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Inter-site analysis of armatures from five *Linearbandkeramik* settlements in the Hesbaye region

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Abstract

This paper analyzes armature assemblages from five *Linearbandkeramik* (LBK) culture settlement enclosures in the Hesbaye region in order to assess the role of this armature class for possible Late Mesolithic-LBK contact models. The results suggest a surprising amount of variability between LBK sites, as well as clear divergences in Late Mesolithic and LBK armature design. This paper argues that the intra-cultural complexity of both Late Mesolithic and LBK societies must be considered before we can build robust models for inter-cultural contact.

Keywords: *Linearbandkeramik* culture, Late Mesolithic, armatures, forager-farmer contact, neolithisation, Hesbaye region (B).

1. Introduction

Recent work on the pioneering settlements of the *Linearbandkeramik* (LBK) culture in the Hesbaye region has enriched tremendously our understanding of the social and economic complexities involved in the spread of agriculture west of the Rhine (Bosquet *et al.*, 2008). This work has provided more depth and validity to the original hypothesis of Keeley and Cahen (1989), which proposed that the LBK 'colonizing unit' was a well-organized, internally differentiated 'corporate social unit'. The recent strengthening of this hypothesis has much to contribute to broader models on the mode and tempo of LBK migrations throughout Europe, particularly the recently popular 'leapfrog' and 'mosaic' models (Gronenborn, 2004; Tringham, 2000; Zvelebil & Lillie, 2000; see numerous contributions in Whittle & Cummings, 2007). One of the best contributions that can be made by recent work in the Hesbaye region is the impact of intra-cultural complexities of LBK migration (e.g. Golitko & Keeley, 2007) on the likelihood of significant social interactions between these 'units' and indigenous forager groups.

One of the longest-running, yet increasingly emphasized debates over the spread of agriculture west of the Rhine is the role of forager-LBK contact in the 'neolithisation' process. This debate is hindered significantly by the nature of the evidence, as just a select few artefact classes can be referenced in creating contact hypotheses (Crombé, 2008; Crombé *et al.*, 2005; Robinson, 2010a). The question of cultural transmission between indigenous Mesolithic foragers and Neolithic farmers is based in two technologies: pottery (e.g. La Hoguette, Limbourg, Begleitkeramik, Swifterbant) and lithics. Within the specific question of the transmission of lithic technologies between foragers and farmers armatures have been the central artefact class on which most contact hypotheses have been constructed (Allard, 2007; Crombé, 2008; de Grooth, 2008; Ducrocq, 1991; Gehlen, 2006; Gronenborn, 1999; Heinen, 2006; Huyge & Vermeersch, 1982; Jeunesse, 2002; Löhr, 1994). These researchers have noted techno-typological similarities between the 'Danubian armatures' found on LBK sites and the 'LBK-like' (or 'evolved') armatures found on Late Mesolithic sites.

In the aim of finding similarities, researchers have unfortunately under-emphasized the variability of armatures in both Late Mesolithic and LBK assemblages. This under-emphasis can be attributed to the fact that the armatures in question – 'Danubian' and 'LBK-like' armatures – have been poorly defined (de Grooth, 2008; Robinson, in press). Recent

