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Identification of Quina and Vasconian technocomplexes in Gatzarria Cave (north-western Pyrenees), based on the stratigraphic, taphonomic and technological revision of the Georges Laplace collections

Mise en évidence des technocomplexes Quina et Vasconien dans la grotte Gatzarria (Pyrénées-Atlantiques) à partir de la révision stratigraphique, taphonomique et technologique des collections Georges-Laplace

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ABSTRACT

The archaeo-sequence of Gatzarria Cave (Ossas-Suhare, Pyrénées-Atlantiques, France), in the northwestern foothills of the Pyrenees, records several phases of the Middle Palaeolithic and the initial stages of the Upper Palaeolithic. This type of deposit in a karstic context enables us to characterize diachronic changes in industries and to demonstrate the relative preservation of the assemblages. This cavity was excavated by Georges Laplace between 1951 and 1976 and contains a complex stratigraphy that was exposed to significant post-depositional processes. It was thus essential to test that the archaeological levels were intact before any techno-economic analysis. Several recent studies have questioned the homogeneity of the archaeological remains in the back of the cave. This article focuses on the sequencing of the industries attributed to the Quina and the Vasconian, based on the correlation of different types of taphonomic and typo-technological analyses (density of remains, surface conditions, refits, spatial distribution, analysis of the fieldwork notebooks). Ultimately, this work sheds light on the sequencing of lithic technocomplexes at a macro-regional scale in a relatively poorly-documented key zone between northern Aquitaine and the Cantabrian mountains.

Mots clés :
Paléolithique moyen
Dissection de palimpseste
Industries lithiques

RÉSUMÉ

Dans le piémont nord-occidental des Pyrénées, l'archéo-séquence de la grotte de Gatzarria (Ossas-Suhare, Pyrénées-Atlantiques) documente plusieurs phases du Paléolithique moyen et du Paléolithique supérieur initial. Ce type de dépôt en contexte karstique permet de caractériser les changements diachroniques dans les industries, sous réserve de démontrer la

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Quina
Vasconien
Gatzarria

préservation relative des ensembles. Fouillée par Georges Laplace entre 1951 et 1976, cette cavité a révélé une stratigraphie complexe ayant subi des processus post-dépositionnels importants, où l'intégrité des niveaux archéologiques doit être préalablement testée. Plusieurs études récentes ont notamment remis en question leur homogénéité dans le fond de la cavité. Cet article propose la mise en évidence d'une succession d'industries attribuées au Quina et au Vasconien, basée sur la corrélation de plusieurs types d'analyses taphonomiques et typo-technologiques (densité de vestiges, états de surface, remontages, répartition spatiale, analyse des carnets de terrain). Ces travaux permettent *in fine* de discuter la succession des techno-complexes lithiques à l'échelle macro-régionale dans une zone charnière peu documentée entre l'Aquitaine septentrionale et les monts Cantabriques.

1. Introduction

Middle Palaeolithic assemblages can be difficult to distinguish and characterize due to their ubiquitous characteristics. In addition, the revision of collections from early excavations is often a complex exercise due to disparate field data. Accurate fieldwork information is often considerably lacking in research carried out in and before the 1950s, and protocols for recovering remains tend to present significant discrepancies (e.g., Combe-Grenal, Discamps and Faivre, 2017). These problems still arise for sites excavated after the Second World War, even though the quality of stratigraphic descriptions, in particular, is much improved. This is the case for the excavation of Gatzarria Cave, carried out by Georges Laplace, where stratigraphic descriptions were recorded, and accurate information is available for sieving and plotting remains in three dimensions, based on the excavation method developed by Laplace and Méroc (1954).

In the North of the Basque Country, the history of archaeological research for the Middle Palaeolithic is characterized by two main phases of site excavation. The first, during the first quarter of the 20th century, corresponds to the work of E. Passemard in Olha I rock shelter and Isturitz (Passemard, 1924, 1936, 1944). His work closely parallels fieldwork carried out at the same time in Cantabria at Castillo, Morín and El Pendo (Breuil and Obermaier, 1914; Obermaier, 1924; Vega del Sella, 1921).

After that, regional archaeological research gained new impetus between the 1950s and the 1970s, with the work of Georges Laplace at Olha II and Gatzarria (Laplace, 1986; Laplace and Sáenz de Buruaga, 2000, 2002–2003), and fieldwork by C. Chauchat and C. Thibault at the open-air sites around Bayonne, namely the sites of Le Basté and Lestaulan (Chauchat, 1968, 1994; Chauchat and Thibault, 1968; Deschamps et al., 2016).

From the 1980s onwards, the coherence of the regional Vasconian facies (defined by Bordes, 1953) was called into question due to the hypothesis that the emblematic Vasconian tool, the flake cleaver, persisted in diverse regional Middle Palaeolithic facies (Cabrera Valdès, 1983). The coherence of the industries found in association with these specific tools was thus rejected (for a history of the Vasconian *cf*., e.g., Bordes, 1953; Cabrera Valdès, 1983, 1984; Deschamps, 2009, 2014, 2017; Deschamps and Mourre, 2011, Rodríguez Asensio and Arrizabalaga, 2004). Furthermore, several occupation levels from recently excavated sites were attributed to the Quina Mousterian (e.g., Castillo, Cabrera Valdès, 1984; Axlor, Gonzalez Urquijo et al., 2005; Esquilleu, Baena et al., 2005; Covalejos, Blanco and Barquín, 2004). Based on radiocarbon dates, some authors suggested that the Quina Mousterian in this region occurred later than 50 000 years (Baena et al., 2005, 2006; Carrión Santafé and Baena, 2002; Ríos Garaizar, 2012), which was more recent than in the North of Aquitaine, where it is attributed to the MIS 3/4 transition, between 55 and 60 ka BP, on the basis of OSL dates (Frouin et al., 2017; Guérin et al., 2012, 2017; Jacobs et al., 2016; Richter et al., 2013). As a result, the hypothesis of a very recent Quina Mousterian in the chronology of the Cantabrian Middle Palaeolithic is still debated. Recently, a regional chronological model was proposed for the eastern Cantabrian zone, where Vasconian industries were placed at the beginning of MIS 3 and considered to be older than Quina assemblages (Ríos Garaizar, 2017). The latter were considered to be one of the last expressions of the Middle Palaeolithic in this region.

This article proposes a reassessment of the lithic material from the levels of Gatzarria Cave excavated by Laplace and attributed to the Middle Palaeolithic. A recent revision of the lithic industries and their stratigraphic context, along with data from our observations of the lithic material (refits, analysis of the spatial distribution of the remains and typo-technological classification), and the analysis of fieldwork observations recorded in the excavation notebooks, enabled us to identify a sequence for the industries attributed to the Quina and Vasconian lithic techno-complexes, whereas they had formerly been attributed to a single archaeological level (Laplace and Sáenz de Buruaga, 2002–2003). This gave rise to a new interpretation of the Middle Palaeolithic archaeo-sequence from Gatzarria, based on a taphonomic and techno-typological approach.

These results open several avenues for reflection at a regional and macro-regional scale, in particular for the comparison of the results from Gatzarria with sites in the North of Aquitaine and in Cantabria, which are, for now, the better documented areas for this period. The ultimate aim is to consider the links and sequences of the lithic techno-complexes in and between these different regions.

2. Material and methods

2.1. Presentation of the site

Gatzarria Cave is located in the western part of the Pyrenees Mountains, in the Soule region (Pyrénées-Atlantiques; Fig. 1). It opens on the northeastern slope of Mont Hargagne, to the east of the Arbailles Massif and overlooks the Saison Valley at an altitude of 270 m above sea level. The cave had been known to the inhabitants of the region for a long time, but the archaeological potential of the site was only revealed in 1950 by P. Boucher. Between 1951 and 1953, P. Boucher, P. Bouillon, F. Bordes, and G.Laplace carried out test pits. In 1956, Georges Laplace began the first excavations of the site, which were interrupted in 1957. They resumed in 1961 and continued until 1976, under the direction of Georges Laplace. Like for the site of Olha II, the "Laplace-Méroc" excavation method was applied (Laplace and Méroc, 1954). However, the recent revision of the collection showed that only large-sized remains, mainly cores and retouched tools, were recorded in three dimensions during these excavations. The rest of the remains were gathered per ninth of a square metre over depths of 5 or 10 cm. Several articles have been published in the past on the characterization of the different Middle and Upper Palaeolithic lithic industries of this cave using the analytical typological approach (Laplace, 1966; Laplace and Sáenz de Buruaga, 2002–2003; Sáenz de Buruaga, 1991), and on faunal (Lavaud, 1980) or sedimentary studies (Lévêque, 1966).

Several attempts were also recently made at dating the Middle Palaeolithic levels. Four ^{14}C dates from the most recent level, Cj, place it in the MIS 3, between 44 and 47 ka BP (Ready and Morin, 2013). In contrast, the ^{14}C results for level Cjr only yielded minimum ages (> 47 400 and > 50 300 BP, Barshay-Szmidt et al., 2012). We can thus consider that the age of the deposits from the base of the stratigraphy of Gatzarria is close or older than the limit of the scope of the ^{14}C method.

2.1.1. Stratigraphy

The stratigraphic sequence recorded by Georges Laplace contains a sequence of nine archaeological levels attributed to the Middle Palaeolithic and the early Upper Palaeolithic. This complex sequence is partially disturbed by post-depositional events (burrows, runoff). Some of the sedimentary layers were only identified as lateral facies.

Moreover, at times, the different archaeological layers identified in the stratigraphic assemblages do not present any sedimentary differences and were only identified on the basis of their archaeological characteristics, as is the case for the subdivisions of assemblage Cj (Table 1).

