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Research Article

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Mineral Resources, Procurement Strategies, and Territories in the Linear Pottery Culture in the Aisne Valley (Paris Basin, France)

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Abstract: This article presents the mineral resource procurement territories of Early Neolithic settlements (LBK or *Rubané*) in the Aisne valley. Our study focuses on data from 15 LBK sites belonging to the final LBK of central Europe; C14 dates for the sites fall between 5100 and 4900 cal BC. The bulk of pottery from these sites seems to have been produced using local raw materials that can be found over a large part of the valley; only a dozen recorded vessels were made of an exogeneous raw material. Analysis of the supply and management of sandstone and flint productions indicates the presence of three groups of villages. These distinct groups correspond to the definition of a cluster as proposed to define site organization in the Aisne valley. On the LBK sites of the Aisne valley blades, polished tools and certain personal ornaments were occasionally made of non-local materials. Some of these objects seem to indicate contacts outside the LBK settlement zones and suggest relationships with southern Neolithic groups.

Keywords: LBK, Early Neolithic, raw material, settlement, procurement

1 Introduction

The emergence of sedentary lifestyles during the Neolithic transition profoundly modified the relationship of humans to their environment and their raw material procurement strategies. Fertile agricultural environments do not always provide the materials necessary for all components of the technical system and access to geo-resources was no longer integrated within the mobility cycles of nomadic populations (Binder & Perlès, 1990). For this reason, raw material analyses are particularly relevant in studies of regional structures and social context (Mateiciucová, 2010). In temperate Europe, the Neolithic transition is characterized by the Linear Pottery Culture (LBK) or *Rubané*. This large cultural entity diffused from Transdanubia (Hungary) to the west towards the Paris Basin (France). Over the course of approximately six centuries, between 5600 and 5000 BCE, Neolithic ways of life extended to most regions of northwestern Europe. Numerous studies of LBK raw material procurement strategies reveal regional diversity and significant links between villages and regions at different spatial scales. The idea of networks at various scales is now well established and illustrated by diverse materials, such as flint, hard stones, and personal

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ornaments (e.g., Claßen, 2009; Gronenborn, 1999; Zimmermann, 1995). Raw material procurement strategies, therefore, play an important role in our understanding of the social and economic structure of these populations.

This article presents the mineral resource procurement territories of Early Neolithic (LBK or *Rubané*) settlements in the Aisne valley. The objective is to present an overview and to outline the main avenues for research regarding the different modes of supply and production of silicites, tough rock, sandstones, ceramics, and personal ornaments made from limestone and shells. This collective work was carried out under the ANR *Homes* program led by C. Hamon. This project aims to model the organization of Europe's first farming societies at high spatial resolution by exploring the interaction of people at village and household levels. The research project, which was initiated in the Aisne river valley almost 40 years ago, is based on systematic monitoring of gravel extraction along an 80 km stretch of the middle Aisne valley, combined with rescue excavations (Ilett, 2012, Figure 1).

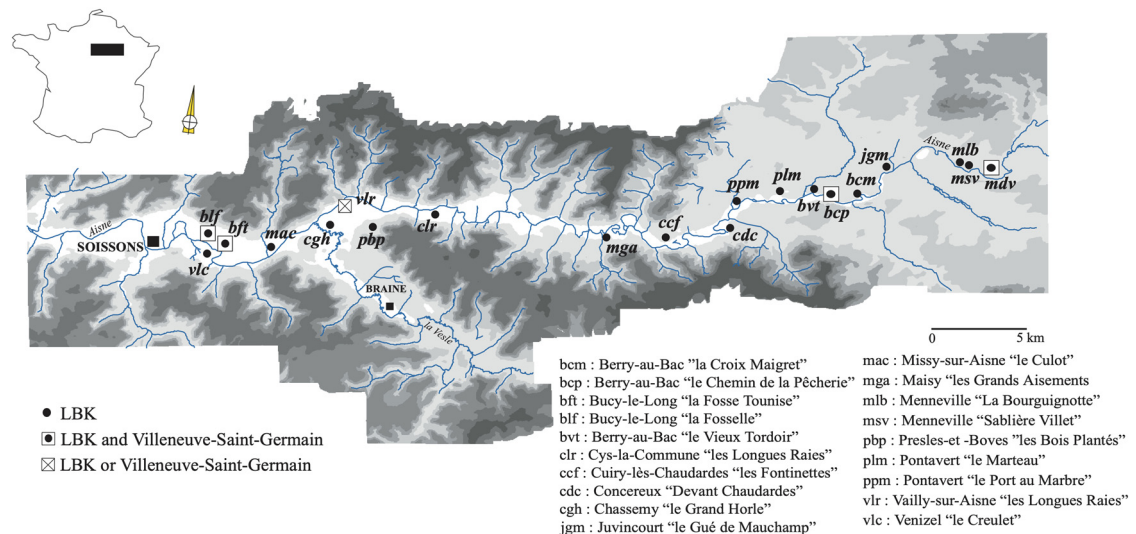


Figure 1: Distribution of Linear Pottery (LBK) sites in the Aisne valley study zone.

2 Materials and Methods

Our study focuses on data from 15 LBK sites, with over 90 house plans and almost 85 graves, including the major site of Cuiry-lès-Chaudardes, which has the longest duration of occupation and the largest number of domestic units recorded in the Aisne valley. The LBK sequence in the Aisne valley corresponds to the final LBK of Central Europe, with C14 dates for the sites falling between 5100 and 4900 cal BC. A major advantage of this region is the relatively clear layout of settlements, with very few overlapping house units, due to the short duration of the local LBK sequence. Thus, the artefacts found in the lateral pits on settlement sites can generally be attributed, without difficulty, to a given house unit.

The sites are distributed along the main valley and a distinction can be made between large villages with long durations of occupation and small villages with short-term occupation (Dubouloz, 2012). The spatial distribution of the large villages shows that they tend to be spaced every 18 km, and Dubouloz (2012) suggests that they represent the "spatial poles of potential territories fifteen to twenty kilometers long" also referred to as micro areas (p. 25). This author also emphasizes that the spatial extension of these territories is comparable to that observed on the Aldenhoven Plateau (according to the work of Lüning, 1998) or in Hesse (after Kneipp, 1995). These poles, which are quite regularly recognized for this period, are also called clusters (Lüning, 1998). The notion of a cluster can imply privileged relations between sites belonging to the

same micro area. Stehli (1989) interprets this model as a pioneer village colonizing a region, while the following generations establish themselves nearby. Four distinct scales of analysis can be distinguished: house, site, cluster, and settlement zone. From these scales, various scenarios for the organization of raw material supply can be discussed: exchange or complementarity between houses, redistribution sites (central place), inter-site traffic, and long-distance networks for the circulation of exogenous products.

