ERAUL 150
ANTHROPOLOGICA ET PRÆHISTORICA 130

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

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

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

sous la direction de
Olivier Touzé, Nejma Goutas, Hélène Salomon, Pierre Noiret

Presses Universitaires de Liège
2021

O. Touzé, N. Goutas, H. Salomon & P. Noiret (dir.) (2021) – *Les sociétés gravettiennes du Nord-Ouest européen : nouveaux sites, nouvelles données, nouvelles lectures / Gravettian societies in North-western Europe: new sites, new data, new readings.* Liège, Presses Universitaires de Liège
(ERAUL, 150 / *Anthropologica et Præhistorica*, 130) : 249-271

New Data on the Gravettian from the Paris Basin Margins: The Taillis des Coteaux (Antigny, Vienne, France)

Elise Cormarèche[*]
Jérôme Primault[**]
Virginie Le Fillâtre[***]

Résumé

Découverte en 1998, la grotte du Taillis des Coteaux située dans le département de la Vienne, livre une séquence exceptionnelle couvrant l'ensemble du Paléolithique supérieur. Unique dans le sud-ouest du Bassin parisien, elle conserve au moins neuf niveaux archéologiques attribués à différents faciès du Gravettien. Dans l'attente de l'avancée des travaux de terrains (pour l'instant principalement consacrés aux niveaux Magdaléniens), les ensembles gravettiens ne sont connus qu'au travers de deux sondages de 4 m² dans le talus à l'avant de la grotte et de 2 m² dans le fond de l'entrée de la grotte. Dans le premier sondage, ce sont sept nappes de vestiges qui ont été individualisées couvrant la deuxième moitié du Gravettien. Les processus post-dépositionnels complexes ayant impactés ces niveaux interrogent encore sur l'homogénéité des ensembles archéologiques, sans pour autant être complètement rédhibitoires. Le second sondage effectué dans le fond de l'entrée de la grotte a lui livré deux ensembles archéologiques, datés entre 22,450 ± 80 BP et 23,220 ± 90 BP, qui semblent moins affectés par des mélanges et que nous proposons d'attribuer au Gravettien récent. Alors qu'une étude en cours et non achevée vise à caractériser les systèmes techniques lithiques du Gravettien récent de ces derniers niveaux, l'objectif de cet article est de présenter la séquence gravettienne inédite du Taillis des Coteaux et plus particulièrement les deux ensembles du sondage situés dans le fond de l'entrée de la grotte, à partir des premières observations faites sur le matériel lithique. Le Taillis des Coteaux constitue alors un jalon supplémentaire à la connaissance du Gravettien et plus particulièrement du Gravettien récent du sud-ouest du Bassin parisien, au Seuil du Poitou, qui reste pour l'instant mal caractérisé, contrairement à d'autres régions comme le sud-ouest de la France.
Mots-clés : Paléolithique supérieur, technologie lithique, Gravettien, Vienne.

Abstract

Discovered in 1998, the Taillis des Coteaux cave displays an exceptional stratigraphic sequence covering the whole Upper Palaeolithic. Unique in the south-west of the Paris Basin, this sequence preserves, at least, nine layers from the Gravettian. These sets of Gravettian artifacts are only known from the excavation of 4m² located on the slope leading to the cave and 2m² at the back of its entrance, the field work having focused for now on the Magdalenian layers. In the first test pit, seven Gravettian archaeological layers have been identified, covering the second half of the cultural complex. The post-depositional processes affecting these layers question their homogeneity and could imply stratigraphic inversions or mixed industries. The second test pit located at the back of the cave's entrance exposed two apparently less disturbed archaeological layers, dated between 22,450 ± 80 BP and 23,220 ± 90 BP, that we propose to assign to the Late Gravettian. Whereas an ongoing technological study aims to characterize the Late Gravettian's lithic technical systems displayed in these archaeological layers, this paper focuses on the presentation of the unpublished Gravettian sequence from the Taillis des Coteaux, especially the two sets of lithic artifacts from the test pit located at the back of the cave's entrance. The Taillis des Coteaux cave establishes an additional milestone for the knowledge of the Gravettian from the south-west of the Paris Basin, still poorly characterized unlike other regions, such as southwestern France.
Keywords: Upper palaeolithic, lithic technology, Gravettian, Vienne.

* Paléotime, 6173 rue Jean-Séraphin Achard-Picard, 38250 Villard de Lans (France) & UMR 7041 ArScAn, équipe AnTET. Email: elisecormareche@gmail.com

** DRAC Nouvelle Aquitaine, Service régional de l'Archéologie, 102 Grand'Rue, 86000 Poitiers (France) & UMR 7041 ArScAn, équipe AnTET. Email: jerome.primault@culture.gouv.fr

*** UMR 5199 PACEA, Université de Bordeaux, Allée Geoffroy Saint-Hilaire, CS 50023, 33615 Pessac cedex (France).

Introduction

Discovered in 1998 and under ongoing excavation since 2000, the Taillis des Coteaux cave (Antigny, Vienne) (fig. 1) reveals an exceptional and unprecedented sequence in the south-west of the Paris Basin covering the whole Upper Palaeolithic (Primault *et al.,* 2007a, 2007b). It displays nine archaeological layers assigned to the Gravettian. Up to now, the excavation focused on the upper layers of the sequence, dating from the Magdalenian. The Gravettian was only documented in two test pits (fig. 2). The first (S-2000) 4m² test pit was carried out in 2000 and is located on the slope leading to the cave's entrance. It revealed seven Gravettian layers (AG-VIa, b, c, d, e, g, h). The second (E17), covering 2m², is located at the back of the cave's entrance. It uncovered two more Gravettian layers: EG-VIa and EG-VIb (Primault, 2002; 2013; 2014; 2016).

The first observations made on the artifacts point to the existence of a sequence spanning, at least, the Middle and Late Gravettian. The site thus represents an additional milestone for the knowledge of Gravettian societies in the south-west of the Paris Basin (fig. 1). Indeed, despite the multiplication of recent works (excavation of La Croix de Bagneux site at Mareuil-sur-Cher: Kildéa, 2008; Kildéa and Lang, 2011; excavation of La Picardie site at Preuilly-sur-Claise: Klaric *et al.*, 2011; excavation of Les Roches d'Abilly site at Abilly: Aubry *et al.*, 2013; test pits: Klaric, 2007), this region still suffers from an insufficiently defined chrono-cultural framework (Primault, 2003; Klaric, 2013), especially when compared to the one established in south-western France (among others: archaeological sequence of Abri Pataud, Bricker, 1995; Laugerie-Haute-Est, Sonneville-Bordes, 1960; Flageolet I, Rigaud, 1982; La Gravette, Lacorre, 1960).

We will present the Gravettian sequence from the Taillis des Coteaux through the preliminary analysis of the lithic industry and geomorphological data.[1] This paper aims to propose a chrono-cultural attribution for these archaeological assemblages and define their place in the regional context.

Site location and environment

The Taillis des Coteaux cave is located in the vicinity of Antigny, in the Vienne, south-west of the Paris Basin, to the north of the Seuil du Poitou (fig. 1). Its entrance opens at an altitude of 92m NGF, at the exit of an important karstic network running across the Bajocian limestone. Its full extension remains unknown due to its important obstruction, and only the first 60m have been explored (fig. 2; Primault *et al.,* 2007a; 2007b).

The cave is located on a hillside facing the right bank of the Gartempe river (Primault, 2010). This river, currently running a few meters only from the archaeological site, buries itself in the Bathonian limestone and Bajocian dolomites, and in places, remnants of stepped terraces yet undated (Mourier, 1989), leaning against steep hillsides (fig. 1).

The region presents a wide range of siliceous raw materials which is expressed both at the intra and inter-site level. The vicinity of the Taillis des Coteaux offers flint nodules from the Bajocian limestone. These are of a poor knapping quality (small blocks with many inclusions and thick texture), and have been seldom used by the inhabitants of the Taillis des Coteaux cave and surrounding sites. Different Bathonian flint, located only 4-5km upstream from the site could have provided good quality raw materials (blocks of 20-25cm with fine texture). The alluvial deposits from the Gartempe River have also transported a great number of flints from the north-west of the Massif Central. Other rivers, in a 20km radius, such as the Vienne, Bénaize, Anglin or Creuse, running along a south-north axis from the north-west of the Massif Central, could also have carried along many Jurassic and Cretaceous flints. Finally, further north, 40 to 50km away from the Taillis des Coteaux, the famous Turonian flint deposits of the Grand-Pressigny region offer a wide range of high quality raw materials (fig. 1, Aubry, 1991; Primault, 2003; Delvigne, 2016).

The Taillis des Coteaux is located near seven other Gravettian sites, within a 40km radius (fig. 1). The quality of the collected data varies unfortunately from one site to the another. The available data comes from surface surveys, old excavations or still ongoing excavations (Klaric, 2003; 2013; Primault, 2003; Klaric *et al.*, 2011; Soressi *et al.*, 2012; Aubry *et al.*, 2013; 2014).