The presence of manganese incrustations in layer Cjmg indicates the existence of stagnant water during this phase. Weathered remains are also unequally distributed throughout the cavity and imply that relatively intense runoff phases affected certain sectors. For these reasons, Georges Laplace proposed a theoretical reconstruction *a posteriori* of the superposition of the archaeological layers, based on his fieldwork observations (Fig. 1.4). This consists of three stratigraphic assemblages regrouping several archaeological layers. From the top to the bottom, the upper assemblage is made up of a sandy-clayey brown sediment including cryoclastic gravel. It comprises a Gravettian level (cbcs), a recent Aurignacian level (cb), and an early Aurignacian level (cbci–cbf).

The middle assemblage is characterized by a compact clayey yellow, very homogeneous sediment. The archaeological levels in this assemblage were only distinguished on the basis of the changes observed in the lithic assemblages. This assemblage comprises two proto-Aurignacian levels (cjn1 and cjn2), some evidence of a Chatelperronian occupation (cjn3), and the first Middle Palaeolithic layer (cj).

Finally, the lower assemblage is characterized by sandy-clayey, mainly red levels, containing significant and variable concentrations of manganese. This assemblage includes two archaeological levels: cjr and cr.

2.1.2. Faunal remains

The paleontological study of the faunal remains from these excavations was carried out by F. Lavaud in the frame of a PhD thesis (Deschamps and Flas, in press; Lavaud, 1980). According to this study, the red deer is the most frequent animal, followed by the horse and bovids, apart from in the Aurignacian layers Cb and Cbf, where bovids are better represented. Small proportions of carnivores are present throughout the sequence, except in the Aurignacian levels Cb and Cbf, where their proportions are much higher.

Remains of isard and ibex were also identified. This is important as in some montanous sites, some authors have advanced the hypothesis of the specialized hunting of mountain species (e.g., Allard, 1993; Altuna, 1990). However, non-human rather than anthropogenic agents can explain these accumulations in most of these sites, like at Amalda (Yravedra, 2007), or Noisetier (Costamagno et al., 2008; Mallye et al., 2012).

A recent study of the Mousterian level Cj confirmed previously proposed trends, with a fauna composed mainly of red deer, followed by bovids (Ready, 2013). This study also showed that 10% of the fauna was represented by mountain species, and that carnivores were rare. This level could thus at least partially represent an anthropogenic accumulation. Similar observations were made at Noisetier, where high percentages of digested bones were identified on isard remains, but equivalent proportions of digested bones and anthropogenic cut marks on the ibex indicate that mixed agents were responsible for the accumulation of this taxon (Costamagno et al., 2008).

The study of the faunal remains from the Middle Palaeolithic levels (Laplace excavation) is still ongoing (Morin, *in progress*).

2.1.3. Lithic industries

The lithic industry from the different levels was previously studied with an analytical and structural approach (Laplace, 1966; Laplace and Sáenz de Buruaga, 2002–2003; Sáenz de Buruaga, 1991). These first studies identified an archaeological sequence extending from the Middle Palaeolithic to the Gravettian (Deschamps and Flas, in press). Georges Laplace defined three assemblages for the levels

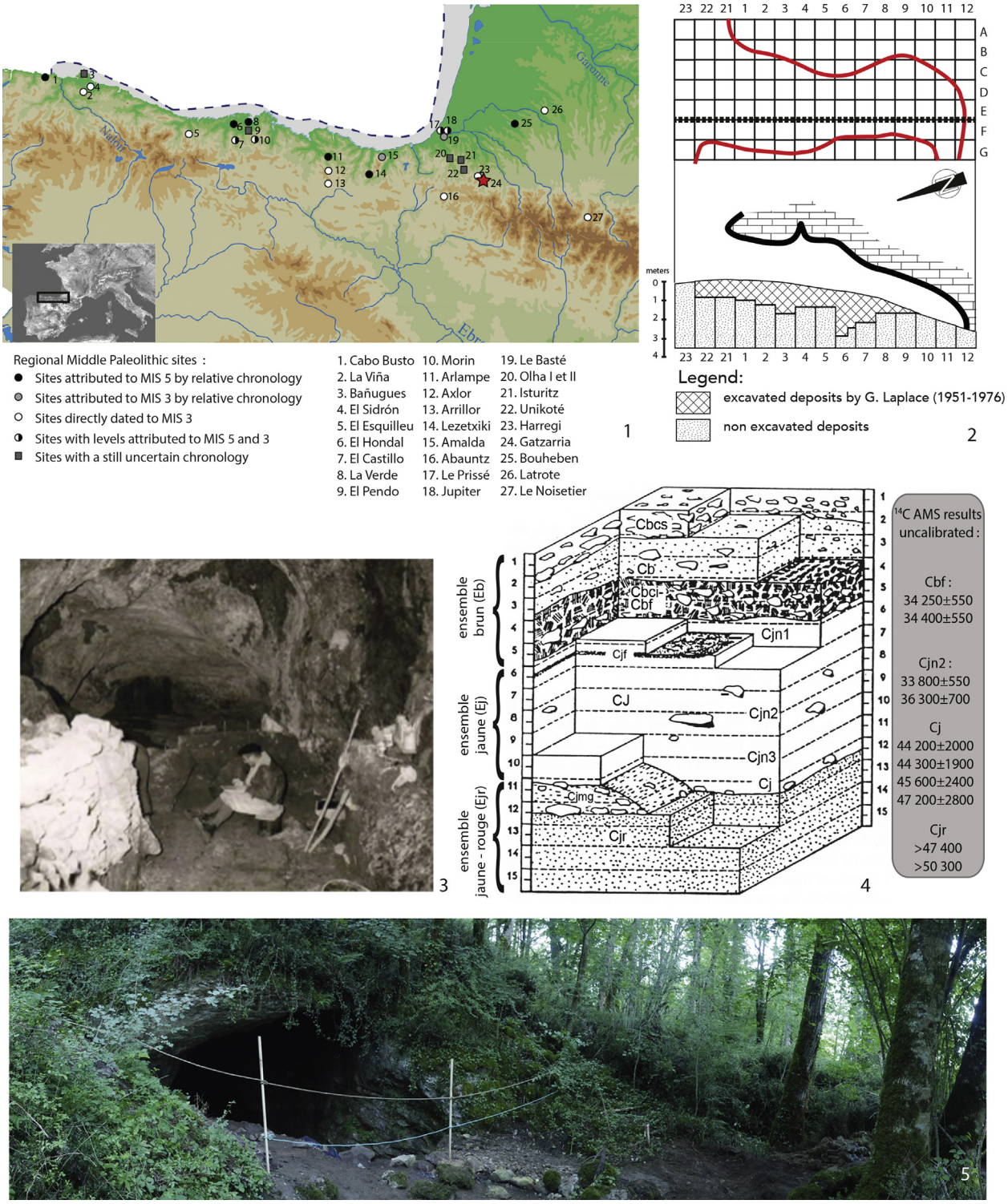

Fig. 1. 1: Main Middle Palaeolithic sites of the region; 2: plan and profile of the cave with the excavated area; 3: photograph of Georges Laplace drawing the sagittal profile in 1968 (MNP archives); 4: theoretical stratigraphic sequence (after Laplace, 1971, modified) with indications of the three main stratigraphic clusters, and the published C^{14} dates (after Barshay-Szmidt et al., 2012; Ready and Morin, 2013); 5: view of the entrance of the cave in 2017 (photo: M. Deschamps).

Fig. 1. 1 : Principaux sites de la région attribués au Paléolithique moyen ; 2 : plan et profil de la grotte avec indication des zones fouillées ; 3 : photographie de Georges Laplace dessinant la coupe sagittale en 1968 (archives MNP) ; 4 : séquence stratigraphique théorique (d'après Laplace, 1971, modifié) avec indications des trois principaux ensembles stratigraphiques, et les résultats des datations C^{14} publiées (d'après Barshay-Szmidt et al., 2012 ; Ready et Morin, 2013) ; 5 : vue de l'entrée de la grotte en 2017 (photo : M. Deschamps).

Table 1
Synthesis of Laplace's observations concerning the identified layers, their sedimentary description and cultural attribution.
Tableau 1
Synthèse des observations de Georges Laplace concernant les niveaux identifiés, leur description sédimentaire et leur attribution culturelle.

Stratigraphic unit	Layer	Archaeological characterization	Geological description
Eb	Cbn–Cbr		Reworked compact brown clay humic sediment corresponding to a cryoclastic cone of éboulis
	Cbcs	Gravettian	Brownish sandy-clay sediment including cryoclastic gravels; partially reworked
	Cb	Recent Aurignacian	Brownish sandy-clay sediment including few cryoclastic gravels and rare limestone roof collapse blocks
	Cbci–Cbf	Early Aurignacian	Brownish sandy-clay sediment including several cryoclastic elements associated with a level of hearths
Ej	Cjn1	Protoaugnacian	Pale yellowish clayey, greasy and compact sediment containing small pebbles of decomposed schist and rare corroded limestone elements. Cjn1 is individualized by diffuse burned elements
	Cjn2	Protoaugnacien	Pale yellowish clayey, greasy and compact sediment containing small pebbles of decomposed schist and rare corroded limestone elements. Cjn2 is individualized only by its archaeological components
	Cjn3	Châtelperronian	Pale yellowish clayey, greasy and compact sediment containing small pebbles of decomposed schist and rare corroded limestone elements. Cjn3 is individualized only by its archaeological components
	Cj	Mousterian Levallois	Pale yellowish clayey, greasy and compact sediment containing small pebbles of decomposed schist and rare corroded limestone elements. Cj is individualized by its archaeological components and by localized lenses of manganese
	Cjmg	Mousterian indeterminated	Concretionned sediment containing many ferro-manganic elements. This layer has very irregular boundaries and is not present in all squares
Ejr	Cjr	Mousterian with cleavers	Sandy clay with small pebbles of often rubefied schist. This layer is predominantly yellow or red. At its base, the Cjr layer is marked locally (in the bottom part of the cave) by an alternation of compact and more sandy sub-levels, named Cjrs.
	Cr	Mousterian indeterminated	Red clay with localized manganese concentrations and concentrations of bone

attributed to the Middle Palaeolithic (Laplace and Sáenz de Buruaga, 2002–2003):

- Cj is the first Middle Palaeolithic layer discerned by Georges Laplace. The industry is characterized by the predominance of quartzite, which contrasts sharply with the overlying levels, and Levallois debitage associated with abundant sidescrapers;
- the industry from Cjr is characterized by carenated scrapers *"racloirs carénoïdes"*, abundant denticulates, and the presence of flake cleavers made on Pyrenean rocks (ophite, quartzite). In contrast, no bifaces were found;
- finally, the lithic material from level Cr is only fleetingly mentioned in publications as this level was only excavated over a very limited surface of 2 m^2 and yielded relatively sparse remains.