The Aisne valley is part of a geological landscape with many easily accessible raw materials. However, these raw material sources are located at various distances from the settlement sites, from the immediate environment to one- or two-day's walk away. The regional geology comprises two large main zones: the Tertiary plateaux in the heart of the Paris Basin to the west and the Upper Cretaceous of the *Plaine Champenoise* to the east, the limit of which is in the district of Pontavert (Figure 2). The available resources in these two large zones are not identical.

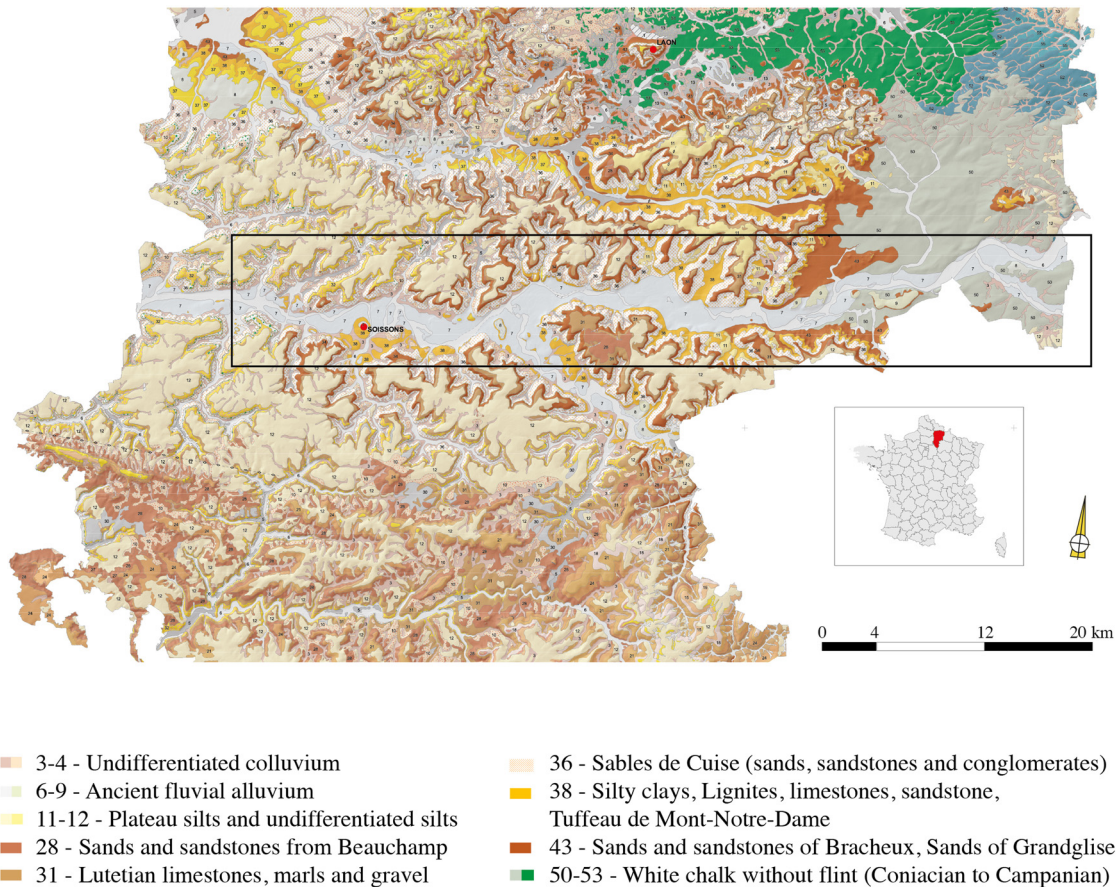


Figure 2: Geological map of the main formations of the Aisne Department (according to Vernhet, 2008). The studied area is indicated by the black rectangle.

To summarize, clays, sandstones, and flints (Thanetian, Turonian, and quartzitic sandstone) are locally present to the west, in both recent and ancient terraces of the river and in nearby outcrops in the small secondary valleys carved into the plateau. Conversely, in the eastern sector, sandstones are present only in the form of residual blocks on hilltops, and only Turonian flint is found in the alluviums.

At a larger scale (20–50 km), primary flint outcrops and fossil shells have been reported. The management of these regional resources will be described below.

Finally, the Paris Basin is a sedimentary basin, the in-filling of which began in the Permian; the Cenozoic and Mesozoic eras saw the accumulation of sediments from a succession of different marine,

lagoon, lake, and fluvial domains. The region is therefore totally devoid of tough rocks and, of course, of seashells.

3 Results

3.1 Ceramic Productions

To date, studies of ceramic raw materials on LBK sites of the Aisne valley have focused on the site of Cuiry-lès-Chaudardes (Constantin, 1985) but a broader valley-wide study is currently underway as part of the ANR *Homes* program. At Cuiry-lès-Chaudardes, the vast bulk of pottery seems to have been produced using local raw materials that can be found over a large part of the valley – the exceptions are a dozen vessels made from an exogeneous raw material, possibly from the Marne area, which may have been imported. One of the two identified clays is characterized by high proportions of limestone, and the second is defined by high proportions of quartz (Ilett & Constantin, 2010). The high uniformity of resources in the Aisne valley makes it difficult to distinguish vessels from one site to another. Regarding the tempers used in coarse vessels, two types have been identified (Gomart, Constantin, & Burnez-Lanotte, 2017): first, gastropod shell fragments from geological layers located 2–4 km from the site of Cuiry-lès-Chaudardes; second, limestone sand and gravels from the alluvial terrace on which the site of Cuiry-lès-Chaudardes is located (Figure 3).

