The Middle Paleolithic of the Côte Chalonnaise: Chronology, Technology and Palethnological Elements

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ABSTRACT

This article examines the technological and general appearance of Middle Paleolithic assemblages from a number of sites in the Côte Chalonnaise, Burgundy, France. Emanating from several assemblage characteristics observed within the stratified material from Grotte de la Verpillière II, ongoing research could demonstrate congruent technological patterns in the assemblages of a number of surrounding sites. Major common features are the presence of *Keilmesser*, with and without tranchet blow, and consistent production strategies, predominantly based on the Levallois concept. Thus, this paper gives initial indications for a conjunct site cluster in the region. Initial dating results suggest a chronological context in the Late Middle Paleolithic.

Furthermore, the spatial allocation of the sites and their respective industries allow us to forward a preliminary hypothesis concerning functional inter-site organization. In addition, recently conducted fieldwork and subsequent analysis provide evidence for intra-site spatiality, which completes the micro-regional overview of the Late Middle Paleolithic in the interplay between technology, chronology and spatiality.

RÉSUMÉ

Cet article examine l'aspect technologique et général des assemblages du paléolithique moyen de plusieurs sites de la Côte Chalonnaise, Bourgogne, France. En partant de plusieurs traits caractéristiques au sein du matériel stratifié de la grotte de la Verpillière II (Germolles), les recherches actuelles ont permis de mettre en évidence des modèles technologiques congruents pour un certain nombre de sites environnants. Les principales caractéristiques communes sont la présence de Keilmesser, avec ou sans coup de tranchet, et des stratégies de production homogènes, principalement basées sur le concept de Levallois.

Le présent travail fournit ainsi les premiers indices d'un cluster cohérent de sites dans la région. Les premiers résultats de datation suggèrent un contexte chronologique dans le Paléolithique moyen tardif.

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En outre, la répartition spatiale des sites et la composition de leurs industries respectives nous permettent d'avancer une hypothèse préliminaire concernant l'organisation fonctionnelle inter-sites. En outre, les travaux de terrain récents et l'analyse subséquente fournissent des données sur la spatialité et organisation intra-site, ce qui complète la vue d'ensemble micro-régionale du Paléolithique moyen tardif dans l'interaction entre technologie, chronologie et spatialité.

ZUSAMMENFASSUNG

Dieser Beitrag untersucht das technologische und allgemeine Erscheinungsbild der mittelpaläolithischen Inventare aus mehreren Fundstellen im Gebiet der Côte Chalonnaise, Burgund, Frankreich. Ausgehend von mehreren charakteristischen Merkmalen innerhalb des stratifizierten Materials der Grotte de la Verpillière II (Germolles), konnten die aktuellen Forschungen kongruente technologische Muster für eine Reihe der umliegenden Fundstellen nachweisen.

Die wichtigsten gemeinsamen Merkmale sind das Vorhandensein von Keilmessern, mit und ohne Schneidenschlag, sowie einheitliche Produktionsstrategien, die auf dem Levallois-Konzept basieren.

Damit liefert die vorliegende Arbeit erste Anhaltspunkte für ein zusammenhängendes Fundstellencluster in der Region. Erste Datierungsergebnisse deuten auf einen chronologischen Kontext im späten Mittelpaläolithikum hin.

Die räumliche Verteilung der Fundstellen und die Zusammensetzung der jeweiligen Inventare erlaubt es, eine erste Hypothese zur funktionalen Organisation zwischen den Fundstellen aufzustellen. Darüber hinaus liefern kürzlich durchgeführte Feldforschungen und anschließende Analysen Belege für eine fundplatzspezifische Organisation, die den mikroregionalen Überblick über das späte Mittelpaläolithikum im Zusammenspiel von Technologie, Chronologie und Räumlichkeit vervollständigen.

INTRODUCTION

Southern Burgundy has a long history of Paleolithic research, starting at the very beginning of archaeological research itself in the 1860s with sites such as Grotte de la Verpillière I, Grotte de la Mère Grand or Solutré (e.g., Combier 1959; Ferry and Arcelin 1868; Méray 1869, 1876; Mortillet 1883). Over the decades, the region has also revealed a very dense Paleolithic occupation record, especially for Middle Paleolithic sites (Fig. 1) which constitute 42% of the known Paleolithic sites (Pautrat 2016). This is true for the wider Saône-et-Loire Department as well as for the Côte Chalonnaise (Fig. 1).

The topography of the region, featuring narrow corridors between the Jurassic cliffs (Burgundian cuesta) that allow passage from the Saône Valley in the east to the elevated hinterland in the west, might be one reason for the dense occupation of the Côte Chalonnaise (Herkert et al. 2015; Hoyer et al. 2014a). Furthermore, there is abundant lithic raw material available in close proximity to the sites (Fig. 1). The dominant siliceous material is flint from the *argiles à silex* (FAS; clays-with-flint), which varies greatly in quality, and various varieties of Jurassic chert (*chaille bathonienne* and *chaille bajocienne*, CB), which are generally more coarse-grained than the flint. Quartz, quartzite and granite are also avail-

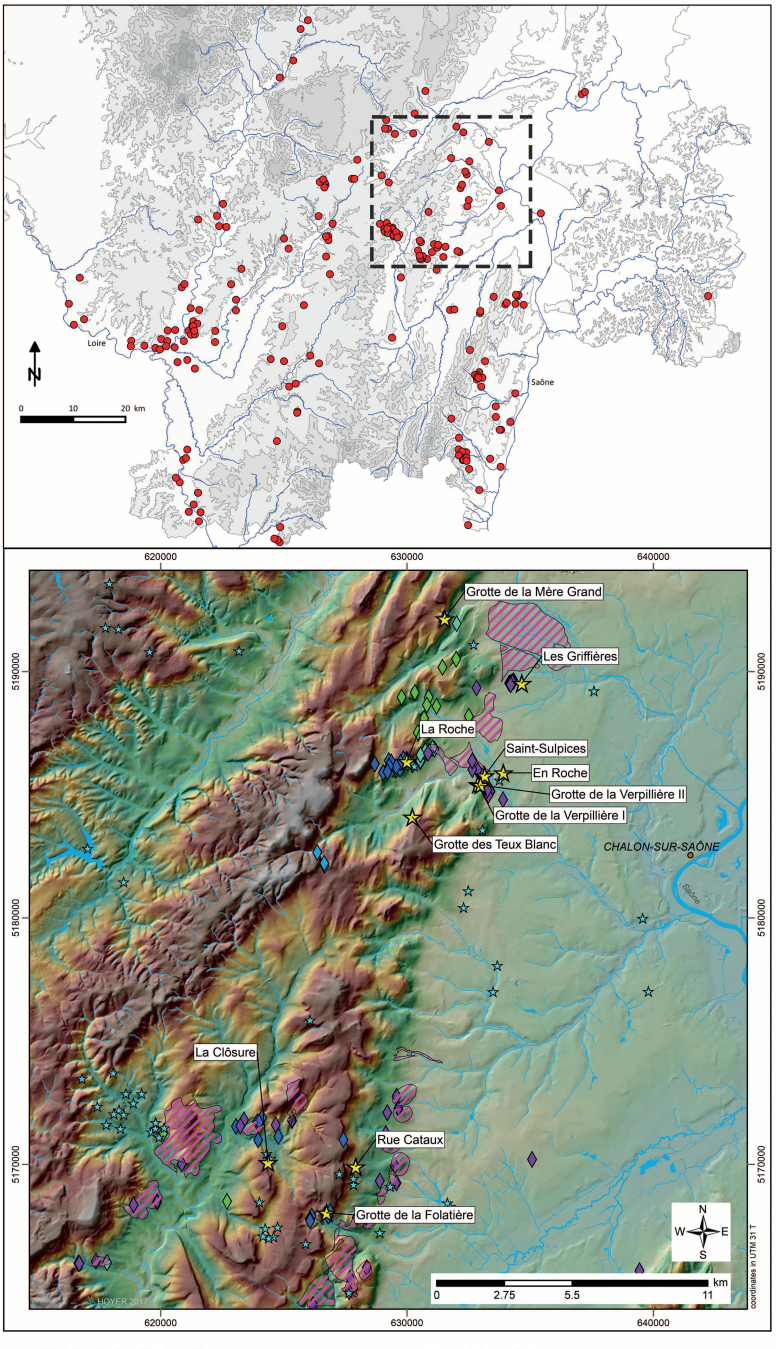


Fig. 1.
Distribution of Middle Paleolithic sites. Above: Saône-et-Loire department with sites attributed to the Middle Paleolithic. The frame highlights the research area in the Côte Chalonnaise. (Map and Data: carte archéologique, SRA Bourgogne).
Below: Côte Chalonnaise research area. Yellow stars indicate Middle Paleolithic sites mentioned in the text. From north to south, these are: Grotte de la Mère Grand - Rully, Les Griffières - Fontaines, La Roche - Saint-Martin-sous-Montaigu, Saint-Sulpice - Germolles, En Roche - Germolles, Grottes de la Vepillière I&II - Germolles, Grotte des Teux Blancs - Saint-Denis-de-Vaux, La Clôsure - Bissy-sur-Fley, La Rue Cataux - Chenôves and Grotte de la Folatière - Culles-les-Roches. Turquoise stars indicate Middle Paleolithic sites reported to the SRA Bourgogne. For raw material availability in the Côte Chalonnaise, dashed areas indicate deposits of argiles-à-silex (i.e., clays-with-flints), diamond symbols show the availability of various chert varieties (blue, turquoise and green), quartz (light blue) and distinct find spots of flint (violet). (Data: carte archéologique, SRA Bourgogne; DEM: IGN France; Raw material data: Siegeris; Map and mapping: Hoyer).

Site	Municipality	Type	Position and Orientation
Grotte de la Mère Grand	Rully	cave	335m asl; in the rock face, opening to the east
Les Griffières	Fontaines	open-air	202m asl; in the plain, declining slightly to the northeast
La Roche	Saint-Martin-sous-Montaigu	open-air	330m asl; slope declining to the south-east
Saint-Sulpice	Germolles	open-air	215m asl; slight slope declining to the south
Grotte de la Verpillière I	Germolles	rock shelter (collapsed)	215m asl; at the bottom of the cliff, collapsed former rock shelter, opening to the east-northeast
Grotte de la Verpillière II	Germolles	rock shelter (collapsed)	215m asl; at the bottom of the cliff, collapsed former rock shelter, opening to the east-northeast
En Roche	Germolles	open-air	210m asl; in the plain, declining slightly to the southeast
Grotte des Teux-Blancs	Saint-Denis-de-Vaux	cave	360m asl; in the rock face, opening to the southwest
La Clôsure	Bissy-sur-Fley	open-air	343m asl; slope declining to the east
La Rue Cataux	Chenôves	open-air	310m asl; slope declining to the east
Grotte de la Folatière	Culles-les-Roches	cave	345m asl; in the rock face, opening to the south

able in primary positions, as gravels on terraces or in riverbeds (Floss 2005b; Herkert et al. 2015, 2016b; Siegeris 2014, 2020; Siegeris and Floss 2015).