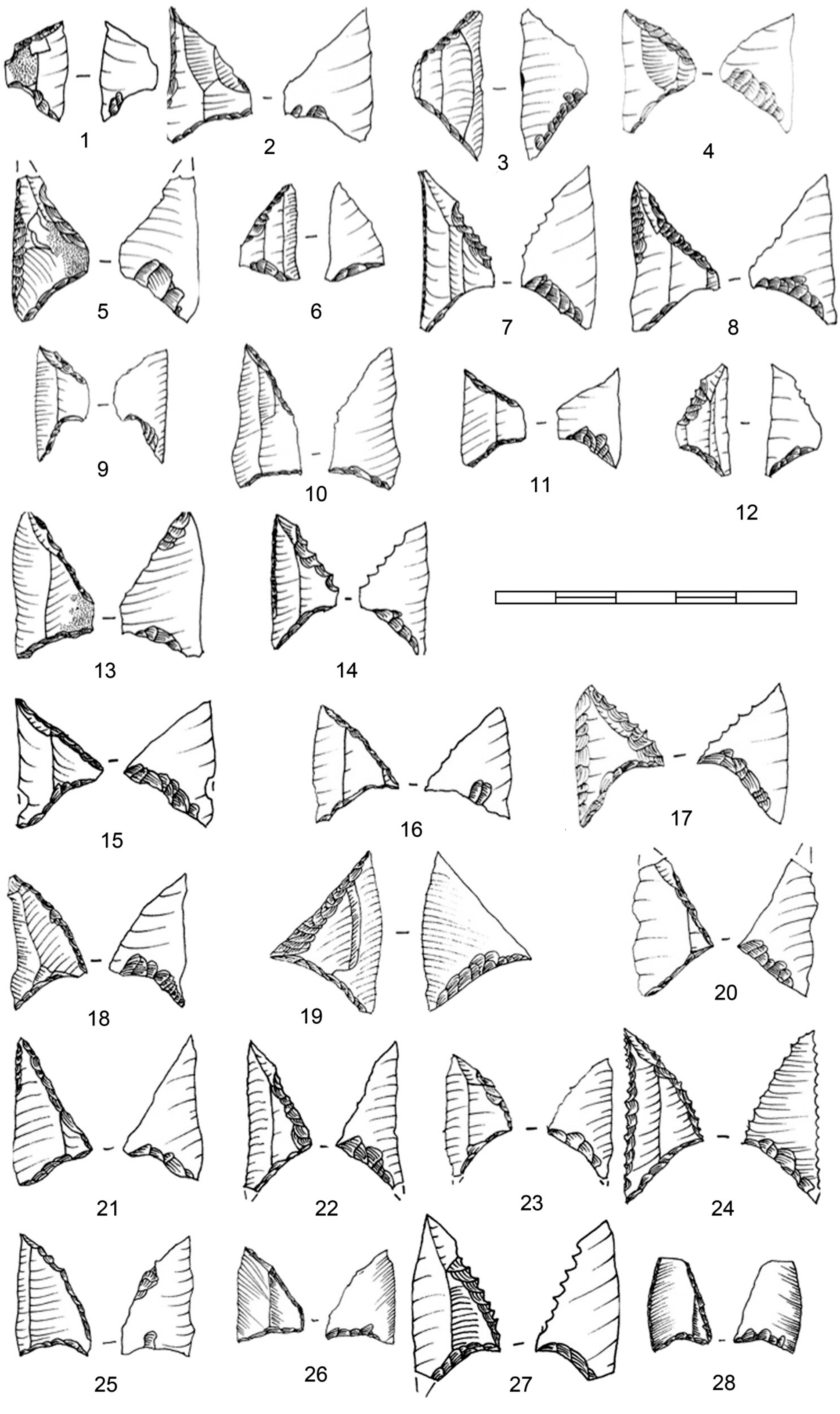

Fig. 1 – Key armature types in the investigation of cultural transmission between the Late Mesolithic and LBK west of the Rhine: Asymmetric trapezes (1-14, 25-26); Belloy arrowheads (15-16, 18, 20-21, 28); Danubian armatures (17, 19, 22-24, 27).

comparative work between Late Mesolithic and LBK armature assemblages in the Scheldt and middle Meuse basins has enabled firm, statistically replicable definitions for both 'Danubian' and 'LBK-like armatures', as well as noted striking divergences in armature design (Robinson, in press). This work has confirmed recent findings of differences in the overall chipped-stone technologies of both societies (Allard, 2005, 2007; Cahen *et al.*, 1986; de Grooth, 2008; Hauzeur, 2006). The most promising findings from this recent comparative work relate to the striking heterogeneity of LBK armatures, which calls for more inter-site comparisons. The data from the LBK of the Hesbaye region provides a particularly interesting case study, as it has been clearly proven that these settlement clusters were economically differentiated and inter-dependent (Burnez-Lanotte & Allard 2003; Bosquet *et al.*, 2008; Jadin, 1990; Keeley & Cahen, 1989; Martin, 2007). This opens up enormous potential for studies that critically assess potentials of armatures as carriers of social information, and the possible impacts that raw material distribution would have on the expression of this information.

In this study we investigate the inter-site variability of armature assemblages from five LBK settlements in the Hesbaye region. Four of these settlements (Darion-*Colia*, Oleye-*Al Zèpe*, Waremme-Longchamps, Remicourt-*En Bia Flo II*) lie within palisaded enclosures (Bosquet *et al.*, 2008). We have two primary aims. First, we compare both individual types and specific attributes between sites in order to gain an understanding of the nature of intra-cultural variability. Second, we provide a critical examination of the potential of armatures as carriers of social information. Our intention is to argue that many of the recent attempts to dichotomize and compare Late Mesolithic and LBK armatures is actually hindering a much more sophisticated understanding of the intra-societal variability which formed the contexts for subsequent 'neolithisation' processes throughout Belgium.

2. *Typology and theory*

Just three armature types can be considered as possible evidence of forager-LBK contact: asymmetric trapezes (fig. 1:1-14), Belloy arrowheads (*flèche de Belloy*) (fig. 1:21-22), and 'Danubian armatures' (fig. 1:18, 1:20, 1:28). Each of these three types have traditionally been loosely associated with a select number of attributes, for which researchers have arbitrarily chosen to determine the relative influence of Mesolithic or Neolithic traditions on the opposite society. Despite the advances made by these qualitative approaches, little work has been done to quantify these different attributes and their correlations with specific types. Recent comparative work between armatures from both excavated and surface Late Mesolithic assemblages and excavated LBK assemblages has enabled the quantitative analyses needed to establish firm, replicable definitions (Robinson, in press).

'Danubian armatures' can be defined as asymmetric triangles possessing a concave small truncation (or base) morphology and/or oblique dorsal retouch of the large truncation (Robinson, 2010a). Attributes such as denticulation or flat ventral retouch of the small truncation (*retouch inverse plate*, hereafter RIP) are not appropriate criteria for the definition of Danubian armatures because they occur in less than 10 % and 40 % (respectively) of armatures possessing the above criteria. RIP is actually present on more asymmetric trapezes than Danubian armatures.

Belloy arrowheads are named after their type-site of Belloy-sur-Somme-'Plaisance' in northern France (Rozoy, 1974). At the moment just a single C14 date has been recorded in relation to this type, at the site of Castel in northern France (Gif-10419 : 6090 ± 95 BP; Ducrocq, 2001: 124). This armature type can be defined as an asymmetric triangle possessing a straight small truncation morphology and steep dorsal retouch of the large truncation. This definition provides a clear distinction between this type and Danubian armatures, as emphasis is not placed on the presence of RIP (e.g. Fagnart, 1991; Ducrocq, 1991), which is present on a wide variety of armature types, but the incidence of dorsal retouch on the large truncation and basal morphology. Recent results from Belgium show that this armature type was present in much lower frequencies during the Late Mesolithic than it was in the Somme basin, which makes it more difficult to interpret this type as a clear prototype of Danubian armatures (Robinson, in press).