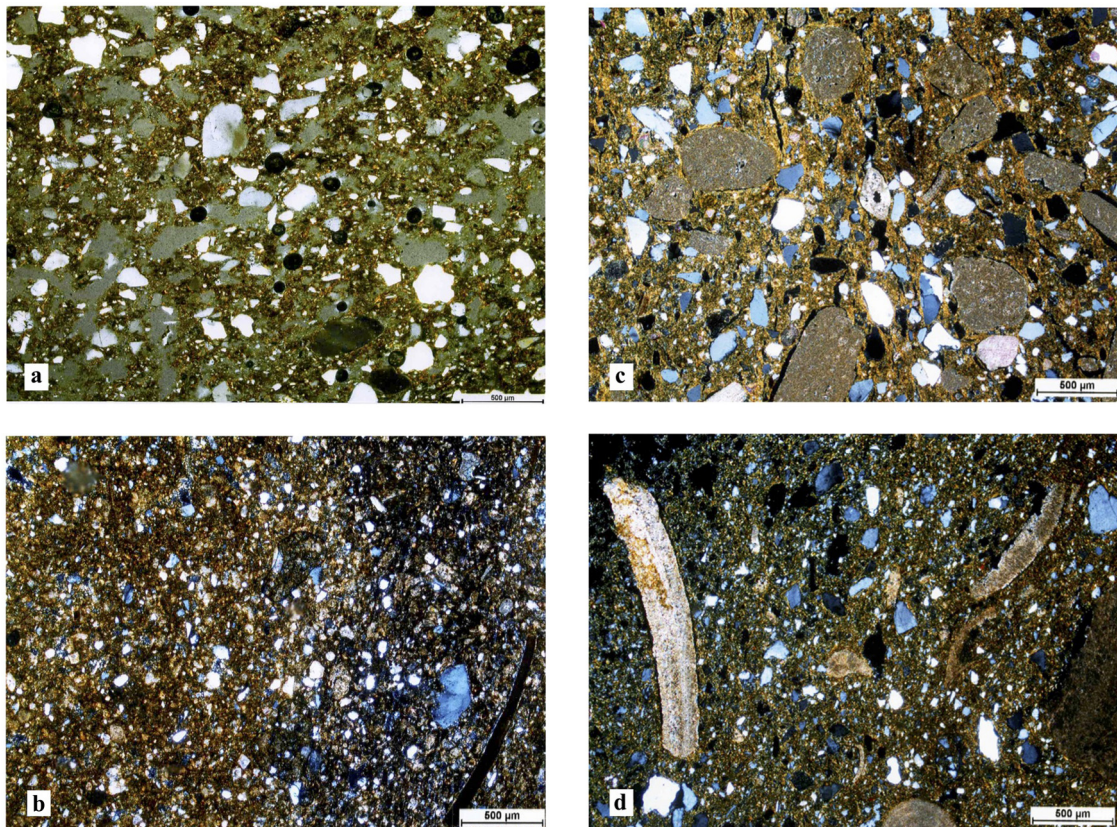


Figure 3: Two main types of clayey materials and the two main types of tempers identified at Cuiry-lès-Chaudardes. (a) Clayey material 1 characterized by the presence of frequent limestone inclusions, (b) clayey material 2 characterized by the presence of frequent quartz inclusions, (c) sand and limestone gravel, and (d) shell fragments.

When looking at the spatial distribution of raw materials at the site, we observe that houses dominated by the same ceramic forming method do not necessarily use the same clay or temper. This is the case in the latest phase of the site, where the large houses located in the south of the settlement are all dominated by the same shaping method but do not share the same clay recipe, suggesting that production was at the house scale (Gomart, 2014). In addition, the comparison of raw material data with ceramic shaping data reveals that in some houses defined by the heterogeneity of ceramic forming methods, such as the two small houses located in the north of the settlement in the latest phase, combinations of shaping methods and clay recipes are observed that also occur in some of the large houses dating to the same stage. This observation allows us to suggest that smaller houses were dependent on larger households for some of their range of pots. Ultimately, we cannot exclude the possibility that forms of cooperation existed between houses or even between villages within the Aisne valley.

Another observation concerns the emergence of exogenous ceramic forming methods in certain houses. During the latest phase of the Cuiry-lès-Chaudardes site, the two small houses located in the north of the settlement reveal evidence for the use of the beating technique in the making of pots (Figure 4). This method, which in the current state of research is rare in the Paris basin, in Alsace, and in Belgium but dominant in Lorraine (Gomart, 2014), may indicate that producers from this latter area occupied these houses. This hypothesis of the arrival of a non-local population in the village can be compared with the results of bioarchaeological studies suggesting a significant level of mobility of people in LBK contexts. We can assume that the newcomers maintained their technical gestures related to the shaping of pottery vessels while changing or adapting their clay recipes to their new environment. Within the same small houses, certain vessels made using local raw materials are characterized by the decoration that is atypical for the Aisne valley, but that can be related to other LBK settlement areas (Figure 4). This observation, which is yet to be confirmed on other LBK settlements in the Aisne valley, tempts us to suggest that newcomers would not have immediately abandoned their own decorative standards before fully integrating the local decorative repertoire (Gomart & Ilett, 2017).

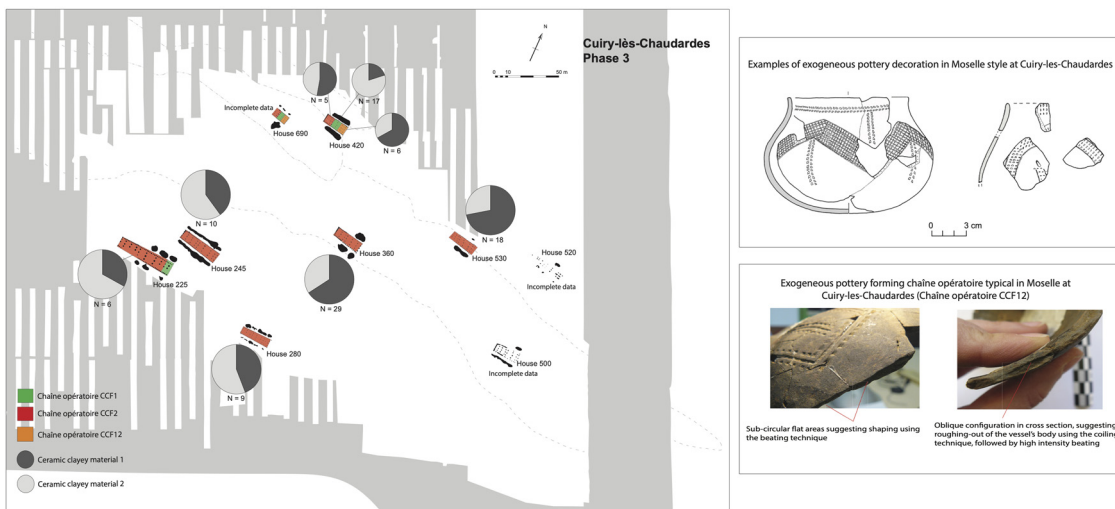


Figure 4: Spatial distribution of the two local ceramic clayey materials at Cuiry-lès-Chaudardes during the third occupational phase and examples of exogeneous pottery decoration and forming *chaîne opératoire* that are typical in the Moselle region.