Starting with the recent fieldwork carried out at Grotte de la Verpillière I and II in 2006 (Floss 2007, 2008, 2009a, 2009c; Floss et al. 2013a, 2013b, 2014, 2016, 2017; Frick 2014b, 2017; Frick and Steigerwald 2016a, 2016b; Hoyer et al. 2014b), research has been expanded to include a multitude of other sites in the region; these consist of cave sites, rockshelters and open-air sites (Table 1 and Fig. 1).

Research history (outline)	Literature
- First excavation: Perrault, late 1860s - Combier excavation: 1956 - Floss prospection 2014	Combier (1959); Gros and Gros (2005); Herkert (2014)
- Discovery and surface collections: Sikner, since around 2000	Seitz (2011); Sikner (2014)
- Discovery, surface collections and small sondage: Lenèz 1926 - Continuous surface collections: Guillard (1935-1950s), Gros (1950s-1960s) - Ongoing surface collections: Donguy and Macioszczyk since 2002 - Floss prospections 2009 and 2014	Guillard (1947); Gros (1964); Gros and Gros (2005); (Herkert 2014); Lenèz (1926)
- Known as flint outcrop since late 1860s - Regular surface collections: Guillard and Gros between 1950s and 1960s - Floss surface collection 2014	Colbere (1979); Gros and Gros (2005); Herkert (2014); Méray (1869)
- Discovery and first excavation: Méray 1868 - Numerous excavations between 1890s and 1970s (e.g., Mayet and Mazenot 1914-1920, Delporte 1953-1955, Combier 1959) - Annual excavation by Floss between 2006 and 2016	Combier (1959); Dutkiewicz (2011); Dutkiewicz and Floss (2015); Floss (2005); Floss et al. (2013, 2016); Gros and Gros (2005); Méray (1869, 1876)
- Discovery and first excavation: Floss 2006 - Annual excavations by Floss betweeen 2006 and 2017	Floss (2007, 2008); Floss et al. (2013b, 2016); Frick (2016a); Frick and Floss (2015)
- Discovery: Guillard 1952 - Continuous surface collections: Guillard and Gros 1950s and 1960s - Ongoing surface collections: Donguy and Macioszczyk since 2002 - Floss prospections 2009, 2011 and 2014	Guillard (1954); Gros and Gros (2005); Macioszczyk and Donguy (2014); Herkert (2017); Herkert et al. (2016)
- First and only excavation: Mayet and Mazenot 1913 - Floss prospection 2015	Combier (1956); Gros and Gros (2005); Lenèz (1935); Mayet et al. (1921)
- Discovery: Méray 1870s - Surface collections: Parriat 1950s - Small sondage: Farizy 1994	Desbrosse and Texier (1973); Gros and Gros (2005); Parriat (1956)
- Discovery and surface collections: Guillard 1935 - Ongoing surface collections: Guillard And Gros 1950s and 1960s - Floss prospection 2009	Gros and Gros (2005); Guillard (1960)
- First excavation: Landa 1860s - Excavation Mayet and Mazenot, 1920 and 1930s - Excavation Lafond 1940s - Floss prospection 2014	Gros and Gros (2005); Guillard (1959); Lafond (1947, 1957)

Table 1.
Relevant Sites in the Côte Chalonnaise mentioned in the text. Research history and literature are only outlined and not exhaustive (see also: Herkert 2020 or Herkert et al. 2015).

All of the sites have yielded lithic artifacts attributable to the Middle Paleolithic, but the assemblages derive either from older excavations or from surface collections. In order to widen the focus, and to enable comparative studies, the various collections have been re-examined (Dutkiewicz 2011; Frick 2010; Herkert 2016, 2017; Herkert et al. 2016a, 2015; Macioszczyk and Donguy 2014; Sikner 2014) and some of this work is still ongoing (see Herkert and Frick 2020). Over the course of more than 150 years of research, which has been primarily based on typological criteria, the various assemblages in question have been interpreted quite

differently and thus have been attributed to various classic Middle Paleolithic techno-complexes or facies (cf. Frick 2014a; Herkert and Frick 2020). To cite but a few examples, the material from Grotte de la Mère Grand in Rully has been identified as *Micoquien final* (Combier and Ayroles 1976), La Roche at Saint-Martin-sous-Montaigu as *Moustérien type Quina* (Combier and Ayroles 1976) or as *Moustérien groupe Quina rhodanien* (Pouliquen 1983), and Saint Sulpice at Germolles as *Moustérien typique de faciès levalloisien* (Colbère 1979). The assemblage from Grotte de la Verpillière I has been ascribed to a *Moustérien de tradition acheulénne* (Combier and Ayroles 1976; Desbrosse et al. 1976) and that from La Closure at Bissy-sur-Fley to a *Charentien de type Ferrassie* (Desbrosse and Texier 1973; Parriat 1956).

This diversity in attribution suggests a panoply of different Middle Paleolithic groups. However, as we will see, these different industries have much more in common than the given attributions might suggest. With this contribution, we are beginning to fill in the gaps in comparative analysis in the region, a lacuna that was already criticized 35 years ago: "*Malheureusement, pour l'instant, le manque de travaux régionaux dans cette partie de la Bourgogne nous prive de références sur les traits généraux et particuliers des faciès en présence, avec leurs éventuelles ramifications géographiques*" (Pouliquen 1983: 206).

THE CHARACTERISTICS OF MIDDLE PALEOLITHIC ASSEMBLAGES

Raw materials used

With regard to the economic aspects of raw material supply and use strategy, we note that local flint predominates in all Middle Paleolithic assemblages. However, a significant amount of chert is always present (Fig. 2). For example, as regards artifacts from the recently excavated layer GH 3 of Verpillière II, 74% are made of flint from the *argiles à silex* while only

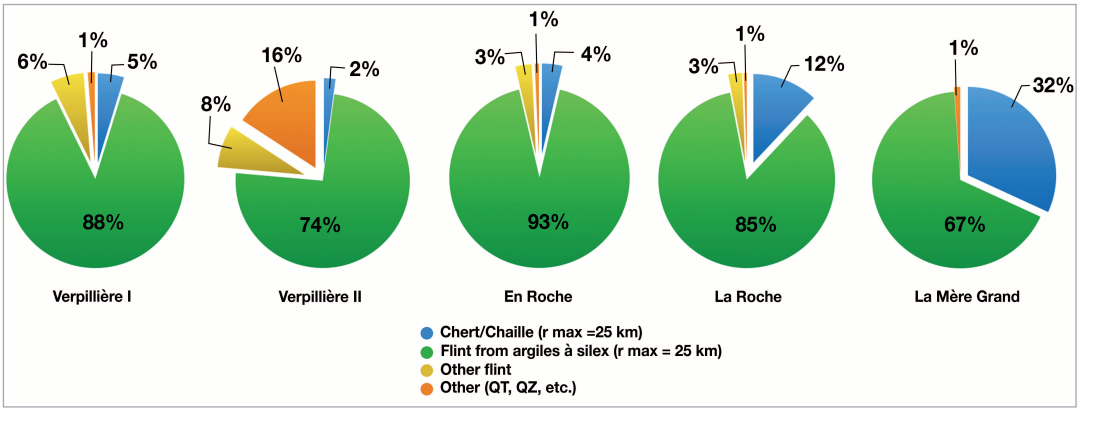


Fig. 2.
Raw material used (percentage values) within the assemblages of Verpillière I, Verpillière II, En Roche, La Roche and La Mère Grand. Data for VPI: Dutkiewicz (2011); Data for VPII: Frick (2016a).

2% are of chert. In comparison, 85% of the artifacts from the open-air site of La Roche in Saint-Martin-sous-Montaigu are made of flint and 12% are made of chert. The highest proportion of chert recognized thus far comes from Grotte de la Mère Grand in Rully, which contains 32% chert artifacts compared to 67% flint artifacts when all pieces are taken into account; indeed, if only the strictly Middle Paleolithic pieces (n=145) are considered, chert use actually increases to 41%. All in all, an average of around 80% of the Middle Paleolithic artifacts are made of locally available flint, and raw material provisioning relies almost exclusively on local or regional sources within a maximum range of 25 km (Fig. 1). Nevertheless, certain specific pieces also suggest long distance imports to the sites. For example, at Verpillière II, at least four pieces can be attributed to raw material sources in the Mont-lès-Etrelles region (Floss 2008, 2009a, 2009b) situated about 110 km to the north-east in the direction of south-western Germany and within the traditional range of the *Keilmessergruppen* (Frick 2016a).

Assemblage characteristics

In the detailed analysis of recently excavated Late Middle Paleolithic stratified assemblages from Verpillière II at Germolles (e.g., Frick and Floss 2015), Frick (2016a: 657–58) concludes with a list of technological and general features that characterize the studied material:

- Presence of *Keilmesser* with and without tranchet blow modification (for this feature, see especially Frick et al. this volume)
- Great diversity in the morphology of bifacial objects with a preference for asymmetrical morphologies
- Prevalent use of Levallois reduction for a wide range of blank shapes (from oval to rectangular blanks, triangular and deltoid points and blades)
- Almost no evidence for other elaborate reduction concepts, such as Quina or Discoidal
- In addition to Levallois reduction there is evidence for opportunistic reduction processes to obtain blanks
- Use of ventral reduction on blanks for the configuration of Levallois cores and bulb reduction on tools
- Occasional presence of blades
- Blank tools are made from a wide range of blank morphologies, such as cortical, configuration and target blanks
- Tools can be made on blanks and cores
- Minor presence of *Groszaki*
- Minor presence of dorsal reduction
- Minor presence of Janus flakes
- Major presence of evidence for hafting processes of a wide range of tools
- "Upper Paleolithic" tool types are more or less non-existent

As listed above, the work of Frick revealed several characteristic features including, among others, the presence of *Keilmesser* (especially those with a tranchet blow modification) and, in addition, a variety of other bifacial elements such as bifaces of different shape and size or bifacially worked objects (Frick and Floss 2017). With regard to blank production, the predominant use of the Levallois concept is attested, using nodules as well as blanks as core matrices. Very little evidence was observed of other explicit production concepts, such as Discoid or Quina reduction for instance, but there is evidence for a degree of opportunistic production. Bulb reduction was recognizable both on tools, and also in the sense of Kombewa or Levallois-like production. Concerning the general characteristics of the assemblage from Verpillière II, a certain amount of blade production was observed. Furthermore, there are a wide variety of tools made from target blanks but also from cortical or configuration blanks. There is minor evidence for *Groszaki* pieces and considerable evidence for hafting and re-working of tools. Classic Upper Paleolithic tools (such as burins and endscrapers) are virtually absent from the assemblage.