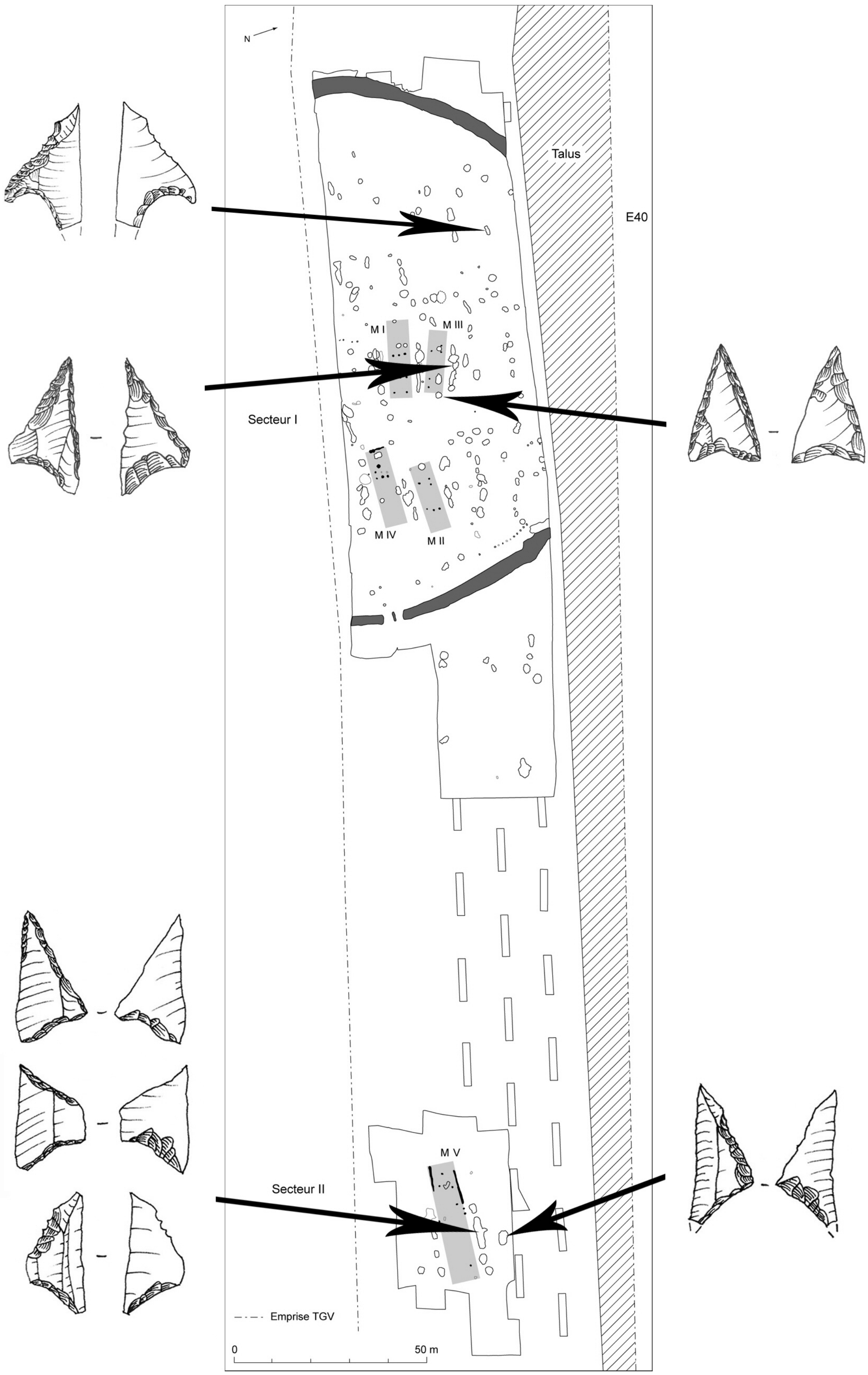

Fig. 2 – Spatial distribution of armatures at Remicourt - *En Bia Flo II*.

Asymmetric trapezes are the third and final armature type that can be used as possible evidence to explain the role of Late Mesolithic trapeze industries on LBK armature design. Ducrocq (2001) has recently noted that Belloy points are a derived form of Late Mesolithic asymmetric trapezes, in that both the large and small truncation would be made to not preserve a fourth edge (*petit côté*). This suggests that quite subtle distinctions can be made between typical Late Mesolithic trapezes (symmetric, asymmetric, rectangular, and rhombic) and the so-called 'evolved armatures', which have been interpreted as transitional markers with the Danubian points. A central question relates to the scale at which finds of these different types on an LBK site can be used to suggest that contact and Mesolithic influence did in fact take place. Furthermore, this opens up the question concerning whether these subtleties are distinct styles or whether they are due to functional or technological forces, such as the curation and repair of damaged armatures of different types, or the economizing use of other blade tools in armature production (e.g. Hauzeur, 2006).

Not only have particular types been highlighted, but also specific attributes such as the presence of *piquant-trièdre* (or microburin scar), lateralization, and the presence of RIP. Researchers have argued that these three attributes were prevalent in Late Mesolithic armature design, and their use in the LBK period represents the transmission of stylistic information from an acculturated group (Jeunesse, 2002; Löhr, 1994). Yet, how exactly might we draw the line of 'style' from function and the adaptation of knappers to the possibilities provided by original blade blanks on which the armatures were made ?

The demarcation of style from function is highly problematic (Bettinger *et al.*, 1996), particularly when reductive technologies such as stone armature manufacture are involved (Barton, 1997; Gero, 1989). Style has been defined by Dunnell (1978) as 'selectively neutral', and he has recently noted (Dunnell, 2006) that stylistic traits have unimodal distributions that can be demarcated clearly in both space and time. Dunnell (2006: 115) therefore notes: "In the cases of projectile points there appears to be at best only modest room for any stylistic attributes (some haft variability): the bulk of variability is either functional or technological". These statements can be validated in our study area by the fact that there are no 'unimodal distributions' of attributes (such as RIP or lateralization) between Late Mesolithic and LBK armatures (Robinson, in press). In reality, we are rather hard-pressed in our area to find any sort of clearly demarcated pattern in attribute frequency which can be confined to either Late Mesolithic 'style' or LBK 'style'. The investigation of armatures as possible evidence for forager-LBK contact must be widened beyond simple stylistic considerations to include both functional questions of composite tool and arrow hafting, as well as technological questions pertaining to raw material budgeting and the organization of particular stages in both Late Mesolithic and LBK chaîne opératoires. A key step in this direction will be the comparison not only between Late Mesolithic and LBK armatures, but the individual assemblages within the Late Mesolithic and LBK. As stated above, the LBK settlement of the Hesbaye region provides a key case study for broadening our perspective on the cultural meaning of armature industries, primarily due to the fact that there was distribution of blade blanks from particularly specialized production sites, such as Darion (Jadin, 1990) and Verlaine (Burnez-Lanotte & Allard, 2003). At this scale of analysis we shall be able to provide a critical assessment of whether 'style' plays any sort of role within LBK armature industries, and in turn, the likelihood that we can view LBK armatures as a continuation of Mesolithic traditions.