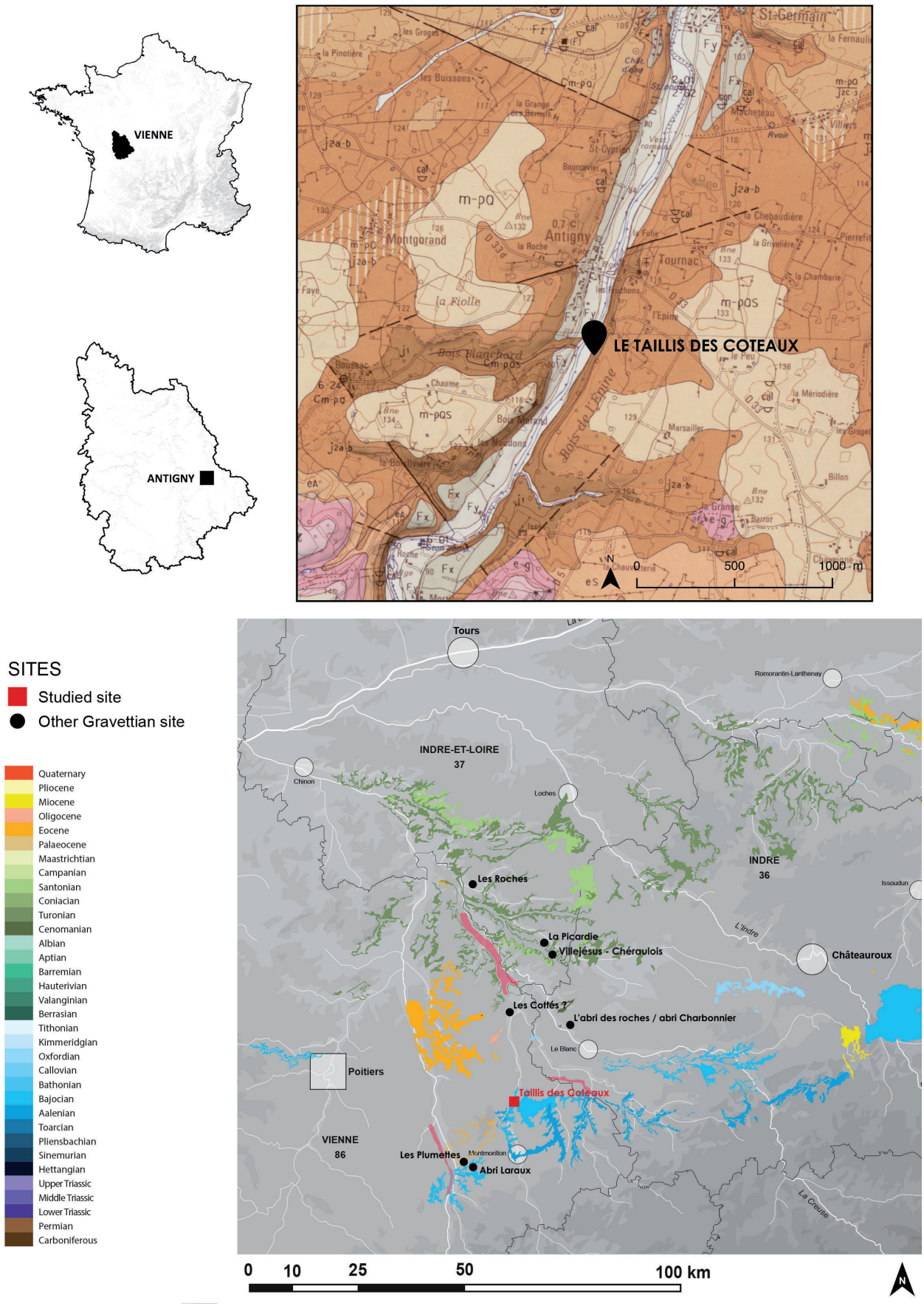

Fig. 1 – Site location and archaeological context. Source geological map background: BRGM; Source raw material formation and archaeological map background: work of the PCR "Réseaux de lithothèques en Centre-Val-de Loire", CAD: P. Tallet, P. Fernandes, V. Delvigne, unpublished.

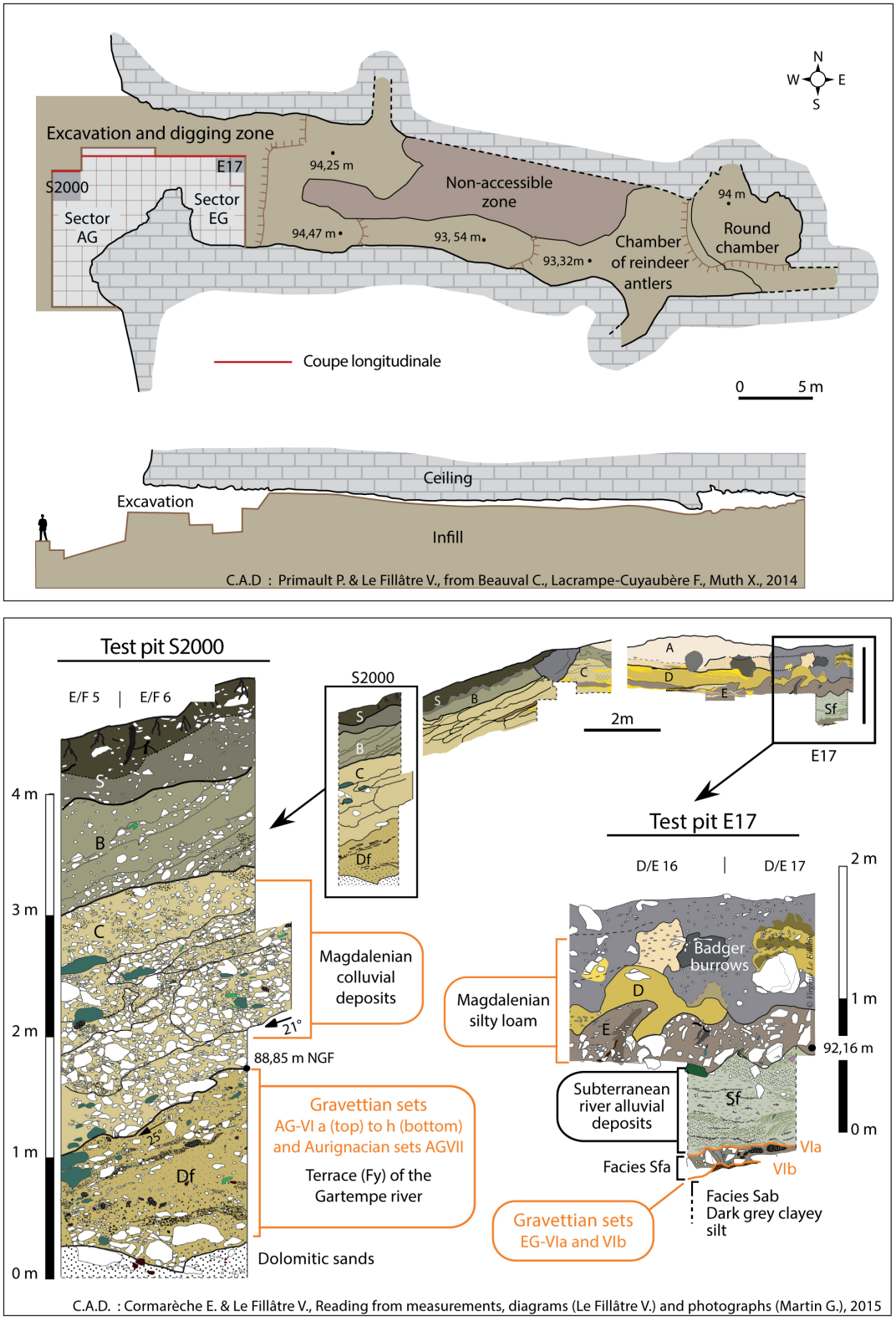

Fig. 2 – Test pits localisation and stratigraphy.

Research history

The Taillis des Coteaux site was discovered in 1998, during a surface survey led by J. Airvaux and B. Paul. In 2000 and 2001, a first test pit (named S-2000) covering 4m² on the slope leading to the cave's entrance (fig. 2), assessed the state of preservation of the archaeological layers. An exceptional 5m tall sequence was revealed, counting 17 archaeological layers covering the whole Upper Palaeolithic (Aurignacian, Gravettian, Solutrean, Badegoulian, Magdalenian), seven of them being assigned to the

Gravettian (Primault *et al.*, 2007a). This discovery led to the start of the excavation in 2003, a work still in progress under the supervision of J. Primault. Up to now, no less than 35 layers of archaeological remains have been identified at the Taillis des Coteaux. Explored on 60m², the Magdalenian sequence is the best documented and was the only one identified outside of the S-2000 test pit, at least until 2013. A second 2m² test pit was then carried out at the back of the entrance to the cave (named E17 fig. 2). Whereas one could have expected to find a Badegoulian layer there, two Gravettian layers were finally discovered under 40cm of barren endokarstic alluvial sands.

The Taillis des Coteaux sequence: overview of the sedimentation conditions

The digging out of the cave by an underground river seems to have taken place towards 270-240 ka uncal BP, in reference to the Fx et Fy terraces of the river Anglin, tributary to the Gartempe river, located at the same level than the site and dated by Voinchet (2002). Only uncertain traces of the deposits from IOS 7 to 3 remain inside the cavity, like cave wall deposits and speleothems polished by water. They are in connection with infilling/declogging phases linked to the activity of the river running through the karstic network.