Using these characteristics of the Verpillière II assemblage as a basis, several surrounding sites have been re-evaluated, and others continue to be reviewed as part of our ongoing research. Frick et al. (this volume) have already pointed out that one major common feature is the presence of Keilmesser, with and without a tranchet blow modification, in at least five of the assemblages (La Roche in Saint-Martin-sous-Montaigu, La Closure in Bissy-sur-Fley, La Rue Cataux in Chenôves and the Grottes de la Verpillière I and II). Other bifacial objects are also present at these sites (see Frick et al. this volume). Apart from these Keilmesser-yielding sites, the Middle Paleolithic assemblages of Grotte de la Mère Grand in Rully and En Roche in Germolles provide some additional bifacial objects (n=8 each), and at Saint-Sulpice 10 of these objects were found (Herkert 2020).

Table 2.
Identified reduction concepts within the Middle Paleolithic assemblages. Data: Herkert (2020) except data for VPI taken from Dutkiewicz (2011) and data for VPII from Frick (2016a).

	Total of Middle Paleolithic assemblage	Levallois cores	Discoidal cores	Opportunistic flake cores	Total number of cores
La Mère Grand	154	4	0	4	8
La Roche	1773	62	4	n.s.	66
Verpillière I	670	39	4	15	58
Verpillière II (GH3)	3770	24	3	77	104
Saint-Sulpice	160	69	4	n.s.	73
En Roche	137	11	0	n.s.	11
Les Teux Blancs	29	0	0	0	0
La Rue Cataux	388	69	9	15	93
La Clôsure	794	82	11	128	221
La Folatière	61	0	0	n.s.	0

As regards the site of La Roche, the presence of bifacial tools had already attracted attention at the beginning of the 1980s: "*Mais l'originalité de La Roche tient dans la fréquence des objets bifaces*" [But the originality of La Roche lies in the frequency of bifacial objects] (Pouliquen 1983: 206).

Levallois production

While examining blank production in these assemblages, a similar emphasis on Levallois production became evident. The Levallois concept completely dominates the recognizable production strategies. Other concepts like the Discoidal or the Quina concepts are only evidenced in a very limited number of pieces or not at all. In comparison to the identified Discoidal cores, Levallois cores represent between 88 and 100% of the Middle Paleolithic cores (Table 2). Due to uncertain chronological attribution, simple opportunistic flake cores have been excluded from our analysis. Otherwise, exclusively Middle Paleolithic assemblages like Bissy-sur-Fley, for example, or the GH 3 of Grotte de la Verpillière II, contain 37% and 23% Levallois cores, respectively.

While there was a concentration on Levallois production (e.g., Boëda 1993; Boëda et al. 1990; Richter 1997), no dominant production mode is recognizable. In fact, several modes are present to a greater or lesser degree (Fig. 3). The reduction strategies have so far been analyzed for seven assemblages (e.g., Herkert 2020) which provide between n=11 and n=71 Levallois cores for which the mode could be identified (Table 3). As Figure 4 shows, preferential and centripetal reduction are the most dominant modes with means of 30.6% and 34.9%, respectively (Table 3). Repeated unidirectional or bidirectional reduction follows with 13.6% and 13.4%, respectively, while the occurrence of convergent or orthogo-

Table 3.
Quantitative distribution of the various Levallois reduction modes observed at different sites. Data: Herkert (2020), except data for VPII taken from Frick (2016a).

	Total Levallois cores analyzed	Preferential		Unidirectional		Bidirectional		Centripetal		Convergent/ orthogonal	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%
Saint-Sulpice	66	13	19.7	17	25.8	8	12.1	22	33.3	6	9.1
La Roche	41	12	29.3	3	7.3	6	14.6	19	46.3	1	2.4
En Roche	11	4	36.4	1	9.1	1	9.1	4	36.4	1	9.1
Verpillière II (GH3)	21	5	23.8	4	19	4	19	6	28.6	2	9.5
Verpillière I	39	14	35.9	5	12.8	4	10.3	13	33.3	3	7.7
La Rue Cataux	54	19	35.2	6	11.1	7	13	19	35.2	3	5.6
La Clôsure	71	24	33.8	7	9.9	11	15.5	22	31	7	9.9
Min			19.7		7.3		9.1		28.6		2.4
Max			36.4		25.8		19		46.3		9.9
Mean			30.6		13.6		13.4		34.9		7.6
Median			33.8		11.1		13		33.3		9.1

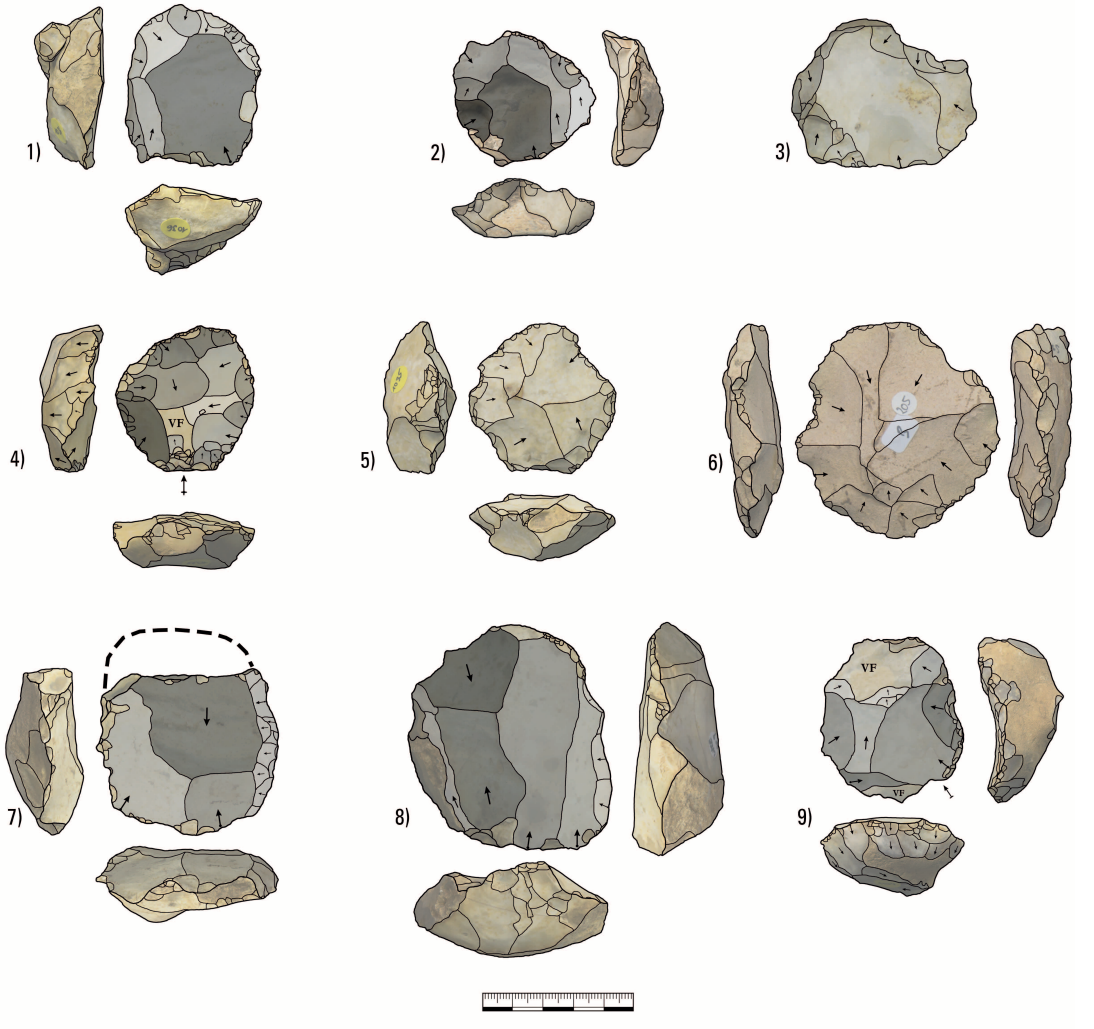


Fig. 3.
Levallois cores from La Roche (1-6 & 9) and Saint-Sulpice (7 & 8) showing the variability of reduction modes. If present, grey shades indicate the succession of reduction from light to dark. 1-3) Preferential reduction (FAS); 4-6) Centripetal reduction (4: on blank; 4 & 5: FAS; 6: rose chert); 7) Bidirectional reduction (FAS); 8) Repeated unidirectional reduction (FAS); 9) Orthogonal reduction (on blank) (photos: Herkert and Huber; image: Herkert).

nal reduction is very limited (mean of 7.6%). This distribution is similar for all analyzed assemblages. Only Verpillière II displays higher values for the repeated uni- and bidirectional reduction (each at 19%), and therefore less preferential (23.8%) and centripetal (28.6%) reduction. In addition, the site of Saint-Sulpice shows a clear peak for repeated unidirectional reduction (25.8%), while preferential reduction was only observed in 19.7% of the pieces; this marks the minimum encountered in all of the assemblages. The minimum values for orthogonal or convergent reduction occur at La Roche where only 2.4% of the cores follow this mode. Here, centripetal reduction was very common (46.3%).

