ERAUL 150
ANTHROPOLOGICA ET PRÆHISTORICA 130

Les sociétés gravettiennes du Nord-Ouest européen : nouveaux sites, nouvelles données, nouvelles lectures

Gravettian societies in North-western Europe: new sites, new data, new readings

Actes du colloque international « Le Nord-Ouest européen au Gravettien :
apports des travaux récents à la compréhension des sociétés et de leurs environnements »
(Université de Liège, 12-13 avril 2018)

sous la direction de
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Presses Universitaires de Liège
2021

O. Touzé, N. Goutas, H. Salomon & P. Noiret (dir.) (2021) – *Les sociétés gravettiennes du Nord-Ouest européen : nouveaux sites, nouvelles données, nouvelles lectures / Gravettian societies in North-western Europe: new sites, new data, new readings.* Liège, Presses Universitaires de Liège
(ERAUL, 150 / *Anthropologica et Præhistorica*, 130) : 111-130

Siliceous Raw Material Exploitation at Station de l'Hermitage: A Palaeogeographic Perspective on North-Western Europe during the Early Gravettian

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Résumé

La structuration et la conception de l'espace chez les sociétés du Paléolithique supérieur apparaissent étroitement dépendantes du degré de mobilité des individus et/ou des groupes. Pour appréhender ces différents aspects, il est ainsi indispensable de replacer le site archéologique au sein d'un territoire par nature dynamique (évoluant dans le temps) et composite, formé de zones actives (zones d'intérêt) et passives (zones faiblement, ou non fréquentées).
La Station de l'Hermitage, qui dans la présente contribution est au cœur de nos analyses, est un site de plein air situé dans la vallée de la Mehaigne (affluent en rive gauche de la Meuse), à l'interface entre le massif des Ardennes et les vastes plateaux lœssiques de la Hesbaye. Fouillé à différentes reprises depuis la fin du xix[e] siècle, il a fourni des industries du Néolithique, du Paléolithique supérieur et du Paléolithique moyen. Les caractères typo-technologiques des vestiges lithiques, ainsi que plusieurs datations radiocarbone, permettent d'attribuer le niveau paléolithique supérieur à une phase récente du Gravettien ancien, postérieure au Maisièrien qui caractérise en Belgique la phase initiale du Gravettien. Ce niveau témoignerait d'une ou plusieurs occupations probablement peu espacées dans le temps, et associées à une même tradition technique.
Fondée sur les données de la pétroarchéologie et de la technologie lithique, l'approche de restitution des territoires passés sous forme de réseaux de lieux que nous proposons a déjà apporté des résultats fondamentaux en ce qui concerne la seconde moitié du Paléolithique supérieur en France. Appliquée au Gravettien ancien de la moyenne vallée de la Meuse, cette approche permet de poser l'hypothèse d'un vaste réseau de lieux, qui lie au sein d'un même territoire (au sens géographique du terme), la Belgique et le Bassin parisien, mais dont les mécanismes socio-économiques qui le sous-tendent demeurent encore à déterminer par le développement d'approches interdisciplinaires à grande échelle.

Mots-clés : Pétroarchéologie, technologie lithique, Gravettien ancien, Europe de l'Ouest, territoires, paléogéographie, réseau de lieux.

Abstract

The structuring and perception of landscape in Upper Palaeolithic societies seem to closely depend on the degree of mobility of individuals and/or groups. To understand the various aspects of any settlement pattern, it is thus essential to place an archaeological site within a territory that is both dynamic and composite by nature. This implies that the territory both changes in size or form through time and comprises active zones (areas of interest) as well as passive zones (non-frequented areas).
Station de l'Hermitage, on which this contribution is based, is an open-air site located in the Mehaigne Valley (a tributary on the left bank of the Meuse River) at the interface between the Ardennes Massif and the vast loess plateau of the Hesbaye. Excavated several times since the late 19th century, this site has yielded Neolithic, Upper Palaeolithic and Middle Palaeolithic industries. The typo-technological characteristics of the lithics, as well as several radiocarbon dates, make it possible to attribute the Upper Palaeolithic layer to a young phase of the Early Gravettian, *i.e.* to a phase postdating the Maisierian, which in Belgium characterizes the initial Gravettian. This layer represents either one occupation or several consecutive ones with little time in between, and in any case relates to a single technological tradition.
The reconstruction of past territories in the form of networks of places that we propose based on the petroarchaeological and technological data has already given significant results for the second half of the French Upper Palaeolithic. Applied

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to the Early Gravettian of the Middle Meuse Valley, this approach makes it possible to hypothesize a vast network of places, linking Belgium and the Paris Basin within one territory (in the geographical sense). However, the socio-economic mechanisms that tied this territory together still remain to be determined through large-scale interdisciplinary studies.

Keywords: Petroarchaeology, Lithic technology, Early Gravettian, Western Europe, Territories, Paleogeography, Network of places.

To Rebecca Miller, who left us on a sad day in Spring.

1. Introduction

Station de l'Hermitage in Huccorgne (Prov. Liège, Belgium) is an open-air site discovered at the end of the 19th century by De Puydt and Lohest (1884-1885), and excavated several times, by Tihon from 1886 to 1890 (1895-1896), by Destexhe-Jamotte from 1969 to 1971, by Haesaerts in 1976 and 1980, and by Straus and Otte from 1991 to 1993 (Straus *et al.*, 2000). It presents a succession of three industries with well-differentiated ages, attributed to the Neolithic, the Gravettian and the Mousterian (Haesaerts, 2000). In contrast to other sub-contemporary cave deposits in Belgium that often show a mixture of Middle Palaeolithic, Aurignacian, Gravettian and Magdalenian industries (Otte, 1979; Pesesse and Flas, 2013), the Gravettian archaeological remains of Station de l'Hermitage testifies to one or more short occupations belonging to the techno-cultural group of the Early Gravettian.

Despite a significant loss of material, the Gravettian assemblage available today still comprises 9277 lithic artefacts (chips included)[1] whose technological diagnosis was recently made (Touzé, 2015), along with poorly preserved faunal remains as is often the case for Palaeolithic open-air sites in Belgium (N = 200, Gautier, 2000). Six radiocarbon dates were obtained from these (tabl. 1). Two results appear too young due to acid humic contamination (Stafford in Straus *et al.* 2000 p. 77), with regards to both the stratigraphy and the archaeological material, while the other four, situated between 28,390 ± 430 BP and 26,300 ± 350 BP, seem more coherent (for a discussion of the dates see Haesaerts, 2000; Touzé, 2015). The oldest dates were obtained on mammoth bones excavated from sub-unit G3, considered by Haesaerts as a debris flow covering the initial G1 archaeological layer (Jacobi *et al.*, 2010 and com. pers.). These two dates at 28 ka BP place the Gravettian occupation of Station de l'Hermitage in the time frame of the Maisierian (Jacobi *et al.*, 2010), which does not seem in accordance with the majority of the remains found on the site (see below). Because of the very questionable stratigraphic positioning (in a debris flow) of the bones that provided these dates, their relationship with the Gravettian occupation should be accepted with caution. Therefore, we will only consider the date of 26,3 ka BP which seems coherent with the characteristics of the lithic industry and the litho-stratigraphy since, according to P. Haesaerts (2000), layer G1 is contemporaneous with the first silty deposits of the Pleniglacial situated above a huge permafrost episode (oscillation IVf in the regional stratigraphy), in which no artefact was found. Such a level is correlated with the one found at Maisière-Canal (Haesaerts, 2000), but situated over the occupation dated around 28 ka. Therefore, the two dates around 28 ka at the Station de l'Hermitage cannot be valid.

Station de l'Hermitage is one of the most northern Gravettian sites in Western Europe. The site is located at the top of a butte overlooking the valley of the Mehaigne, a tributary on the left bank of the Meuse that cuts the vast loess plateau of the Hesbaye. North of the site, the Hesbaye provides a great diversity of Cretaceous marine flints, either in primary position, alteritic position, or remobilized in the Cenozoic deposits that also contain levels of sandstone—the famous "Grès bruxellien". To the south stands the old massif of the Ardennes cut by numerous valleys, sometimes quite deep, which provide cherts and Jurassic marine flints. These two geographical spaces are separated by the Meuse valley which constitutes a major axis through the Ardennes between the Paris Basin and Northern Europe.

The purpose of this article is to question the place of Station de l'Hermitage in the world of Early Upper Palaeolithic societies with regards to landscape management. Previous raw material studies, based on observations with the naked eye (in particular Miller, 1997; 2000; 2001), found a low diversity of materials and an absence of flint circulation over long distances—a result that did not allow any identification of the inter-space relationships at the dawn of the Gravettian in North-West Europe. However, the method used in this work provides unexpected results that shed new light on this lack.