3. Contextualizing armature production in the five LBK settlements

For this study armatures were recorded from five late LBK (ca. 5250 cal BC: Jadin & Cahen, 2003) settlement enclosures in the Upper Geer and Yerne river valleys: Darion-*Colia*, Oleye - *Al Zèpe*, Waremme-Longchamps, and Remicourt - *En Bia Flo II*. Four of these sites (Darion, Waremme, Fexhe, Remicourt) attest to houses both inside and outside the enclosures (Bosquet, 2008). Recent ceramic (Golitko *et al.*, 2007) and anthracological (Salavert, 2008) suggest the possibility that the houses constructed outside of the enclosure and could predate the houses constructed inside of the enclosure (Bosquet *et al.*, 2008). Techno-functional analyses have been carried out at Fexhe (Beugnier, 2005) and Darion (Jadin, 2003), while the study of the lithics from Waremme is still ongoing (Martin, 2007; Bosquet *et al.*, 2008). These analyses have yielded important information regarding the raw material differences between the internal and external houses. At Fexhe and Waremme the external houses had a predominant amount of the non-local dark-grey speckled 'Gulpen' flint, whereas the internal houses had a majority of the local grey fine-grained 'Hesbaye' flint (Beugnier, 2005; Martin, 2007). The 'Gulpen' type variety may come from the Dutch Limbourg region, which is the proposed location from which the Hesbaye LBK population migrated (Bosquet *et al.*, 2008). This evidence suggests that possibly the pioneering settlements continued to utilize the material that they were most use to, before later shifting to the intensive exploitation and redistribution of the locally procured 'Hesbaye' variety. However, it must be stated that at this present state of knowledge this is a mere hypothesis that requires further testing to determine whether the 'Gulpen' variety is in fact non-local, as it could quite possibly be a local variety too. In terms of the armature industries, this hypothesis can be validated further at the site of Remicourt (fig. 2). At this site five of the six armatures were made in different types of 'gres granular' flints (in which the 'Gulpen' variety might be included) such were found in pits alongside the external house, whereas the armatures inside the enclosure were made of local varieties such as Hesbaye flint. Interestingly, the only asymmetric trapezes were found near the external house, and were made in these granular flints. The more elaborately retouched armatures can be found inside the enclosure, including a Danubian armature with a very concave base unlike any other found in the region.

As mentioned throughout, a particularly unique feature of the LBK archaeological record in the Hesbaye region is the evidence for village-level craft specialisation. Darion has yielded evidence of blade blank production on a scale much larger than its immediate needs, while at Oleye little evidence was found that suggests on-site blade debitage (Jadin, 1990). It does seem, however, that at the three other sites analyzed for this study the local production of blades did occur (Keeley & Cahen, 1989; Martin, 2007; Valérie Beugnier, oral communication). This provides some interesting contexts for our armature analyses, as we are able to consider the possible impact of the variability of blade production between sites on both the inter- and intra-assemblage variability of armatures.

On a broader technological level, lithic specialists have noted the general homogeneity of chaîne opératoires in the later LBK west of the Rhine (Allard, 2005; Cahen *et al.*, 1986; de Grooth, 2008). A central aim of the following analysis will be to examine whether this homogeneity continued on into the later stages of tool production, and if not, to find an appropriate explanation for the heterogeneity present.

4. Results

In this study a total of ten attributes were recorded on each armature. These attributes varied from raw material and dimensions (length, width, thickness), to incidences of retouch and the evidence for breakage. The sample sizes varied quite significantly between sites (fig. 3). Darion vastly outnumbered all other sites with a total of fifty-two armatures, whereas the smallest sample came from Remicourt (n = 9). In the case of Remicourt, a total of nineteen armatures were recovered, but just nine were available at the time that this study took place. Darion attests to the highest number of armatures for any LBK site in Belgium. The only comparable site is that of Rosmeer-'Staberg', which had 46 (Ulrix-Closset & Rousselle, 1982).

The evidence of fractured armatures varied between sites. While Remicourt had no fractured samples, 45 % of the Fexhe assemblage was fractured. Oleye had 18 % fractured armatures, Darion had 21 %, and Waremme had 26 %. Not all of these fractures can be considered 'impact' fractures, as, for example, most of the armatures from Fexhe showed non-stepped fractures at their bases.