According to Laplace and Sáenz de Buruaga, the typological spectrum identified in Cjr undergoes morpho-technical diversification in Cj, where a tendency towards leptolithic forms also develops. The authors envisage the idea of "increasing diachronic complexity" (Laplace and Sáenz de Buruaga, 2002–2003, p. 112). However, this raises the question of stratigraphic mixing for layer Cj as "*this level is inseparably associated with the lower part of cjn3 [...]*" (Laplace and Sáenz de Buruaga, 2002–2003, p. 86), which contains a leptolithic assemblage attributed to the Chatelperronian.

2.2. Taphonomic analysis

In order to carry out a critical revision of the Middle Palaeolithic lithic assemblage from the Gatzarria archaeo-sequence, it was first of all necessary to carry out distribution and homogeneity tests for the remains in the different excavated sectors.

Indeed, level Cj was excavated over a large surface (44 m^2), but the excavation of the underlying levels was confined to test pits over a surface of 1 m^2 in the entrance and 3 m^2 in the second half of the cavity.

An earlier study already pointed out differences in the preservation of archaeological occupations in the entrance and the back of the cave for levels attributed to the Protoaurignacian (Barshay-Szmidt et al., 2012; Eizenberg, unpublished). In this way, the results of the taphonomic analysis influenced the sampling of remains in order to characterize the assemblages.

This aspect of the study takes several parameters into consideration (Fig. 2).

- The distribution of the density of remains more than 2 cm long per spit was projected onto a sagittal section. Square 3F and square 6E (which represents the most deeply excavated sector in the second half of the cavity) were selected. The three coordinates were available for some of the remains, but most of them had been gathered by sub-squares of 33 × 33 cm, over depths of 5 or 10 cm. This projection generates the density of remains according to

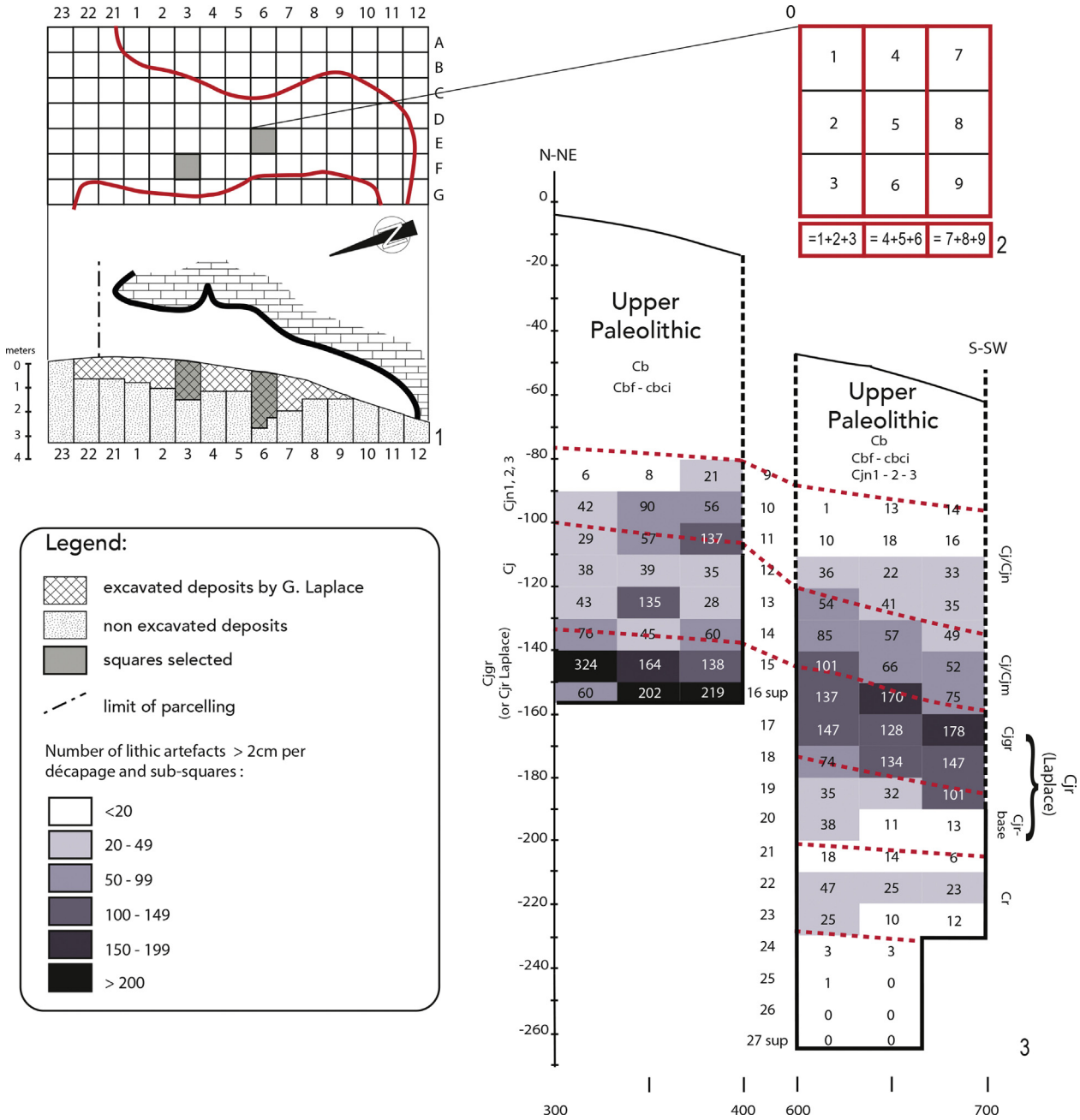

Fig. 2. Distribution of artefact density. 1: Plan of the cave with squares concerned in grey; 2: Laplace's excavation grid for each square and cumulated numbers used to represent it on a profile; 3: profiles of squares 3F and 6E with artefact density over a depth of 10 cm for each spit and correspondence of layers according to the main dip (CAD: M. Deschamps).

Fig. 2. Répartition de la densité des vestiges. 1 : Plan de la grotte avec les carrés concernés en gris ; 2 : carroyage de Georges Laplace pour chaque carré et sous-carré additionnés pour les représenter sur le profil ; 3 : profil des carrés 3F et 6E avec la densité des vestiges représentée par décapage et la correspondance des niveaux selon le pendage principal des niveaux (DAO : M. Deschamps).

their relative depth, which indicates whether remains occur in concentrations, or whether sterile zones can be identified in the stratigraphy, regardless of sedimentary observations. The main aim here was to test correlations between these two types of data.

In spite of the easily identifiable overall natural dip of the layers from the entrance towards the back of the cavity, which is visible on the surface of the natural ground, Georges Laplace's excavations followed plane surfaces. Therefore, all the assemblages defined during his excavations are probably partially truncated or at least mixed up with their interfaces. The analysis of the distribution of the density of remains can nevertheless identify the presence and morphology of layers of relatively abundant remains at different levels of the stratigraphy, as well as their

continuity between the entrance (square 3F, zone A) and the rear sector of the cavity (squares 6D, 6E, 7E; zone B). The integration of the granulometric data and the distribution of the fine fraction can also provide important taphonomic information (Bertran et al., 2012). However, the intensity of post-depositional processes, linked to runoff in particular, has already been discussed here and we have already suggested that these remains are not in primary position (Deschamps and Flas, in press). Moreover, it is impossible to check the sieving protocol implemented during Laplace's excavations, which could bias our interpretations, and thus the interest of this type of analysis in this context must be put in perspective. We thus counted all the lithic remains longer than 2 cm, by spit and by sub-square. In order to represent these quantities on a sagittal section, we then combined the sub-squares on the sagittal sections. In this way, sub-squares 1, 2, 3; 4, 5, 6, and 7, 8, 9 were grouped together (Fig. 2.3).

These analyses enabled us to show that the quantities of remains at the interface between Upper and Middle Palaeolithic levels are not very dense. However, remains are slightly more abundant in layer Cj. In 6E, layer Cjm is an irregular layer with an intense manganese deposit. As previously discussed, level Cjm is not an archaeological level in its own right, but probably formed at the interface of two layers by partially reworking them.

In the two test squares, the density of remains then clearly intensifies in both sectors. Georges Laplace named this assemblage Cjr, but the study of the excavation notebooks enabled us to find the trace of a layer named Cjgr (red-grey-yellow layer) in the upper part of layer Cjr. This Cjgr layer was identified and described in the excavation notebooks, but was not retained in the theoretical stratigraphy published later (Laplace, 1971), as it was considered as a local occurrence affecting Cjr. Therefore, all of these remains were grouped together in assemblage Cjr.

In square 3F, on the other hand, there is no such distinction and this level is called Cjr. But the excavation in 3F stopped after two spits into Cjr layer, and it was thus not possible to assess whether a similar subdivision could be made in square 3F between Cjgr and Cjr.

Subsequently, Laplace decided not to conserve the Cjgr distinction and to group everything under Cjr. However, this subdivision appears to be more significant than a simple sedimentary variation, as the density of remains also indicates a difference between the spits initially attributed to Cjgr and those attributed to Cjr. The results of other analyses also support this hypothesis (*cf.* below).