Zone	Nature	taxa	Méthode	Année	Laboratoire	Ref Labo	Age BP	Err. Age BP	Age BP cal**
Destexhe excavation	bulk bone collagen	indet	conventionnal	1981	Groningen	GrN-9234	23170	160	27713-27174
J7	individual bone collagen	mammoth	AMS	1991-1993	INSTAAR, University of Colorado	CAMS-5893*	24170	250	28706-27764
J6	individual bone collagen	indet	AMS	1991-1993	Oxford Accelerator Laboratory	OxA-3886	26300	350	31080-29705
J7	individual bone collagen	mammoth	AMS	1991-1993	INSTAAR, University of Colorado	CAMS-5895 ^	26670	350	31342-30171
J7	individual bone aspartic acid	mammoth	AMS	1991-1993	INSTAAR, University of Colorado	CAMS-6371 ^	28170	430	33257-31240
J7	individual bone gelatin	mammoth	AMS	1991-1993	INSTAAR, University of Colorado	CAMS-5891*	28390	430	33464-31395

Table 1: *Station de l'Hermitage* – radiocarbon dates in years BP (before 1950) and cal BP. Standard deviation (2 sigma). ^ same bone; * same bone; ** values calculates with OxCal 4.2.3 (Ramsey, 2013; curve IntCal13, Reimer *et al.*, 2013).

2. Material and Method

Petroarchaeology, that is the sub-discipline of archaeology which studies the composition and origin of silicites[2] found on archaeological sites, has two main *foci*: 1) the reconstitution of techno-economic systems in documenting the first phases of the *chaîne opératoire*—that is the acquisition phase and, coupled with the lithic technology, the mode of introduction into the sites, and 2) highlighting the supply routes, acquisition areas and thus, more generally, prehistoric territories.

However, if one goal of petroarchaeology is to highlight places where humans collected lithic raw materials, the simple recognition of the stratigraphic and diagenetic origin of a silicite (that is to say its primary source) is not currently sufficient (Turq, 2005). Based on various works related to the weathering of silicites—including patinas, lustre, mineralogical changes related to temperature variations and locational changes (Hurst and Kelly, 1961; Rottländer, 1975; Vilas-Boas, 1975; Aubry, 1975; Thiry, 1981, to name only the main ones), in the 2000s, Fernandes and Raynal developed the concept of the "evolutionary chain of flints" (Fernandes and Raynal, 2006; Thiry *et al.*, 2014). The addition of an alterological component to classical silicite diagnostic methods (Masson, 1981; Séronie-Vivien and Séronie-Vivien, 1987) makes it possible to define the different gitological derivatives of the same genetic type; derivatives that correspond to many stages in the life of silicites and makes it possible to identify the formation in which lithic raw materials outcropped; formations that are sometimes far away from primary sources (Fernandes, 2012; Delvigne, 2016).

Our work is therefore based on precise petrographic analysis of all the lithic material from Station de l'Hermitage, integrating the concept of "evolutionary chain of flints". It is also supported by the study of different rock libraries in Belgium (Prehistomuseum of Ramioul, Royal Belgian Institute of Natural Sciences, University of Namur) enhanced by data sourced from the realization of targeted surveys in an area of twenty kilometers radius around the site. Each flint is described in a database containing 160 fields and divided into three forms: 1) petrographic, 2) alterologic and 3) taphonomic. This analytical approach, which combines field work and observations at different magnifications, makes it possible to specify the origin of the artefacts present on the site and to quantify the homogeneity of the archaeological deposit.

As the alterological processes are continuous throughout the life of the artefact, its transformation is not only pre-depositional (*i.e.* before its abandonment on the site), but also post-depositional (that is to say, in the archaeological site). The so-called pre-depositional phase, which corresponds to the life of the flint before its collect, is the subject of the alterological approaches, whereas the post-depositional phase, which corresponds to the period during which the flint is abandoned in the site until its discovery by the archaeologist, is the subject of taphonomic studies. There are different degrees of definition of a type for the same flint:

1. the genetic type, defined by the classical method, *i.e.* that relating to the diagenesis of flint (see table 3);
2. the gitological type, defined by the alterological criteria, that is to say the one relating to the place of residence of the flint before its collect by humans;
3. the archaeological type, defined by taphonomy, *i.e.* the one bearing the stigmas (any mark that reveals a mechanical degradation) and traces (marks that indicate a chemical degradation) of its evolution into the archaeological site.

The genetic type is thus divided into several gitological types, which themselves are subdivided into several archaeological types (Fernandes and Raynal, 2006). In the context of this article, our principal aim is to identify the paleogeographic consequences induced by this approach.

Accuracy of petrographic analyses is of primary importance. We have shown in previous works (Delvigne *et al.*, 2014; Delvigne, 2016) that using only the diversity, quantity and type of introduction of materials from coherent geographical spaces (*i.e.* geotops) makes it possible to hypothesize on a direct or indirect acquisition of materials, and thus to reflect on the extension of past territories. However, the simple assimilation of the litho-space[3] of a single site into the exploited geographical space and/or the territory of a given group is insufficient, since it fails to consider the underlying mechanisms relating to the presence of the material in the sites, and the indices exterior to the site. The analysis therefore remains site centered. From the perspective of landscape management and the study of territories this is paradoxical, since the work of social and cultural geography has shown that it is the set of interconnections between places that carries meaning in a given geographical space, and allows territorialization to develop or occur (*e.g.* Bonnemaison, 1981; Collignon, 1996; Di Meo, 1998).

Graphic representations of past territories in most scientific literature are presented in the form of flat areas covering vast landscapes. However, this kind of representation of territorial space differs totally from that recognised and used by current and sub-current nomadic peoples, regardless of their economic system. From a theoretical point of view, we can say that for these peoples, a territory is structured in the form of a network of routes. These routes, which may be traversed regularly and cyclically, visit points of interest or certain identified places, that usually bear specific names regardless of their function, whether hunting area, source of lithic or vegetable resources, sanctuaries or ceremonial places. The route networks used by a group that link particular sources of lithic resources and some habitation sites can be referred to as 'litho-space.' This is now the principal kind of territorial dimension that can be identified from the archaeological excavation of a site. Indeed, it is clear that routes to exploit lithic resources form only a fraction of the total network of routes taken by a population to exploit physical or spiritual resources. The routes taken for the exploitation of a totality of resources used by a group may extend outside of a clan estate or territory and thus impinge on the territory of another group. Despite this limitation, in order to reconstitute the past territories in the form of networks of places (Debarbieux, 2009) and to determine likely intergroup relationships, we base our hypotheses on three postulates:

1. The palethnographic truth of the studied artefacts: this is common to any archaeological study in which objects from the same level are considered to belong to a single set;
2. The temporal stability of the territories: since above all the territory is a social construct, its structure does not vary significantly as long as its governing cultural system persists; the absence of strict contemporaneity between sites is therefore not problematical as long as we study coherent cultural entities, in this case prehistoric techno-cultures;
3. The structural simplification of the network: that is to say that the recurrence and the crossing of the routes allow the inscription of two distinct places in a same network (fig. 1).

Based on the results from Station de l'Hermitage, and by adding to them data from other disciplines acquired for this site and for the sub-contemporary sites whose the litho-space has been already identified, we suggest in the rest of this work that it becomes possible to network the lithic resources (litho-space) of North-Western Europe at the beginning of the Gravettian, and to refine in consequence our understanding of one aspect of their territorial range.

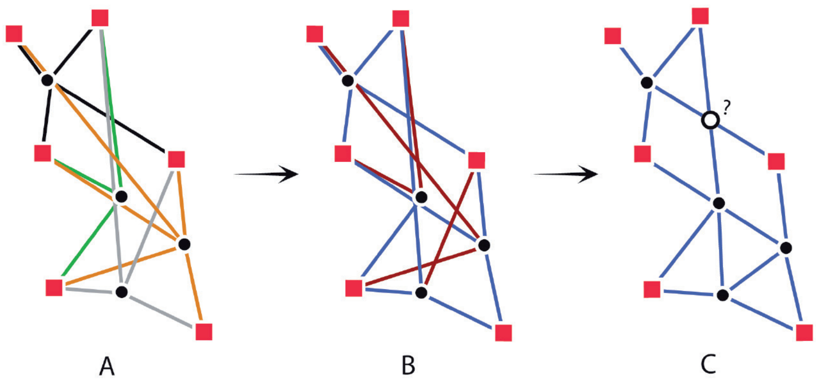

Fig. 1: Simplification of the network. A: Each site (round) has a set of lines connecting it to different lodgings; B: In blue, the links preserved in the definitive model, in red, the links removed according to the three postulates (contemporaneity, representativeness, simplification); C: Networking of places (deposits and sites).

3. Results

3.1. *Gitology*

Of the 9277 pieces analysed, 9152 present similar surface conditions and are attributed to the Gravettian (low to medium white patina, fresh edges and ridges, action of frost). Objects attributable to the Mousterian show a significant degree of weathering (total white patina, blunt edges and ridges, surface traces of transportation), whereas those deemed Neolithic have a fresher aspect (absence of patina and traces linked to frost action). The data by number and weight for each silicite type are summarized in table 2 and the microfaciological data, genetic type by genetic type, are synthetised in the table 3.