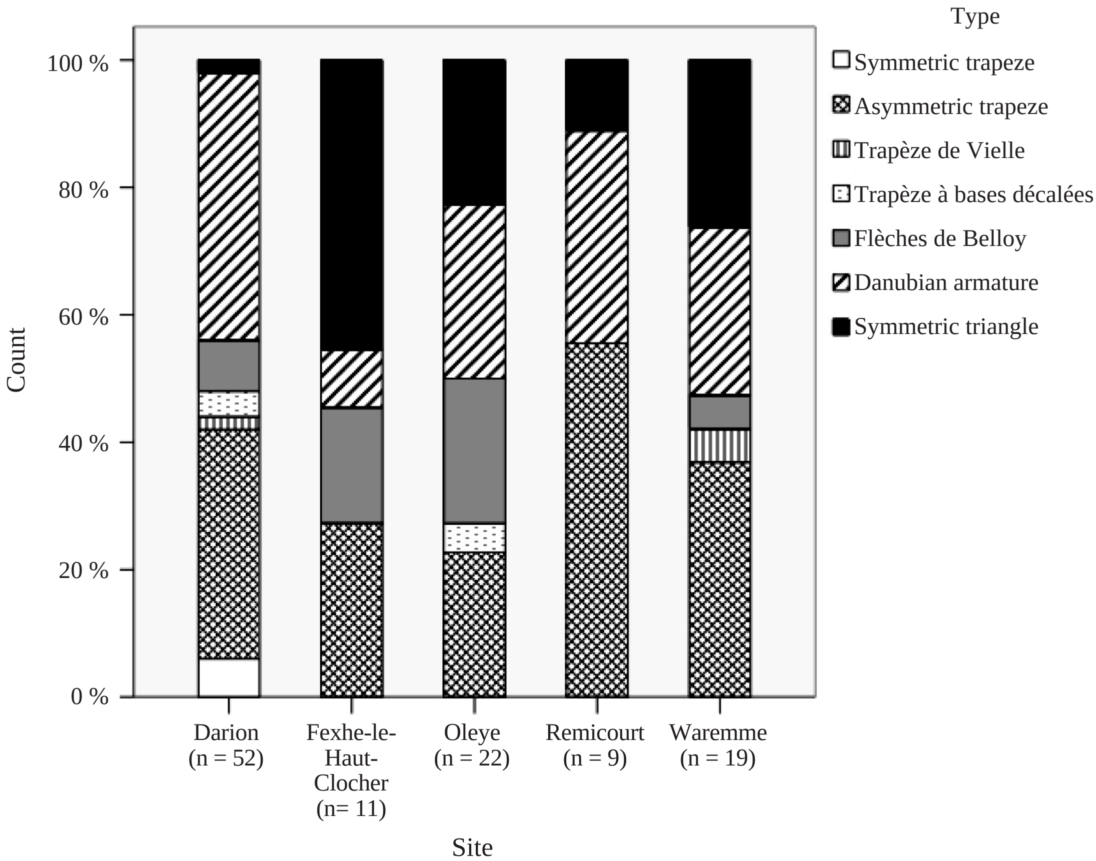

Fig. 3 – Armature types present each of the five LBK sites.

Considering that the frequencies of blade debitage varied between sites, it is surprising that the armature dimensions varied little. The largest mean length was found at Fexhe (2.98 cm: sd = .495), and the smallest was recorded at Remicourt (2.85 cm: sd = .488). Mean widths had even less variability, at least between Fexhe (1.76 cm: sd = .338), Waremme (1.73 cm: sd = .27), Oleye (1.76 cm: sd = .23), and Darion (1.72 cm: sd = .244). Remicourt can be viewed as a rare outlier, where the mean width is 1.53 cm (sd = .332). In terms of thickness, the same lack of variability was suggested, where at Fexhe it was .364 cm (sd = .092), at Remicourt .389 cm (sd = .06), at Waremme .4 cm (sd = .009), at Oleye .382 cm (sd = .107), and at Darion .394 cm (sd = .094).

Some striking results came from the study of different types present at each site (fig. 3). Because this study focused on the formal relationships between trapezes and triangular armatures, no surface retouched points (such as mistletoe points) or earlier Mesolithic types were recorded. The only traditionally late Mesolithic trapeze types recorded on all of the sites were symmetric, asymmetric, 'Vielle' ('rectangular' or 'right angle'), and *bases décalées* (or 'rhombic') trapezes. Symmetric trapezes were only recovered from Darion. Vielle trapezes were only found at Darion and Waremme, whereas *bases décalées* were recovered from Darion and Oleye. It has been argued, however, at Oleye for example, that the microliths and trapezes recovered were not in association with, and therefore predated, the LBK habitation (Keeley & Cahen, 1989). In the near future we intend to carry out intra-spatial analyses of all the armatures found in each site, such as that presented in fig. 2 for Remicourt.

The most interesting results from the typological comparison came from the analysis of the four most common types on the five sites (fig. 3): asymmetric trapezes, Belloy points, Danubian armatures, and symmetric triangles. First, there seems to be a strong trade-off between presence/absence of Danubian armatures and symmetric triangles. For instance, Darion attests to the highest frequency of Danubian armatures out of the five sites, whereas it has the lowest frequency for symmetric triangles. Likewise, Fexhe has the highest percentage of symmetric triangles, while very few Danubian armatures were present. The results also suggest the same trade-offs between asymmetric trapezes and Belloy points. Oleye attests to the highest frequency of Belloy points and the lowest frequency of asymmetric trapezes. The direct opposite of this is indicated at Remicourt. A perplexing question that arises from this is: If Belloy points and asymmetric trapezes are formally derived from each other (see above), and they are the best possible evidence for investigating the potential role of Mesolithic influence on the LBK, why are they found in exactly opposite association with each other ?

A surprising result of the study was the small amount of Danubian armatures recorded from all of the sites. In total, this type makes up just 31 % of all armature types recorded. This type comprises a much smaller percentage of LBK armature assemblages than assumed before the study started. It only forms the majority type from the sites of Darion (40 %) and Oleye (27 %). The total results of all types recorded from the Hesbaye LBK can be found in a recent study by one of the authors (Robinson in press). Interestingly, for the five sites recorded in this study asymmetric trapezes formed the highest frequency of all the other points (ca. 33 %).