Most of the sedimentation occurred in a lapse of time comprised between 30 ka and 14,5 ka uncal BP, and was covered by Holocene deposits within and out of the cavity. Although the sedimentation of the Taillis des Coteaux is very complex and varies on the slope, the entrance and the back of the cave, it can be summarized to two main phases linked to climatic fluctuations throughout this period:

- The sedimentary phase taking place before the Late Glacial Maximum (comprising archaeological sets AG-VII to AG/EG-VI: 29,840 / 20,870 uncal BP [tabl. 1]), is characterized by an important activity from the subterranean river flowing into the Gartempe river only 5m away from the cave's entrance. Inside the cavity, floods have partially destroyed the upper part of the Gravettian layers, and totally eroded the Solutrean and Badegoulian layers. Remains of the Gravettian archaeological layers are represented by sooty organic dark grey clayey silts (Sab) and the deposit of olive-drab to yellowish brown alluvial sands showing cross-stratification and parallel bedding [2] and phased climbing ripple laminations (Sf). The transition between the two facies is carried out by the Sfa facies, a mixture of sediment belonging to the Gravettian levels and alluvial sands containing small soft pebbles and angular stone-blocks (fig. 2). In the lower part of the hillside, the Gravettian to Solutrean remains are staged in their normal chronological order inside the Gartempe's Fy terrace,[3] fed by materials coming from the hillside and the subterranean river. The river floods, undermining the base of the colluvial deposits, left yellow sandy and gravelly silts containing amphibolite, quartz, quartzite and gneiss pebbles and decimetric to metric gravel lens. Metric stony lens can be seen in this alluvial sedimentary set Df (= Fy terrace). Under these fluvial deposits, the facies and mineralogy of the brown-yellow sandy clay containing limestone grains, stones and blocks (Ags) and comprising the Aurignacian remains, indicate that the Gartempe flows could have disturbed the endokarstic deposits. Thus, the cave's entrance was probably located more upstream at the time. The C^{14} dating of faunal remains gives a minimal age of 29,840 ± 210 uncal BP (tabl. 1) for the base of the fluvial sedimentation (Df) (fig. 2).
- During the second phase (archaeological sets AG-V, AG/EG-III et EG-II: 18,140–14,630 uncal BP), the subterranean river gradually dries up. Fluvial circulation becomes temporary and frequently alternates with flows similar to concentrated to diffuse runoff. The subterranean waterway disappears towards 17,000 uncal BP with the transition towards the older Dryas during the Lower Magdalenian, in relation to the sinking of the karstic network during the Late Glacial Maximum and tectonic uplift. In the cave, during the Lower Magdalenian, the archaeological layers and sedimentary deposits correspond to periods without flows. These layers are composed of organic-rich brown loamy silts (Lb), resulting from loess, cryoclasty and dolomites alteration products (dolomitic silts, silexite and stones) accumulation, as well as hearths combustion residues. The great quantity of organic matter resulting from the Lower Magdalenian anthropic activity excepted, these deposits will go on during the older Dryas and the Middle Magdalenian in the form of yellow loess and sandy silt (Lj to Ljs). The main difference is the disappearance of clear periglacial phenomena (cryoexpulsions, polygons, local cryoturbations…) between 17,190 and 16,900 uncal BP due to this climatic change. Towards the cave entrance, thinly bedded pale yellow silts resulting from eolian deposits alternate with the different facies of the brown silt lower set E (brown silt), tending to disappear with the coming of Dryas. Towards the outside of the cave,

occupation levels and karstic infills alternate with colluvial deposits or are connected to them up the slope. They cover the Fy terrace entirely at the beginning of the Lower Magdalenian, thus indicating a maximum age of 17,460 ± 110 uncal BP. The hillside is mainly affected by solifluction at the base of the Magdalenian sequence, evolving towards frost creeping during the Lower Magdalenian. Although the lobes characterizing these periglacial phenomena are present, many other facies exist since the hillside is also affected in variable ways in space and time by gravity phenomena, runoff, spring snowmelt and thaw and episodical underground flows. Sedimentation varies consequently from vertically or longitudinally compositionally graded lobes with linear or planar orientation, to simple stretchings of the top of the hillside's facies, or diamictons, or else a metric stony or gravely lenses organization in the favoured direction of water flow in the upper part of the slope. Ploughing boulders can also cross the slope. The matrix is more or less rich in loess, dolomitic silts and eolian sands from the Gartempe. Between 15,400 and 15,350 uncal BP, an earthquake caused the deformation of the Lower and Middle Magdalenian layers, and the collapsing of the cave's entrance. The top of the Middle Magdalenian complex (C) was eroded later by linear runoff, generating the sedimentation of complex B (fig. 2).

Thus, periodic subterranean river activity has had important consequences on the recording and preservation of the different human occupations at the Taillis des Coteaux. If it seems to have greatly favored sedimentary accumulation before the Late Glacial Maximum, its reactivation towards 18 ka-19 ka uncal BP also resulted in massive sedimentary clearing-out, and the almost complete truncation of the Solutrean and Badegoulian layers inside the cavity. Micromorphological analysis demonstrated that Gravettian layers could exist under the Sf fluvial sands deposit. The particles reorganization and ice segregation, due to the many a frost and thawing alternations, have blurred trampling traces and discreet deposit processes geological patterns (such as diffuse runoff), but the origin of sediments (loess and dolomite alteration) and evidence of combustion activity could perhaps allow to think that the Gravettian sets could be well preserved, although disturbed at the top by the subterranean river.

The Gravettian sequence: lithic industry's contribution in recognizing the different Gravettian layers

The Taillis des Coteaux's Gravettian sequence, identified for now only in two test pits covering 4 and 2m², displays nonetheless nine archaeological layers, from the Middle Gravettian with Noailles and Raysse burins to the Late Gravettian. They delivered lithic remains, osseous industry, ornaments, faunal remains and engraved art pieces, stressing their great potential for multidisciplinary research.[4]

The Gravettian sequence in the slope leading to the cave

Seven archaeological layers were identified there, assigned to the Middle Gravettian or Gravettian *lato sensu* (fig. 3):

- A Middle Gravettian with Raysse burins (AG-VIg) (fig. 3), undoubtedly the best individualized artifact layer, thanks to their abundance and the presence of charcoal layers. The faunal remains display a blackened surface, probably due to manganese impregnation. Dated at 24,950 ± 135 uncal BP (Ly-2642, bone material, tabl. 1), the layer delivered 788 lithic objects (mostly chips, bladelets and a few unretouched blade fragments). Among flint tools, five burins, one *pièce esquillée*, three Picardie bladelets and three Raysse burins were discovered. Analysis of the origin of the flint points towards procurement from close and distant raw materials deposits, including different Late Turonian flint facies from the Grand-Pressigny region (Primault, 2003).
- A Gravettian with Noailles burins (AG-VIb) (fig. 3): the remains are abundant in this layer (650 artifacts, 522 of them are flint). The faunal remains (reindeer mostly), unlike the underlying layers, do not show a blackened surface. The lithic industry is mainly composed of blade and bladelet by-products, small blades and bladelets, burin spalls and many chips. Nine tools, non-typical (burin, *pieces esquillées*, used blade fragments) were found, along with four Noailles burins. Local or nearby raw materials were preferentially used.
- Layers AG-VIa, c, d, h and e do not display typical archaeological features (fig. 3). A few backed pieces fragments (bladelets and points), along with some burins and retouched blades were found among the tools. Small blade and bladelet *débitage* are well represented (except for cores), although the *chaînes opératoires* cannot be clearly identified. Three cores found in layers AG-VIa,

Level	BP results	Calibrated BC	"Laboratory reference"	Sample	Site reference	Chrono-culture	References	Sample	% collagen	"% C extact. "	C/N	"δ 15N (‰)"	"δ 13C (‰)"
EG-IIf	15350 ±50	16809 à 16545	Beta-395295	tooth	TdC-EG-II-f-F14-17	Middle Magdalenian	Primault (dir.) 2014						
EG-IIg	14630 ±70	16056 à 15656	Ly-3876	bone	TdC-EG-IIg-F17-9	Middle Magdalenian	Primault (dir.) 2007						
EG-IIg	15400 ±50	16842 à 16601	Beta-395299	bone	TdC-EG-IIg-F14-17	Middle Magdalenian	Primault (dir.) 2014						
EG-IIIa	16900 ±100	18696 à 18141	Ly-6409	bone	TdC06-EG-IIIa(IIh)-H16-71	Early Magdalenian	Primault *et al.*, 2010						
AG-IIIa	17190 ±110	19105 à 18501	Ly-6406	bone	TdC05-AG-IIIa-H8-27	Early Magdalenian	Primault *et al.*, 2010						
AG-IIIb	17460 ±110	19497 à 18804	Ly-6407	bone	TdC06-AG-IIIb-H8-20	Early Magdalenian	Primault *et al.*, 2010						
AG-Vd	18140 ±85	20336 à 19801	Ly-2639	bone	TdC-S2000-Vd	Badegoulian	Primault (dir.), 2005						
AG-VIb	20870 ±105	23592 à 22856	Ly-2640	"bone: reindeer femur"	TdC-S2000-Vib	Solutrean / Gravettian	Primault (dir.), 2005	"diaphysis fragment of reindeer femur"			7,44 % ± 0,1		-17,9
EG-VIb	22450 ±80BP	25218 à 24596	Beta-423445	"bone: reindeer metapod"	TdC2014 EG-VIb E17 39	Late Gravettian	Primault (dir.) 2015	"diaphysis fragment of reindeer metapod"				3,5	-19,7
EG-VIb	23220 ±90BP	25732 à 25352	Beta-423446	"bone: reindeer metapod"	TdC2014 EG-VIb E17 404	Late Gravettian	Primault (dir.), 2005	"diaphysis fragment of reindeer metapod"				7,6	-17,9
AG-VIg	24950 ±135	27421 à 26716	Ly-2642	"bone: reindeer femur"	TdC-S2000-VIg	Middle Gravettian	Primault (dir.), 2005	"diaphysis fragment of reindeer femur"			4,48 % ± 0,08		
AG-VIIa	29840 ±210	32396 à 31655	Beta-210191	"bone: reindeer femur"	TdC-S2000-VIIa	Aurignacian	Primault (dir.), 2005	"diaphysis fragment of reindeer femur"					-20,2

Table 1 – ^{14}C AMS dates of the remains of the cave of the Taillis des Coteaux (Antigny, Vienne).
Calibration dates with OxCal 4.3.2 (Bronk Ramsey, 2017) software and the calibration curve IntCal13 (Reimer *et al.*, 2013).