Local silicites (<10km radius from the site) largely dominate the assemblage (74.1% of the total number and 67.6% of the total weight). These seem to have been collected in all types of deposits. This illustrates the use of all the Mehaigne valley from the alterites and colluviums of Braives (type 01, Fig. 2.1) to the Jurassic lands of the Ardennes, located immediately south of the site, as shown by types 03 and 05 (Fig 2.3). Among the variety of flint known as "Hesbaye flint" and in addition to types 01 and 02, we have recognized a small proportion of other marine flints (types 08, 10, 16, 17 and 21), corresponding to facies variations of the Campanian flints of the Gulpen Formation. These variations are based on the number, distribution and diversity of allochems—notably planktonic foraminifera (*Heterohelix, Globigerinidae, Lenticulina*), the ratio of detrital to biogenic fractions, and the spicule fragmentation rate. These five types indicate that collections were made preferentially near the primary deposits (in subprimary, alteritic or colluvial positions).

The presence of semi-local flints (collected within 10 and 100km radius from the site), whose proportion is less than 5.0% of the total number and 7.0% of the total weight, testifies to visits made to the rest of the Hesbaye, like the Gette valley (type 02, Fig. 2.2) and in particular to the clay and colluvium soils containing flints that cover its flanks at Orp. It is the same for most of the Maastrichtian flints (types 12, 18 and 24), which probably come from the north-east of the Liège Basin on the border between Hesbaye and Campine. Supply in the central part of the country (Brabant) is attested by the Eocene sandstone (type 09, Fig. 2.6) whose natural lithoclase[4] and fractures shows no sign of transport, as well as by rare phtanites (type 11, Fig. 2.7) probably coming from the Dyle and Thyle valleys (40km of the site).

Distant silicites (> 100km radius from the site) come from two distinct geographical spaces. They were preferentially collected near their primary sources, with the exception of the Maastrichtian flint of the Mons Basin which was collected in equal parts in both colluvium and alluvium formations. The first space corresponds to the north of the Mons Basin (8.6% of the total number and 14.0% of the total weight), as illustrated by the different types of Maastrichtian flints of the Ciply-Malogne formation (types 06, 25.1 and 29, Fig. 2.4), the Saint-Denis Turonian formation (type 27, Fig. 3.8) and the Campanian of the Obourg-Nouvelle formation (type 13, Fig. 3.1). The second space, to the south, has remained undocumented within Belgian Palaeolithic assemblages: the Paris Basin (4.9% of the total number and 2.1% of the total weight), and more particularly its centre and eastern fringes, as shown respectively by the Bartonian lacustrine flints of the Aisne and Oise valleys (type 20 board 3.5), and by the Middle Oxfordian marine flints with incertae sedis from the Meuse valley (type 15 and probably type 07, Fig. 2.5 and 3.2).

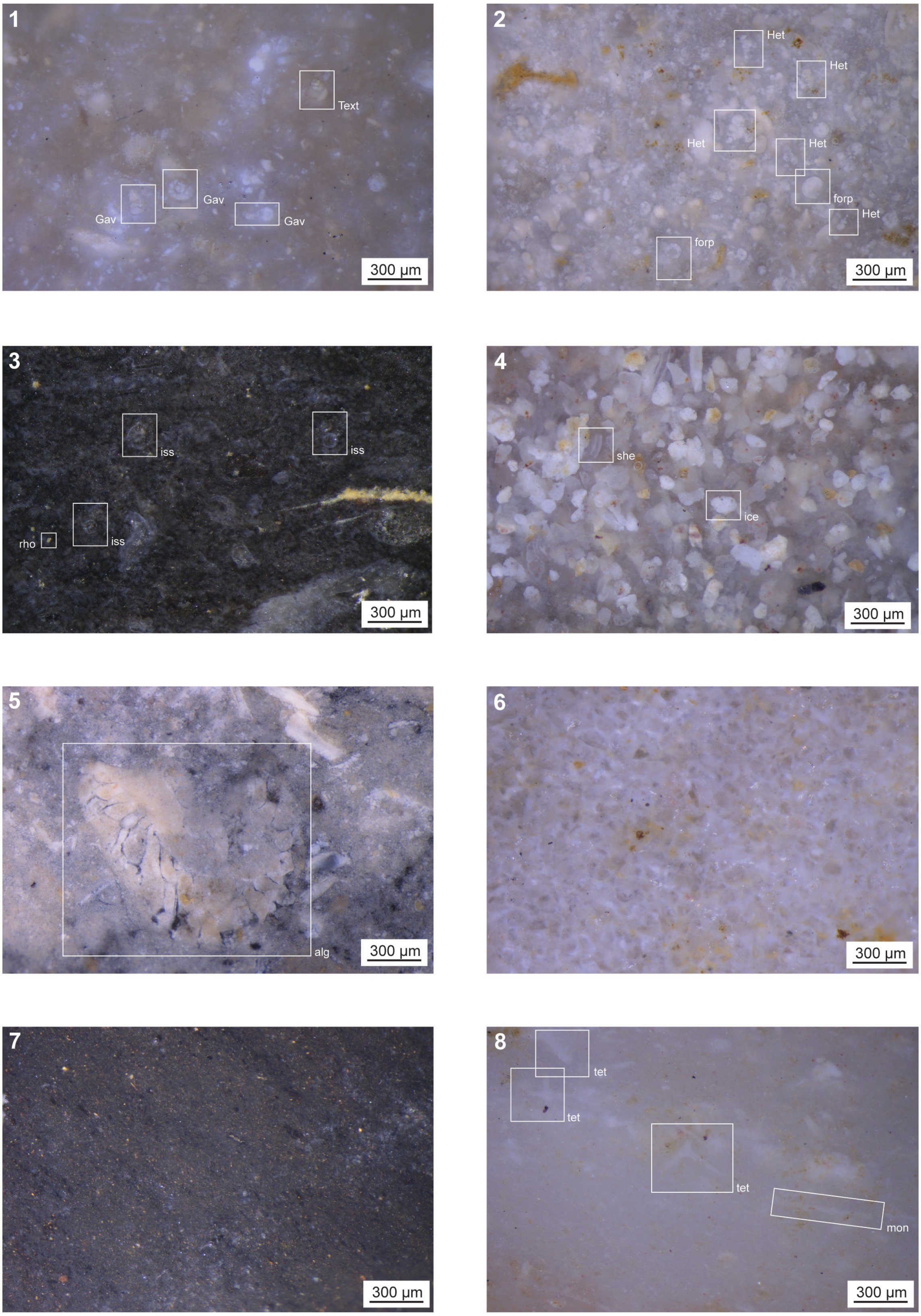

Fig. 2: *Station de l'Hermitage* – Microfacies of silicites: 1. Type 01 – Campanian (Gulpen Formation), Méhaigne Valley, Gav: *Gavelinela*, Text: *Textularia*; 2. Type 02 – Campanian (Gulpen Formation), Jette Valley, Het: *Heterohelix*; forp : indeterminate plancktonic foraminifera; 3. Type 05 – Dinantian (Lives Formation), Méhaigne Valley, iss: indeterminate subcircular shapes, rho: rhomboedric boxworks; 4. Type 06 – Maastrichtian (Ciply – Malogne Formation), north of the Mons Basin, she: shell fragment; ice: initially carbonate element; 5. Type 07 – middle Oxfordian?, Lorraine (Fr.)?, alg: algae; 6. Type 09 – Eocene, Brabant Wallon; 7. Type 11 – Cambrian (Mousty Formation), Dyle and Thyle Valley; 8. Type 12 – Maastrichtian, North-East of the Hesbaye, tet: tetraxone spicule, mon: monaxone spicule.