In addition to nodules, which dominate the range of matrices used, blanks were also selected and transformed into Levallois cores; generally, advantage was taken of the existing general shape and the convexities of

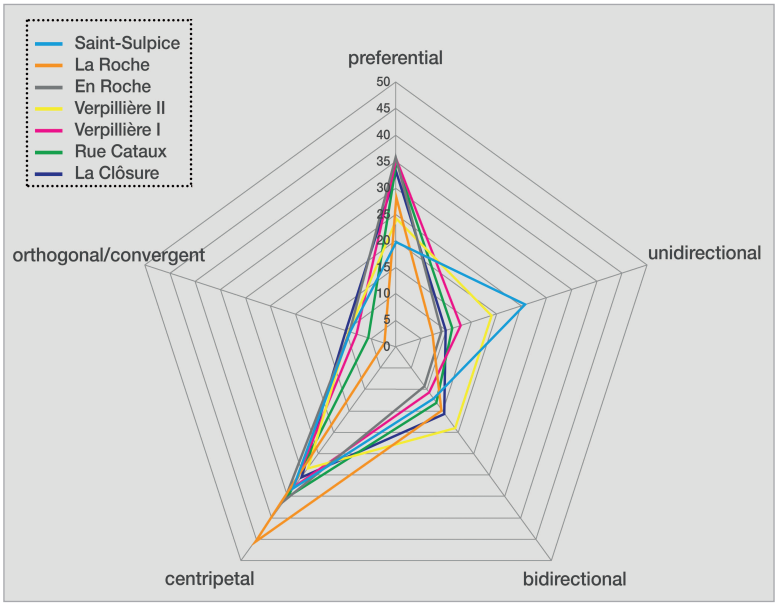


Fig. 4.
Net graph showing the distribution of the various Levallois reduction modes observed at different sites. Values are percentage values based on the total amount of identifiable Levallois cores per site. Data: Herkert (2020), except data for VPII taken from Frick (2016a).

the blank (e.g., Fig. 3.4 and 3.9). Although the studied assemblages did not attain the same level of blank use as observed at Verpillière II, where n=9 blanks were identifiable as core matrices out of a total of n=24 Levallois cores, using blanks as core matrices is nonetheless an observable strategy present in the other collections. For Saint-Sulpice, there are n=5 Levallois cores which could be identified as blanks. At La Roche, n=3 cores on blanks could be detected within the studied material, and at En Roche at least n=1 of the n=11 cores were configured on a blank.

Levallois products

As for products linked to Levallois production, we observe quite a similar situation within the assemblages. As Frick pointed out for the Levallois products from Verpillière II, elongated forms (Levallois blades) are usually present. A similar observation has been made for the assemblage from Saint-Sulpice in Germolles, where Colbère (1979: 33) already noted that one of the characteristics of the industry is its laminar component.

With the exception of Culles-les-Roches, all other assemblages contain a certain amount of Levallois blades (Fig. 5) and Levallois points. Data are available for eight sites (Table 4). As illustrated in Figure 6, Levallois flakes always dominate the spectrum with a mean of nearly 70%. Levallois blades on average represent about 17% of artifacts that fall within the spectrum of Levallois blanks and reach a maximum at Bissy-sur-Fley (35.2%). For the assemblage from Saint-Sulpice, 27.5% of its Levallois products are comprised of blades. In addition to Culles-les-Roches, where no blades have been identified so far, a minimum is provided at En

Table 4.
Absolute and percentage quantitative distribution of Levallois cores and Levallois blanks, subdivided into flakes, blades and points, within the different Middle Paleolithic assemblages. Data: Herkert (2020), except data for VPII taken from Frick (2016a).

	Total of Middle Paleolithic assemblage	*Total of Levallois cores*	*Total of Levallois blanks*	*Amount of Levallois flakes*	*Amount of Levallois blades*	*Amount of Levallois points*
La Mère Grand	154	4	71	53	13	5
La Roche	1773	62	437	309	65	63
Verpillière I	670	39	158	124	14	20
Verpillière II (GH3)	3770	24	156	114	18	24
Saint-Sulpice	160	69	40	24	11	5
En Roche	137	11	56	48	4	4
Les Teux Blancs	29	2	11	5	4	2
La Rue Cataux	388	69	204	101	49	54
La Clôsure	794	82	327	197	115	15
La Folatière	61	0	35	27	0	8
Total	7936	362	1495	1002	293	200
Mean						

Fig. 5.
Examples of Levallois blades from the sites of La Mère Grand (1-3), La Roche (4-7) and En Roche (8). All blades are made of flint, except no. 3, which is made of chert (photos: Frick, Herkert and Huber; illustration: Herkert).

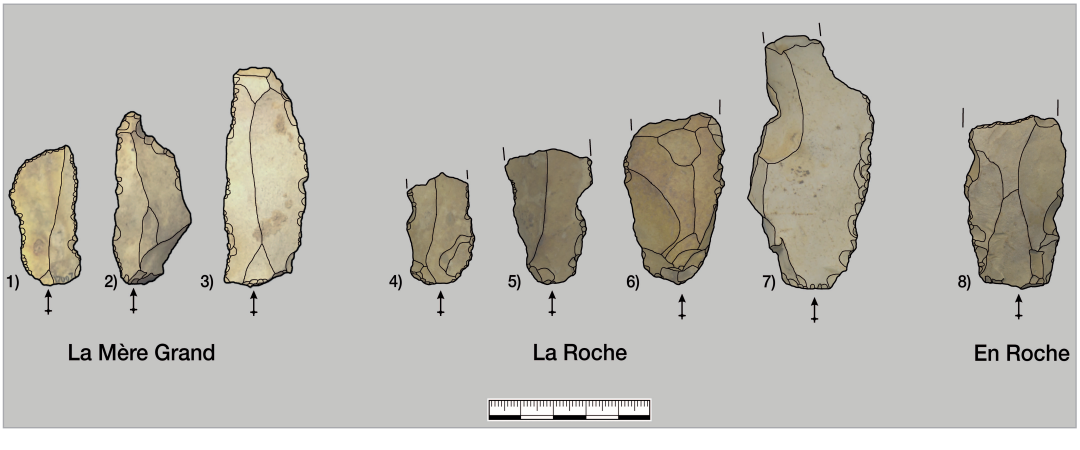
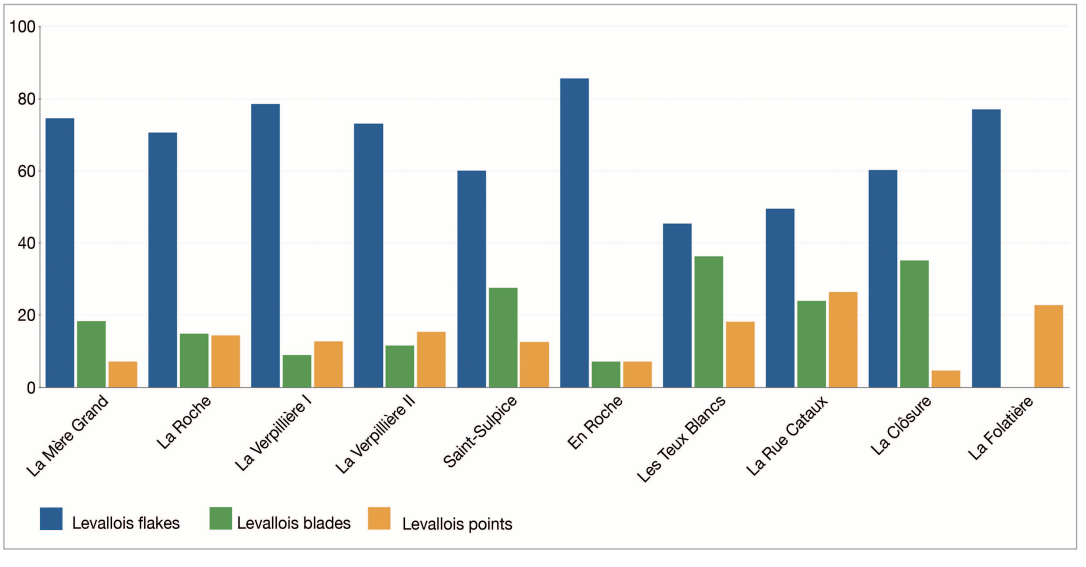


Table 4. cont.

Within total of Levallois blanks			Within total of Middle Paleolithic assemblage			
% of Levallois flakes	*% of Levallois blades*	*% of Levallois points*	*% of Levallois blanks*	*% of Levallois flakes*	*% of Levallois blades*	*% of Levallois points*
74.6	18.3	7	46.1	34.4	8.4	3.2
70.7	14.9	14.4	24.6	17.4	3.7	3.6
78.5	8.9	12.7	23.6	18.5	2.1	3
73.1	11.5	15.4	4.1	3	0.5	0.6
60	27.5	12.5	25	15	6.9	3.1
85.7	7.1	7.1	40.9	35	2.9	2.9
45.5	36.4	18.2	37.9	17.2	13.8	6.9
49.5	24	26.5	52.6	26	12.6	13.9
60.2	35.2	4.6	41.2	24.8	14.5	1.9
77.1	0	22.9	57.4	44.3	0	13.1
67	19.6	13.4	18.8	12.6	3.7	2.5
68.9	17.3	13.8	36.5	25	6.2	5.3

Fig. 6.
Bar graph of the percentage distribution of Levallois blank types within the different assemblages. Blue: Levallois flakes; Green: Levallois blades; Yellow: Levallois points.



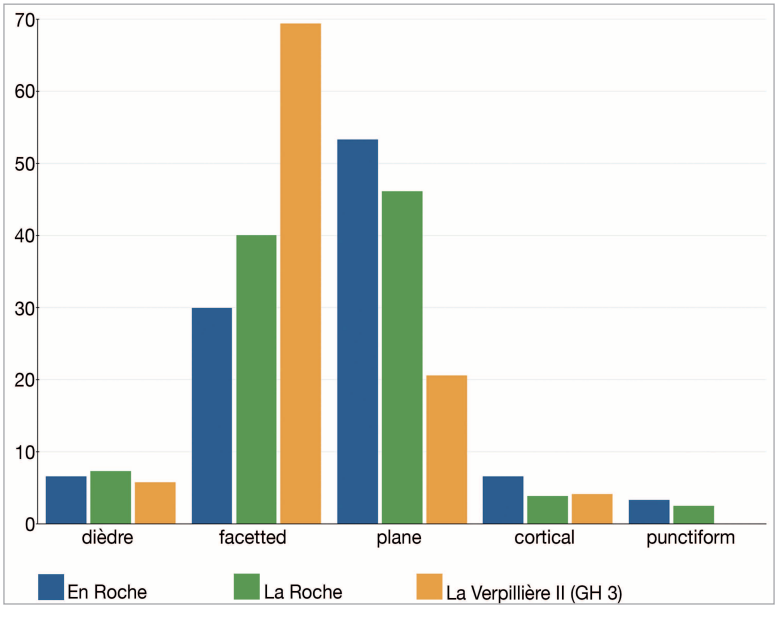
Roche (Germolles), where only 7.1% of the Levallois products could be identified as blades. Triangular forms, in the sense of Levallois points (and pseudo-Levallois points), reach a mean of almost 14%. Perceptible peaks can be observed for Chenoves and Culles-les-Roches, where the proportion of points reaches 26.5% and 22.9%, respectively.