The following spits are related to layer Cr, which was only attained by Georges Laplace's excavations in squares 6E and 6D. He described this level as containing few remains, which is also apparent in Fig. 2.4. A subdivision can also be added in assemblage Cr between a first level containing a low density of remains, and a second sub-sterile level from spit 24 onwards, where even sieved elements from the fine fraction are absent (personal observations).

- Secondly, the distribution of rolled remains enables us to show whether post-depositional actions linked to runoff are homogeneous, or whether they are differentially distributed. This type of alteration provides information on the sectors exposed to runoff.

Based on this projection (Fig. 3.2) and in spite of the fact that this information is partial, as it only takes into consideration the recorded remains, it appears that there is a concentration of rolled remains in the sector of the rear test pit of the cavity. In contrast, rolled remains are sparse in the entrance zone. This could be due to:

- remains falling from a vertical alignment and getting mixed up with the remains of the archaeological levels. The latter would then have undergone mass transport towards the interior of the cave, incorporating these rolled remains.
- or to sheets of remains moving towards the back of the cavity and then being exposed to more or less intensive runoff action over time. This second hypothesis appears to be consistent with the manganese incrustations in these levels.

In any case, the rear sector of the cavity appears to have undergone several post-depositional actions, which are clearly less visible in the entrance zone. It has yet to be determined if this sector is relatively intact or if it should be excluded from future analyses.

- In order to determine this question, we tested the refits and conjoins in the sequence (Fig. 3.2–4). The limited excavated surface for these levels (4m^2 in two distinct zones) was a clear obstacle for refits, but the rare refits and conjoins nonetheless provide crucial information on the conservation of archaeological levels and the correspondence between the square of the entrance (3F) and the sector of the deep test pit (6D/E–7E). The large quantity of remains and the homogeneity of the dominant raw material, a bluish quartzite, represent a further obstacle for this exercise. Furthermore, some of the refitted remains were not plotted during the excavation and the average coordinates of the spit from which they came were attributed to them.

In spite of these difficulties, several artefacts were refitted (Fig. 3.3–4), providing important information on the integrity of the levels. Altogether, 30 remains were grouped into 14 refit units, comprising 9 conjoins and 5 refits. Most of them were on a sub-horizontal axis and a short distance apart (in the same square). Only layer Cj was excavated over a large surface. Two refits identified in this layer are further away from each other (over a meter). However, we observe that these two refits are still sub-horizontal and follow the natural dip of the layer. This indicates that the remains from Cj underwent transport over a short distance, from the entrance towards the back of the cavity.

Six conjoins and refits come from the deep test pit, between squares 6E and 6D in levels Cjgr/Cjr. Their position shows how complex it is to identify clear differences at this level of the stratigraphy. A clearer distinction emerges on the frontal projection of these refits (Fig. 3.4), where two horizons of separate refits seem to occur.

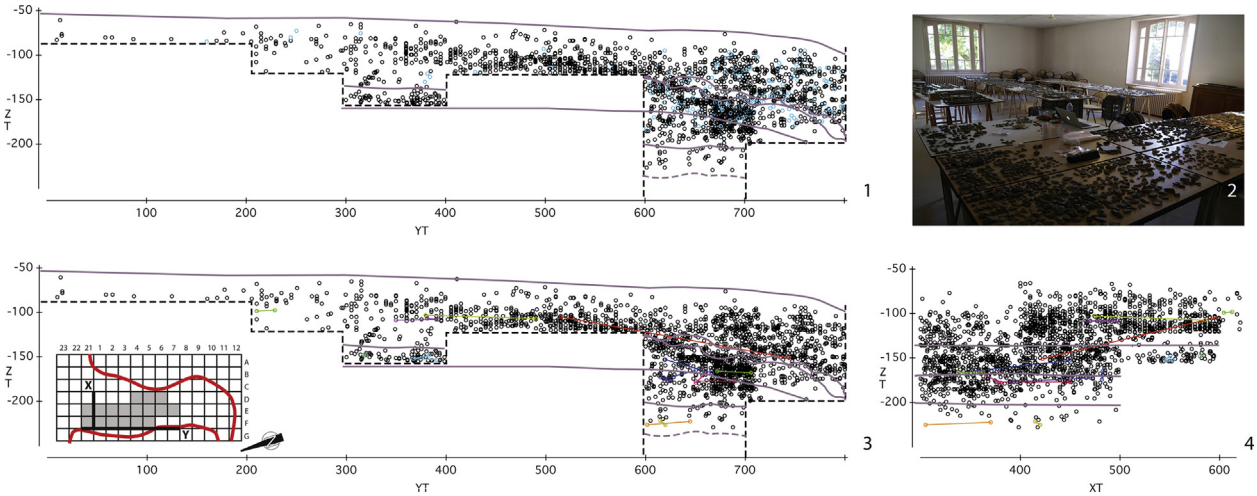

Fig. 3. 1: Distribution of artefacts weathered by run-off on a sagittal profile; 2: view of the study room during refit attempts in Les Eyzies-de-Tayac in 2015; 3: distribution of refits on the sagittal profile; 4: distribution of refits on a transversal profile (CAD: M. Deschamps).

Fig. 3. 1 : Répartition des vestiges roulés par ruissellement sur le profil sagittal ; 2 : vue de la salle d'étude pendant les tentatives de remontage aux Eyzies-de-Tayac en 2015 ; 3 : répartition des remontages sur le profil sagittal ; 4 : répartition des remontages sur le profil transversal (DAO : M. Deschamps).

Finally, two refits come from the deepest level Cr, which was only excavated in squares 6D and E. These two refits are at the same altitude and are about 50 cm lower than the others, implying that a relatively better preservation of this level at this altitude. This suggestion is backed up by the distribution of weathered artefacts (Fig. 3.1), which are absent from the bottom of the test pit where the remains display fresh or slightly altered surfaces.

2.3. Typo-technological analysis and spatial distribution

The taphonomic study showed that the aspect of the remains from the entrance was different than those from the second half of the cavity, indicating that the rear sector was exposed to more severe post-depositional action. In addition, our first revision of the Laplace collections show differences in the typological characteristics of layer Cjr between square 3F and squares 6D/E–7E. Indeed, Quina-type scrapers were present in squares 6D/E–7E, whereas they were absent in square 3F. However, it was not possible to clearly identify sedimentary and archaeological correlations between the two sectors, as square 3F was not excavated down to the substratum.

This concentration of remains with Quina-type retouch in the test pit could be due to the differential distribution of activity zones in layer Cjr, or these remains could also correspond to another archaeological level, different from that defined as belonging to Cjr in square 3F.

In light of post-depositional actions, it is unlikely that the distribution of anthropogenic activities was preserved. In the second hypothesis, the absence of artefacts with Quina-type retouch in square 3F, where the excavation did not continue to the base of the stratigraphic sequence, is consistent with the better preservation and greater thickness of the sedimentary deposits in the entrance, as also observed by L. Eizenberg.

In order to test this hypothesis, we made projections of the most discriminating typological elements in the Mousterian sequence (Deschamps, 2014; Deschamps and Flas, in press). We selected all the tools plotted in three dimensions and divided them into five main typological groups. It is important to recall here that only some of the cores and retouched tools were plotted during excavations. These five groups comprise: *"ubiquitous"* tools (1), including flakes with partial retouch and lateral, transverse, double or multiple scrapers with simple retouch, generally found in most of Middle Palaeolithic lithic technocomplexes. They can be differentiated from *scrapers with scalar Quina (2) and demi-Quina* (3) retouch, which generally attest to specific techno-economic and functional strategies. The *notches and denticulates* (4) comprise another group and the *macro-tools* (flake cleavers, 5) form the last one (Fig. 4.1–2).

These projections brought to light a differential vertical distribution of these categories. All the Quina and demi-Quina scrapers, with one exception, are concentrated at the base of the stratigraphy at altitudes ranging between < −170 and −200 cm. Conversely, there are few denticulates in these lower levels. The group of denticulates is concentrated above < −170 and persists until the end of the sequence, attributed to the Middle Palaeolithic. They are thus present in the upper part of layer Cjr (hereafter renamed Cjgr) and in layer Cj. Finally, cleavers are rare and are only present in layer Cjgr.

This reinterpretation of the archaeo-sequence in the test pit enabled us to attempt to position the industry from layer Cjr in 3F in relation to this new stratigraphic sequence. Thus, the typological composition of the industry from square 3F at altitudes ranging between < −135 and −155 cm, and the general dip of the layer, correspond to level Cjgr identified in the test pit where scrapers are the most abundant tools, followed by denticulates, but there are also two flake cleavers and a large non-retouched blank in ophite in the same altitudinal horizon.