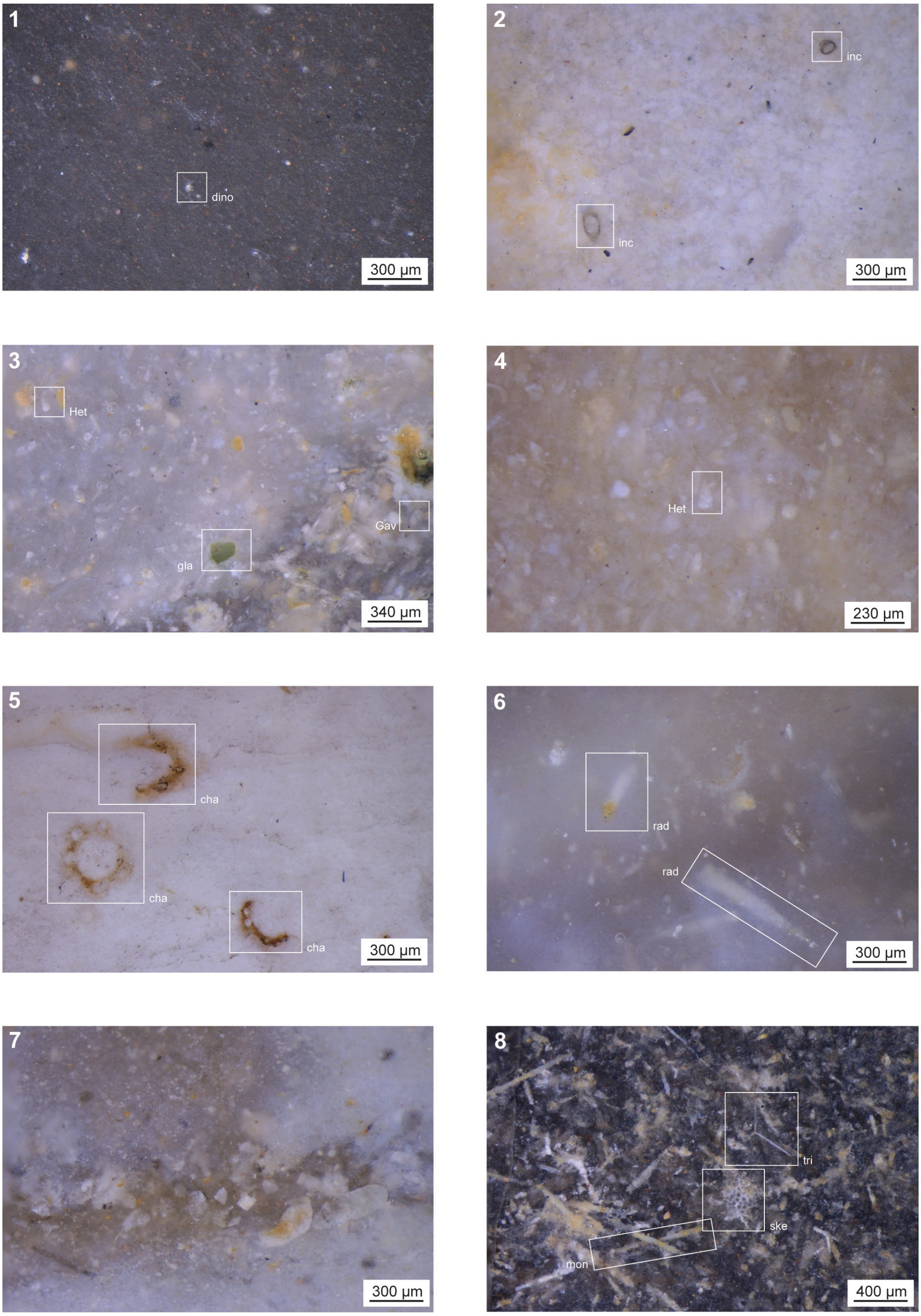

Fig. 3: *Station de l'Hermitage* – Microfacies of silicites: 1. Type 13 – Campanian (Obourg – Nouvelles Formation), North of the Mons Basin, dino: dinoflagelate; 2. Type 15 – Middle Oxfordian, Meuse Valley (Fr.), inc: *incertae sedis*; 3. Type 17 – Campanian (Gulpen Formation)?, Hesbaye, Het: *Heterohelix*; Gav: *Gavelinella*, gla: glauconie; 4. Type 18 – Maastrichtian, North of the Hesbaye, Het: *Heterohelix*; 5. Type 20 – Bartonian, Tardenois (Fr.), cha: stem of characeae; 6. Type 23 – Maastrichtian, unknown origin; 7. Type 25.2 – Maastrichtian, unknown origin, rad: radiole of echinoid; 8. Type 27 – Turonian (Saint Denis Formation), North of the Mons Basin, tri: triaxones spicule, mon: monaxone spicule, ske: sponge skeleton.

Type (Δ = 27)	Primary stratigraphic origin	Primary geographic origin	Origin	SubP	Alt./col.	All.	Anc. All.	Ind.	Number	% Number	Weight	% weight
Type 01	Campanian (Gulpen)	Mehaigne Valley	Local	X	X	X	X		6743	73,7	13486,2	67,4
Type 02	Campanian (Gulpen)	Gette Valley	Semi-Local	X	X	X			219	2,3	1118,2	5,8
Type 03	Dinantian s.l.	unknown	Local ?		?		X		7	> 0,1	10	> 0,1
Type 05	Dinantian (Lives)	Mehaigne Valley	Local			X			2	> 0,1	1,3	> 0,1
Type 06	Danian (Ciply)	North of the Mons Basin	Distant		X	X			702	7,7	2381,51	11,9
Type 07	Middle Oxfordian ?	Lorraine s.l. (Fr.) ?	Distant		X				357	3,9	336,4	1,7
Type 08	Campanian (Gulpen) ?	Hesbaye s.l.	Semi-Local ?		?	?		X	2	> 0,1	0,2	> 0,1
Type 09	Eocene	Brabant ?	Semi-Local ?		X	X			205	2,2	259,9	1,3
Type 10	Campanian (Gulpen) ?	Hesbaye s.l.	Semi-Local ?		X				3	> 0,1	4,2	> 0,1
Type 11	Cambrian (Mousty)	Dyle and Thyle Valley	Semi-Local ?					X	4	> 0,1	3	> 0,1
Type 12	Maastrichtian ?	North-east of the Hesbaye ?	Semi-Local ?	?	?			X	4	> 0,1	7,4	> 0,1
Type 13	Campanian (Obourg-Nouvelles)	North of the Mons Basin	Distant		X				79	0,9	267,5	1,3
Type 15	Middle Oxfordian ?	Meuse Valley (Meuse, Fr.)	Distant		X				89	1	32,3	0,2
Type 16	Campanian (Gulpen)	Hesbaye s.l.	Local ?	?	?			X	1	> 0,1	0,3	> 0,1
Type 17	Campanian (Gulpen) ?	Hesbaye s.l.	Local ?		X				4	> 0,1	16	> 0,1
Type 18	Maastrichtian	North of the Hesbaye	Semi-Local ?		X				2	> 0,1	19,2	> 0,1
Type 19	Maastrichtian	unknown	Unknown		?			X	2	> 0,1	55,4	0,3
Type 20	Bartonian	Tardenois (Aisne and Marne, Fr.)	Distant		?			X	8	> 0,1	29,7	0,1
Type 21	Campanian (Gulpen) ?	Hesbaye s.l.	Local ?		?			X	2	> 0,1	7,9	> 0,1
Type 23	Maastrichtian	unknown	Unknown		X				5	> 0,1	94,8	0,5
Type 24	Maastrichtian	North of the Hesbaye	Semi-Local ?					X	2	> 0,1	20,4	0,1
Type 25.1	Danian (Ciply) ?	North of the Mons Basin	Distant		?	?		X	7	> 0,1	38,6	0,2
Type 25.2	Maastrichtian	unknown	Unknown		?	?		X	5	> 0,1	32,2	0,2
Type 27	Turonian (Saint-Denis)	North of the Mons Basin	Distant		?			X	1	> 0,1	113,8	0,6
Type 28	unknown	unknown	Unknown					X	2	> 0,1	7,7	> 0,1
Type 29	Danian (Ciply)	North of the Mons Basin	Distant	?	?			X	1	> 0,1	11,6	> 0,1
Type 30	unknown	unknown	Unknown					X	1	> 0,1	0,2	> 0,1
Indeterminate	not specified	not specified	not specified						656	7,1	1058,4	5,3
Autres Roches												
Sandstone	not specified	not specified	not specified			X			15	0,2	176,5	0,9
Quartz	not specified	not specified	not specified			X			7	> 0,1	339	1,7
Schist	not specified	not specified	not specified					X	5	> 0,1	3,8	> 0,1
Sponge	not specified	not specified	not specified		X				10	0,1	42,2	0,2
Total									**9152**	**100**	**20006,11**	**100**

Table 2: *Station de l'Hermitage* – Weight, number and sources of the different types of silicite.