For the preparation of the detachment of Levallois products, flat and facetted butts are clearly preferred (Table 5 and Fig. 7). At La Roche, more than 86% of the identified butts fall into these two categories. The same is true for En Roche, where flat and facetted butts together reach 83%, with a slightly different emphasis than that observed at La Roche. At Verpillière II, there is also a distinct preference for flat and facetted platforms, while the majority of the blanks show facetted butts. This phenomenon

Table 5.
Quantitative distribution of platform configuration on Levallois blanks from En Roche, La Roche and Verpillière II. Data: Herkert (2020), except data for VPII taken from Frick (2016a).

	En Roche		La Roche		Verpillière II (GH3)	
	n	%	*n*	%	*n*	%
Dièdre	4	6.7	17	7.3	7	5.8
Facetted	18	30	93	40.1	84	69.4
Plane	32	53.3	107	46.1	25	20.7
Cortical	4	6.7	9	3.9	5	4.1
Punctiform	2	3.3	6	2.6	0	0
Total	60	100	232	100	121	100

Fig. 7.
Bar graph showing the percentage distribution of butt configuration on Levallois blanks from En Roche, La Roche and Verpillière II. A clear emphasis is to be noted for flat and facetted butts.



has also been observed for the entire lithic blank production from GH 3 at Verpillière II (Frick 2016a: 609–10). A similar picture emerges where recent data are available for the Levallois core platforms. The n=11 cores from En Roche show either a flat striking platform (n=5) or a facetted one (n=6). La Roche, in contrast, provides almost exclusively facetted core platforms (n=38 to n=3 flat platforms), which does not in fact correlate with the image of the corresponding blanks but at the same time does not entirely contradict it. Furthermore, there seems to be no further correlation or preference for one or other of these two platform styles in terms of, for example, ongoing reduction, in regards to either core or to blank sizes.

General appearance

Within the more general appearance of the assemblages, further common features can be observed. At most of the sites, tool production is not restricted to target blanks, as is the case at Verpillière II. In fact, tools are made from a huge variety of blanks, including, next to target blanks, configuration blanks and initialization blanks (i.e., cortical blanks). Where sufficient data are available, this pattern could be observed for all of the assemblages studied. La Closure, where studies are still in progress, is an exception. This type of opportunistic matrix selection for tool production could be related to economic strategies governing raw material use patterns.

Another commonly observable trait is the intentional removal of bulbs on many tools (Table 6). Even though not extensively applied, this feature concerns 5.5% of the modified blanks at La Roche and 6.8% of those at En Roche, respectively. The studied material from Verpillière II reaches a value of 4.5% for bulb reduction within the spectrum of modified blanks. Bulb reduction on tools has also been observed within the assemblages of some other surrounding sites, although quantitative data are lacking (e.g., Verpillière I, La Mère Grand, Saint-Sulpice and La Folatière).

The removal of bulbs might be related to, among others, the manipulation or hafting of the tools concerned (Banks 2004; Rots 2010, 2016). Furthermore, there are other "morphological adjustments" evident on the tools that provide "indirect arguments" (Rots 2016: 168) for the practice

	Total of modified blanks	Total of modified blanks with bulb reduction	% of bulb reduction
La Roche	581	32	5.5
En Roche	59	4	6.8
Verpillière II (GH3)	374	17	4.5
Total	1014	53	5.2

Table 6.
Quantitative distribution of modified blanks with bulb removal (ventral flattening) from La Roche, En Roche and Verpillière II. Data: Herkert (2020), except data for VPII taken from Frick (2016a).

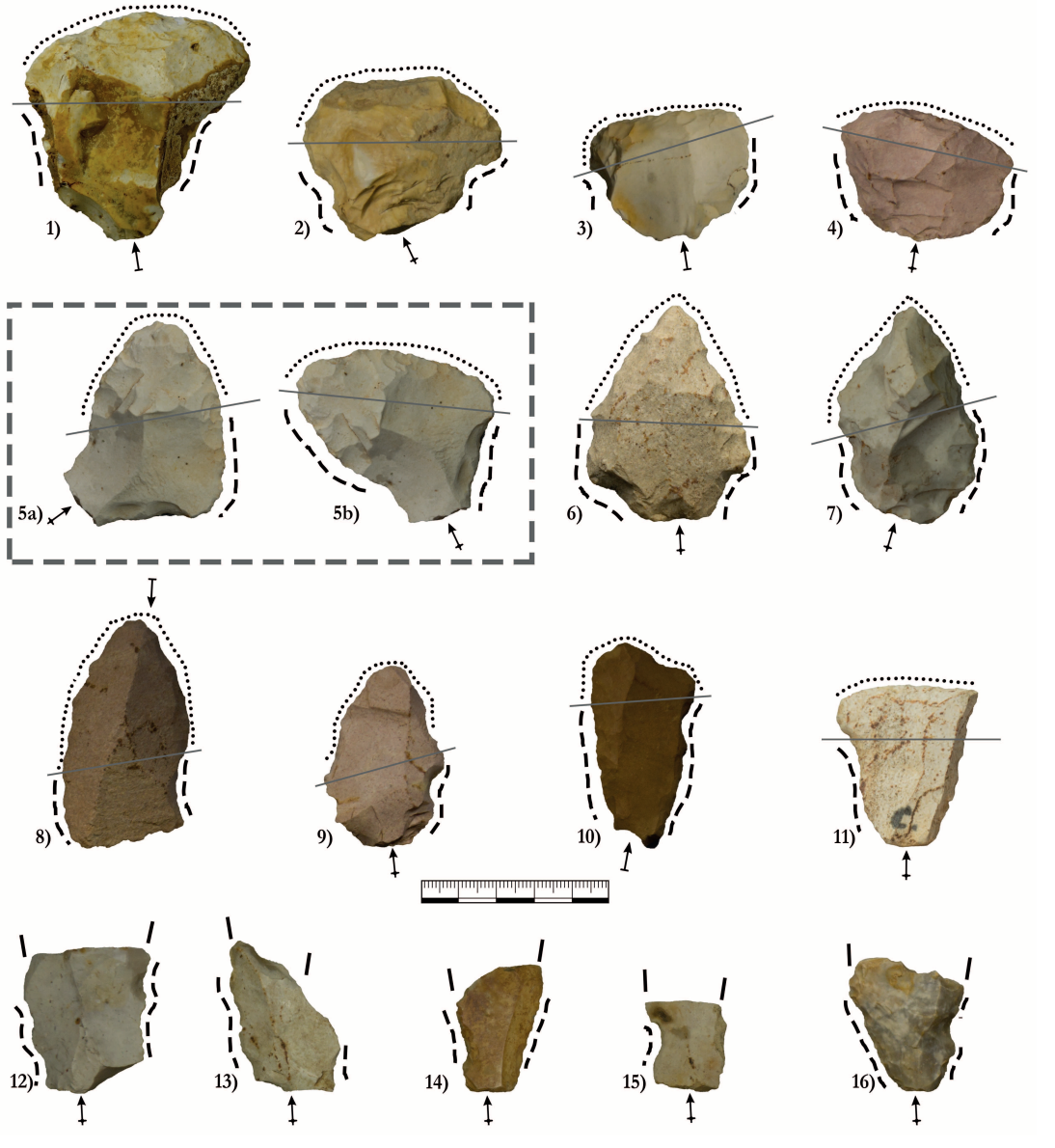

1)
2)
3)
4)
5a)
5b)
6)
7)
8)
9)
10)
11)
12)
13)
14)
15)
16)

Fig. 8. left
Artifacts from La Roche with hafting evidence. Dotted lines: Active edge; Dashed lines: modification for hafting purposes (retouch and/or notches); grey lines: techno-functional separation between transmitting part (hafted section) and transformative part (active section) (e.g., Boëda 2013; Frick and Herkert 2014).
1-3) Scrapers (flint from argiles à silex) showing different reduction stages (1: Bonnotte collection, 2-3 Donguy collection); 4) Heavily reduced scraper (rose chert, Donguy collection); 5) Scraper (flint from argiles à silex) with two proposals of hafting (Denon collection), a: hafting with rounded active edge; b: hafting as regular scraper; 6) Point or convergent scraper (grey chert, Donguy collection); 7) Point or convergent scraper (flint from argiles à silex, Denon collection); 8) Rounded end scraper (rose chert, Donguy collection) on Levallois blade; 9) Rounded end scraper (rose chert, Donguy collection); 10) End scraper (brown flint, Donguy collection); 11) End scraper (pale chert, Denon collection) on Levallois blade; 12-15) Basal fragments of Levallois blades (flint from argiles à silex) with lateral retouch or notches (Bonnotte collection); 16) Basal blank fragment (flint from argiles à silex) with lateral retouch (Donguy collection) (photos: Herkert and Huber; image: Herkert).

of hafting. In addition to bulb removal (or ventral face flattening), we observe opposite lateral notches as well as uni- and bifacial retouch on one or both of the edges (Fig. 8). These observations also provide evidence for specific activities carried out on site, such as re-working and re-hafting of tools. While edge-modified basal fragments, for example, represent the hafting remains of supposed composite tools, there are also, as Frick (2016a) demonstrated, fragments that only display a modified active edge (tool tips). Such tool tips complement the hafting evidence.

Technological cluster

Concerning the other general features set out by Frick (2016a), analysis is still in progress (see also Herkert and Frick 2020); in some cases the lack of stratigraphical contexts for the pieces prevents further clarification. Nevertheless, the initial overview of the assemblages appears quite homogeneous (Table 7), which leads us to the hypothesis of a technological cluster on these sites. The major common feature on which this assumption is based is the presence of various bifacial objects including *Keilmesser* with and without tranchet blow (see also Frick et al. this volume) as well as a homogeneous pattern of lithic production evident in the prevalent use of the Levallois concept, on the one hand, and the almost complete absence of other specific reduction concepts, on the other hand. Furthermore, these technological traits are accompanied by a general homogeneous 'habitus' in the assemblages, composed of laminar blanks, opportunistic tool manufacturing on a multitude of blanks (including target blanks and other debitage blanks), bulb reduction on tools and further indications for tool hafting.