3.2 Macrolithic Tools

Throughout Europe, LBK people invariably sought out different qualities of sandstones in order to produce querns and polishers from blanks with varied mechanical properties (Graefe, 2008; Jadin, 2003; Verbaas & van Gijn, 2007; Weiner & Schlich, 2006). Since the production of querns was of major importance to ensure

daily food preparation, the diversity and accessibility of Tertiary sandstones in the Basin Paris, and more particularly in the Aisne valley, was probably highly attractive for these populations. By combining the availability of the different qualities of sandstones along the Aisne valley and the strategies of raw material supply and use on the LBK sites within our research area, it has been possible to propose a model of sandstone exploitation at local and regional scales (Hamon, 2006; Hamon & Fronteau, 2018).

The most accessible Thanetian levels generally offer relatively well-cemented quartzitic sandstone. The strong cohesion, hardness, and high abrasiveness of the most cemented of these sandstones meant that they were most suitable for grinding actions. In another field of activity, Thanetian and Ypresian levels also provided small blocks of glauconious and ferruginous sandstones with low cohesion; this type of stone was particularly sought after for the production of abraders for the shaping ornaments or bone tools.

In the Aisne valley, the possibilities of access to sandstone outcrops in the direct local geological landscape have clearly guided, at least partly, the exploitation strategy and the technical behaviours of LBK people (Hamon & Fronteau, 2018). In this sense, the management of the blank and sandstone resources seems to have been much more influenced by the facility of sublocal access to sandstone resources, than by some chronological evolution or by the size of the settlements.

Three groups of LBK sites can be identified (Figure 5) on the basis of differential management of the sandstone resources within the different supply zones at a regional scale:

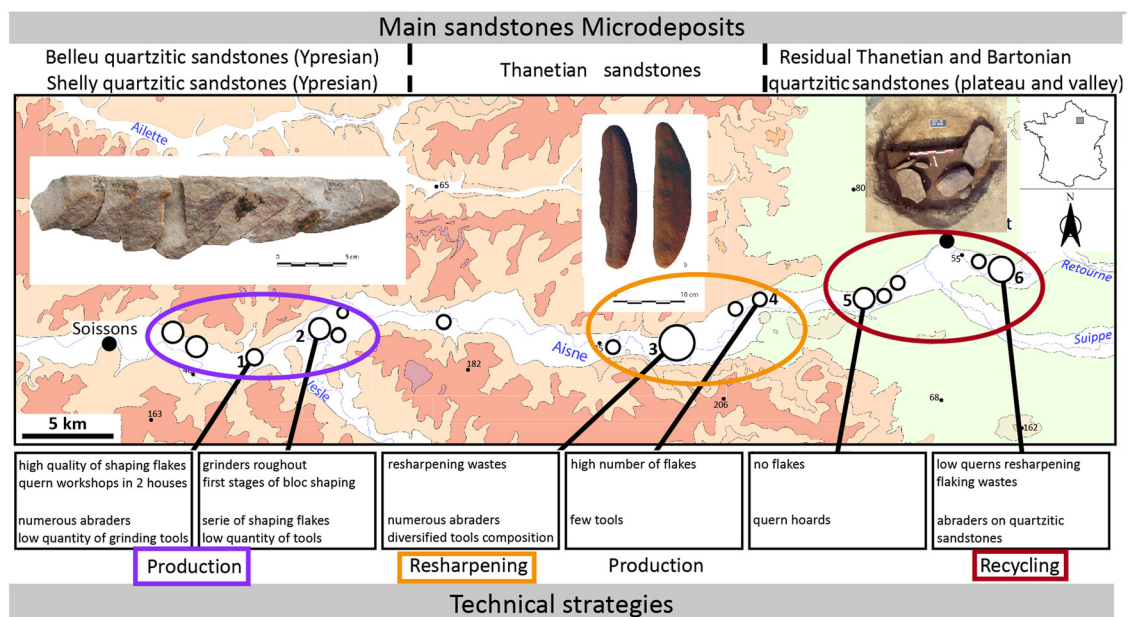
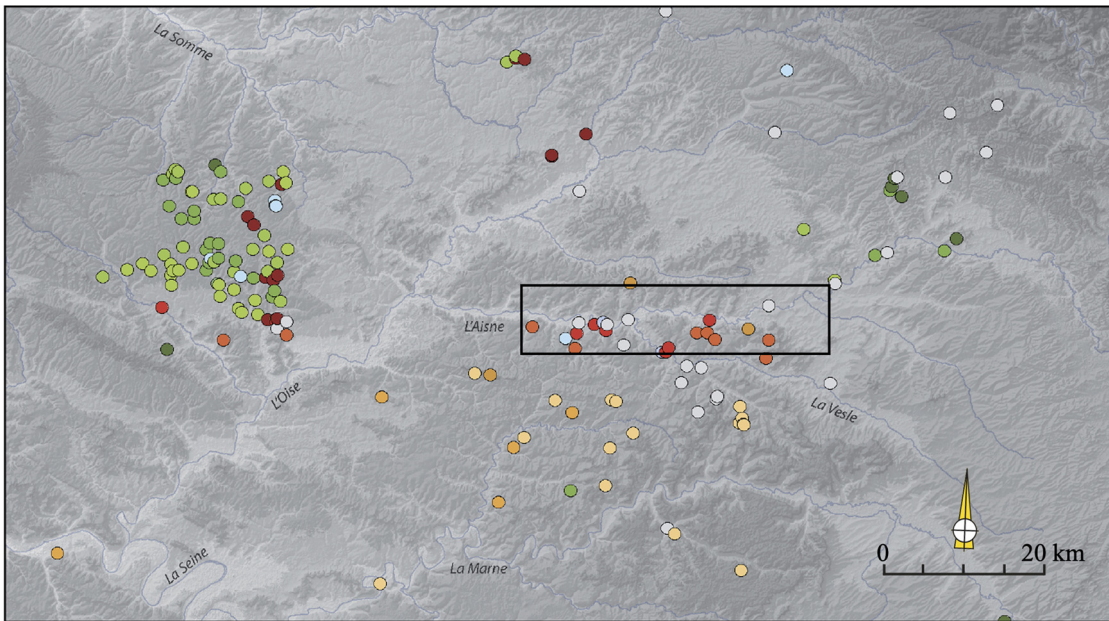