Type	Type 11 (Fig. 2.7)	Type 05 (Fig. 2.3)	Type 03	Type 07 (Fig. 2.5)	Type 15 (Fig. 3.2)	Type 27 (Fig. 3.8)	Type 01 (Fig. 2.1)	Type 02 (Fig 2.2)	Type 08
Locality	Dyle and Thyle Valley	Mehaigne Valley	Unknown	Lorraine s.l. (Fr.)	Meuse Valley (Meuse, Fr)	Northe of the Mons Basin	Mehaigne Valley	Gette Valley	Hesbaye s.l.
Primary stratigraphic origin	Cambrian (Mousty)	Dinantian (Lives)	Dinantian s.l.	Middle Oxfordian ?	Middle Oxfordian	Turonian (Saint-Denis)	Campanian (Gulpen)	Campanian (Gulpen)	Campanian (Gulpen) ?
Type of silicite	phtanite	marine chert	marine chert	marine flint	marine flint	marine flint	marine flint	marine flint	marine flint
host rock	schiste	biocalcimicrite	biocalcisparite	biocalcimicrite	biocalcimicrite ?	biocalcimicrite	biocalcimicrite	biocalcimicrite	biocalcimicrite
Shape	pluricentimetric bench fragment	pluricentimetric bench fragment	pluricentimetric bench fragment ?	pluricentimetric to decimetric nodules	pluricentimetric to decimetric nodules	pluricentimetric to decimetric nodules	decimetric to pluridecimetric regular nodules	decimetric to pluridecimetric regular nodules	pluricentimetric to decimetric nodules ?
Primary Color	black	black	black	black	grey to white	black	grey to black	black	grey
Acquired color	/	/	/	/	/	/	brown	brown	blond
structure of the silicite	homogeneous to pseudobrechic	homogeneous	homogeneous	heterogeneous with slum and stylolithes	homogeneous to bioturbate	homogeneous to bioturbate	homogeneous and bioturbate	homogeneous and bioturbate	homogeneous
allochems % (detrital % ; chemical % ; biogenic %)	< 5 % (100% ; 0% ; 0%)	15% (ind% ; ind% ; ind %)	≈ 30 % (70 ; 0% ; 30 %)	< 5 % (50 % ; 0% ; 50%)	< 10% (80 % ; 0% ; 20 %)	≈ 30% (25% ; 5% ; 70%)	< 20 % (50% ; 0% ; 50 %)	≈ 30 % (25% ; 0% ; 75 %)	< 15 % (50% ; 0% ; 50 %)
Sorting of the clasts	indeterminate	indeterminate	moderate	indeterminate	indeterminate	moderate	good	good	good
distribution of the clasts	indeterminate	homogeneous	homogeneous	heterogeneous	homogeneous	homogeneous	heterogeneous	homogeneous and bioturbate	homogeneous
Average size of the detrital clasts	< 50 microns	50 to 150 microns	100 to 300 microns	< 50 microns	50 microns to 1 mm	100 microns to 1 mm	50 to 150 microns	100 to 200 microns	≈ 100 microns
Average shape of the clasts (cf. Krumbein and Sloss 1963)	indeterminate	indeterminate	sph. 0,5-0,7 ; arr. 0,5-0,7	indeterminate	variable	sph. 0,9 / arr. 0,3	sph. 0,5-0,9 / arr. 0,9	sph. 0,7-0,9 / arr. 0,9	sph. 0,5-0,7 ; arr. 0,7-0,9
detrital clasts	indeterminate (-)	rhomboedric boxworks (o)	initialy carbonate particules (+)	initialy carbonate. particules (o)	initialy carbonate particules (+++) detrital quartz (---)	initialy carbonate particules (+) indetermintate black mineral (o)	initialy carbonate particules (+++) detrital quartz (---)	initialy carbonate particules (+) glauconite (---)	initialy carbonate particules (+) detrital quartz (-)
chemical clasts	/	/	/	/	/	peloïds (≈ 100 microns) (-)	/	/	/
Algae	/	/	/	(+)	/	/	/	/	/
Macrofauna	/	/	/	rounded shapes (shell ?) (o)	/	roughly fragmented radiole of echinoids (---)	fragmented radiole of echinoids (-)	fragmented radiole of echinoids (-) / bivalve shell fragments (o)	/
Ostracods	/	/	/	/	/	/	/	/	/
Sponges	/	/	fragmented monaxone spicules of demosponges (o)	fragmented monaxone spicules (o)	/	rarely fragmented monaxones and triaxones spicules of Demosponge (+++) fine perforate sponge skeleton (-)	fragmented monaxones and triaxones spicules of Hexactinnelides (++)	rarely fragmented monaxones and triaxones spicules of Hexactinnelides (+)	fragmented monaxones and triaxones spicules of Hexactinnelides (+)
Bryozoans	/	/	/	/	/	/	/	/	/
Foraminiferas	/	/	/	/	indeterminate little rotalidea (-)	/	*Gavelinella* (++) ; *Heterohelix* (var.) ; *Textularia* (var.); *Praeglobigerinoides* (+)	*Heterohelix* (++) ; *Gavelinella* (o) ; *Globorotalia* (o) ; *Textularia* (o) ; undeterminate benthic *rotalidea* (-)	*Gavelinella* (-) ; *Heterohelix* (+)
Vegetals	/	/	/	/	/	/	/	/	/
Other	/	indeterminate subcircular shapes	/	incertae sedis (o)	incertae sedis (+) / indeterminate bloack fragments (+)	/	/	/	dinoflagelate (o)

Type	Type 10	Type 16	Type 17 (Fig. 3.3)	Type 21	Type 13 (Fig. 3.1)	Type 12 (Fig. 2.8)	Type 18 (Fig. 3.4)	Type 24	Type 19
Locality	Hesbaye s.l.	Hesbaye s.l.	Hesbaye s.l.	Hesbaye s.l.	North of the Mons Basin	North-east of the Mons Basin	Noth of the Hesbaye	North of the Hesbaye	unknown
Primary stratigraphic origin	Campanian (Gulpen) ?	Campanian (Gulpen)	Campanian (Gulpen) ?	Campanian (Gulpen) ?	Campanien (Obourg-Nouvelles)	Maastrichtian ?	Maastrichtian	Maastrichtian	Maastrichtian
Type of silicite	marine flint	marine flint	marine flint	marine flint	marine flint	marine flint	marine flint	marine flint	marine flint
host rock	biocalcimicrite	biocalcimicrite	biocalcimicrite	biocalcimicrite	biocalcimicrite	biocalcimicrite	biocalcimicrite	biocalcimicrite	biocalcimicrite
Shape	pluricentimetric to decimetric nodules ?	pluricentimetric to decimetric nodules ?	pluricentimetric to decimetric nodules ?	pluricentimetric to decimetric nodules ?	pluricentimetric to pluridecimetric nodules	indeterminate	decimetric to pluridecimetric nodules ?	decimetric to pluridecimetric nodules	decimetric to pluridecimetric nodules
Primary Color	grey to black	grey to black	grey	grey to black	black	grey	grey	grey	black
Acquired color	blond to brown	/	/	/	/	blond	/	/	/
structure of the silicite	heterogeneous	homogeneous	homogeneous to bioturbate	zonate to bioturbate	homogeneous	beded	bioturbate	bioturbate	homogeneous
allochems % (detrital % ; chemical % ; biogenic %)	20% (75% ; 0% ; 25 %)	≈ 30% (50% ; 0% ; 50%)	≈ 30% (75% ; 0% ; 25%)	30% (40% ; 0% ; 60%)	< 5% (75% ; 0% ; 25%)	0 % to 30 % (50% ; 0% ; 50%)	30% (50% ; 0% ; 50%)	≈ 20% (50% ; 0% ; 50%)	< 10% (75% ; 0% ; 25%)
Sorting of the clasts	good	very good	good	good	indeterminate	good	very good	good	very good
distribution of the clasts	homogeneous	homogeneous	homogeneous	heterogeneous	heterogeneous	heterogenous and orientate	heterogeneous	homogeneous	homogeneous
Average size of the detrital clasts	≈ 150 microns	< 150 microns	100 to 300 microns	50 microns to 1 mm	< 50 microns	100 to 300 microns	50 to 200 microns	100 à 200 microns	50 to 150 microns
Average shape of the clasts (cf. Krumbein and Sloss 1963)	sph. 0,7 ; arr. 0,5	sph. 0,7-0,9 / arr. 0,9	sph. 0,7 / arr. 0,3-0,7	sph. 0,7-0,9 / arr. 0,9	indeterminate	sph. 0,7-0,9 / arr. 0,7	sph. 0,5-0,9 / arr. 0,3-0,9	sph. 0,9 / arr. 0,7	sph. 0,7 / arr. 0,9-0,9
detrital clasts	initialy carbonate particules (+)	initialy carbonate particules (+++) detrital quartz (+)	initialy carbonate particules (+++) detrital quartz (o) glauconite (+) indetermintate black mineral (-)	initialy carbonate particules (++) detrital quartz (---)	initialy carbonate particules (o) indeterminate black mineral (o)	initialy carbonate particules (o) detrital quartz (+) indeterminate black mineral (-)	initialy carbonate particules (++) detrital quartz (---) glauconite (---)	initialy carbonate particules (+++) detrital quartz (o) indetermintate black mineral (-)	initialy carbonate particules (+++)
chemical clasts	/	/	/	/	/	/	/	/	/
Algae	/	/	/	/	/	/	/	/	/
Macrofauna	/	/	fragmented radiole of echinoids (o) shell fragments (whose gasteropoda) (o)	fragmented radiole of echinoids (+) shell fragments (-)	/	fragmented radiole of echinoids (-)	fragmented radiole and shell of echinoids (o) shell fragments (whose gasteropoda) (o)	fragmented radiole of echinoids (+) shell fragments (whose gasteropoda) (o)	fragmented radiole of echinoids (o) shell fragments (whose gasteropoda) (o)
Ostracods	/	/	/	/	/	/	/	/	/
Sponges	fragmented monaxone spicules (o) ; fine perforate sponge skeleton (-)	rarely fragmented monaxones and triaxones spicules of Hexactinnelides (+++)	fragmented monaxones and triaxones spicules of Hexactinnelides (+) ; fine perforate sponge skeleton (-)	fragmented monaxone spicules (o)	rarely fragmented monaxones and triaxones spicules of Hexactinnelides (-)	rarely fragmented monaxones and tetraxones spicules of Demosponge (+)	rarely fragmented monaxones and triaxones spicules of Hexactinnelides (+) ; fine perforate sponge skeleton (---)	fragmented monaxone spicules (+++)	fragmented monaxones of Demosponge (+) ; fine perforate sponge skeleton (-)
Bryozoans	/	/	/	/	/	/	/	/	/
Foraminiferas	triseriate (*Bulimina* ?) (o)	*Gavelinella* (o) ; *Heterohelix* (o) ; *Praeglobigerinoides* (o)	*Heterohelix* (+) Gavelinella (-)	*Gavelinella* (-) *Heterohelix* (o) *Praeglobigerineloides* (+) *Lenticulina* (o) *Bulimina* (-)	*Praeglobigerinoides* (-) ; *Heterohelix* (---)	/	*Gavelinella* (-) ; *Heterohelix* (++) ; *Praeglobigerinoides* (o)	*Lenticulina* (o) ; *Gavelinella* (-), *Lagena* (o), *Textularia* (o), *Praelobigerineloides* (o)	*Textularia* (-) ; *Bulimina* (-) indeterminate rotalidea (o)
Vegetals	/	/	/	/	/	/	/	/	/
Other	/	dinoflagelate (-)	/	/	dinoflagelate (--)	/	/	pythonelles (o)	worms tubes (-)

Table 3: *Station de l'Hermitage* – Microfacies synthetic table of the different genetic types.