AG-VIc and AG-VId, using blades or elongated flakes for blanks, are reminiscent of Early and Late Gravettian *débitage* methods.

Sedimentation in layer AG-VI is mostly the result of an alluvial and colluvial dynamic, lending a lens-aspect to the archaeological levels. In the slope deposits of which the dip angle is arround 20-27°, it can be expected, maybe even more than in the overlying layers, to find post-depositional disturbance that could imply stratigraphic inversions or the mix of originally distinct industries. In fact, the superposition of Noailles and Raysse burins could reflect such an inversion, since it goes against what is usually documented in Gravettian sequences (see for example Bricker, 1995; Klaric, 2003). In the same way, the discovery of a Solutrean shouldered point fragment in the upper part of layer AG-VIe, along with a Levallois core, invites to exercise caution in defining the nature of the lithic industry. Moreover, a bone from layer AG-VIb, assigned to a Middle Gravettian with Noailles burins, was dated at 20,870 ± 105 uncal BP (Ly-2640, bone material, tabl. 1). This date seems really young for a Gravettian assemblage. Moreover, obtained on a unique sample it is advisable to remain cautious about its interpretation. Further fieldwork will undoubtedly provide more elements for discussion.

The Gravettian sequence in the cave

Two additional archaeological layers (EG-VIa and EG-VIb) were discovered in the cavity, under the Magdalenian sequence (EG-III and EG-II), separated from them by 40cm of barren endokarstic alluvial sands (fig. 2). The sediments that fix these two layers result from a weak endokarstic alluvial dynamics. Unlike the layer AG-VI, the chances of significant remobilization of archaeological remains are reduced. Further field work will undoubtedly provide more information on this subject.

Only identified on a small area of 2m², their technological analysis is limited but a few observations can still be made as well as a proposal to assign them to the Late Gravettian.

EG-VIa

In the current state of research, layer EG-VIa is composed of 1721 artifacts, counting 1459 chips or flakes measuring less than 2cm that we were unable to assign to a specific *chaîne opératoire*. The remaining lithic artifacts are composed essentially of unretouched flakes, blade and bladelet fragments, deriving from the shaping, maintenance and main phase exploitation of the cores ("plein débitage"). 27 tools with 14 backed pieces fragments were identified (fig. 4; tabl. 2).

The freshness of the lithic pieces is good, the objects are lightly patinated and surface states are satisfying. There are a few impacts on the edges or ridges of the artifacts, especially when compared to the pieces found in test pit S-2000 which show many impacts and crusting.[5]

Siliceous raw materials from this layer were gathered locally (less than 15km) (tabl. 3). The few cortical and semi-cortical flakes of the set show a slightly altered cortex, indicating the materials were collected at a short distance from the primary deposit. A variety of Upper Turonian flints from the Grand-Pressigny region can also be found among the common set of tools[6] (30-60km, considered as allochthonous raw materials) (tabl. 3).

The study of raw material procurement strategies shows, in the current state of the archaeological assemblage, the same goal: the production of a large range of straight blade and bladelets. The small sample and great number of broken pieces are serious limitations to the characterization of the reduction process (especially that of large blades), even if some objects bear information and this regardless of the raw material considered. The indications used to determine the *débitage* methods are consequently collected from the various raw materials groups.

A blade-bladelet production can be identified through one core (fig. 4, no. 1), core rejuvenation flakes (fig. 4, no. 2), blades detached at the intersection of the *débitage* surface and the flanks of the core (fig. 4, nos. 3 and 4), crested blades (fig. 4, no. 5) and elongated maintenance and restructuring flakes. The only core in the set, displays two opposed striking platforms exploited alternately. The orthogonal removal scars on both flanks of the core indicate that the *débitage* started with the shaping and removal of a crested blade. It is not possible to determine if this is a true bipolar *débitage* or if the second striking platform is only used to maintain volumes and convexities. Most of the blades, bladelets and elongated maintenance and restructuring flakes suggest an unipolar *débitage*. However, bipolar removal scars on such products point to the second hypothesis or the successive exploitation of one striking platform after the other.

Thirty two butts are preserved on the regular blades and bladelets. These are usually plain and narrow or punctiform, showing a bulb (24/32) with a bulb scar (10/24) and sometimes a small lip. It should be noted that sometimes the lip can be important. The impact point is rarely clearly marked. These clues seem to indicate direct soft percussion, maybe mineral.

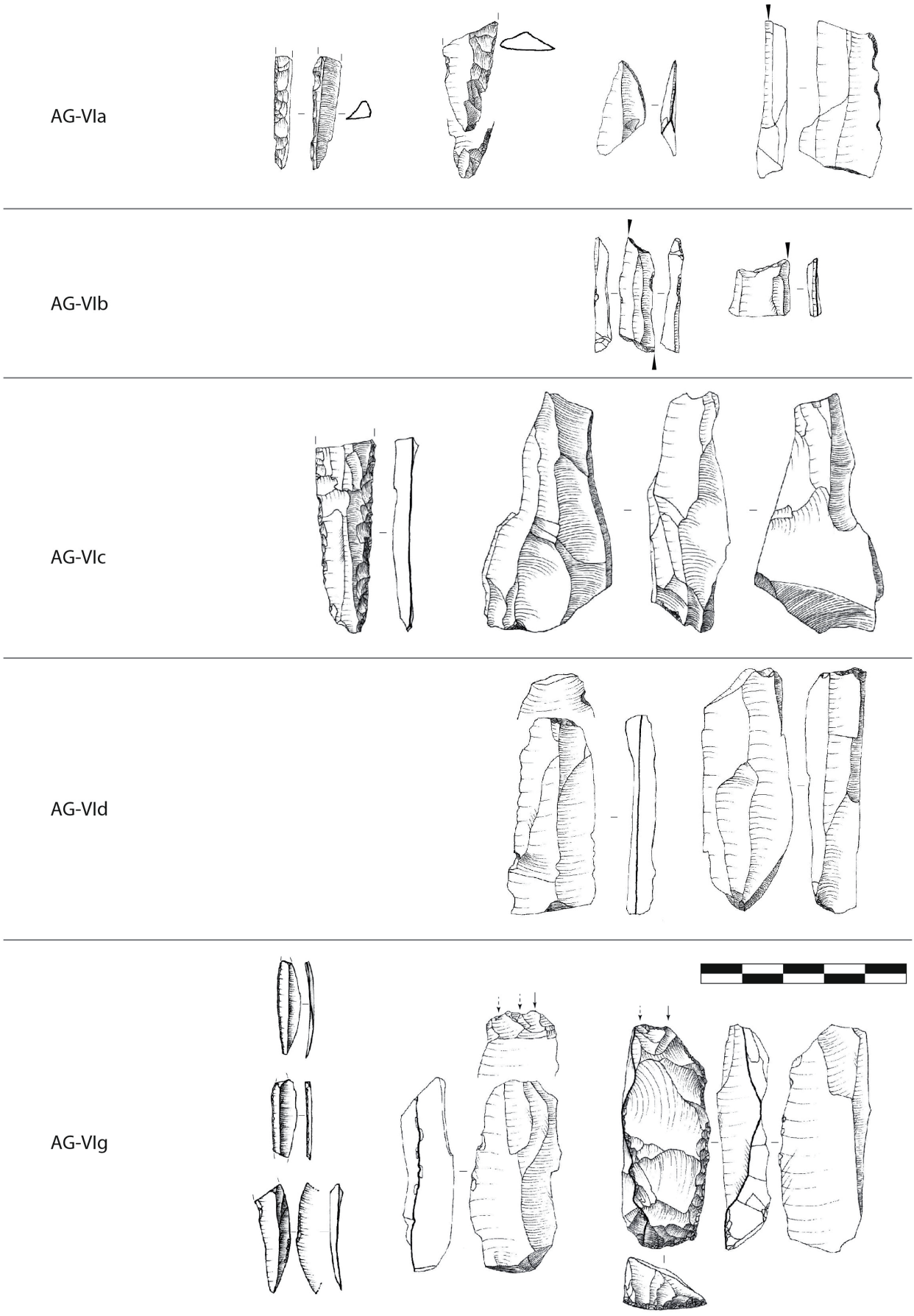

Fig. 3 – Lithic industry AG-VI, drawing: J. Primault.