Figure 5: Schematic organization of sandstone supply and management on LBK sites, in relation to the availability of micro-deposit sandstones in the geological layers along the Aisne valley (revised after Hamon & Fronteau, 2018). (a) First shaping sequence of a sandstone block in Missy-sur-Aisne, (b) example of an abrader of glauconious thanetian sandstone from Cuiry-les-Chaudardes, and (c) quern hoard from Berry-au-Bac.

- The first group is characterized by the close proximity between easily accessible Thanetian quartzitic sandstone outcrops used for quern production and the settlement sites. It corresponds to the western and central parts of our study area. On these sites, the production and maintenance of grinding tools seem to have involved both the gathering of raw material in alluvial deposits and the use of extracted blocks. While the first stages of quern production were generally carried out outside the village, probably directly on the outcrops, blocks were occasionally pre-shaped in some houses. More often, shaping flakes are found in the domestic area suggesting that the last stages of quern production took place in most of the villages. The precise pattern of grinding tool production within each settlement is still under investigation.

- The second group is characterized by intensive exploitation of specific local sandstone micro-deposits. This is particularly evident for specific types of sandstones such as the Sparnacian shelly sandstones of Missy-sur-Aisne, where a series of workshops have been discovered. It is also the case for the large quantity of glauconious and ferruginous sandstones used for the production of abraders in Cuiry-les-Chaudardes “les Fontinettes.”
- The third area corresponds to the calcareous plateau to the east of our study area, where the lack of diversified sandstones led to the emergence of specific behaviours. First, we note the adaptability of LBK people evident in the opportunistic re-use of quern fragments for the production of abraders. Second, this region has yielded the only quern hoard recorded in the Aisne valley, at Berry-au-bac, suggesting a desire to carefully preserve such grinding implements. Finally, in this third area, sandstone supply included exchanges with other parts of the Aisne valley, sometimes tens of kilometers away.

In fact, in the Aisne valley, the abundance of local sandstones of high and diverse qualities close to the riverbeds along which LBK people settled ensured regular supply with reduced investment in the search and transportation of blocks. Nonetheless, this organization of the raw material procurement at a local or regional level appears to have been highly organized following rules of access, exchanges, and management between sites.



Geological formations of sampled mineral material

- Not informed
- | | | |
|---|---|---|
| <p>Cretaceous</p> <ul style="list-style-type: none"> ○ T4b, Muschelkalk ○ J7, Upper Jurassic ○ J3, Bathonian ○ J, Jurassic ○ C3b-c, Turonian ○ C4, Coniacian ○ C4, Cretaceous ○ C5, Santonian ○ C6, Campanian ○ C7, Maastrischie | <p>Tertiary</p> <ul style="list-style-type: none"> ○ e2, Thanetian ○ e3, Sparnacian ○ e5, Lutetian ○ e6aG, Lower Bartonian (Auversien) ○ e6 b, Middle Bartonian (marinesian) ○ e7b, Upper Bartonian (Ludian) | <p>Secondary position</p> <ul style="list-style-type: none"> ○ Fx/e2, Old alluvions ○ LP, Plateau silt ○ fy, Quaternary alluvions ○ Colluvions |
|---|---|---|

Figure 6: Map of siliceous rocks inventoried in the reference collection of the Aisne valley (after Lietar et al., 2014). Champagne flints are not indicated; they are located further south.

3.3 Flint Industry

The flint resources in primary formations are differentially distributed across the region. The Tertiary and Senonian levels of Champagne are located in the south, the Turonian in the northeast, and the Campanian in the northwest. All of these sources are available at least 20 km from the settlements and most often at an average of 30–50 km away (Figure 6).

Locally, the alluviums contain small pieces of Turonian flint (Ardennes), Thanetian flint with a greenish cortex, and quartzitic sandstone, for which only one outcrop is known in the Presles-et-Boves sector. Concerning the quartzitic sandstone, it is found widely in the alluviums from the valley's western sector.

All the lithic assemblages from the LBK sites contain these various materials but with significant variations between individual houses and sites. At the settlement zone scale, we can highlight three main points:

- Chronological changes are perceptible and should be confirmed with a general seriation including all sites. For the houses of the early stage, Champenois flint dominates, such as at Berry-au-Bac “le Chemin de la Pêcherie” (BCP) and Presles-et-Boves “les Bois Plantés” (PBP). Conversely, the end of the sequence shows more frequent use of flint originating from the alluviums, as seen in the late-stage houses at Cuiry-lès-Chaudardes, for example.
- The first studies reveal a sort of regional procurement frontier located in the eastern sector, around the Berry-au-Bac sites (Plateaux, 1993). The LBK sites in this district and further east have yielded assemblages mainly composed of Turonian flint, which is likely to have been procured in primary formations. Senonian and Tertiary flint dominate the assemblages in the rest of the valley. The discovery of new sites demonstrates that, while this limit is always observed, it does not appear in the first phase of LBK colonization (at the Berry-au-Bac site of “Le Chemin de la Pêcherie”), and there is a third partition in the western zone, in the sector of Bucy-le-Long. This micro-zone is distinguished by the abundant use of alluvial flint for expedient productions, starting in the first phase (blanks for splintered pieces).

This geographic tripartition is in line with the proposed model based on the analysis of the macro-tools, showing differential management of blanks depending on the availability and accessibility of sandstone materials along the valley (Hamon & Fronteau, 2018) (Figures 5 and 7).