Type	**Type 23 (Fig. 3.6)**	**Type 25.2 (Fig. 3.7)**	**Type 06 (Fig. 2.4)**	**Type 25.1**	**Type 29**
Locality	Unknown	Unknown	North of the Mons Basin	North of the Mons Basin	North of the Mons Basin
Primary stratigraphic origin	Maastrichtian	Maastrichtian	Danian (Ciply)	Danian (Ciply) ?	Danian (Ciply)
Type of silicite	marine flint	marine flint	marine chert	marine flint	marine chert
host rock	biocalcimicrite	biocalcimicrite	biocalcarenite	biocalcarénite	biocalcarénite
Shape	pluricentimetric to decimetric nodules ?	pluricentimetric to decimetric nodules ?	decmetric to pluridecimetric nodules	pluricentimetric to decimetric nodules ?	decimetric to pluridecimetric nodules ?
Primary Color	grey	grey to brown	grey	grey	grey
Acquired color	blond to brown	brown	blond to brown	/	/
structure of the silicite	zonate	zonate	homogeneous	bedded to zonate	bioturbate
allochems % (detrital % ; chemical % ; biogenic %)	< 10% (25% ; 0% ; 75%)	0% to 30% (75% ; 0% ; 25%)	≈ 40 % (75 % ; 0% ; 25%)	0% to 30% (75% ; 0% ; 25%)	≈ 30% (100% ; 0% ; 7%)
Sorting of the clasts	very good	good to bad	very good	very good	very good
distribution of the clasts	homogeneous	variable	homogeneous	variable	homogeneous
Average size of the detrital clasts	50 à 300 microns	50 to 500 microns	150 to 200 microns	100 to 200 microns	100 to 200 microns
Average shape of the clasts (cf. Krumbein and Sloss 1963)	sph. 0,7 / arr. 0,7	sph. 0,5-0,7 / arr. 0,1-0,9	sph. 0,5-0,7 ; arr. 0,3-0,7	sph. 0,7 / arr. 0,5	sph. 0,5-0,7 / arr. 0,5-0,7
detrital clasts	/	initialy carbonate particules (+++) detrital quartz (+)	initialy carbonate particules (+++) detrital quartz (o) glauconite (---) indeterminate black minerals (o)	initialy carbonate particules (+++) detrital quartz (+)	initialy carbonate particules (+++) detrital quartz (+)
chemical clasts	/	/	/	/	/
Algae	/	/	/	/	/
Macrofauna	fragmented radiole of echinoids (++) shell fragments (whose gasteropoda) (o)	fragmented radiole of echinoids (o) shell fragments (whose bivalve) (+)	bivalve shell fragments (o)	shell fragments (whose bivalve) (-)	/
Ostracods	/	/	/	/	/
Sponges	roughly fragmented monaxone spicules (o)	fragmented monaxone spicules (+) fine perforate sponge skeleton (-)	fragmented monaxone spicules (o)	fragmented monaxone spicules (+)	/
Bryozoans	/	/	/	/	/
Foraminiferas	*Lenticulina* (-) Lagena (---)	Biseriate (cf. Ramondi ?) (---)	*Textularia* (---)	/	/
Vegetals	/	/	/	/	/

Finally, indeterminate materials (highly weathered or too small) represent 7.0% of the total number and 5.0% of the total weight of the lithic assemblage; and types of unknown origin (that is to say the silicites which form very distinct types but whose origins remain unknown for lack of reference samples) represent only 0.5% of the total number and 1.0% of the total weight of the assemblage. The five unknown types have microfaciological characteristics evocative of Maastrichtian marine flints. In this respect, further field examinations or better descriptions of the flints contained in these geological deposits, whether in the northern part of the Liège Basin and Limburg, eastern Germany or the northern part of the Paris Basin, would perhaps allow us to determine more precise origins for these.

If previous studies (Miller, 1997; 2000; 2001; Touzé, 2015) had identified the local dominant geo-resources exploited at the Hermitage—including the so-called "black or grey" Hesbaye flint and Brussels sandstone—, the diversity identified (Δ = 27) in this work was unexpected. Similarly, the presence of silicites coming from distant spaces, notably the Paris Basin, had been suspected based on the possible presence of the so-called "Obourg black flint" (Miller, 2000; Touzé, 2015), but never really demonstrated. Regarding this specific flint type, it is finally important to stress that most of the black flints exploited at Station de l'Hermitage are actually Oxfordian flints collected in the Meuse valley.

3.2. *Techno-economic approach*

3.2.1. Mode of introduction

The linking of techno-typological and lithological observations—the techno-economy—elucidates the management of the geo-resources of a particular site (Geneste, 1985). The methods of introduction and export for Station de l'Hermitage are detailed for each type of raw material in table 4.

Local types, mainly represented by type 01, were brought to the site in different forms: as whole blocks demonstrated by the presence of numerous cortical flakes; and also in the form of blade and bladelet cores. Types 03, 05 and 16 are represented by very few debris or *débitage* flakes. Type 21 demonstrates the introduction of already knapped blanks, while cores for this type may have been amongst the lost objects (Destexhe-Jamotte excavation). We also determined that a substantial number of type 01 tools were carried away from the site, or at least are absent in the studied assemblage. These include burins, shown by the under-representation of these tools compared to the number of burin spalls examined. A similar situation exists for cores, since there is a lack of these objects by comparison with the number of débitage products and by-products. Conversely, although we identified a core for the flint type 17, we could not identify any flaked material corresponding to it, indicating the possible departure or loss of these elements.

By comparison with local silicites, a smaller proportion of regional raw materials were introduced to the site as blade and/or bladelet cores and previously knapped laminar products. This is particularly noticeable for the Campanian flint of the Gette valley, for the Brussels sandstone and, apparently, for the phtanite of the Mousty formation. In addition, similarly to the local flints, it appears that several elements were possibly exported from the excavated area or from the site including cores, tools, and blanks.

Perhaps more surprisingly, the distant silicites coming from the Mons Basin and the Paris Basin were introduced in the form of bladelet cores, or rarely as blade cores, in the same manner as were local and regional raw materials. These raw materials entered the site in the form of already knapped blades and tools, notably burins. Again, in regard to the number of elements produced, some of the cores and tools, including burins, made from these distantly sourced materials were possibly taken away from the site, or at least from the excavated area.

The techno-economic study suggests that the supply of lithic raw materials by the human group(s) that settled at Station de l'Hermitage took place throughout the Hesbaye, as well as in more western and southern areas; respectively the northern part of the Mons Basin[5] and the Paris Basin. However, management of geo-resources does not seem to be strictly related with supply distance, either in terms of quantity or weight (local silicites > distant silicites > semi-local silicites > silicites of unknown origin), or in terms of the mode of introduction and treatment modalities.

3.2.2. Lithic technology

The lithic technical system identified at Station de l'Hermitage is mostly based on the analysis of the type 01 Campanian marine flint because it forms a high proportion of the assemblage (73.7%), and also because it is the only raw material that shows an entire *in situ* reduction sequence that reflects all the different production goals (fig. 4).

Type	Block	Core	Raw products	Tools	Indet.	Export
Type 01	X	Blades and bladelets				Tools (and cores ?)
Type 02	X	Blades and bladelets				Tools (and cores ?)
Type 03					X	
Type 05					X	
Type 06	?	Blades and bladelets				Tools (and cores ?)
Type 07		Blades and bladelets				Tools (and cores ?)
Type 08					X	
Type 09		Blades and bladelets				
Type 10					X	
Type 11		Bladelets ?		Armatures ?		
Type 12					X	
Type 13		Blades and bladelets	?	*Burin*		Cores
Type 15		Bladelets	Blades			Tools (and cores ?)
Type 16					X	
Type 17		Indeterminate				Raw products
Type 18					X	
Type 19				Retouched Blades		
Type 20			Blades			Burins
Type 21			Blades			
Type 23		Blades ?	Blades	*Burin*		
Type 24			Blades			
Type 25.1		Blades ?	Blades ?	*Burin*		Blades cores
Type 25.2			Blades and Bladelets	burin and armatures		
Type 27		Blades ?	Flakes			Blades cores
Type 28				*Burin*		
Type 29					X	
Type 30					X	
Sandstone	X					
Quartz	X					
Schist	?					