4.1. Individual attributes

As figure 4 indicates, there was some degree of raw material variability between sites. In total, six varieties were used for armature manufacture (fig. 4). The typical Mesolithic variety of Wommersom quartzite was present at Oleye (4.5 %) and Darion (1.9 %). This material was only used for the manufacture of symmetric and asymmetric trapezes, and was not found in the immediate association of other typical LBK armatures made from different varieties. The greatest amount of inter-site variability for one material has been recorded for Gulpen flint. While this material is present at every site except for Darion, it makes up variable frequencies between Oleye (4.5 %), Waremme (10.5 %), Remicourt (55 %), and Fexhe (18 %). Like the total chipped stone assemblages of all the sites, the local Hesbaye flint was used for the production of most armatures. In correspondence with previous studies, this material was present in almost the same frequencies between Oleye (86 %) and Darion (84 %). Remicourt is the only site where Hesbaye flint was

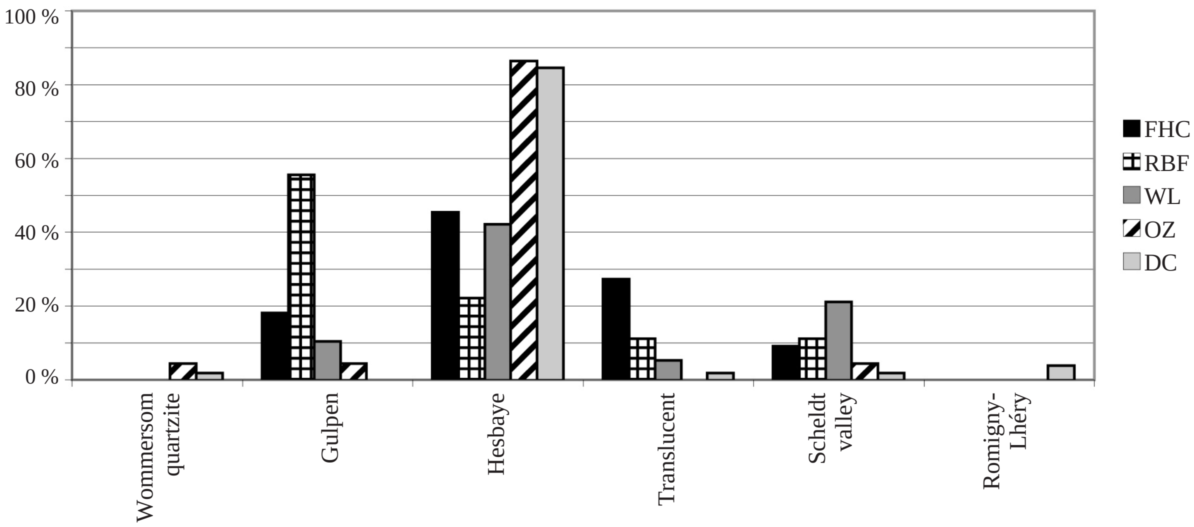

Fig. 4 – Raw material types (FHC: Fexhe-le-Haut-Clocher - *Podrî l'Cortri*; RBF: Remicourt - *En Bia Flo II*; WL: Waremme-Longchamps; OZ: Oleye - *Al Zèpe*; DC: Darion-*Colia*).

not preferred for armature production. Semi-granular translucent flint was also present in variable frequencies between Fexhe (27 %), Remicourt (11 %), Waremme (5.3 %), and Darion (1.9 %), but was missing from Oleye. The fourth major variety is difficult to categorize, as it most closely resembles the fine-grained, dark-black matted and spotted flint coming from the Scheldt valley in western Belgium (e.g. Crombé, 2008). This material is mostly known from later Mesolithic sites in the Scheldt valley, and therefore it is difficult to categorize this material in the context of the LBK, as it has never been isolated as a different flint type. While here we call this flint type 'Schledt valley', it must be noted that more work must be done to compare this variety found on Mesolithic sites and some very dark, fine-grained subcortical levels of Hesbaye nodules. Nevertheless, this material is represented in variable frequencies at every site. The sixth flint type is made up of the Bartonian flint thought to come from the region of Romigny-Lhéry in the northern Paris Basin. This material was used for just two armatures (Danubian and asymmetric trapeze) at Darion.

The first attribute used by scholars to indicate Mesolithic influence on LBK armatures is lateralization. Löhr (1994) has argued that the dominant right lateralization of Late Mesolithic armatures between the Paris Basin and Rhine/Meuse delta carried over into the LBK period, which he interprets as the inheritance of different social identities from the Mesolithic. Jeunesse (2002) carries on from this study by linking the lateralization distribution maps of Löhr (1994) with the distributions of both La Hoguette and Limbourg pottery. He argues that right lateralization was dominant in the region of Limbourg pottery, whereas left lateralization was dominant in the La Hoguette tradition. Unfortunately, neither research quantifies the different lateralizations in the LBK. The results of our studies showed how right lateralization was indeed preferred in the LBK, however, it is by no means dominant (fig. 5). The results actually showed much higher left lateralization than expected. In total, just 54 % of LBK armatures are lateralized to the right, compared to the 89 % right lateralization in the Late Mesolithic. These results make it difficult to conclude that lateralization was inherited from the Mesolithic as specific social information. It is clear that too much emphasis has been placed on one attribute without properly testing for the meaning of the attribute within the full suite of armature industries in particular, let alone the larger context of lithic technology or the specific cultural and ecological contexts in which they were based.

The microburin technique of blade reduction is thought to be a clear technological inheritance from the Late Mesolithic period (Allard, 2007; Crombé, 2008; Jeunesse, 2002). Our study found that the microburin negative, or *piquant-trièdre*, was absent more than it was present in the Hesbaye LBK, excluding the site of Fexhe where the *piquant-trièdre* is present on more than 80 % of the armatures. In all, there seems to be little variability in the present/absence of this attribute between the other four sites. We must conclude, therefore, that the microburin technique was not used on a majority of the armatures recorded in the study. One of largest differences between Late Mesolithic and LBK assemblages regarding the use of this technique is the amazing lack of microburins recovered from LBK sites. This suggests that, when used, the microburin technique was carried out in a different fashion than it was in the Late Mesolithic.