- Finally, there are also clear variations between the sites with few houses and those with long-term occupations. The short-term settlements display raw material spectra that differ greatly from one another, such as the use of a large number of quartzitic-sandstones at Presles-et-Boves (PBP). In contrast, this material is rarely used in large sites.

Blades were made at all of the sites in more or less similar proportions ranging from 22 to 37% of the total number of flint pieces, except at Berry-au-Bac “la Croix Maigret.” The latter is the only site that yields a house with a lateral pit containing the waste from a flaking station (Turonian flint).

While blade production was usually dominant, we also observe, particularly in the final phase of the LBK, expedient flake production and the frequent use of small unworked pieces as blanks for splintered pieces. A diverse range of siliceous materials is used in all the houses. While there is no raw material economy *stricto sensu* – i.e. a material used exclusively for one type of production – there are clear preferences for high-quality regional flints (especially, Senonian flint) for blade production and for local materials for expedient productions (Allard, 2005; Ilett & Allard, 2008). At this stage of our research, we believe that flint blades were made in all housing units. Our technological analysis shows that flint knapping waste products are present in all of the houses, including those with few remains.

On the other hand, and this work must be continued, our techno-economic analysis, combining the evidence for reduction sequence (*chaîne opératoire*) stages and the raw materials employed, yields new information suggesting that some materials were exchanged between houses or sites. This is the case for Bartonian flint, for example, for which there is small piece of evidence for flaking in House 10 at Menneville “Derrière-le-Village,” house 55 at Presles-et-Boves (Ilett & Allard, 2008) and house 125 at Berry-au-Bac “la Croix Maigret” (Allard, 2005).

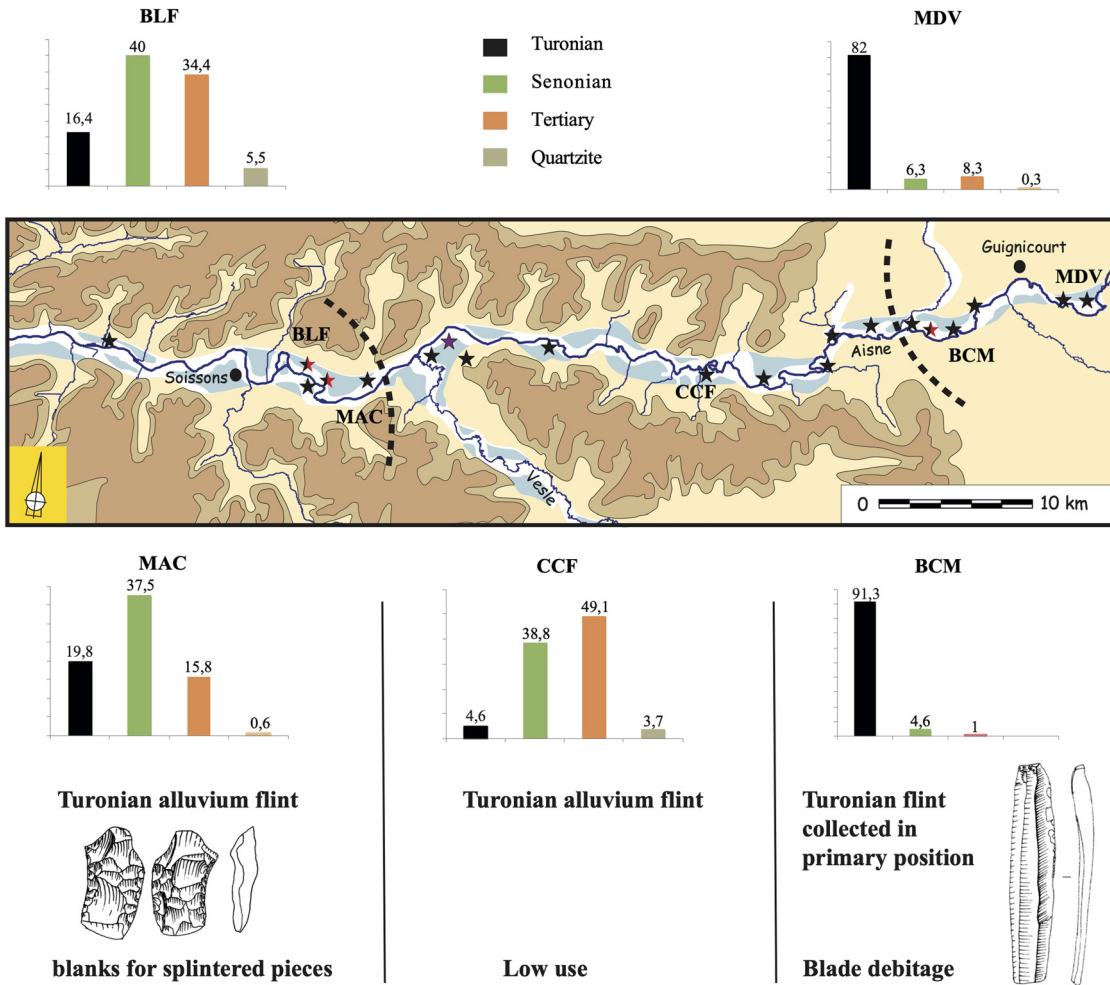


Figure 7: Frequency of the main flints in LBK assemblages (five sites are presented). The exploitation of Turonian flint allows three distinct areas to be identified: a western area characterized by marked use of alluvial blocks, a central area characterized by low use, and an eastern area where this flint was almost the only type used and collected from primary locations for blade debitage.

Moreover, in the LBK sites of the Aisne valley, occasional pieces are made from exogenous flints, such as Ghlin flint at Cuiry-lès-Chaudardes, fine-grained Hesbaye (Campanian) flint at Missy-sur-Aisne, and from a granular variety, probably from Belgium, at Menneville (granular Hesbaye flint?, Maastrichtian). Ghlin flint is abundant in the LBK sites of the Hainaut in Belgium. These few objects obviously had no economic impact, but their informative value is pivotal since they reveal the existence of social relationships with the LBK sites of the Hainaut region in Belgium.