The correlation of all these taphonomic, typo-technological and spatial distribution data enabled us

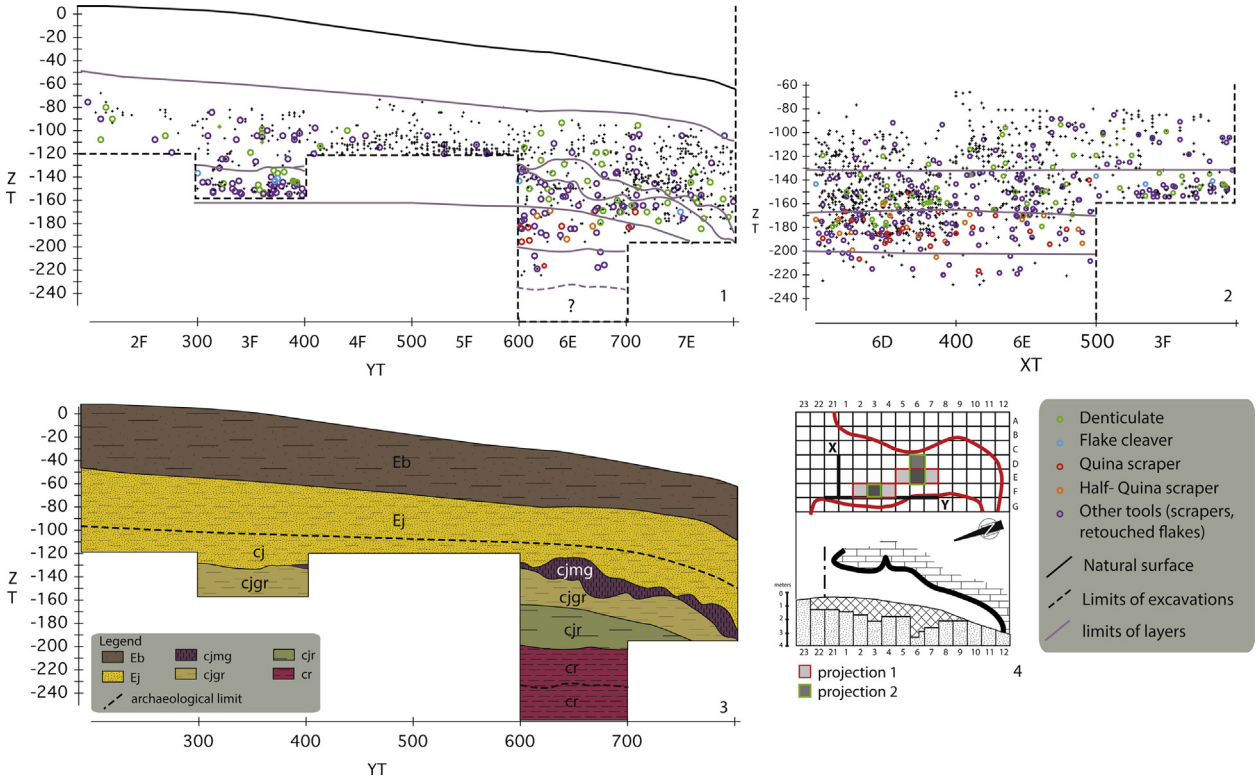

Fig. 4. 1: Distribution of coordinated retouched tool groups on the sagittal profile and hypothetical limits of layers; 2: distribution of coordinated retouched tool groups on the transversal profile; 3: new stratigraphic interpretation of the sequence based on Laplace's description and the results of this study; 4: plan of the cave with concerned squares in grey.

Fig. 4. (CAD: M. Deschamps) 1 : Répartition des outils retouchés par groupe sur le profil sagittal et limites hypothétiques des niveaux ; 2 : répartition des outils retouchés par groupe sur le profil transversal ; 3 : nouvelle interprétation stratigraphique de la séquence basée sur les descriptions de Laplace et les résultats de cette révision ; 4 : plan de la grotte avec les carrés concernés en gris (DAO : M. Deschamps).

to distinguish several coherent levels and to propose a new breakdown of the archaeo-sequence attributed to the Middle Palaeolithic of Gatzarria (Fig. 4.3). The cross-referencing of data concerning the density of the remains, refits and the spatial distribution of typological attributes shows the same interruption in layer Cjr in the test pit. The delimitation between these two assemblages is not clear, but the transversal and sagittal projections identify this limit at a depth of < −170/−175 cm for squares 6D/E.

The fieldwork notebooks also show that the Cjr assemblage was initially divided into two phases, with an upper part named Cjgr in the test pit, with altitudes corresponding to the typological interruption observed on our projections. In squares 6D/E–7E, Laplace's Cjr layer thus corresponds in reality to two distinct archaeological levels: a first one that we rename Cjr-base, above which is level Cjgr.

3. Results. New characterization of the Middle Palaeolithic industries of Gatzarria

In light of the new breakdown of the stratigraphic sequence proposed here, it is now essential to redefine the characteristics of the lithic assemblages for each archaeological level.

First of all, the gradual change in the industries in the last level attributed to the Middle Palaeolithic and those attributed to the Upper Palaeolithic brought to light the presence of mixing between these levels, at their interface. Indeed, as described earlier, remains attributed to the Chatelperronian and the Protoaurignacian intrude into the upper part of layer Cj (Ready and Morin, 2013). We can consider that above this limit, there is mixing between the industries attributable to the Middle Palaeolithic and those attributable to the initial phases of the Upper Palaeolithic. Laplace noted that this Mousterian component mixed in with the Chatelperronian would be "*a Mousterian with denticulates [. . .]. The composition of this industry could be explained by possible mixing between a late Mousterian level and a Castelperronian level*" (Laplace, 1966). The mention of a Mousterian with denticulates on the same altitudinal horizon as the Chatelperronian is rather different from the description of Cj, with rare denticulates and well-represented Levallois debitage.

Future studies will allow us to characterize the different components of this upper assemblage and identify whether the Mousterian component of this assemblage is consistent with the industry identified in level Cj, or whether it is a last Middle Palaeolithic occupation, just before the Upper Palaeolithic.

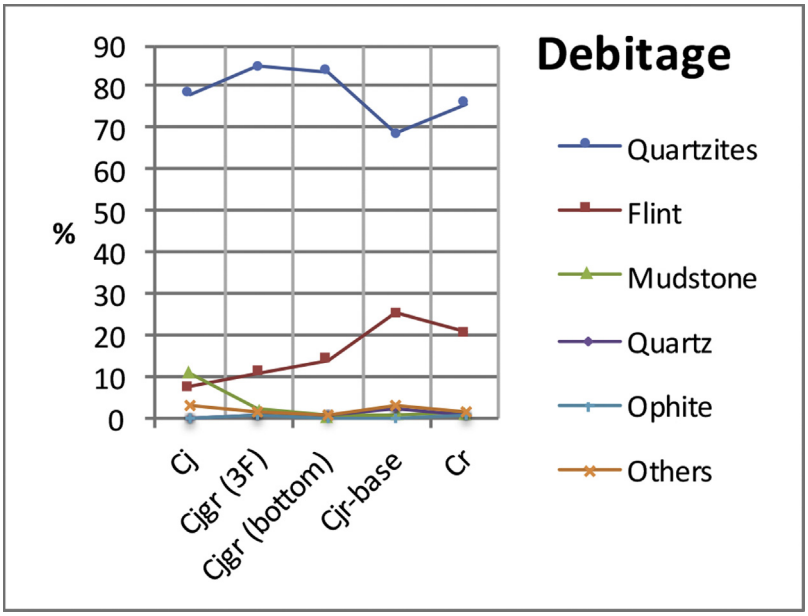

Fig. 5. Raw material distribution per layer except for Cjgr (3F) and Cjgr (bottom), which are shown separately to demonstrate their correlation.
Fig. 5. Répartition des matières premières par niveau excepté pour Gjgr (3F) et Cjgr (fond), qui sont représentés séparément afin de démontrer leur corrélation.

3.1. Raw materials

There are variations in the raw materials used in the different levels attributed to the Middle Palaeolithic.

Quartzites are predominant throughout the sequence (between 78 and 84%; Fig. 5). They are available in nearby river alluvions, in particular in the Saison, which is about 2 km from the site. Samples from the Saison and its main tributaries are currently under study, in order to characterize the different types of Pyrenean rocks available in the local environment of the site and to evaluate the degree of qualitative raw material selection (Deschamps et al., in press; Minet et al., submitted).

The flint is mainly allochthonous, apart from the nearest known source, Iholdy flint, which is about 10 km from the site. The different types of flint identified at Gatzarria show that a considerable variety of regional sources were used, in addition to the Bidache type Flysch flint. These include the deposits of Hibarette to the east, those of Tercis and Chalosse towards the north and Urbasa and Treviño to the south (*op. cit.*). This implies that human groups had extensive knowledge of a vast regional territory and connections with the Ebro Valley, which also infers that they may have crossed the Pyrenees through valleys and passes in the inland Basque Country.

These flints form the second most frequent category after quartzite, particularly in Cjr-base, where they represent 25% of the remains. Conversely, they are relatively rare in Cj where a local rock, mudstone, was widely used. In all levels, flint was generally imported from distances of 40 to 50 km in the form of flakes and retouched tools (cf. below).

All the other rocks were relatively rarely used, such as ophite, which only represents 0.5% in level Cjgr-3F (where it was most widespread), or quartz, which represents 2.4% in level Cjr-base. The other identified rocks were only marginally used and have been combined in the other/undetermined category (cinerite, lydite, sandstone, indeterminate volcanic rocks, jasper, etc.).

3.2. Blank production

The technological classification of whole flakes also shows variations between the assemblages. In Cj, we observe Levallois production in quartzite (Fig. 6.1, Fig. 7), whereas Levallois blanks in quartzite are practically absent elsewhere in the sequence (Fig. 6.2–5). However, Discoid debitage is also present in this level along with a significant number of pseudo-Levallois points. It is possible that two operative chains coexisted in this level or that there is a palimpsest effect in Cj. The ongoing study of the upper part of level Cj should clarify this hypothesis in the near future.

The industry from layer Cjgr is characterized by dominant Discoid debitage on quartzite (Deschamps, 2014, 2017; Fig. 8). Most of the blanks from cores are thick flakes with a cortical upper surface. Thus, cortical surfaces are generally directly used as striking platforms. This observation is also backed up by an increase in Kombewa-type flakes in this level (Fig. 6.2–3). Unlike in the overlying level, elongated and Levallois products are rare. Several shaping flakes are present. We also note an increase in products linked to toolkit management. This level also contains a small percentage of flake cleavers (Fig. 9). Flint debitage is rare and flint cores appear to be related to Levallois management, but it is difficult at times to understand production aims as cores were only discarded when highly exhausted (Deschamps, 2014, p. 375).