Small truncation morphology was the next attribute to be assessed. The two attribute variables highlighted in figure 5 are straight and concave morphologies, as this seems to be a key difference between the bases of Late Mesolithic and LBK armatures. The results indicate the variable presence of both straight and concave bases. While concave bases form the majority of basal morphologies on the sites of Remicourt, Waremme, Oleye, and Darion, straight morphologies are preferred at Fexhe. However, this result is rather insignificant, as Fexhe has the largest majority of symmetric triangles, which almost always have straight base morphologies. Because concave bases are dependent on the specific points used, we decided to calculate their relative frequencies on asymmetric trapezes and Danubian armatures. We found that 83 % of all Danubian armatures have a concave base, whereas it was present on just 36 % of asymmetric trapezes. Since concave bases are a definitional quality of Danubian armatures, these results are more significant for asymmetric trapezes, as the asymmetric trapezes of the Late Mesolithic have less than 3 % concave bases (Robinson in press). These results suggest that concave base morphologies are a distinctive feature of LBK armature industries.

RIP is the one attribute to receive the greatest amount of attention as evidence for Mesolithic influence on LBK armatures (Allard, 2007; Crombé, 2008; Jeunesse, 2002). Our results suggest much more complex usage of RIP in the LBK than previously recognized. As figure 5 shows, the presence/absence ratios of this attribute varies within the LBK armature assemblages. For instance, while RIP is absent on a majority of armatures from Oleye and Darion, it is present on most of the armatures from Fexhe, Remicourt, and Waremme. In order to find out whether RIP can be limited to a particular armature type, we examined its relative frequencies between the three types (asymmetric trapezes, Belloy points, and Danubian armatures) thought to link Late Mesolithic and LBK armatures. This analysis indicated the presence of RIP on 52 % of asymmetric trapezes, 41 % of Danubian armatures, and 25 % of Belloy points. While these findings await further statistical analyses pertaining to their correlations, we can hypothesize that RIP is not unimodally affiliated with particular armature types, and can therefore not be suggested as a specific 'stylistic' feature.

As noted above for the definition of Danubian armatures, another key difference between Late Mesolithic and LBK armatures is found in the oblique retouch of the large truncation. Surprisingly, this is the one attribute that had the most inter-site variability in this study (fig. 5). For example, the results suggest striking differences between the sites of Darion and Remicourt. At Darion steep retouch was present on 76 % of armatures, whereas at Remicourt oblique retouch was present in 77 % of cases. At Oleye there is equal presence of both steep and oblique retouch, but at Waremme oblique retouch slightly outnumbers steep retouch.

The last two attributes examined were denticulation of the large truncation and steep retouch of the long-side (*grand côté*). Denticulation has been noted as another difference between Late Mesolithic and LBK armatures (Crombé, 2008), as it is thought to be present on some Danubian armatures. We found that denticulation is never present in more than 20 % of an LBK armature assemblage. This result of 20 % came from Remicourt, whereas the other four sites had comparable frequencies, which were all just below 10 %. An interesting point of inter-site variability is the presence of subtle, steep retouches along the long-side. These retouches are very different to the oblique, almost flat ones found on symmetrical triangles. While this kind of secondary

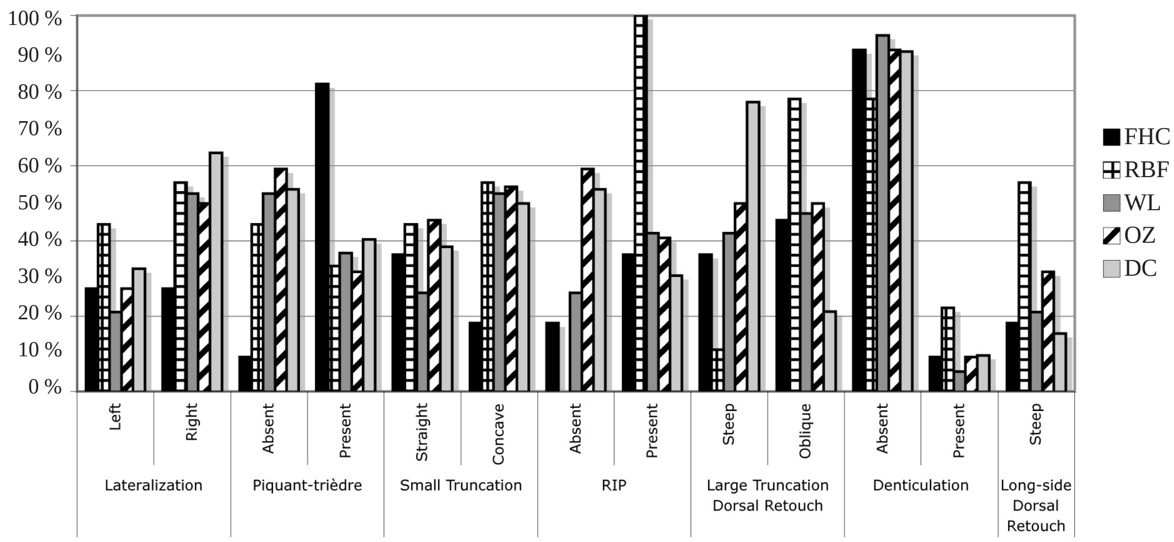

Fig. 5 – Relative frequencies of key attributes.

retouch is present in over 50 % of the armatures from Remicourt, it is present on just over 30 % of the armatures of Oleye, and under 20 % at Fexhe, Waremme, and Darion. These small steep retouches are not limited to a particular type, but are most prevalent on asymmetric trapezes and Danubian armatures.

5. *Discussion*

This study has suggested some interesting inter-site variability of armature assemblages between four late LBK settlement enclosures in the Hesbaye region. This variability can be recognized for both the individual types present at each site as well the particular attributes comprising these types. The results of this study indicate that researchers focusing on questions pertaining to the role of Late Mesolithic trapeze industries on LBK material culture have over-simplified LBK armature industries. This over-simplification has, in turn, allowed for an approach to 'stylistic' comparisons between both societies that fails to consider other functional and technological constraints on the production of armatures.