3.4 Polished Tools

The inventory of polished tools lists about 30 pieces and two roughouts for the 19 LBK sites in the region. Their scarcity is striking and the discovery context confirms their total absence in burials, a phenomenon that is nevertheless common in other LBK settlement areas outside the Seine Basin. Besides the paucity of this assemblage, it is also important to note that these pieces are very fragmented. They are sometimes represented by a single fragment, often from the edge of an object. There are only three complete pieces (one from Bucy-le-Long “la Fosselle,” one from Pontavert “le Port-aux-Marbres,” and another, in two

pieces, from Cuiry-lès-Chaudardes) and these were found in lateral pits on settlement sites. Moreover, three complete pieces were discovered in the segments of the LBK enclosure at Menneville “Derrière le Village.”

No flakes from the shaping or preparation of polished artefacts have been found. It seems therefore that the objects were already polished when brought onto the sites. Nevertheless, in Bucy-le-Long “la Fosselle,” a rough-out was discovered in house 20. The object is more or less shaped and the material is grey limestone. Macroscopic examination shows the presence of *Characeae oogons* in the matrix indicating that it is a tertiary limestone, probably from the Bartonian. It is a noteworthy piece because it was abandoned before polishing or final preparation and the raw material does not appear to be suitable for use in thrusting percussion. Another rough-out has been found on the Menneville site; in this case, the raw material remains undetermined. It is possible that such objects were occasionally brought back to the sites at this stage, or else, as seems to be the case at Bucy-le-Long, that the Neolithic communities wished to exploit nearby resources.

The characterization of the materials used for the production of polished tools is still in progress, but macroscopic analysis indicates a wide diversity of potential sources. The lack of exploitable materials in the Paris Basin requires the acquisition of primary sources, the closest being located at least 150–200 km away. These objects, therefore, attest to long-distance contacts, although it is essential to have a better understanding of their exact modes of circulation in order to correctly determine effective relations. In all cases, these polished tools indicate contacts with neighboring areas, beyond the supply of other lithic materials.

3.5 Personal Ornaments

Shell ornaments also attest to distant supply. The late LBK is characterized by the diversification of ornamental elements. *Spondylus*, *Cardiidae*, and *Dentalium* are found in all burials within the settlement zones of the Seine Basin. In contrast, freshwater mussels, *Venericardia*, *Natica*, *Trivia*, and *Littorina*, are only found in the Aisne valley (Bonnardin, 2009). *Spondylus* had to be traded with neighbouring communities. Moreover, some of the shells, such as dental or cowries, originated on the shores of the English Channel or Atlantic, which means that the LBK populations developed unprecedented routes for their acquisition.

A study of limestone bracelets (Constantin & Vachard, 2004) shows that these objects are rather rare and that they are made from exogenous materials. The first material used is a grey limestone typical of the Ardennes Massif. The other material used is white limestone, represented by six bracelets, an analysis of which suggests that they originate from southern France. These bracelets were found in domestic contexts (Bucy-le-Long “La Fosse Tounise,” Missy-sur Aisne “Le Culot”), in two graves (Berry-au-Bac “La Croix Maigret” and Cys-la-Commune) and in the enclosure of Menneville Derrière-le-Village. Their typology shows two variants that are similar to those known in Cardial contexts in southern France. Moreover, their petrographic analysis (Constantin & Vachard, 2004, p. 77) shows that the white limestone that they are made from comes from the Lower Cretaceous, more precisely a deposit from the Baremian. These limestone deposits are present only in southern France.

Thus, some of these objects seem to indicate contacts outside the LBK settlement zones and suggest relationships with southern Neolithic groups (Billard, Bostyn, Hamon, & Meunier, 2014, pp. 259–263).

4 Discussion

The synthesis of production and acquisition territories allows us to discuss and combine our results at different scales of raw material supply (Figure 8).

- (1) Local resources were exploited in the technical system for domestic lithic, macrolithic, and ceramic production, the houses being largely self-sufficient. As regards pottery, we observe production at the household level and possible exchanges between houses at the site level are perceptible.