Thus far, radiometric dates obtained by IRSL, ESR and AMS-^{14}C have been used to establish a chronological framework for Verpillière I (GH 15) and Verpillière II (GH 3 and 4) (Heckel et al. 2016; Richard et al. 2016; Zöller and Schmidt 2016). These dates place the Middle Paleolithic assemblages of these two neighboring sites within the probability range between 62 and 42 ka BP (Fig. 9). On the basis of the technological traits,

Table 7.
Cross table with the technological and general assemblage characteristics after Frick (2016a) (lines) and the various Middle Paleolithic assemblages (rows). Given, that most of the assemblages derive from surface collection or older excavations, it was not always possible to determine whether a criterion is fulfilled or not and analysis is in progress, but in most cases, a similar pattern is noticeable. Dark green: presence confirmed; Light green: present in small quantities; Dark red: absence confirmed; Light red: absence indicated after first overview; Yellow: (chronological) attribution unclear; Grey: no reliable data yet.

	La Verpillière II - Germolles	La Verpillière I - Germolles	La Mère Grand - Rully	Les Teux Blancs - Saint-Denis-de-Vaux
Presence of Keilmesser (with and without tranchet blow)	X	X	—	—
Morphological diversity of bifacial objects	X	X	X	X
Prevalent use of Levallois reduction		X	X	X
Almost no evidence for other reduction concepts	X	X	X	X
Evidence for opportunistic reduction	X	X	?	X
Ventral reduction on blanks for configuration of Levallois cores	X	X	—	—
Incidental presence of blades	X	X	X	X
Tools on blanks and cores	X	X	?	?
Tools from cortical, configuration and target blanks	X	X	X	X
Bulb reduction on tools	X	X	X	?
Minor presence of Groszaki	X	X	X	—
Minor presence of dorsal reduction	X	X	?	?
Minor presence of Janus flakes	X	X	—	—
Almost absence of "Upper Paleolithic" tool types	X	?	?	?
Evidence for hafting of tools	X	X	X	?

Table 7. cont.

La Roche - Saint-Martin-sous-Montaigu	En Roche - Germolles	Saint Sulpice - Germolles	La Clôsure - Bissy sur Fley	La Rue Cataux - Chenôves	La Folatière - Culles les Roches
X	—	—	X	X	—
X	X	X	?	X	X
X	X	X	X	X	X
X	X	X	X	X	X
?	?	X	?	?	?
X	X	?	?	X	—
X	X	X	X	X	—
—	—	—	?	—	—
X	X	X	?	X	X
X	X	X	?	—	X
—	—	—	?	—	—
?	—	—	?	?	—
X	—	—	?	X	—
?	?	?	?	?	?
X	X	?	?	X	—

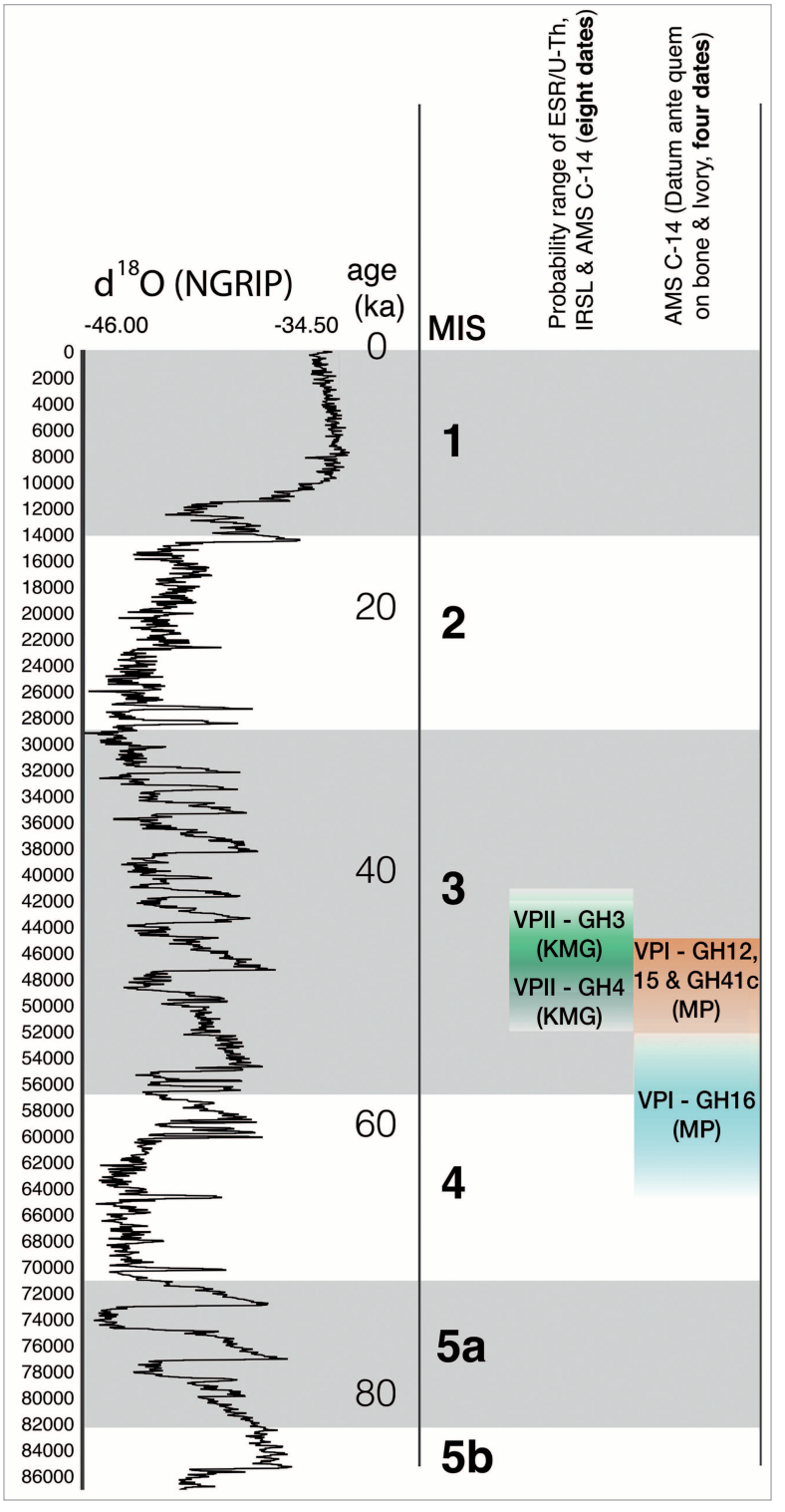


Fig. 9.
Results of initial radiometric dating of the Middle Paleolithic at Verpillière I and II using IRSL, ESR and AMS-14C. For Verpillière I, the dates of GH 15 can be seen as termini ante quem for the underlying intact GH 16. Data: Heckel et al. (2016), Richard et al. (2016) and Zöller and Schmidt (2016); illustration: modified according to Frick.

we presume that the other assemblages fall within the same chronological bracket, but further work is required and is currently in progress. Nevertheless, especially within the context of an affiliation of these industries to the Keilmessergruppen (Frick 2016a; Frick and Floss 2017; Frick et al. intra), it seems likely that the other assemblages also belong to the Late Middle Paleolithic (Frick et al. 2017).

SPATIAL ORGANIZATION

In the context of the observed technological correlation between the assemblages and given that "[s]ite patterning in both within-place and between-place contexts is a property of the archaeological record" (Binford 1982: 6), recent research in the Côte Chalonnaise region provides further evidence of potential regional inter-site organization of late Middle Paleolithic land-use patterns as well as of high resolution intra-site spatial distribution patterns.

Inter-site functionality: a hypothesis

Given that the research area constitutes a dense micro-regional concentration of caves, rockshelters and open-air sites with different raw materials available in close proximity (Fig. 1), the assemblages differ in terms of qualitative and quantitative composition (e.g., tool frequencies). Due to these differences, and with regard to the geographical distribution, the topological position, and the extent of the sites, we propose a hypothetical regional functional model (Fig. 10).

Both Verpillière sites have been interpreted as base camps (Fig. 10a) with extensive assemblages, which have produced evidence for in-situ lithic production as well as recycling and re-working of tools and abundant food waste (Frick 2016a, 2016b; Frick and Floss 2015; Herkert et al. 2015; Litzenberg 2015).

At Saint-Sulpice in Germolles and Les Griffières in Fontaines, two probable workshops (Fig. 10b) with extensive lithic production are situated on flint outcrops (Colbère 1979; Pascal 2013; Sikner 2014).

La Roche at Saint-Martin-sous-Montaigu is a very large open-air site (Herkert 2020; Herkert et al. 2015; Pouliquen 1982, 1983). Lithic production is in evidence here, but with a focus on scraper production (constituting nearly 40% of the known Middle Paleolithic material), which might indicate a specialized processing site (Fig. 10c).

Finally, there are smaller satellite sites in the surrounding area (Fig. 10d) that have yielded smaller assemblages. Particularly noteworthy are the small cave sites of La Mère Grand in Rully and Les Teux Blancs in Saint-Denis-de-Vaux whose elevated locations provide a very good overview over the whole region. In contrast, En Roche is situated on the plain.

