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The Acheulean site of “La Grande Vallée” at Colombiers (Vienne, France): stratigraphy, formation processes, preliminary dating and lithic industries

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Introduction

1 For the last thirty years, research into early Middle Pleistocene deposits has multiplied in Western Europe at sites such as Boxgrove (Roberts *et al.* 1997) and Happisburgh (Parfitt *et al.* 2010) in England, Cagny (Tuffreau *et al.* 2008), Menez-Dregan (Hallegouët *et al.* 1992) and Soucy (Lhomme 2007) in the north of France, La Noira (Despriée *et al.* 2010) in the center of France, Notarchirico (Piperno 1999) in Italy and Atapuerca (Carbonell *et al.* 2001) and Aridos (Santonja *et al.* 1980) in Spain.

2 In Poitou-Charentes, many Acheulean sites were discovered during the early stages of prehistoric research from the 19th century onwards. In Charentes, well-known sand quarries in the Saint-Amand-de-Graves region yielded early lithic industries, from Saint-Même-les-Carrières to Jarnac (Guillien 1941; Patte 1956, 1972; Airvaux 1983). The Charente alluvions in Charente-Maritime also contain abundant Acheulean remains. Unfortunately, the interlocking terrace system is not well differentiated and often borders on the water table, making fieldwork difficult. In the north of the Deux-Sèvres, at the edge of the Massif armoricain, the Dive and Thouet alluvions contain Acheulean industries (Germond 1982). In Vienne, north of Châtellerault, several Acheulean sites were discovered in the 19th century (Patte 1941). At La Roche-Posay, in the northeast of Vienne, the Creuse alluvions extend between the Vienne department on the left bank

and the Indre-et-Loire on the right bank. At La Revaudière, on the commune of Yzeures-sur-Creuse, the 15-22 m terrace yielded an exceptional Acheulean industry (Fritsch 1972; Gratier & Macaire 1981). This brief overview of the Poitou-Charentes region brings to light a context of many early discoveries of Acheulean sites. However, no excavations had been conducted at any of these sites up until now. There is thus no stratigraphic context and no dating whatsoever for these lithic assemblages.

3 The site of La Grande Vallée, in Colombiers near Châtellerault, is thus a fundamental addition to these discoveries. We excavated this site from 2005 to 2008, and brought to light several Acheulean assemblages from five archaeological levels in a dated sequence. This paper presents the geological, stratigraphic and chronological context of the site and discusses the nature and the characteristics of the lithic assemblages.

1 – Site discovery and geological and geographical context

4 The Poitou region in west central France, bounded by the Parisian Basin and the Aquitaine Basin, is a geological sill (le Seuil du Poitou) prolonging the respective extensions of the Massif central and the Massif armoricain (fig. 1). The Jurassic substratum outcrops on the edge of the primary massifs, enclosing the Cretaceous terrains characteristic of the two large sedimentary basins. The Upper Turonian (and sometimes Middle Turonian) stage has been strongly altered right up to south Touraine. The clayey alterites issued from this transformation contain an impressive quantity of tabular flint. The site of La Grande Vallée is located in this geological context, on the edge of the Upper Turonian alterites.

5 The site is located south of the Loire, in the Vienne department, in Colombiers near Châtellerault (fig. 1 and 2). This commune is on the northern slope of a large woodland plateau of about 8 sq.km, dominating a valley with a northern width of more than 6 km where the Envigne River runs. The latter is a modest tributary of the Vienne River at Châtellerault (fig. 2).

6 Half way between Colombiers and the neighboring townland of Marigny-Brizay, at La Grande Vallée, there is a short and deep thalweg with a north orientation axis. Here, the small road linking Beaumont to Colombiers follows the curve of the west thalweg slope and that of a structural flat 60 m above the local base level. This flat developed on a lithological weakness underlining the contact between the Lower Turonian limestone base and the Middle Turonian sandstone bars (fig. 2).

7 In 1995, maintenance work on the road talus and the ditch revealed the presence of fossil deposits on this flat. Abundant artefacts including handaxes were discovered by one of us (J. Airvaux) and the talus section exposed the presence of an extensive site. In 2005, we excavated a 2 sq.m. test pit about 1.5 m deep behind the road talus section. From 2006 to 2008, a programmed operation allowed us to excavate *in situ* archaeological levels over a surface of 18 sq.m. and to study the stratigraphic sequence of the site.