The fact that almost all of the attributes studied were not consistently represented from site-to-site clearly shows that much more complexity was involved in armature manufacture than we have traditionally considered. Furthermore, the variable presence of important types such as asymmetric trapezes, Belloy points, Danubian armatures, and symmetric triangles suggests that we can in no way describe one or two points as indicative of LBK armature industries west of the Rhine. We can no longer look at LBK armatures west of the Rhine *en masse* and assume that, as a whole, these armatures might have been influenced by acculturated Mesolithic foragers.

We must therefore ask 'why' questions relating to the inter-site variability of armature industries. First, as the site of Remicourt shows (fig. 2), significant changes in armature design can even be demarcated between the pioneering phase of LBK settlement and the subsequent phase of enclosure and village construction. To a certain extent we might argue that the variability represented could suggest the subtle nuances of certain individuals choosing to make a Danubian armature with an elaborately concave base. If this is the case, it will be virtually impossible to demarcate specific core traditions of armature design that might have been transmitted both within LBK society, as well as with the surrounding Late Mesolithic foragers. To the extent that core traditions or 'styles' are present in unimodal distributions (Dunnell, 2006), it is difficult to put the subtle variability of LBK armatures into a 'stylistic' category with significant social meaning. We are not saying that the variability of LBK armatures did not have social meaning, but that the meaning previously attributed to this artefact must be drastically revised in favour of a more holistic perspective that considers the entire operative schemes of chipped-stone tool manufacture.

Possibly the most interesting result of this brief, and still preliminary, study is placing the recognized inter-site armature variability within the social context of these LBK societies. It is now well-confirmed that the LBK settlement of the Hesbaye region was carried out by well-organized 'colonizing units' that were practicing craft specialisation as a means of establishing interdependence between particular villages (Bosquet *et al.*, 2008; Jadin, 1990; Keeley & Cahen, 1989). Based on previous ethnographic work on the significance of armatures as carriers of social information (e.g. Wiessner, 1983), we might expect the interdependence of these LBK 'colonizing units' to be indicated in the armatures, as a means of social alliance and boundary defence. Yet, in a classic case proving that we must centre on our archaeological realities before jumping to ethnographically inspired conclusions, this study showed that these interdependent farming villages did not in fact express the kind of type and/or attribute consistencies indicative of clear-cut social identities, but rather that the situation was much more complex and must not be limited to a single artefact class (Allard, 2005).

One of the most holistic considerations of LBK armature variability has been provided by Hauzeur's (2006) work in Luxembourg. In this work Hauzeur has argued that the morphological variability of LBK armatures in this region is not due the regional expression of a distinct identity, but economic contingencies due to the fact that the region had to import high quality raw materials (Hauzeur, 2006: 301). She argues that LBK communities in Luxembourg had to economize their flint more than in areas where it was readily abundant. Therefore, most of the morphological variability of armatures from this region is due to the reuse of other tools (such as sickle blades) that had damages and could no longer be used for their intended purposes (Hauzeur, 2006). This insightful analysis can be extended to the Hesbaye region on a much smaller scale, where the distribution of blades might have influenced the typological and attribute-level variability between sites. While this is a tentative hypothesis that awaits further confirmation, a comparison between Darion and Oleye might move us in the right direction. The presence of symmetric triangles at Oleye could suggest the use of more irregular blades, and possibly the conservation of materials used for other chipped stone tools, due to the lack blade debitage present. Symmetric triangles are often produced on more irregular blades than other armature types, and they also exhibit the highest amount of invasive and reductive secondary retouch. Furthermore, as the most regular blades were typically used for the production of asymmetric trapezes it is not surprising that a site that did not produce their own blades would have less of this armature type than that of the blade production site (Darion). We must start considering the role of blade distribution between different LBK sites on the particular techno-typological variability present in armature assemblages.

Lastly, scholars interested in the role of armatures as forager-LBK contact need to consider the variability of armature hafting within LBK projectile technology. Just because this culture subsisted primarily on farming does not mean that their hunting strategies were removed from the constraints of time and resource budgeting that foragers have to contend with. It is just as likely that that, like foragers, LBK farmers had to consider the number and different types of armatures to bring with them while travelling out into the surrounding landscape to procure resources. Future work must consider the diversity of LBK projectile technology before considering it as a unified practice expressed by a homogenous set of armature types. Could the diversity of LBK armature assemblages in the Hesbaye region suggest farmers attempts to cope with new socioecological contexts that were threatening their very existence in the region ?

6. Conclusion

In this paper our primary aim was to investigate the inter-site variability of armatures between five LBK settlement enclosures in the Hesbaye region and to offer a preliminary hypothesis for this variability. Our study has indicated much more inter-assemblage variability than has been traditionally expressed by scholars interested in the role of armatures as evidence of forager-LBK contact. Using a clear definition of Danubian armatures we have shown that this armature type should not be interpreted as the total representation of LBK armature assemblages west of the Rhine. In fact, asymmetric trapezes were the most well represented type in the Hesbaye LBK. These asymmetric trapezes are much broader and possess many attribute-level differences with those from the Late Mesolithic. Placed in the broader contexts of LBK chipped-stone chaîne opératoires, these trapezes can be interpreted as the most optimal usage of the broad blade blanks produced by LBK knappers, and not a distinct expression of past forager social identities. More extensive analyses promise to open up a broader consideration of the interrelations between social-stylistic, functional, and technological contexts of LBK armature production. We must continue to investigate the intercultural complexities of both Late Mesolithic and LBK cultural transmission, as only these enriched perspectives will enable robust enough models to provide explanation for the two most important 'why' questions in the study of neolithisation processes in Belgium:

- Why did the LBK culture disappear from the archaeological record around the 49th century cal BC in Belgium ?
- Why did it take another five to seven centuries for the transmission of agriculture beyond the once colonized loess regions ?

We feel confident that significant progress will continue to be made over the next decade, and as a result, we will have a much more deeply enriched knowledge of the complex cultural evolutionary processes that we call 'neolithisation'.

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