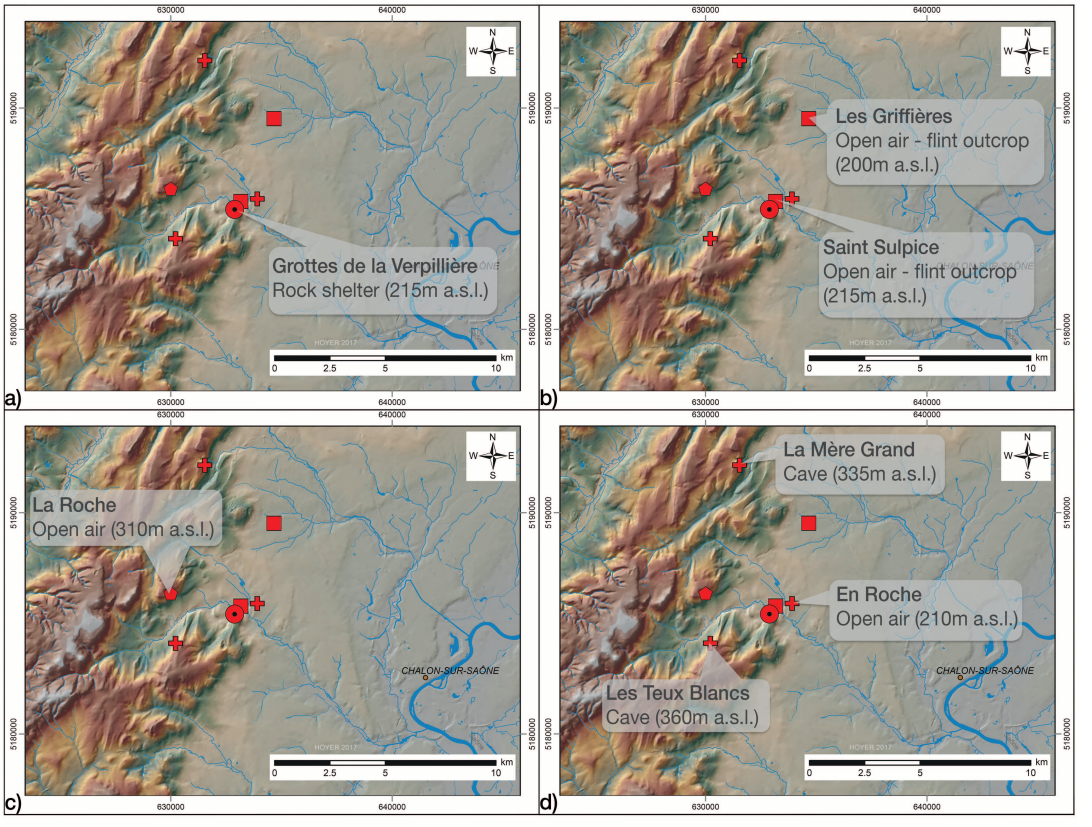


Fig. 10.
Distribution of Middle Paleolithic sites around the Grottes de la Verpillière I & II with indications of their suggested function within the micro-regional site cluster.
a) Base camps: Grottes de la Verpillière I & II (circle with dot); b) Workshops: Les Griffières and Saint-Sulpice (squares); c) Specialized processing site: La Roche (pentagon); d) Smaller satellite camps in elevated positions: Grotte de la Mère Grand and Grotte des Teux Blancs (crosses) and smaller satellite camps on the plain: En Roche on the plain (cross). (DEM: IGN France; map and mapping: Hoyer).

Intra-site organization

GH 16 at Verpillière I

During the excavation of Verpillière I, preserved parts of an intact Middle Paleolithic layer (GH 16) were detected between 2010 and 2015 in the inner part of the cave (Floss 2011, 2012; Floss et al. 2013b, 2014, 2016). The area makes up 15 m^2 of the excavation grid (Fig. 11). The character of the lithic industry, although quantitatively limited, is not without analo-

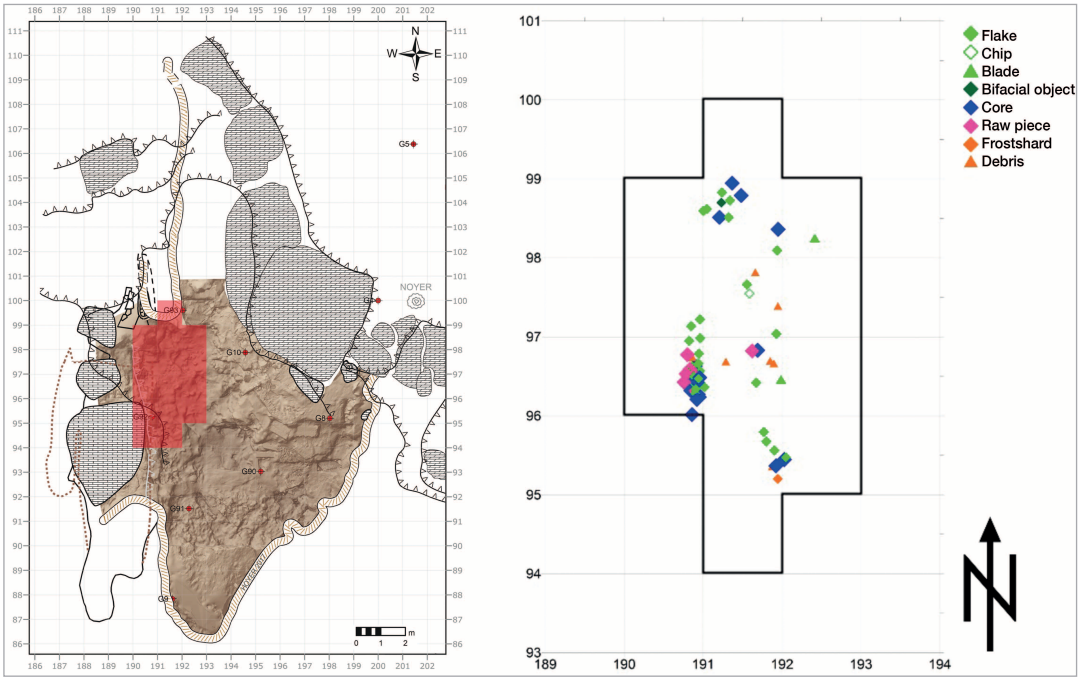


Fig. 11.
GH 16 at Verpillière I. Left: Plan of Verpillière I with location of the sediment unit GH 16 in the north-western part of the cave (red shaded) (Mapping: Hoyer). Right: Distribution of single find measurements of lithic objects within GH 16, showing the concentration of cores and raw pieces in square number 191/097. Modified according to Litzenberg (2015).

gies to those from Verpillière II or other surrounding sites. In addition to opportunistic flake cores, Levallois production has been observed. The spectrum also comprises elongated forms as well as a quantity of bifacial objects (Litzenberg 2015). Radiometric dating (AMS-^{14}C and ESR/U-Th) of the overlying GH 15 provides indications for a terminus ante quem at around 48 ka BP (Heckel et al. 2016; Richard et al. 2016). Faunal remains that include deer (*Cervus elaphus* and *Megalocerus giganteus*), reindeer (*Rangifer tarandus*), horse (*Equus ferus*), bison (*Bison priscus*), fox (*Vulpes vulpes*), and lynx (*Lynx spelaea*) support a chronological attribution to between MIS4 and early MIS3, within a temperate phase of the early or middle Weichselian glaciation.

Despite the limited extent of the preserved area, the analysis of the find distribution provides initial evidence for distinct concentrations and thus for spatial organization within the various occupation events. As Litzenberg (2015) points out, the main concentrations of lithic artifacts and faunal remains overlap each other. Nevertheless, indications for anthropogenic zonal structuring are present, especially in the case of the distribution of cores and raw pieces (Fig. 11). Cores and raw pieces are mainly concentrated in an area covering only half a square meter (square number 191/097), with cores generally found in the southern part of the area and raw pieces in the northern part. The spatial distribution of blanks does not indicate primary knapping events in this part of the site, although quartzitic hammerstones have also been found. Furthermore, given that the rear of the former rockshelter is not the most suitable place

for knapping activities, the deposition of the pieces can instead be interpreted as the storage of raw materials for use in future re-visits to the site within a pattern of repeated seasonal migration (e.g., Binford 1980, 1982) or as "insurance gear" (Binford 1979). This indicates economic organization on the part of late Middle Paleolithic Neanderthals in the region.

GH 3 at Verpillière II

Another reliable source for intra-site organization, spatial patterning and the identification of occupation features dating to the late Middle Paleolithic in southern Burgundy concerns the stratified deposits of GH 3 at Verpillière II (Frick 2016a, 2016b).

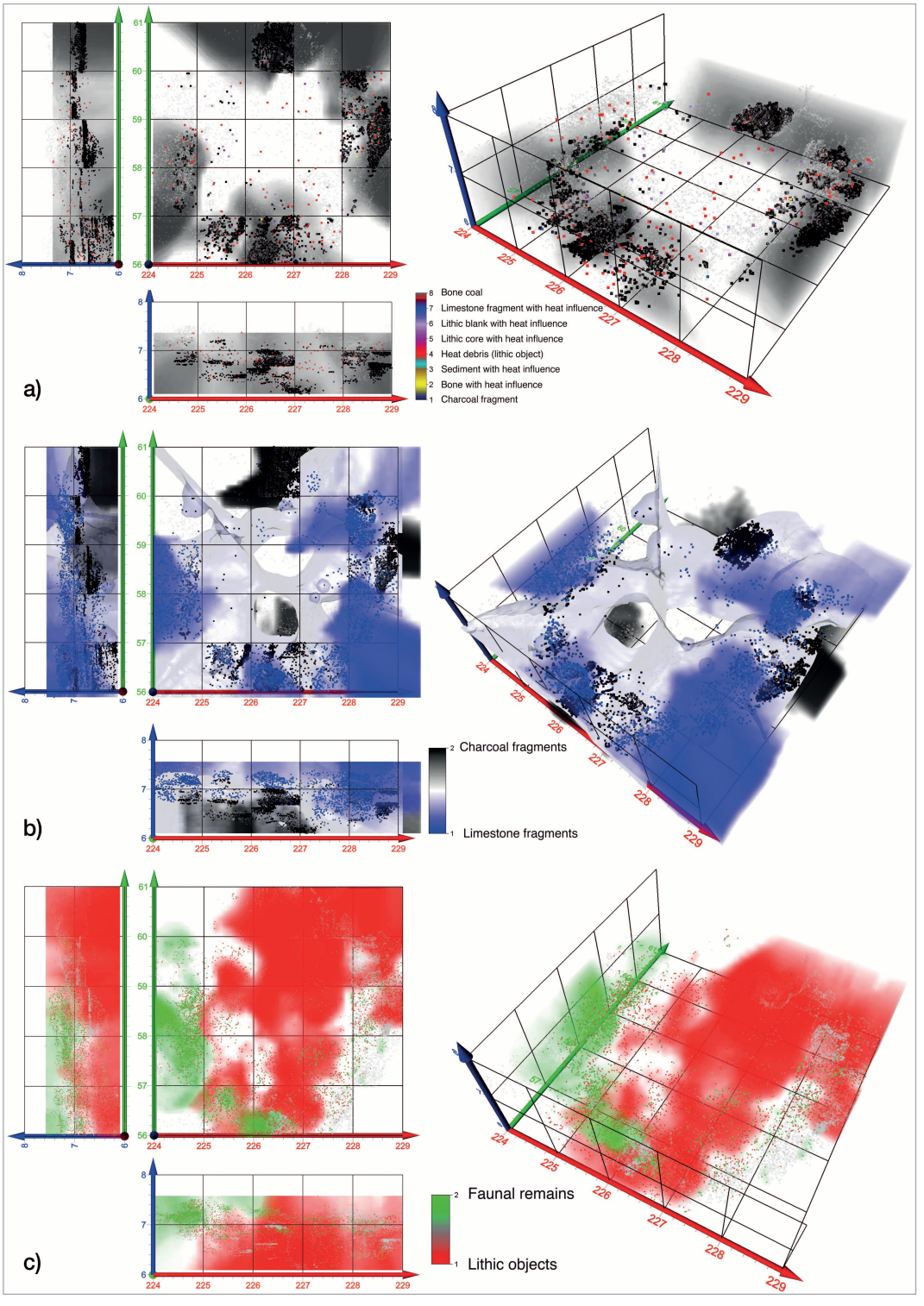
The identification of several distinct charcoal lenses in the otherwise very homogeneous deposits of GH 3 (Fig. 12a) not only indicates homogeneous, low-energy, proximate aeolian sedimentation, resulting in the transportation of lighter burnt material from presumed hearths located at the entrance of the former rockshelter into the interior (Frick 2016b: 707), but also suggests that several repeated occupation events, which would have included the use of fire, occurred over the course of this period of constant sedimentation. Furthermore, the charcoal concentrations are clearly separate from the recorded limestone fragments (Fig. 12b).