Blank	No retouched blanks	Cores	Tools						TOTAL
			Backed pieces	Burins	Scrapers	Retouched blades	Troncated blades	Retouched flakes	
Blades	40			3	1	2	1		**47**
Bladelets	65		14						**79**
Elongated maintenance and restructuring flakes	52			1	1	1			**55**
Core tablets	5								**5**
Maintenance and restructuring flakes	32							2	**34**
Elongated preparation flakes	4								**4**
Preparation flakes	8								**8**
Flakes	9							1	**10**
Burin spalls	18								**18**
Blocks		2							**2**
Chips or flakes measuring less than 2cm	1459								**1459**
TOTAL	**1692**	**2**	**14**	**4**	**2**	**3**	**1**	**3**	**1721**

Table 2 – Inventory of the lithic industry – EG-VIa.

Local raw materials	
	Number
Tool	
common tool	
backed pieces	3
Blades-bladelets	35
Burin spall	6
Elongated maintenance flakes	35
Maintenance flakes	21
Flakes	21
Cores	1
Chips or flakes measuring less than 2cm	
TOTAL	**122**

Allochthonous raw materials (like Grand Pressigny region)	
	Number
Tool	
common tool	11
backed pieces	6
Blades-bladelets	12
Burin spall	
Elongated maintenance flakes	7
Maintenance flakes	1
Flakes	6
Cores	1
Chips or flakes measuring less than 2cm	
TOTAL	**44**

Indeterminate raw materials	
	Number
Tool	
common tool	2
backed pieces	5
Blades-bladelets	66
Burin spall	9
Elongated maintenance flakes	13
Maintenance flakes	
Flakes	1
Cores	
Chips or flakes measuring less than 2cm	1459
TOTAL	**1555**

Table 3 – Inventory of the lithic industry by raw material sources – EG-VIa.

Tools are shaped on blades and bladelets. Common tools favour the bigger blanks whereas backed pieces are made on small blades and bladelets. The common tools are non-typical and represented by burins (dihedral or on break), scrapers, scraper-burins, truncated blades, retouched blades and flakes (tabl. 4; fig. 4, nos. 7 to 10).

Backed pieces are clearly prominent in the tool-set (tabl. 2 and 4; fig. 4, nos. 11 to 14), mainly documented by truncated backed pieces (8), mesial fragments (5), but also by a possible microgravette fragment. Shaped on elongated and straight blanks, the back is abrupt and invasive (it reaches the central ridge of the dorsal face of the blank). The retouch is direct, sometimes crossed to overcome some technical difficulty. The opposite edge is often retouched to correct and stress the piece's morphology. Dimensions are rather uniform (fig. 5). One piece raises doubt about its typological attribution. It is characterized by an irregular back, linked to many gibbosities, and the presence of inverse retouch in the proximal part of the blank, a type of retouch often produced on microgravette extremities. The piece's irregularity raises the question of its typological attribution.

	Number
Burins	
dihedral	2
on break	2
Scraper - burins	1
Scrapers	1
Troncated blades	1
Retouched blades	3
Retouched flakes	3
Backed pieces	
troncated backed bladelets	8
mesial fragments	5
microgravette fragments?	1
TOTAL	**27**

Table 4 – Tools inventory – EG-VIa.

EG-VIb

This archaeological layer is more substantial. Counting 3401 artifacts (2881 chips and flakes smaller than 2cm), most of the pieces are not retouched. There are only 30 tools and 22 backed pieces among them (whole or fragmented). Other tools include dihedral (1), on break (2), transversal (1), and truncation burins (1), as well as retouched blades (2) and flake (1) (fig. 6; tabl. 5 and 6).

As for layer EG-VIa, freshness of the lithic artifacts is good, patina remains light and few impacts can be seen on the edges and ridges of the pieces.[7]

Raw materials procurement strategies are also very similar to the ones displayed in layer EG-VIa. A great diversity of flint has been collected in the local environment (15km radius). Some pieces were made with flints from the Grand-Pressigny region (30-60km considered as allochthonous raw materials). Unlike layer EG-VIa, these latter materials have indiscriminately been used for tool making and blank production (tabl. 7).

Whatever the type of raw material, the *débitage* focuses on blade and bladelet production (fig. 6, nos. 3 to 15; tabl. 7). In the current state of our study, we have not observed any differences in the exploitation strategies of the different raw materials. As for EG-VIa, characterizing *débitage* methods remains difficult, due to the lack of a sufficient number of artifacts and the absence of cores. Nonetheless, some observations can be made. Some wide and thick blades carrying the entire flaked surfaces, and many blades detached at the intersection of the flaked surface and the flank of the core, testify to the exploitation of blocks with narrow flaked surfaces using one or two striking platforms (fig. 6, nos. 1 and 2). Even though most of the elongated pieces show removal scars originating from the same striking platform than the blank, the blades detached at the intersection of the flaked surface and the flank of the core show bidirectional blade and bladelets removal scars. The presence of posterolateral crested blades suggests their use for maintenance or shaping of the core. A possible second method raises questions. At least one of the backed pieces is shaped on a burin spall, suggesting a core-like-burin *débitage* method (fig. 5, no. 17). However, it may also simply imply the possible use of burin spalls as blanks for the production of backed pieces.

Tools are made on blades and bladelets, the bigger blanks being favoured for common tools, and the smaller for backed pieces. The 22 backed pieces demonstrate a much wider diversity than those in layer EG-VIa (tabl. 6). However, as in the layer EG-VIa, they are all broken. The backed pieces from layer EG-VIb can be divided into four typological groups: points (6), truncated pieces (3), "simple" backed bladelets (11)[8] and rough-outs or pieces broken during the shaping process (2). They have all been shaped on elongated and straight blanks (bladelets or burin spalls) and show, as in layer EG-VIa, an invasive back shaped by direct or crossed, extensive, straight and meticulous retouch. Most of the pieces are retouched on the opposite edge. The main differences between EG-VIa and EG-VIb backed pieces sets, are the presence of points among the backed bladelets and their dimensional variability. Width and thickness distributions are continuous and cover a wide range. Width varies mostly between 3 and 6mm, but can measure up to 9mm, whereas thickness varies between 1 and 3mm (fig. 5; fig. 6, no. 16 to 21). Like the other backed pieces, the backed points,

or micrograves, are characterized by an invasive straight back shaped by a direct or crossed retouch. The tip is located in the axis of the back or in the mesial axis of the blank. Only one of them has an inverse retouch at one extremity.

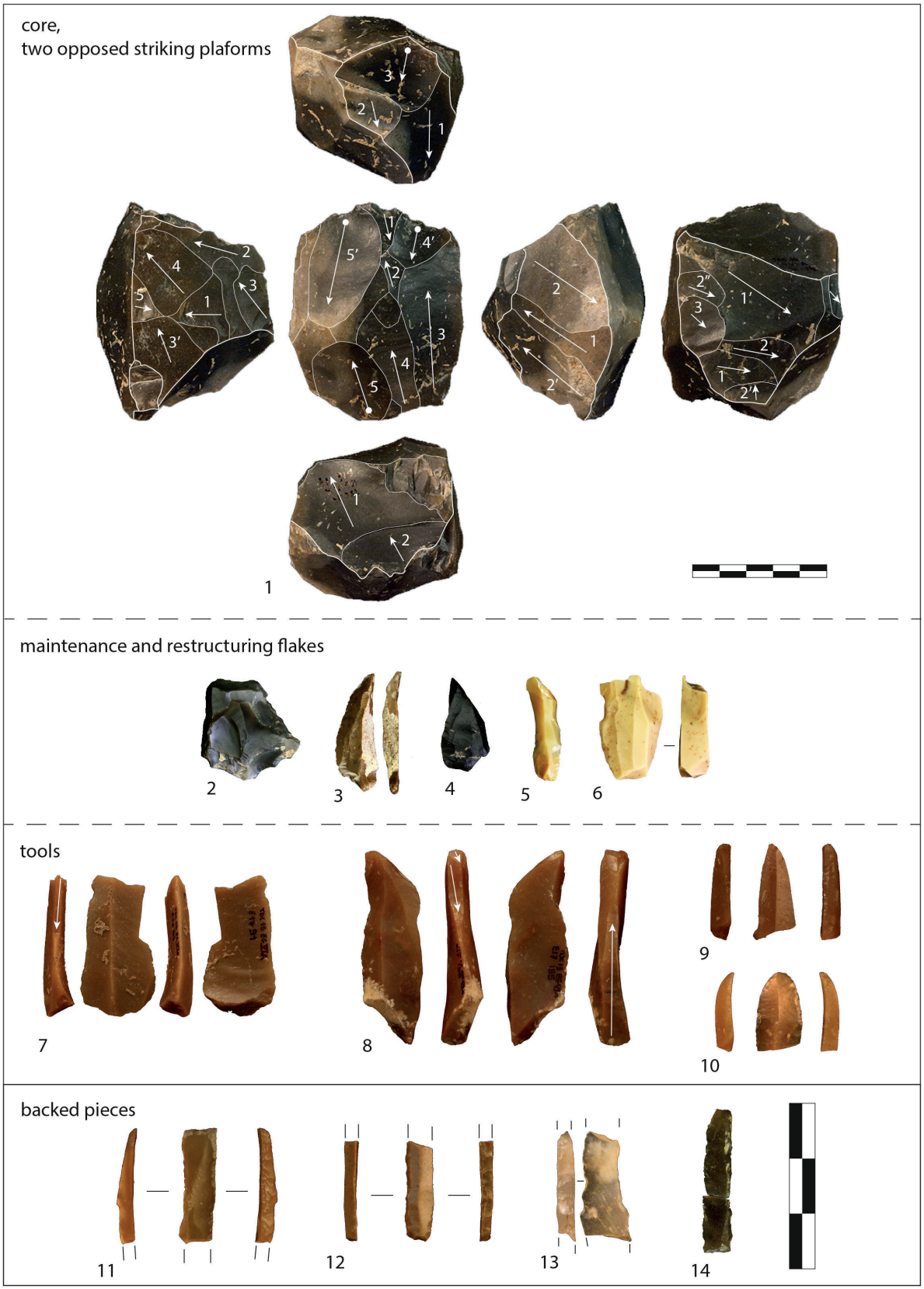

Fig. 4 – EG-VIa, photo: G. Martin et E. Cormarèche. 1. Cores, 2. Rejuvenation core flake, 3 and 4. Blades detached at the intersection of the *débitage* surface and the flanks of the core, 5. Crested blade, 6. Elongated flake with *débitage* surface, 7 to 9: burins, 10. Scrapers, 11, 12, 14: truncated backed pieces, 13. Backed piece.