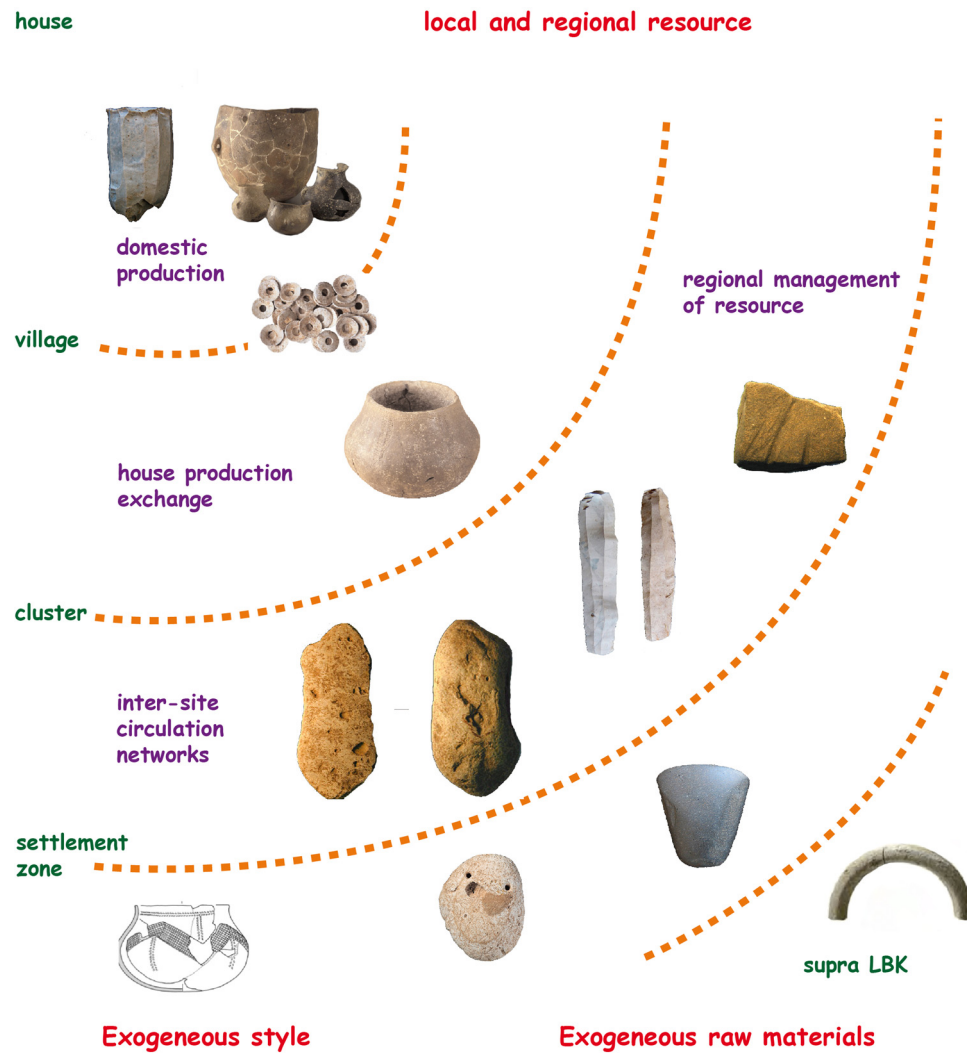


Figure 8: Different scales of raw material supply in the LBK settlements in the Aisne valley.

Furthermore, the general lack of waste material from the production of personal ornaments within the domestic area suggests that most of these artefacts were produced outside of the houses or, for a large part, were imported from other locations. To date, no specialized workshop for the production of limestone and shell ornaments has been documented in the Aisne valley.

- (2) At the level of village clusters, the relationships between sites remain to be clarified. Gaps in the reduction sequence of Bartonian flint, for example, could indicate exchanges between houses in different villages at a scale that remains to be determined.
- (3) At the regional level (settlement zone), acquisition territories for lithic objects are diverse, although it is not possible in the current state of data to confirm whether this diversity also applies to other types of material.

Our techno-economic analysis of sandstone productions indicates the presence of three groups, distinguished according to the raw materials and the stages of production of the grinding stones represented. The lithic industry also shows variation between these three groups, especially in terms of the materials exploited and the presence of expedient productions (typical of the sites in the western part of the valley). These distinct groups are comparable to the definition of a cluster that has been proposed to define site organization in the Aisne valley. The tripartite division observed in the case of sandstone and flint exploitation will, in particular, be tested for ceramic productions through the

broader analysis of clay and temper selection at the scale of the valley. Inter-regional exchanges are obvious, especially for sandstones, though the exact circulation routes and modalities of these circulations are difficult to track.

Most flint procurement is oriented toward the primary sources of high-quality materials for blade production (Bartonian and Senonian). These sources are generally situated 20–50 km from the knapping locations. Local flint is also used to make blades but in low proportions. These resources were thus procured well-beyond the cluster but fully participated in the self-sufficiency of the houses.

- (4) Although they are rare at the scale of the valley, exogenous objects are particularly informative. This is notably true for adzes, which show relationships with areas outside of the Paris Basin; it appears that these objects were not manufactured regionally and were imported at an already advanced stage of use. At Cuiry-lès-Chaudardes, a few exogenous decorative pottery styles typical of LBK sites in eastern France, as well as rare exogenous clay materials possibly from the Marne area are observed, although most pottery was made using local resources.

Personal ornaments provide a unique insight into circulations. Some objects indicate links to western maritime sources (Atlantic or Channel coasts), while a small series of white limestone bracelets points to links further south; these objects attest to circulations that extend beyond the LBK *œkoumene*.

Thus, the acquisition of mineral resources is organized around distinct territories, which range from acquiring materials from the immediate surroundings of a site to obtaining non-local objects, sometimes even from outside the LBK cultural area. The concept of a cluster developed for the Aisne valley (Dubouloz, 2012) can be visualized in the tripartite division identified for flint and sandstone productions. This general pattern is comparable to that described for Dutch Limburg (Bakels, 1982). The needs of the communities were estimated based on our knowledge of their raw materials, on a list of the raw materials accessible within the territories of each village, and according to the settlement clusters. Resources such as firewood, wood, and plant materials for house construction, and clays for constructing walls and making pottery were directly accessible in the supposed 60–170 ha zones around each site. Stones for grinding tools, wood, a few local flint sources, and hunting zones were accessible at the scale of site clusters (the micro-zone, according to Dubouloz, 2012, pp. 22–25). Rijckholt flint, on the other hand, was easily accessible in the region, but in an area beyond the limits of the site cluster. Other hard stones and hematite were clearly exogenous to the Dutch province of Limbourg considered in this study (Bakels, 1982)

Thus, although the tripartite scheme proposed for the Aisne valley has yet to be supported by further analyses of the origin of clays, it appears that the different territorial modalities of resource acquisition are characteristic of these populations, combining the immediate environment of the villages with more distant expeditions for specific resources and exchanges with neighbouring populations.

5 Conclusion

Although the synthesis presented in this article is preliminary, it reveals the complexity of the technical system and the acquisition territories of the first agricultural populations of the Aisne valley. This complexity can only be fully understood by integrating different scales of analysis, i.e. the household, the cluster, and the settlement zone. The current ANR *Homes* program aims to assess the different scales and strategies of procurement of each production in order to better understand the social and territorial organization of these communities.

In this research, one significant aspect remains to be explored in detail: the relationships between housing units.

Faunal analyses at Cuiry-lès-Chaudardes (Hachem, 2000), and an analysis of the sandstone artifacts (Hamon, 2006), have revealed differences in consumption linked to the house size. The large houses were more active in the management of stored goods and cereal consumption, while the small houses were more involved in hunting and its sub-products (Hachem & Hamon, 2014). This study was enriched by the

contribution of a technological approach to pottery production (Gomart, Hachem, Hamon, Giligny, & Ilett, 2015). In this model, the large houses are qualified as economically “mature,” in contrast to the smaller houses, which could reflect small families in the process of integrating within the village. The latter sometimes welcomed people originating from other LBK settlement zones – as is suggested by the sudden appearance of new technical practices in pottery making and exogenous decoration.

This model could have significant consequences for the variation of procurement territories and raises several questions concerning the distribution of some productions. We still have to clarify whether the exogenous objects were evenly distributed throughout the settlement site or whether they were more closely linked to newcomers to the community and thus preferentially found in the smaller houses. The same is true for flint where the frequency of high-quality materials acquired outside of the clusters could reflect an asserted knowledge of the diversity of distant sources, sources that might not necessarily be accessible to newcomers.

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