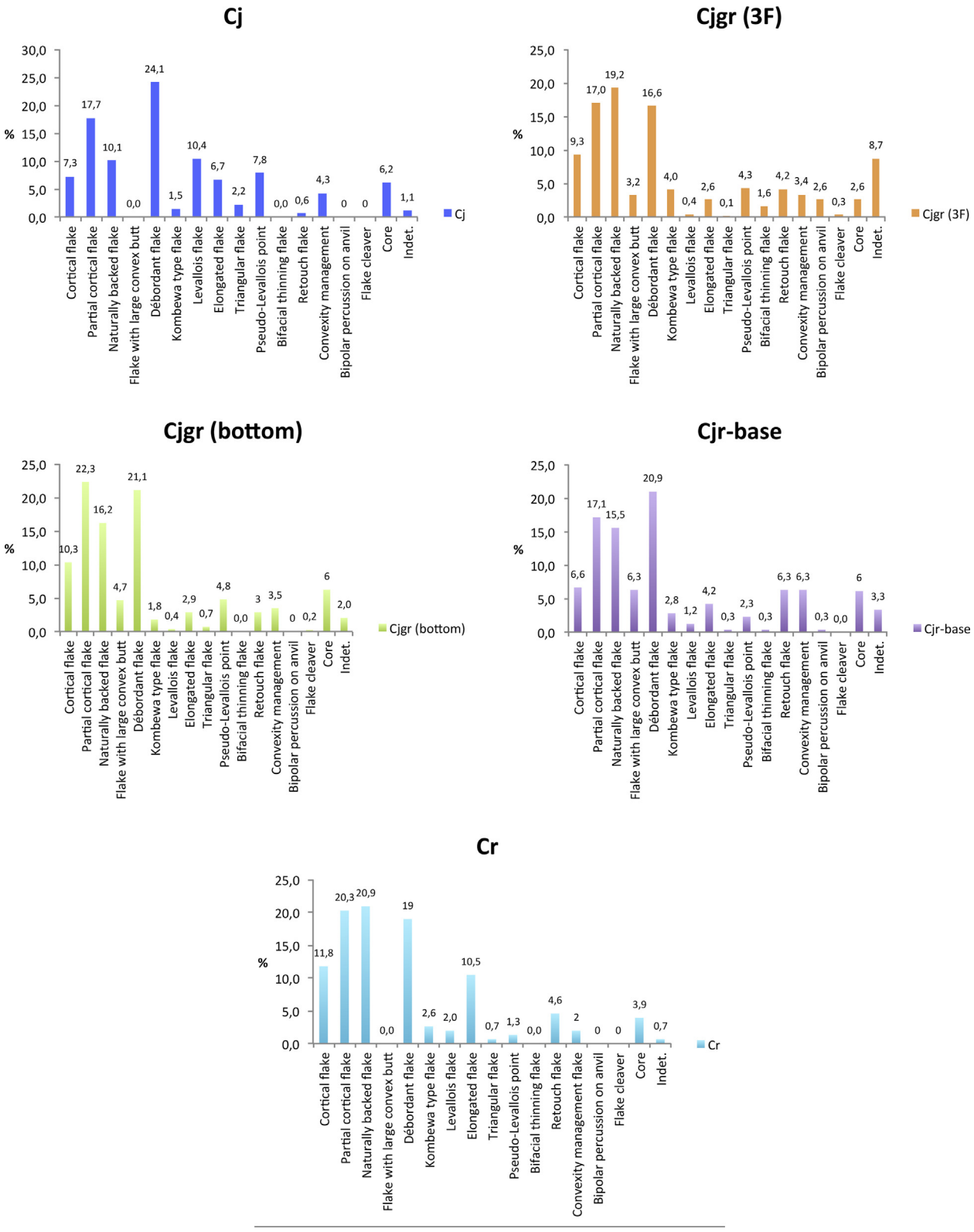

Fig. 6. Distribution of technological categories for each layer, except for Cjgr (3F) and Cjgr (bottom), which are shown separately to demonstrate their correlation.

Fig. 6. Répartition des catégories technologiques pour chaque niveau excepté pour Cjgr (3F) et Cjgr (fond), qui sont représentés séparément afin de démontrer leur corrélation.

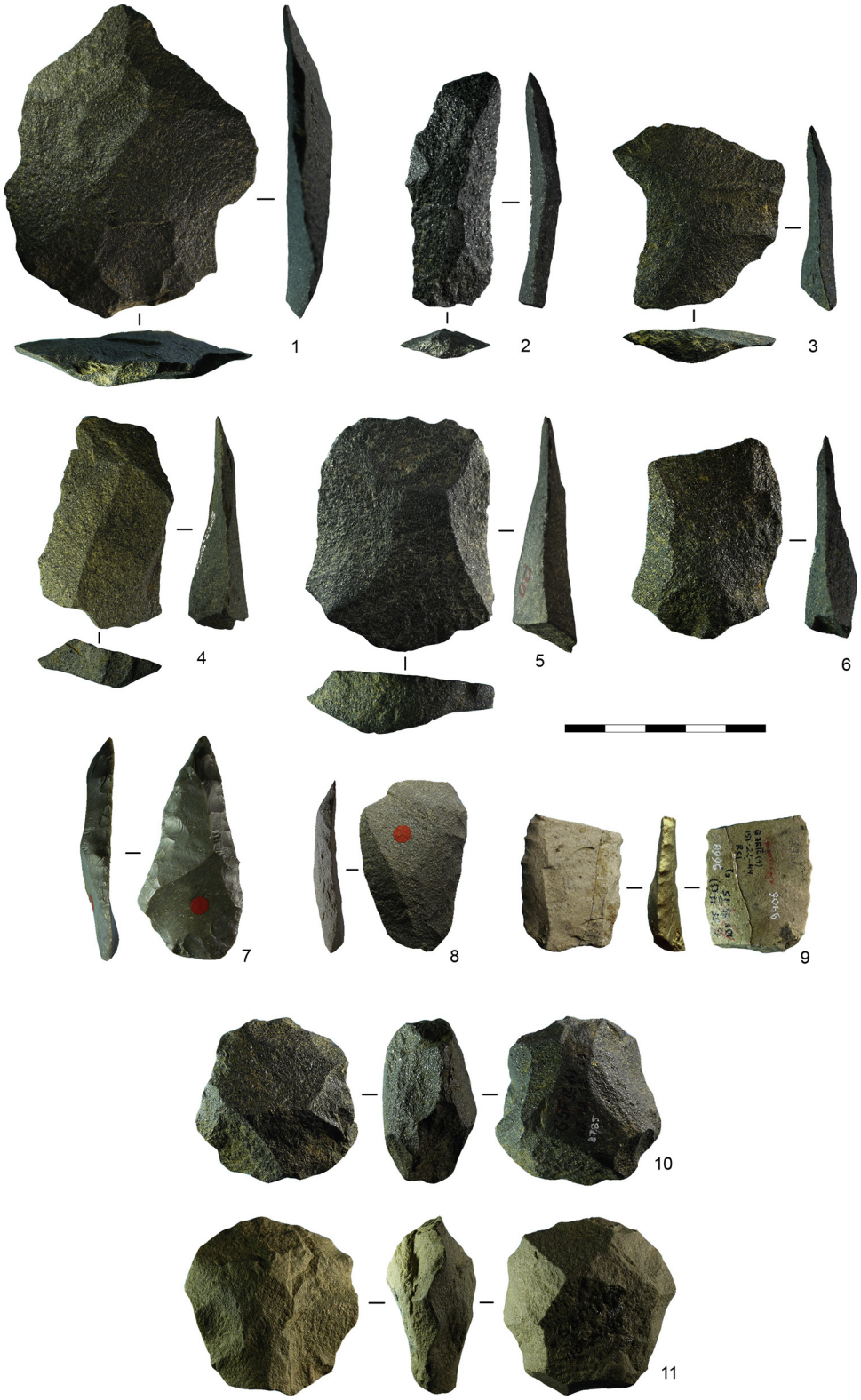

Fig. 7. Lithic industry from Cj. 1–6: Levallois flakes in quartzite; 7–8: retouched tools; 9: conjoin of a retouched tool from squares 5F and 7F (orange connection in Fig. 4.2); 10, 11: cores. (photo and CAD: M. Deschamps, except 2, 6, 8, photo by © MNP les Eyzies - Dist RMN, Ph. Jugie.)

Fig. 7. Industrie lithique du niveau Cj. 1–6 : Éclats Levallois en quartzite ; 7–8 : outils retouchés ; 9 : raccord d'un outil retouché provenant des carrés 5F et 7F (connexion orange de la Fig. 4.2.) ; 10, 11 : nucléus. (photo et DAO : M. Deschamps, sauf 2, 6, 8, photo par © MNP Les Eyzies - Dist RMN, Ph. Jugie.).