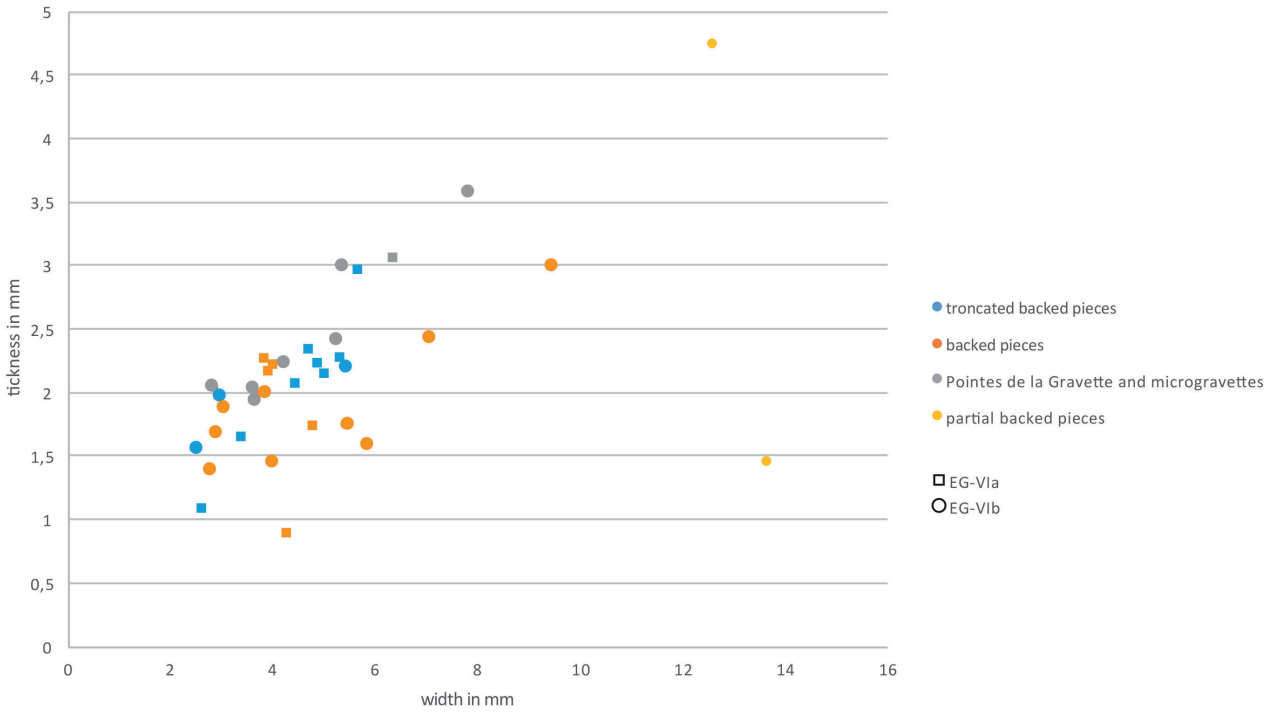

Fig 5 – EG-VIa and EG-VIb backed pieces width and thickness.

Blanks	No retouched blanks	Cores	Tools			TOTAL
			Backed pieces	Burin	Retouched blades	
Blades	73			4	2	**79**
Bladelets	167		20			**187**
Elongated maintenance and restructuring flakes	86			1	1	**88**
Core tablets	2					**2**
Maintenance and restructuring flakes	16					**16**
Elongated preparation flakes	13					**13**
Preparation flakes	24					**24**
Flakes	62	1				**63**
Burin spalls	46		2			**48**
Chips or flakes measuring less than 2cm	2881					**2881**
TOTAL	**3370**	**1**	**22**	**5**	**3**	**3401**

Table 5 – Inventory of the lithic industry – EG-VIb.

	Number
Burins	
on break	2
dihedral	1
on troncation	1
transversal	1
Retouched blades	3
Backed pieces	
troncated backed bladelets	3
mesial fragment backed bladelets	11
backed points	6
partial backed pieces	2
TOTAL	**30**

Table 6 – Tools inventory – EG-VIb

Local raw materials	
	Number
Tools	
common tool	3
backed pieces	16
Blades-bladelets	102
Burin spall	15
Elongated flakes and maintenance	68
Maintenance flakes	40
Flakes	44
Cores	1
Chips and flakes smaller than 2 cm	
TOTAL	**289**

Allochthonous raw materials (like Grand Pressigny region)	
	Number
Tools	
common tool	4
backed pieces	2
Blades-bladelets	15
Burin spall	8
Elongated flakes and maintenance	9
Maintenance flakes	1
Flakes	7
Cores	
Chips and flakes smaller than 2 cm	
TOTAL	**46**

Indeterminate raw materials	
	Number
Tools	
common tool	1
backed pieces	4
Blades-bladelets	123
Burin spall	23
Elongated flakes and maintenance	22
Maintenance flakes	1
Flakes	11
Cores	
Chips and flakes smaller than 2 cm	2881
TOTAL	**3066**

Table 7 – Inventory of the lithic industry by raw material sources – EG-VIb.

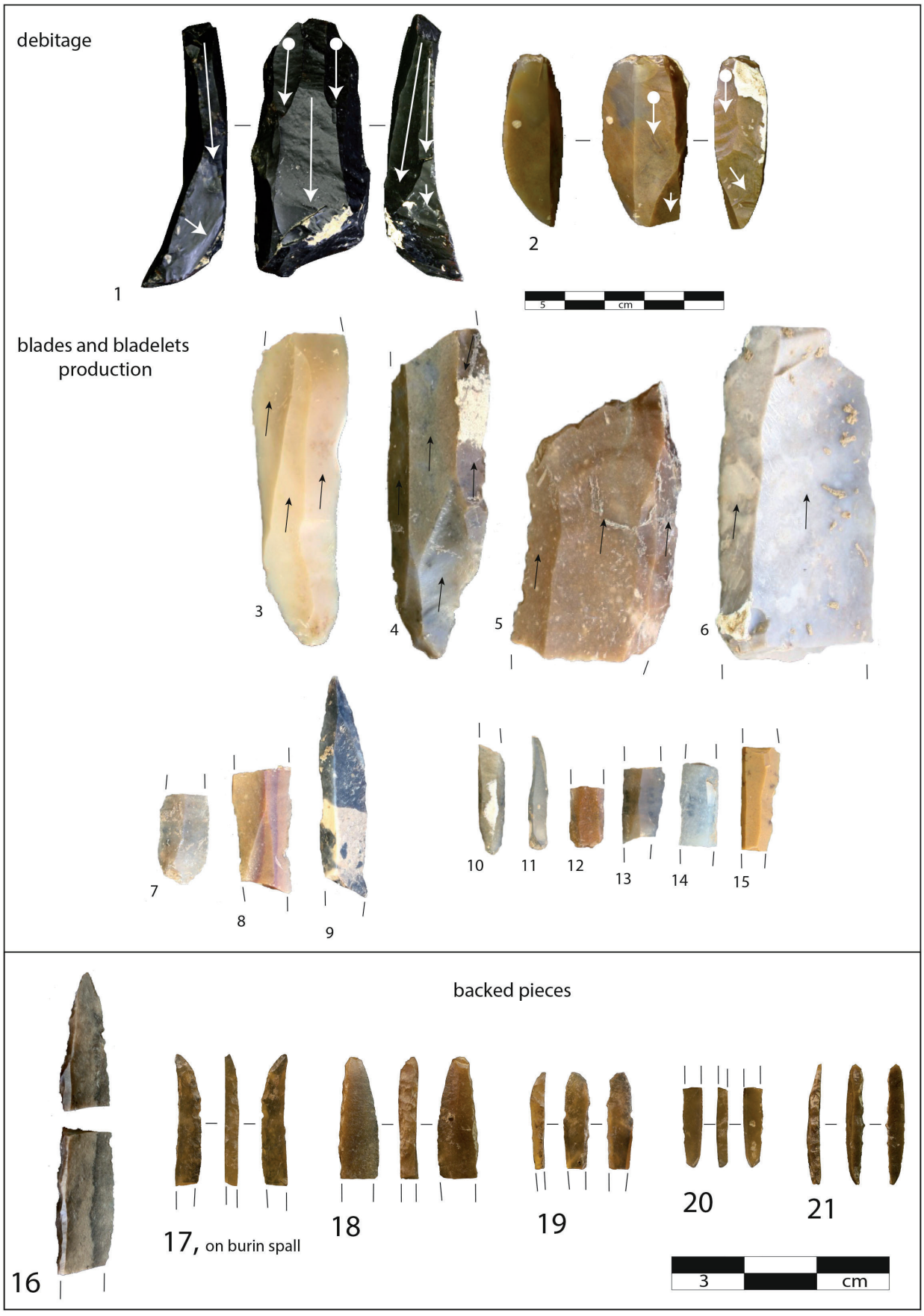

Fig. 6 – EG-VIb, photo: G. Martin et E. Cormarèche. 1 and 2. Elongated flake with *débitage* surface, 3 to 15. Blades and bladelets, 16. Microgravette broken during the crossed retouch process, 17. Microgravette on burin spall, 18 to 20. Backed pieces, 21. Microgravette.