Table 4: *Station de l'Hermitage* – Introduction mode of the different types of silicites.

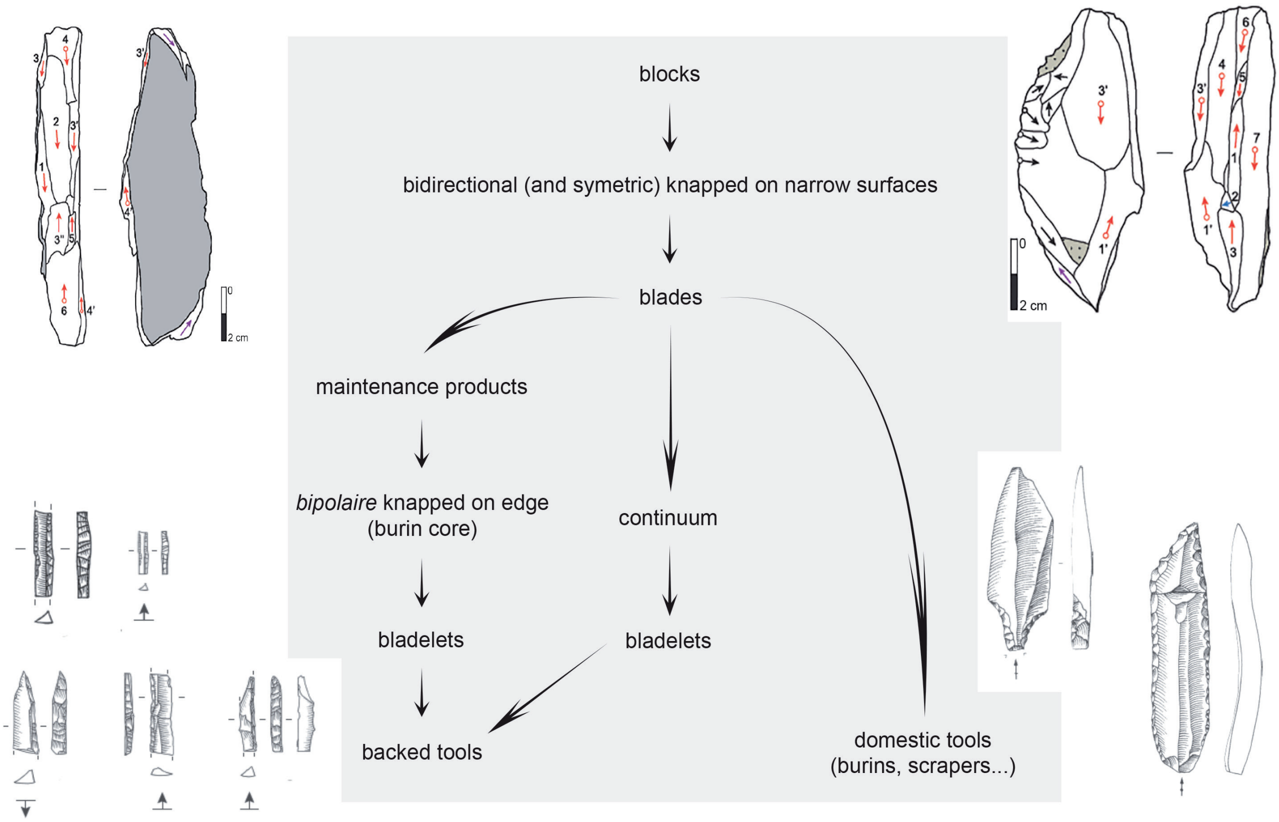

Fig. 4: *Station de l'Hermitage* – synthetic view of the *schéma opératoire*.
Drawings: M. Otte (tanged piece and pointed blade) and O. Touzé (all other drawings).

The knapping surface is created on a narrow face of the block and its exploitation follows a symmetrical progression. Blanks are extracted using soft-stone percussion on two opposed and smooth striking platforms, after a careful abrasion of the overhang. The resulting blades are either transformed into "domestic" tools (burins, end-scrapers, retouched blades) or left unretouched. At the end of blade production, the gradual decrease of the core's volume leads to the production of small blades and bladelets, the latter of which are used for the preparation of microgravettes. In parallel with this blade/bladelet continuum, bladelets are also obtained on the edge of by-products of blade production following an autonomous *schéma opératoire*.

This lithic technical system and its goals in terms of blank and tool production are in accordance with what is documented for the recent phase of the Early Gravettian (Touzé *et al.*, this volume). Other sites in Western Europe display similar features and are also characterized by the association, from a typological perspective, of numerous microgravettes and burins, and rare tanged elements. This is the case particularly in southwestern Germany at Hohle Fels and Geissenklösterle (Conard and Moreau, 2004; Moreau, 2009; 2010); in the Paris Basin notably at Ormesson-Les Bossats (Lacarrière *et al.*, 2015; Touzé *et al.*, this volume) and Flagy-Belle Fontaine (Klaric, 2013), and in the eastern fringe of the French Massif Central, at La Vigne Brun (Pesesse, 2013), le Sire (Surmely *et al.*, 2011) and Azé-Camping de Rizerolles[6] (Floss and Taller, 2011). Closer to Station de l'Hermitage, Early Gravettian components may also be present at the Belgian sites of Trou Magrite in Walzin, Goyet in Mozet and Bètche-aux-Roches in Spy (Pesesse and Flas, 2013; Touzé, 2019), but the archaeological deposits of these sites are so disturbed that interpretations remain difficult.

4. Discussion: Station de l'Hermitage in the Early Gravettian world of North-West Europe

In addition to the exploitation of mineral resources coming from every part of the Hesbaye region as illustrated by the genetic and geological diversity of types brought to the site in various forms, we note the occurrence of materials coming from two other distinct areas. It is necessary to question the reasons for their presence in the site.