A second detected pattern at Verpillière II concerns the spatial distribution of lithic artifacts and faunal remains. As already presented elsewhere (Frick 2016a, 2016b), these two categories display a clear spatial separation from each other (Fig. 12c). While lithic artifacts are primarily scattered towards the eastern part of the excavation area and thus also towards the former opening of the ancient rockshelter, the faunal remains, in contrast, are mostly concentrated in the inner part of the cavity in the west and south of the excavated area.

Comparable observations have been made on other sites, such as Abric Romaní or Kebara Cave (Carbonell i Roura 2012; Speth et al. 2012). "If we assume that the main occupation occurred under the rock shelter, the far interior of the shelter and the area of the cave tunnel make logical areas for toss-zones and rubbish dumping, further from the active occupation area and less likely to attract carnivores" (Frick 2016b: 708).

These observations are, to a certain extent, in contrast to those made for Verpillière I (GH 16). On the one hand, no separation between fauna and lithics has been observed here; on the other hand, there are no deposit-like features in Verpillière II.

Fig. 12. right
Find distribution plots from Verpillière II (GH 3) with top view (north up) and profile views on the left and 3D view on the right. a) Elements with evidence for heat (fire), showing distinct lenses of charcoal particles. b) Distinct separation of charcoal particles and limestone fragments. c) Distribution of lithic artifacts and faunal remains in GH 3, showing a clear zonation of the latter in the west and in the south of the interior part of the cave. Illustrations: Frick (2016a: 636).


a)
8 Bone coal
7 Limestone fragment with heat influence
6 Lithic blank with heat influence
5 Lithic core with heat influence
4 Heat debris (lithic object)
3 Sediment with heat influence
2 Bone with heat influence
1 Charcoal fragment
b)
2 Charcoal fragments
1 Limestone fragments
c)
2 Faunal remains
1 Lithic objects

DISCUSSION

The Middle Paleolithic archaeological record of the Côte Chalonnaise region allows multifocal analyses on a regional scale. The recently conducted excavations at Verpillière I and II provide high resolution data for microscale intra-site analysis that may serve as a reliable reference and start-

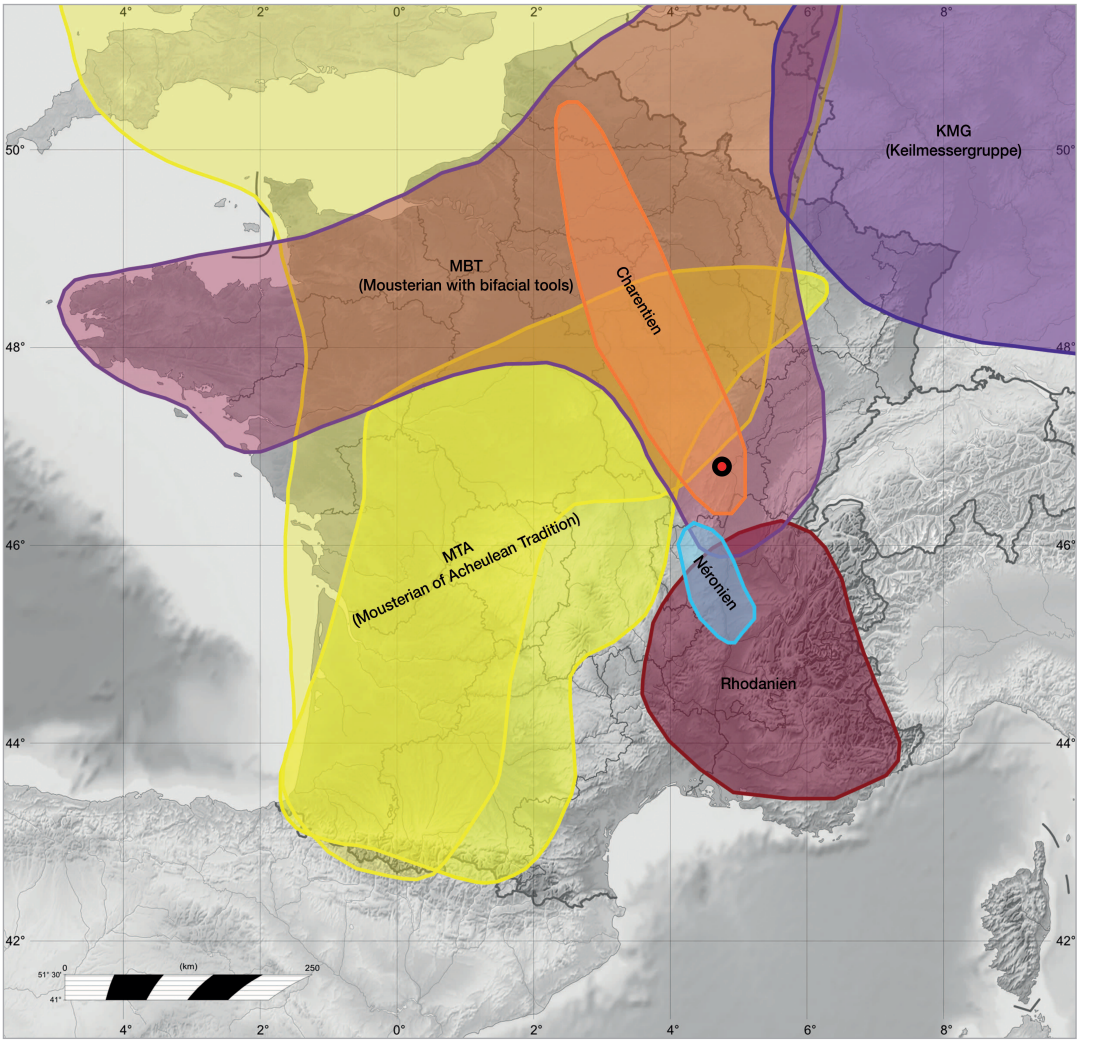


Fig. 13.
Schematic extent of different late Middle Paleolithic technocomplexes as indicated by different authors. MTA (Mousterian of Acheulean Tradition): bright yellow according to Soressi and Roussel (2014), light yellow according to Ruebens (2013); MBT (Mousterian with Bifacial Tools): according to Ruebens (2013); KMG (Keilmessergruppe): according to Ruebens (2013); Charentian (with Micoquian influence): according to Koehler (2009); Néronien: according to Koehler (2009); Rhodanien: according to Koehler (2009). The red spot indicates the location of the Côte Chalonnaise region. (map: wikipedia.org; mapping: Herkert).

ing point for further investigation. As demonstrated, the stratified assemblages contribute significantly to our understanding of the technological particularities within an observable variability. Initial radiometric dating provides further evidence for a chronological position in the late Middle Paleolithic, around the end of MIS 4 and the beginning of MIS 3.

The comparative studies of neighboring sites in the area, which we have recently commenced, reveal a multitude of common features despite the lack of stratigraphical context. Such mesoscopic regional research is crucial for understanding the structuring of late Middle Paleolithic settlement. The homogeneous patterning discovered contrasts with the former fairly heterogeneous image of the Middle Paleolithic record that emerged through typological assignments. In this context, we have to once again stress the identification of several assemblages containing *Keilmesser* with and without tranchet blow (Frick et al. 2018; Frick et al. 2017, also this volume; Herkert et al. 2015). Despite all of the production variability observed, this litho-technological correspondence within the industries links them to a plausible site cluster present in a region which is on the margins of the traditional circumjacent late Middle Paleolithic technocomplexes or facies (Fig. 13). This comparative regional analysis is an indispensable step for macroscopic considerations.

Our research has only just begun, and the identified presence of *Keilmesser* already enlarges the traditional extent of the central-eastern European *Keilmessergruppen* complex further to the west. Other lithic elements, such as various bifacial objects, have already led to other attributions for the Verpillière I assemblage, such as a Charentian with Micoquian influence, or, in a broader scale, to a Mousterian with Bifacial Tools (MBT) with affinities even to a Mousterian of Acheulian Tradition (MTA) (Koehler 2009; Ruebens 2012, 2013). To date, no definite attribution of the different assemblages can to be made. But rather than defining a discrete technocomplex, we propose to see the southern Burgundy site cluster in terms of a regional "style zone" (Binford 1965: 208), embedded in and reflecting the technological traditions of the surrounding space-time units and thus demonstrating the "[…] typo-technological and spatio-temporal variability" (Ruebens 2013: 349) of late Middle Paleolithic behavior.

CONCLUSION

We provide a comparative overview of a number of Middle Paleolithic assemblages from the Côte Chalonnaise that reveals quite homogeneous characteristics. The presence of bifacial objects, and, therein, particularly the presence of *Keilmesser* (with tranchet blow), embedded in a nearly exclusively Levallois-based blank production with a laminar component, strongly suggest a litho-technological linked site cluster. In total, five sites out of ten feature *Keilmesser* within their assemblages and four more contain bifacial elements (Table 7). The Levallois production shows a clear predilection for preferential and centripetal reduction (Fig. 4). On a re-

gional scale, initial indications emerge regarding inter-site functionality within the ranged habitat. High resolution data from stratified deposits show further evidence for spatial intra-site organization within the region. There, the example of Verpillière I demonstrates spatial patterning for lithic production purposes (Fig. 11). At Verpillière II, a distinct deposition of faunal remains and lithic artifacts indicates intended zoning within the occupation area (Fig. 12). Located on the margins of surrounding traditional late Middle Paleolithic techno-complexes, the research area is judged crucial to further our understanding of the relationship and possible interplay between these lithological facies at the end of MIS4 and the beginning of MIS3.

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