Two Late Gravettian layers at the Taillis des Coteaux?

Although they have only been identified on 2m², layers EG-VIa and EG-VIb show many similarities. The Gravettians have exploited local raw materials deposits in order to produce a wide range of blades and bladelets. Different débitage methods appear to have been used:

- Cores on blocks display one or two striking platforms, one of them being usually preferred for blades and bladelets production, shaping out and maintenance calling for the use of crested blades. Core rejuvenation flakes and elongated product distribution stress the core's progressive reduction process.
- Some cores display a narrow flaked surface maintained by the removal of blades at the intersection of the flaked surface and the flanks of the core. The elongated maintenance products are straight suggesting that it was also the case for the flaked surfaces.
- A backed piece shaped on a burin spall suggests the possible use of core-like burins, nonexistent for now in the lithic set.

The tool-set is composed of common tools and mostly, many backed pieces that stress the differences between layers EG-VIa and EG-VIb. These differences cover backed pieces typology and dimensional variability, more than shaping process. In both layers the selected blanks are straight bladelets and sometimes burin spalls. The straight backs are shaped using a direct, although sometimes crossed, retouch. The opposite edge is also often retouched in order to define the piece's morphology. EG-VIa's backed pieces present a greater consistency than in the underlying layer. They are sometimes truncated and show little dimensional variability. In layer EG-VIb, there are more typological groups: backed points or micrograveltes, truncated backed bladelets and "simple" backed bladelets. The dimensional variability is also greater, especially when considering the width of the pieces.

Despite these differences, there are many similarities between the two layers, allowing to assign them to the same cultural facies.

Currently, the absence of diagnostic Early and Middle Gravettian artefacts would exclude an attribution to these cultural facies. The few qualitative observations concerning the reduction process, production goals and typological composition of tool sets could suggest the Late Gravettian. Indeed, the *débitage* methods that have been roughly sketched have been described for different phases of the Gravettian complex, particularly for the Late Gravettian (among others: Nespoulet, 1996; Klaric, 2003; Klaric *et al.*, 2009; Kildéa and Lang, 2011; Soriano and Pollarolo, 2011). The tool-set is mainly composed of backed pieces. The presence of backed points in layer EG-VIb would point towards the Late rather than the Final Gravettian. The Final Gravettian is particularly characterized by the giving up of the Gravette concept (Klaric *et al.*, 2009; Guillermin, 2011). This giving up of the Gravette concept does not appear to be an abrupt change between Late and Final Gravettian. To the contrary, it appears to be much more progressive in some sites. The Peyrugues shelter's sequence displays two Late Gravettian layers surmounted with a Final Gravettian layer. In these three layers, the number of points and micropoints diminishes gradually, whereas a marked increase in the number of truncated and simple backed bladelets can be noted (Klaric *et al.*, 2009; Guillermin and Morala, 2013; Cormareche, 2020). This typological evolution goes with a miniaturization process of the backed pieces during the whole Gravettian period. In the earlier phase, many Gravette points are identified in the sites but they show larger dimensions than those recorded in the Late Gravettian where micrograveltte points dominate (among other: Bricker, 1995; Simonet, 2009; Klaric, 2010; Pesesse, 2013a; 2013b). Thus, the morphometric analysis of backed pieces of the Taillis des Coteaux recalls observations made at sites like Le Blot (Middle set, Late Gravettian, Cerzat, Haute-Loire; Klaric, 1999), or Rabier (Late Gravettian, Lanquais, Dordogne; Soriano, 1998) and thus relates them to the Late Gravettian.

Two radiocarbon dates exist for the EG-VIb layer (tabl. 1): 23,220 ± 90 uncal BP for the first at the base of the layer, and 22,450 ± 80 uncal BP at the top. If these dates are consistent with an assignment of EG-VIb to the Late Gravettian, layer EG-VIa would be younger than 22,450 ± 80 uncal BP, and dated at the tipping point between Late and Final Gravettian (tabl. 8 and 9). Late Gravettian is dated between 24 ka and 22 ka uncal BP, whereas Final Gravettian is dated around 22 ka uncal BP. Despite the dates given for the upper and lower parts of layer EG-VIb, the absence of diagnostic technological and typological criteria suggest an assignment of layers EG-VIa and EG-VIb to the Late Gravettian. There are few Final Gravettian sites, but they have in common a number of features: the giving up of bipolar *débitage* methods in favour of mainly unipolar methods for backed pieces blank production, the presence of big blades showing Proto-Magdalenian retouch used as blanks

for dihedral burins, a large number of dihedral burin of many sizes, the predominance of backed bladelets over backed points (Bosselin, 1992; Guillermin, 2011; Nespoulet *et al.*, 2013; Pesesse, 2013a).

Further progress of the field work should bring more data to support the refining of the typological composition, reduction process and production goals, in order to better characterize these lithic sets and their chrono-cultural assignment. In the current state of research, we propose to assign these two layers to the Late Gravettian. Layer EG-VIa can then be assigned to an evolved Late Gravettian. For now, these proposals are mainly based on the typological evolution of the backed pieces corpus. This has already been proposed at the Peyrugues rock-shelter (Orniac, Lot) where the number of Gravette points and micrograves decreases in favour of different types of backed pieces, followed by the giving-up of the Gravette concept during the Final Gravettian (Klaric *et al.*, 2009; Guillermin, 2011).

Site name	Level	Sample reference	Material	Method	Age ^{14}C BP	References
Abri Pataud	couche 3 - Lens 2 ou 2a	GrN-1864	burnt bone	conventional	18470+-280	Vogel et Waterbolk, 1963
	couche 3 - Lens 2 ou 2a	GrN-1892	burnt bone	conventional	21540+-160	Vogel et Waterbolk, 1963
	couche 3 - Lens 2 ou 2a	GrN-4506	bone	conventional	22780+-140	Vogel et Waterbolk, 1967
	couche 3 - Lens 2 ou 2a	GrN-4721	bone	conventional	23010+-170	Vogel et Waterbolk, 1967
	couche 3 - Lens 2 ou 2a	OxA-163	bone	AMS	23180+-670	Gowlett *et al.*, 1987
	couche 3 - Lens 2 ou 2a	OxA-164	bone	AMS	24250+-750	Gowlett *et al.*, 1987
	couche 3 - Lens 2 ou 2a	OxA-165	bone	AMS	24440+-740	Gowlett *et al.*, 1987
	couche 3 - Lens 3	OxA-599	bone	AMS	21740+-450	Gowlett *et al.*, 1987
	couche 3 - Lens 3	OxA-686	bone	AMS	24500+-600	Gowlett *et al.*, 1987
Le Blot	couche 39	Ly-1338		AMS	24640 ±120	Delvignes, 2016
	couche 39-GJ, foyer GK	Ly-565	carbonaceous earth	conventional	21500 ±700	Evin *et al.*, 1973
	couche 39-JM, 1970	Ly-564	carbonaceous earth	conventional	21700 ±1200	Evin *et al*., 1973
	couche 42	Ly-1339		AMS	22210 ±150	Delvignes, 2016
Abri des Peyrugues	couche 22	Gif. 7998	bone	unspecified	24800+-500	Allard, 2009, 2011
	couche 22	Lyon-3598	bone	unspecified	24200+-190	Allard, 2011
	couche 21 b	Lyon-3597	bone	unspecified	23510+-180	Allard, 2009, 2011
	couche 20a	Lyon-3596	bone	unspecified	23150+-170	Allard, 2009, 2011
	couche 20	Lyon-3595	bone	unspecified	23520+-180	Allard, 2009, 2011
Renancourt		Lyon-9943	bone	unspecified	22600+-170	Paris *et al.*, 2017
		Ly-9942	burnt bone	unspecified	23580+-180	Paris *et al.*, 2017
		Beta-306063	bone	unspecified	21890+-90	Paris *et al.*, 2013
		Ly-11659	charcoal	unspecified	23250+-210	Paris *et al.*, 2017
		Ly-632	bone	unspecified	23040+-220	Fagnart *et al.*, 2013
		Ly-633	bone	unspecified	22360+-240	Fagnart *et al.*, 2013
Croix de Bagneux		ETH-30299	wood charcoal	AMS	23280+-220	Kildea et Lang, 2011

Table 8 – ^{14}C dates of some Late Gravettian sites.

