

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