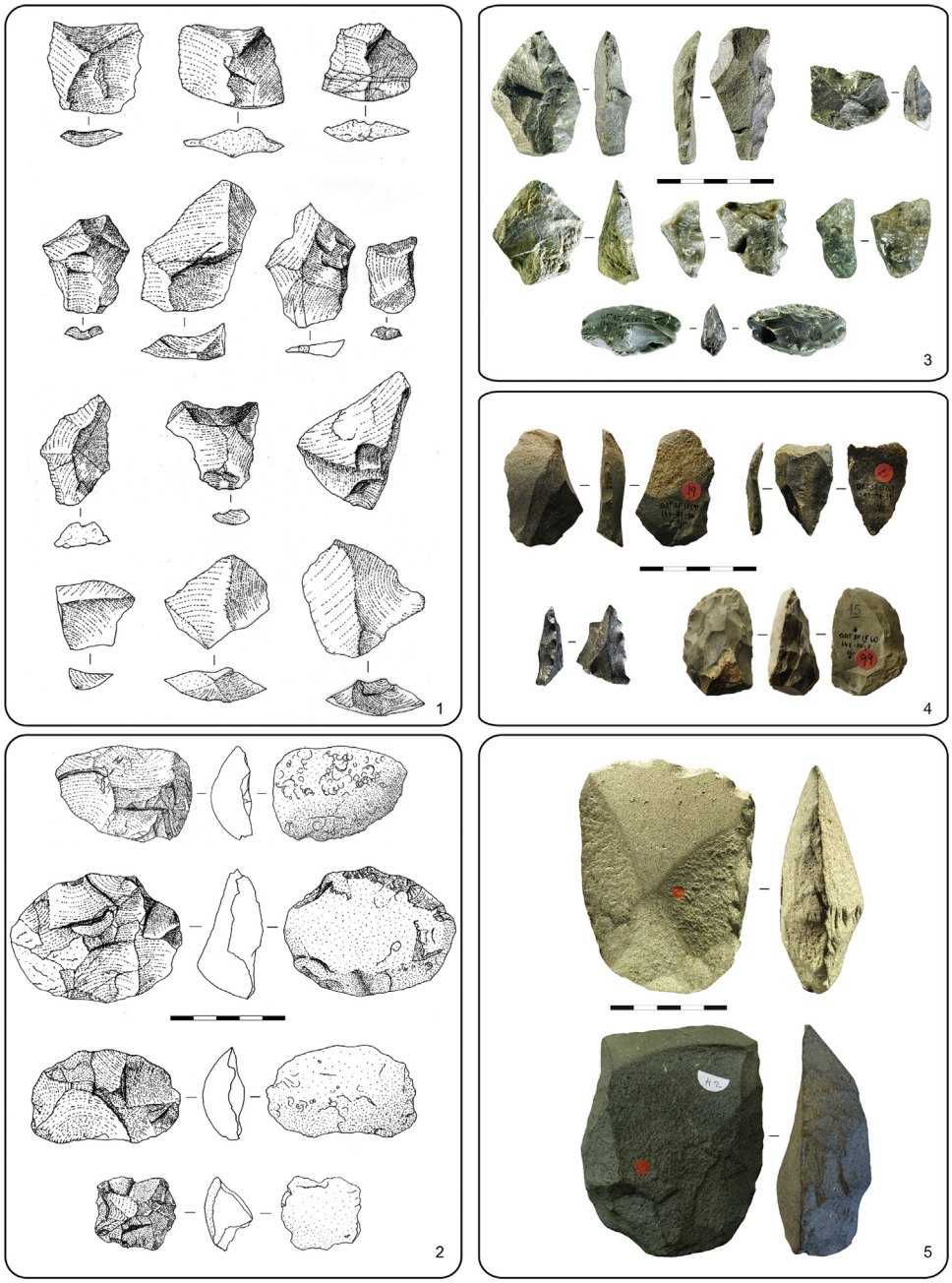

Fig. 8. Lithic industry from Cjgr. 1: quartzite flakes; 2: quartzite cores; 3: retouched tools in several raw materials; 4: flint retouched tools; 5: cleaver flakes in ophite.

Fig. 8. (Photo and CAD: M. Deschamps, except 3, photo by ©MNP Les Eyzies - Dist RMN, Ph. Jugie Industrie lithique du niveau Cjgr. 1 : Éclats en quartzite ; 2 : nucléus en quartzite ; 3 : outils retouchés en différentes matières premières ; 4 : outils retouchés en silex ; 5 : hachereaux en ophite. (Photo et DAO : M. Deschamps, sauf 3, photo par ©MNP Les Eyzies - Dist RMN, Ph. Jugie).

The limits between the industry from layer Cjr-base and the immediately overlying layer Cjgr are rather unclear. We excluded the remains issued from clearing the interface of these two layers in order to limit possible intrusions. However, it is difficult to eliminate the presence of other disturbances, such as the burrows mentioned at the back of the cave in fieldwork notebooks, and residual disturbances probably subsist between these two levels.

In spite of these biases, the preliminary study of the industry from this level enabled us to identify predominantly Discoid debitage (21 Discoid cores). When blanks could be identified, we observed again that debitage was generally carried out on the lower surfaces of flakes. Four quartzite cores seem to correspond to a Quina-type debitage. They are organized into two secant surfaces from which unipolar sequences were detached with an inward

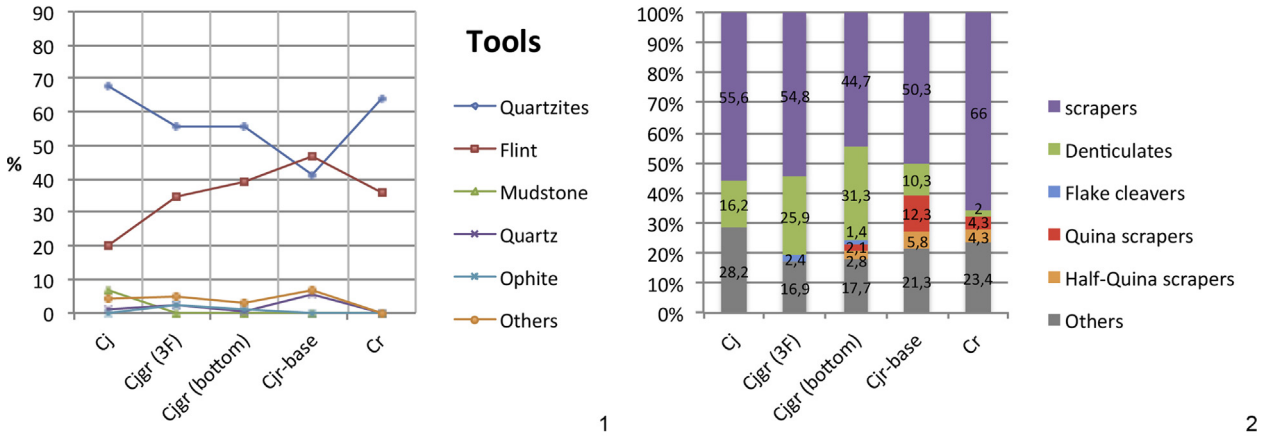

Fig. 9. 1: Raw material frequencies for retouched tools per layer; 2: cumulative frequency of tool types per layer.

Fig. 9. 1 : Fréquence des matières premières utilisées pour les outils retouchés par niveau ; 2 : fréquence cumulative des types d'outil par niveau.

motion (Fig. 10.1). Two flint cores also correspond to Levallois debitage (Fig. 10.2–3). Most of the retouched tools are in flint, even though flint cores are rare (Fig. 9.1). Thus, considerable spatio-temporal fragmentation of the flint operative chains is perceptible.

The debitage methods indicate the coexistence of different operative chains. However, in light of the abovementioned taphonomic problems in this level, it is difficult to determine whether rare elements derive from stratigraphic intrusions. The coexistence of several similar operative chains was also described for the Quina-type Mousterian in several sites in the Cantabrian region (Carrión et al., 2008; Lazuén, 2012).

Finally, layer Cr presents clearer differences. In terms of the density of remains, a general rarefaction of remains was identified below the concentration attributed to Cjr-base, then with a less dense layer of remains at a depth of < –220 cm. This assemblage was only identified in a 2-m^2 test pit, but the absence of rolled remains and the presence of two sub-horizontal refits at the same altitude imply that it is intact (Fig. 3).

It is difficult to identify the dominant debitage system due to the paucity of cores ($n = 5$). Flake production is characterized by elongated products and Levallois debitage. Retouch and resharpening activities are also well represented. On the other hand, shaping flakes totally disappear in this layer.

3.3. Tools

If we take into consideration the proportions of raw materials used for the toolkit, we observe clearer variations between levels (Fig. 9.1). Generally speaking, the percentage of quartzites decreases while the percentage of flint increases. Overall, debitage products in flint are relatively rare, whereas imported flint tools abandoned at the site are more frequent. These tools correspond to individual personal equipment brought to the site by human groups (personal gear, Binford, 1979). The presence of certain tools is only indicated by retouch and resharpening flakes, which demonstrate that they transited through the site (phantom tools, Cahen and Keeley, 1980; Porraz, 2005). This is observed in particular for tools in the most distant raw materials, in flint from Tréviño and Urbasa for example, which were only identified by sidescraper sharpening flakes (Minet et al., submitted). This is particularly striking in Cjr-base, where the management strategies of tools in distant raw materials appear to be different from the ones in the other levels.

Variations in tool-type frequencies are also visible between the levels. The toolkit from level Cj is characterized by a low proportion of denticulates (16%), and a majority of sidescrapers (55%). The other tools consist of flakes with partial and/or marginal retouch, which are not characteristic of any particular tool type.

Sidescrapers are still predominant in level Cjgr, but there is also a clear increase in denticulates in this level. This is visible in the Cjgr toolkit in both zones (square 3F and in the test pit 6D/E–7E). The presence of cleavers on ophite flakes was also only evidenced in this level. These artefacts are an important component of Cjgr as they are absent from the surrounding levels. This provides an additional argument to refute the hypothesis that they result from the simple persistence of tool types from the Acheulean in the different regional Middle Palaeolithic industries (Cabrera Valdès, 1983, 1984; Freeman, 1966, 1969–1970). Conversely, it shows that they must participate in the characterization of the industry from which they came, like any other element. A low percentage of Quina type sidescrapers is also present in Cjgr in the test pit zone, but they probably result from disturbances with the underlying level Cjr-base, where the quantity of these tools increases considerably.