Site name	Level	Sample reference	Material	Method	Age ^{14}C BP	References
Abri des Peyrugues	couche 18	Gif. A. 92169	bone	AMS	22400 ±280	Allard, 2011
	couche 18	Gif. A. 96224	charcoal	AMS	22750 ±250	Allard, 2011
Le Blot	couche 22	Lyon-1643	bone	AMS	21330 ±210	Surmely, Hays, 2011; Delvigne, 2016
	couche 23	Lyon-1644	bone	AMS	21510 ±220	Surmely, Hays, 2011; Delvigne, 2016
	couche 24	Lyon-1645	bone	AMS	22030 ±230	Surmely, Hays, 2011; Delvigne, 2016
	couche 27	Lyon-1646	bone	AMS	22190 ±220	Surmely, Hays, 2011; Delvigne, 2016
	couche 28	Lyon-1647	bone	AMS	20810 ±170	Surmely, Hays, 2011; Delvigne, 2016
	couche 32	Lyon-1648	bone	AMS	21870 ±230	Surmely, Hays, 2011; Delvigne, 2016
Abri Pataud	couche 2 - Lens 2	GrN-1885	burnt bone	conventional	19300 ±170	Vogel and Waterbolk, 1963
	couche 2 - Lens 2	GrN-3255	bone	conventional	19650 ±300	Vogel and Waterbolk, 1967
	couche 2 - Lens 2	GrN-2123	bone	conventional	19780 ±170	Vogel and Waterbolk, 1963
	couche 2 - Lens 2	GrN-2115	bone	conventional	20340 ±200	Vogel and Waterbolk, 1963
	couche 2 - Lens 2	GrN-2081	bone	conventional	20540 ±140	Vogel and Waterbolk, 1963
	couche 2 - Lens 2	GrN-1861	burnt bone	conventional	20780 ±170	Vogel and Waterbolk, 1963
	couche 2 - Lens 2	GrN-4230	bone	conventional	20810 ±170	Vogel and Waterbolk, 1967
	couche 2 - Lens 2	GrN-1857	burnt bone	conventional	20960 ±220	Vogel and Waterbolk, 1963
	couche 2 - Lens 2	GrN-4231	bone	conventional	21380 ±340	Vogel and Waterbolk, 1967
	couche 2 - Lens 2	GrN-1862	bone	conventional	21940 ±250	Vogel and Waterbolk, 1963
Laugerie Haute Est	couche 36	GrN-1876	burnt bone	conventional	21980 ±250	Vogel and Waterbolk, 1963

Table 9 – ^{14}C dates of some Final Gravettian sites.

A new milestone for the Late Gravettian in the south-west of the Paris Basin

The identification of two Late Gravettian archaeological layers at the Taillis des Coteaux participates to the renewal of our knowledge of the Gravettian in the south-west of the Paris Basin. Although some sites can be assigned to the same facies, they would deserve a better characterization in this region. The Plumettes shelter,[9] located about 20km to the south-west of the Taillis des Coteaux (fig. 1), in the Lussac-les-Chateaux district, has an archaeological layer that has been assigned to "un moment assez récent du Gravettien"[10] (Primault, 2003, p. 271), showing some similarities with the Taillis des Coteaux's Late Gravettian layers. The *débitage* focuses on blade production for the shaping of common tools and bladelets for the backed pieces. Blade production is usually

made on block-cores, the *débitage* beginning by the shaping of a crest, maintenance of the volume being ensured by postero-lateral crests. The flaked surface is narrow and unipolar, but a second striking platform can be opened to provide maintenance of the core's longitudinal convexity. The shaping out of new crests during the knapping process is also common. Bladelet production is tougher to characterize. The Gravettians could have selected diaclistic nodules which did not require extensive shaping out. They often look like thick angle-burins (Primault, 2003). As in the Taillis des Coteaux, the Gravettians have favoured local raw materials, although some of the blades are made from Upper Turonian Grand-Pressigny flint (*ibid.*; Cormareche, 2020).

The tools, on bladelets, are mostly backed pieces and then mainly backed bladelets, although some micrograveттes are also present. According to their description and drawing by J. Primault (2003), these objects show some similarities with the Taillis des Coteaux pieces. Average measurements are close, the width measuring around 5mm and the thickness 2mm. The drawing plates also show great dimensional variability. These tools are made on straight blanks, their back shaped by a direct, seldom crossed or alternating, retouch. The main difference is the use of an inverse retouch, flat and covering, at the extremities of the Plumettes shelter's points, and the absence of retouch on the opposite edge. Research work about the Taillis des Coteaux cave have to be carried on, and the Plumettes shelter's lithic set reexamined in order to confirm these similarities and the proposed chrono-cultural assignments.

Some indications of Late Gravettian presence have been found during surface surveys at the Villejésus hamlet in Bossay-sur-Claise (fig. 1). These lithic remains are consistent with the small straight blade production procuring blanks for micrograveттes, characterized and dated in the Late Gravettian of the La Croix de Bagneux site at Mareuil-sur-Cher (Aubry *et al.*, 2013). In the Villejésus sets, there are unfortunately no backed pieces allowing a comparison with Le Taillis des Coteaux. It should also be noted that these archaeological remains come from surface survey. The test pits carried out by L. Klaric in 2007 did not reveal the archaeological site (Klaric, 2007).

The La Croix de Bagneux site, at Mareuil-sur-Cher, located less than one hundred kilometers away from the Taillis des Coteaux and dated at 23,500 uncal BP, is the nearest archaeological site assigned to the Late Gravettian. The lithic remains, mostly local Lower Turonian and Grand-Pressigny Upper Turonian flints, show that one of the goals of the *débitage* was the production of small blades and bladelets that would be shaped into backed pieces. The blanks were produced on unipolar or alternately bipolar cores, carefully shaped out. The shaping out of crests and the removal of core rejuvenation flakes would help maintaining the volumes (Kildéa and Lang, 2011). The cores described in this set are slightly different from those in layer EG-VIa, their width is greater. The *débitage* methods remain nonetheless close. Some similarities can be observed in backed pieces technology, especially in dimensional variability and typological composition of the sets (micrograveттes, backed bladelets, truncated backed pieces).

Indications of Late and Final Gravettian occupations appear too scarce to allow us to specify the place of layers EG-VIa and EG-VIb's remains in the south-west of Paris Basin, but their stratigraphic position revealed through a modern and methodical excavation process will bring important information for further research in understanding these prehistoric societies.

Conclusion: an unprecedented archaeological sequence in the south-west of the Paris Basin

The Taillis des Coteaux cave displays an exceptional Upper Palaeolithic archaeological sequence, starting with Aurignacian occupations (dated at 30 ka BP) and finishing with Early Middle Magdalenian layers (*circa* 14,500 uncal BP).

Contrary to the Magdalenian layers that have been excavated on a large scale (around 60m^2), the Gravettian sequence has merely been sketched out, identified in two test pits only. Dated between 22,500 and 25 ka BP and preserved in a low dynamic alluvial context, it comprises at least three Middle and Late Gravettian substages composed of lithic, faunal and bone and antler industry remains, as well as pieces of ornament and engraved art objects. The chronological succession of these different facies, and particularly the Noaillian laying above the Rayssian facies, is unprecedented, although a taphonomic bias cannot yet be ruled out completely. Further extension of the excavated surface, as for the Magdalenian sequence, will undoubtedly bring more data to confirm the proposed chrono-cultural assignments, refine the technical systems' description and contribute to further discuss the chronological structuration models for the second half of the Gravettian complex. These models were actually founded on a small sample of sites located in a restricted geographical context (among others: Djindjian and Bosselin, 1994; Rigaud, 2008; Klaric, 2003; 2010; Goutas *et al.*, 2011; Noiret, 2013; Pesesse, 2013). Thus, apart from the opportunity to describe the technological features of its middle and late phases, this sequence offers a

great potential for a multidisciplinary reading of the Gravettian environmental context and its evolution.

Acknowledgement

We would like to thank Alexis Taylor for translating the text into English, Mathieu Rué and Yan Axel Gómez Coutouly for proofreading. We also thank the Direction régionale des Affaires culturelles and the Service Régional de l'Archéologie Nouvelle-Aquitaine for the archaeological operation financing.

Endnotes

1. The excavation of the Taillis des Coteaux cave focused mainly on the Magdalenian and Badegoulian layers. Carrying on the excavation work will allow to specify the geoarchaeological and technological observations. Study of the lithic industries is still in progress within an academic work aiming to characterize the Late Gravettian's technical systems.
2. The existence of green fluvial sands (Sf) was first mentioned by Géraldine Delfour (PACEA) in 2011 (Primault, 2011), prior to the Gravettian layers' discovery. The description of new facies (2012-2019) and sedimentological and heavy minerals analysis have since been carried out by Virginie Le Fillâtre.
3. The presence of an alluvial sedimentation process beneath the colluvial deposits has been identified by Morgane Liard in 2000 (Primault, 2000). Sedimentological analysis, relations with the Fy Terrace, relative timing and palaeogeographic interpretation have since been made by Virginie Le Fillâtre.
4. Study in progress.
5. A systematic analysis of surface states, currently in progress, will further specify these observations.
6. The term of « common tool » refers to domestic sphere tools like burins, scrapers, retouched blades, etc. and is opposed to the hunting sphere represented by backed pieces.
7. A systematic analysis of surface states, currently in progress, will further specify these observations.
8. Pending a more suited terminology, we will use the term of "simple" backed pieces or bladelets when both extremities of the blanks bear no retouch or breaks.
9. Comparisons with other archaeological sites are based on bibliographical data only
10. Translation: "a rather recent moment of the Gravettian"

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