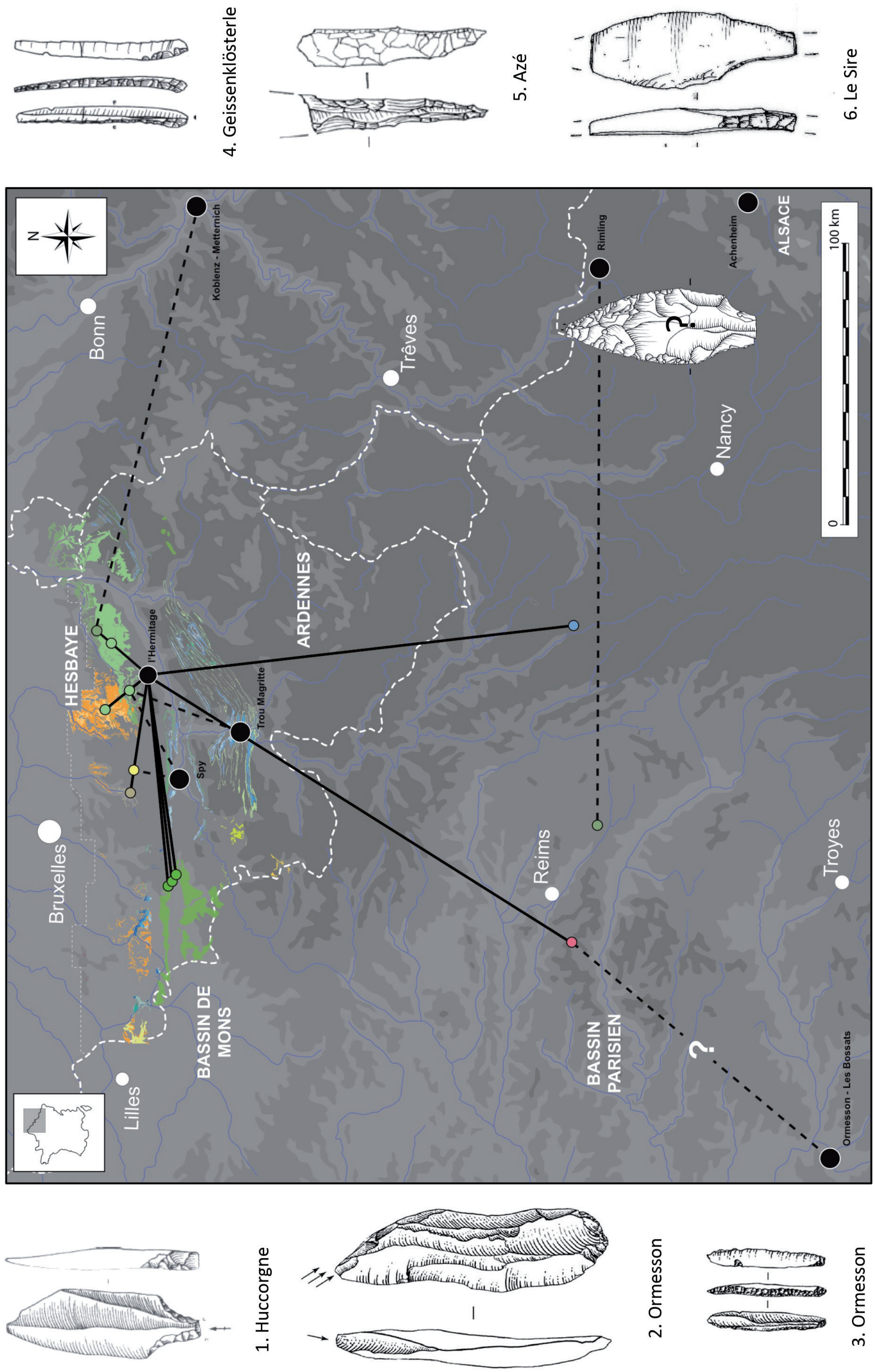

Fig. 5: *Station de l'Hermitage* – Litho-space: The black dots represent the archaeological sites, the color dots represent the deposits of raw materials. The black lines illustrate the proven relationships between places shown in this work, the white dashed lines illustrate the relationships between places according to the literature (after Miller, 2001; Moreau *et al.*, 2016; Touzé *et al.*, 2016a). Drawings: 1. M. Otte; 2-3. Lacarrière *et al.*, 2015; 4. Moreau, 2010; 5. Digan *et al.*, 2008; 6. Surmely *et al.*, 2011; Rimling point, Touzé *et al.*, 2016.

Station de l'Hermitage is interpreted as an occupation site linked to hunting activities carried out in habitats located in the middle valley of the Meuse (Straus *et al.*, 2000).[7] However, the introduction of materials coming from other geographical spaces (Mons Basin and Paris Basin) could correspond to: 1) meetings between individuals coming from two distinct areas, as suggested by the similarity of the modes of introduction of raw materials, the presence of complete tool-kit and the objectives of the *débitage* whatever the origin of the materials. Each group arrives with its lithic perceptions and gears and obtains its supplies mainly near the site—such behaviour is known from the Early Gravettian of La Vigne Brun (Loire, France) (Pesesse, 2013) or; 2) groups use the site at different times as we have observed for the Recent Gravettian levels of Le Blot rock-shelter (Haute-Loire, France) (Delvigne *et al.*, 2020) or Epipalaeolithic levels of Le Cuze de Neussargue (Cantal, France) (Langlais *et al.*, 2018) where supply areas vary over time. Given the truncated view that we have of the site (loss of collections, partial excavation of the deposit, history of the site), the representativeness of the sampling can be drawn into question and makes it especially difficult favouring one hypothesis over the other.

If the connection between Station de l'Hermitage and the other possible Early Gravettian sites of the Meuse catchment area (Trou Magrite at Walzin, Bètche-aux-Roches at Spy) seems plausible (at the condition there really is Early Gravettian in this two sites), as shown by the presence of the so-called "gray and black" flint of the Hesbaye in these assemblages (Miller, 2001) and the southern origin of some flints at Station de l'Hermitage, it is also necessary to consider the Hesbaye/Mons Basin relationship. The only site dated to the beginning of the Gravettian period in the Mons Basin is Maisières-Canal, which displays a very particular lithic facies named the "Maisierian" (Campbell, 1980) and has some of the oldest dates for the Gravettian of Western Europe (around 28 ka BP, Haesaerts and Heinzelin, 1979; Touzé *et al.*, 2016b). It should also be remembered that the Gravettian assemblage of the Bètche-aux-Roches in Spy in the Sambre valley, contains typical elements of the Maisierian (Pesesse and Flas, 2013) and that it is located halfway between the Mons Basin and the Mehaigne valley. Thus, should we consider that sites related to the second part of the Early Gravettian are currently missing in the Mons Basin, or that the raw materials coming from this region reflect an ancient occupation of Station de l'Hermitage—dated to the Maisierian—not localized (or excavated) and whose lithic indices are therefore absent?[8] In view of both the stratigraphic (Haesaerts, 2000) and technological (Touzé *et al.*, 2016b) data, the second hypothesis seems less probable than the first one.

Concerning the Paris Basin, there is a complex of Early Gravettian sites in the Loing Valley, including the recently excavated site of Ormesson-Les Bossats (Seine-et-Marne, France) which provides dates close to those obtained at Station de l'Hermitage (Lacarrière *et al.*, 2015), and displays technical and lithological convergences (exploitation of lacustrine flint from the Paris Basin, the origin of which remains to be specified). Coupled with the origin of the raw materials found at Station de l'Hermitage, these observations make it possible to hypothesize a community of ideas, connected by physical elements, in a geographical space linking the Belgian plains, the Ardennes massif and the Paris Basin. Although probably older and closer to the Maisières-Canal industry, the tanged points discovered at Rimling (Moselle, France; Touzé *et al.*, 2016a) and Melun-Montaigu (Seine-et-Marne, France; Chaussé *et al.*, 2015) as well as at the Cirque de la Patrie (Schmider, 1971; de Heinzelin, 1973; Otte, 1979) support the reality of strong links crossing North-Western Europe at the dawn of the Gravettian period (fig. 5).

Thus, the study of raw material origins at Station de l'Hermitage in Huccorgne opens important palaeogeographic perspectives. However, in order to proceed further, precise petrographic analyses for other sites of the Early Gravettian of North-Western Europe must be considered too. For example, the sites of western Germany (*e.g.* Geissenklösterle, Brillenhöle) for which, at least in Rhineland-Palatinate, a circulation of lithic raw materials from the Cretaceous formations of Belgium is suspected but is not yet proven (Moreau *et al.*, 2016).

5. Conclusion

Hinted at by elements of shell adornments at Spy, Goyet and Maisières (Otte, 1979, Moreau, 2003; Lacarrière et al., this volume; Peschaux, this volume) and by similarities between the lithic industries (Touzé *et al.*, 2016a; Touzé, 2019), the existence of links between the Paris Basin and eastern Belgium is now demonstrated by the distribution of lithic raw materials. We may consider the valley of the Meuse as a major circulation axis that allowed the crossing of the Ardennes massif. By restoring the true geographical value of Station de l'Hermitage and viewing it in relation to other sub-contemporary sites of North-Western Europe, and by including the sources of exploited raw materials, it is possible to hypothesize the existence of a vast network of places during the Early Gravettian, linking Belgium and the Paris Basin into one territorial unit (in the geographical sense of the term). However, the economic and social mechanisms within that unit remain to be determined through the development of interdisciplinary approaches.

Acknowledgments

This work was done as part of a scholarship from the Fyssen Foundation (VD) and a PhD F.R.S-F.N.R.S. dissertation (OT), both under the direction of P. Noiret. We thank all the members of the Prehistory Department of the University of Liège and of the TraceoLab, represented by its director V. Rots, for access to the observation equipment. We also express our gratitude to C. Jungels and the staff of the Prehistomuseum, as well as to I. Jadin, M. De Ceukelaire, M. Otte and J.-L. Schütz for access to the archaeological and geological collections studied. A special thanks to J.-Ph. Collin and L. Moreau for their advice and for having followed this work with interest. Finally, many thanks to P. Bindon for his English translation and his advices, always wise and relevant.

Endnotes

1. The lithic assemblage lacks most part of the 16,000 objects collected during the excavations of J. Destexhe-Jamotte. The interpretation made here is therefore necessarily partial since the absence of these elements may alter significantly our hypotheses.
2. The term "silicite", recently introduced by Professor A. Prichystal (2010) in Eastern and Central Europe, refers to all silicified rocks of chemical, biochemical or diagenetic origin. It avoids the term "flint", whose meaning is controversial and contributes to misunderstandings among geologists, petrographers, sedimentologists and archaeologists. In the rest of this work, we will use the term "silicite" to designate all the siliceous sedimentary rocks, the term "flint *sensu stricto*" to designate the rocks constituted by siliceous epigenesis and bearing a cortex, and the term "flint" in the archaeological sense to designate lithic objects knapped by humans.
3. Considering a given archaeological level for which the mechanisms dictating the establishment of deposits is well known, we call litho-space, the geographical space defined by the maximum extent sketched by the origin of the raw materials found in this level.
4. *Any breakage of rock with or without relative displacement of the parts.*
5. With the exception of one Campanian flint fragment from the Spiennes formation in the upper level attributed to the Middle Neolithic, we could not identify any silicites from the southern part of the Mons Basin.
6. However, we note that these industries differ in some details, such as the presence of *pointes à dos alternes* and *fléchettes* at La Vigne Brun.
7. However, Early Gravettian occupations are only occasionally documented in Belgian caves whose long archaeological sequences present important mixtures of several cultures (*e.g.* Bètche-aux-Roches at Spy: see Pesesse and Flas, 2013).
8. Remember that we discard the two dates around 28 ka BP (28,170 +/- 430 BP and 28,390 +/- 430 BP) obtained at *Station de l'Hermitage* because they come from a level corresponding to a debris flow (Jacobi *et al.*, 2010) and are not in agreement with the stratigraphy of the deposit (P. Haesaerts, com. pers.)

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