Indeed, the toolkit from level Cjr-base can be clearly distinguished from the other levels. This is the only level in which flint is the dominant raw material for the toolkit (46%), whereas quartzite only represents 41%. Sidescrapers are clearly prevalent, while denticulates are rarer. Quina-type sidescrapers are only made on flint. On the other hand, some sidescrapers in quartzite also bear demi-Quina retouch. Equivalent proportions of flint and quartzite sidescrapers display simple scalar retouch. Tool types with

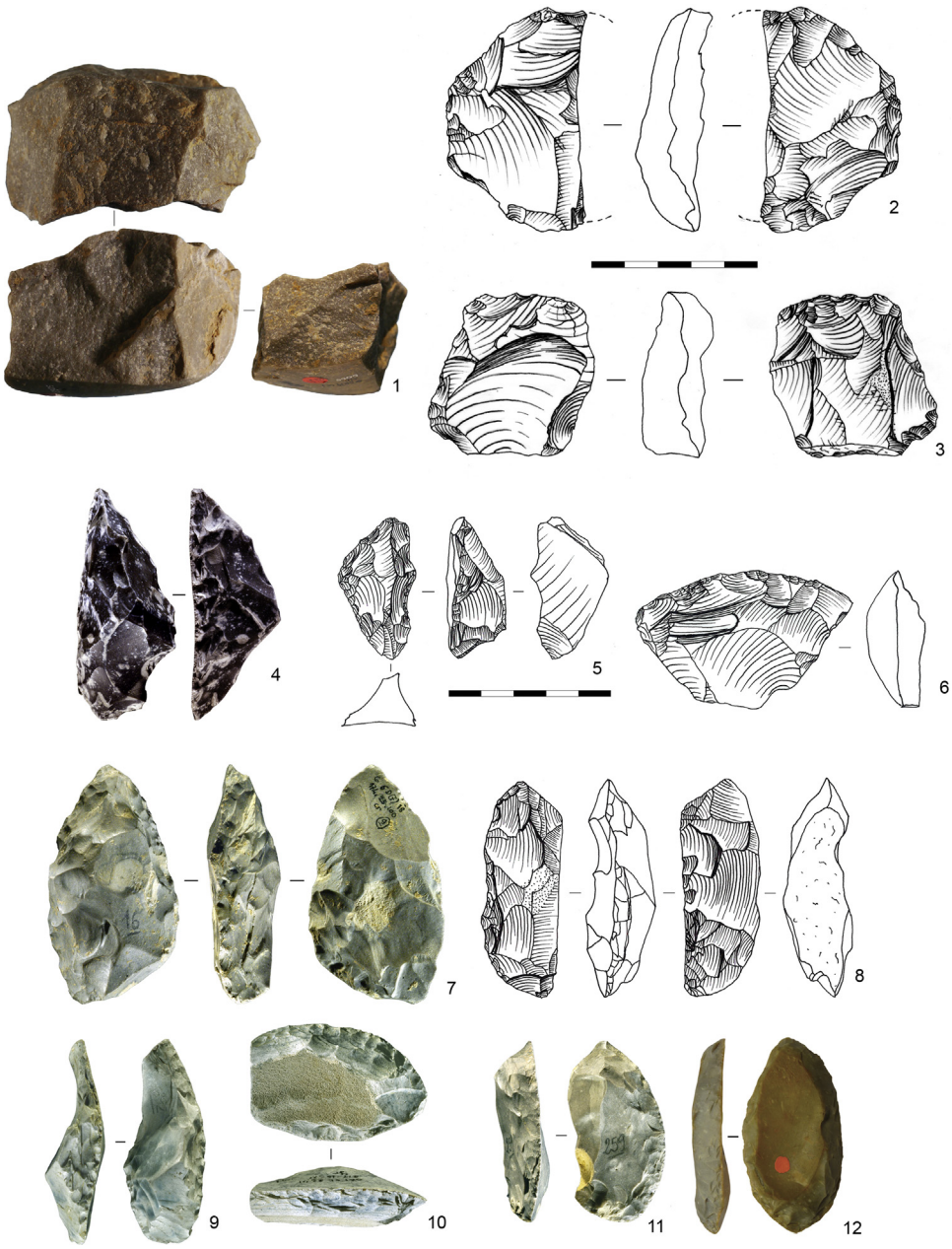

Fig. 10. Lithic industry from Cjr-base. 1–3: Cores; 4–5: limaces; 6, 10: transversal scrapers; 7–8: plano-convex bifacial scrapers; 9, 11–12: sidescrapers. (Photos and CAD: M.Deschamps, except 4-11, photo by ©MNP Les Eyzies - Dist RMN, Ph. Jugie).

Fig. 10. Industrie lithique du niveau Cjr-base. 1–3 : Nucléus ; 4–5 : limaces ; 6, 10 : racloirs transversaux ; 7–8 : racloirs bifaciaux plano-convexes ; 9, 11–12 : racloirs simples latéraux (Photo et DAO : M. Deschamps sauf 4-11, par ©MNP Les Eyzies - Dist RMN, Ph. Jugie).

Quina-type retouch are mainly transversal sidescrapers, followed by double convergent sidescrapers and limaces, while demi-Quina retouch is more frequently associated with simple lateral sidescrapers. In addition, two plano-convex bifacial scrapers were also identified (Fig. 10.6–7). Finally, five flakes from sidescraper resharpening with retouch on their distal edge were also observed. This type of economic behaviour is one of the characteristics of the Quina technocomplex defined in the North of Aquitaine (Bourguignon, 1997; Faivre, 2008; Jaubert et al., 2001).

Finally, in level Cr, tools in quartzite (64%) are much more abundant than tools in flint (36%). Again, denticulates and notches are almost absent. Sidescrapers are the best-represented tools, mainly simple lateral types. Several sidescrapers with Quina-type retouch are also present (Fig. 10); however, they are concentrated in the upper part of the level (Fig. 4). Therefore, at this altitude, we cannot completely rule out the possibility that they may initially have been part of level Cjr-base.

4. Implications of the Gatzarria sequence for the debate on the sequencing of late Middle Palaeolithic technocomplexes

This new interpretation of the Gatzarria archaeo-sequence calls into question Georges Laplace's initial interpretation of the industry from Cjr, considered to be an assemblage "with carenated sidescrapers and cleavers" (Laplace and Sáenz de Buruaga, 2002–2003). In actual fact, this assemblage is mainly characterized by sidescrapers with scalar retouch, followed by a level with Discoid technology, comprising simple classical sidescrapers, denticulates, and cleavers. Several uncertainties still subsist, particularly for the interfaces between the different sedimentary assemblages, but two archaeological assemblages are nonetheless discernible in layer Cjr. They can be distinguished from a stratigraphic point of view, and also in terms of their typo-technological and economic characteristics (more intense flint importation in level Cjr-base, different toolkit management; Deschamps, 2014). These two archaeological levels thus record the sequencing of Quina and Vasconian technocomplexes.

This sequencing has implications for other sites in the region, as the chronology and the succession of technocomplexes in the Pyrenean and Cantabrian region are still complex and widely debated topics. As mentioned in the introduction, certain authors suggest that the Quina-type Mousterian in this Cantabrian region is later than 50 000 BP (Baena et al., 2005, 2006; Blanco and Barquín, 2004; Carrión and Baena, 2002; Ríos Garaizar, 2012, 2017). It would be more recent in Cantabria than in the North of Aquitaine, where it is attributed to the MIS 3/4 transition, between 55 and 60 ka BP according to OSL dates (Frouin et al., 2017; Guérin et al., 2012, 2017; Jacobs et al., 2016), apart from Jonzac (OIS 4; Richter et al., 2013). However, the ^{14}C dates for such early archaeological levels can only be considered as minimum ages.

A recent attempt at constructing a synthesis for the eastern Cantabria also places the Vasconian before the Quina (Ríos Garaizar, 2017). However, at Gatzarria, the Quina industry appears to be relatively older than the level including Vasconian industry. It is also important to point out that none of the sites used to defend this model of chronological organization (Ríos Garaizar, 2017, p. 60) contains these two technocomplexes together in the same stratigraphic sequence, which underlines the importance of the Gatzarria sequence for shedding light on these questions. In addition, some of the cited sequences are not sufficiently reliable or were excavated too early on to be used without prior taphonomic revision, in particular levels P and M of Isturitz, excavated by E. Passemard between 1912 and 1922 (Delporte, 1974). The author states that these data must be treated with caution, yet uses them without a critical revision of the industries.

Moreover, the archaeological levels of the Bayonne sites, le Prissé and Jupiter, both yielded occupations with Discoid debitage associated with bifaces and flake cleavers, recently dated by OSL between 46 and 50 ka BP (Colonge et al., 2015; Deschamps et al., 2016). This indicates also the presence of at least a part of these industries at recent phases of the regional Middle Palaeolithic. For the time being, these dates appear to be more reliable than any radiocarbon dates for the Quina.

Furthermore, the very young ages for some of the levels attributed to the Iberian Middle Palaeolithic have been pushed back considerably by new dates and studies (Discamps et al., 2015; Higham et al., 2014; Maroto et al., 2012). In fact, most of the former radiocarbon dates obtained for levels from the end of the Middle Palaeolithic are likely to be pushed back in time by other dating methods.

In the frame of the new excavation conducted at Gatzarria (Deschamps and Flas, dir.) a sediment sample was taken at Gatzarria in 2017 in order to test the potential of OSL dating on quartz. The first tests seem to indicate that the composition of the OSL signal is adapted to dating (Guérin, com. pers.). As a result, a dating campaign of the site by luminescence will take place in the near future. In this way, continued research at Gatzarria should soon bring new data and considerations on the regional chronology of the Middle Palaeolithic. The characterization of Middle Palaeolithic technocomplexes in the Gatzarria sequence will also enable us to establish a Pyrenean link with the two surrounding regions, the North of the Aquitaine basin and Cantabria, which are better documented for these periods.

5. Conclusion

This research was carried out over several years on the Laplace collections from Gatzarria Cave (Claud et al., 2015; Deschamps, 2008, 2014, 2017) and resulted in a new interpretation of the archaeo-sequence attributed to the Middle Palaeolithic by crossing several types of studies with converging results.

This study enabled us to identify zones that underwent intense post-depositional processes in the cavity, to differentiate additional archaeological levels, and to propose a new sequencing of the technocomplexes.

These results also call into question the chronology and the sequencing of Middle Palaeolithic lithic technocomplexes in the region, in comparison to the chronology of the western Basque Country and Cantabria, notably because the Quina complex underlies the Vasconian assemblage at Gatzarria Cave.

In order to refine these hypotheses, new fieldwork began in Gatzarria Cave in 2017 (Deschamps and Flas, dir., 2018) and should enable us to provide an absolute chronological framework for this sequence with OSL dates (G. Guérin; NATCH project). New test pits also aim to identify sectors where the stratigraphy is better preserved in order to test the coherence of this archaeo-sequence in different zones of the site.

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