Figure 1- Location of the site of La Grande Vallée in its regional geological context.

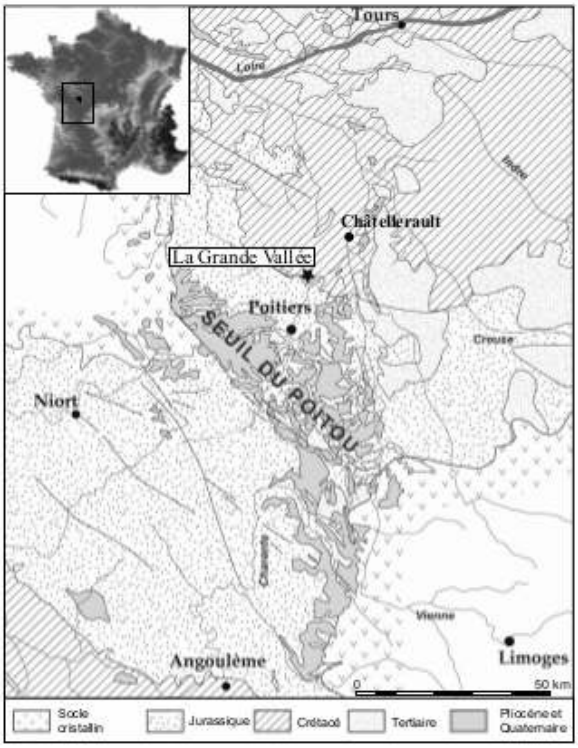
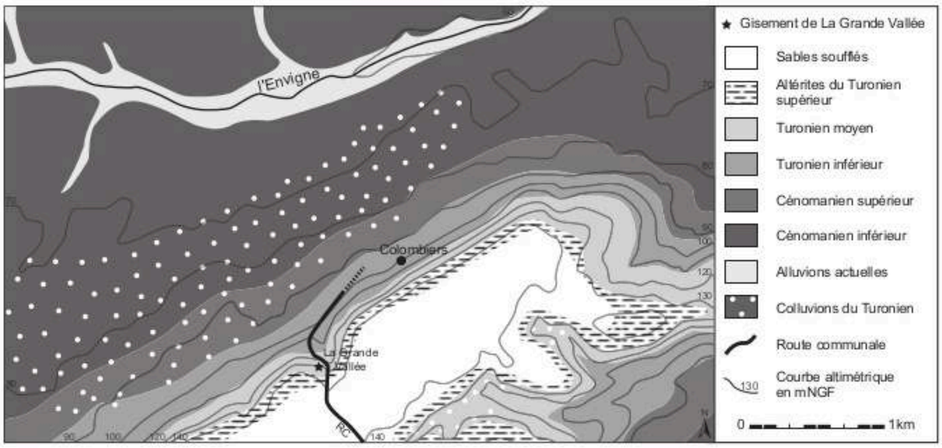


Figure 2 - Location of the site of La Grande Vallée in its local geological context (extract of the geological map of Bourgueil et al. 1976, modified).



2 – Stratigraphy and sedimentary dynamics

2.1 - Description of the lithostratigraphic units

8 The excavation unearthed a three meter thick stratigraphy and has not yet reached the base of the Pleistocene deposits (fig. 3). Five units were identified and described following the study of the facies and sedimentary structures (tab.1). The base deposits are made up of 1.4 m of massive brown variegated sandy clays interspersed with sandy

lenses running into a stony diamicton with blocks further down (unit 5). They are overlain by a thick sheet of 0.6 m of poorly bedded coarse sands with granules and stones (unit 4), covered by a thin sandy lens (unit 3) then a semi-metric deposit of roughly stratified clays with superposed beds containing variable quantities of stones of all sizes and orientation (unit 2). A rather thin discordant colluvium deposit overlies the sediments (unit 1). Besides the archaeological fraction, the coarse elements are made up of silicified limestone debris, flint slabs and gelifracts issued from the alterites capping the mound and pedorelics from old soils, mainly represented by iron oxides. The latter are mainly located in the units from the upper part of the sequence.

2.2 – Sedimentary dynamics and periglacial phenomena

Figure 3 - Stratigraphic log of the site of La Grande Vallée: lithostratigraphic units and archaeological layers (the oblique triangles represent not homogeneous archaeological groups of lithic artifacts coming from an accumulation caused by the erosion of numerous occupancies on the hillside).

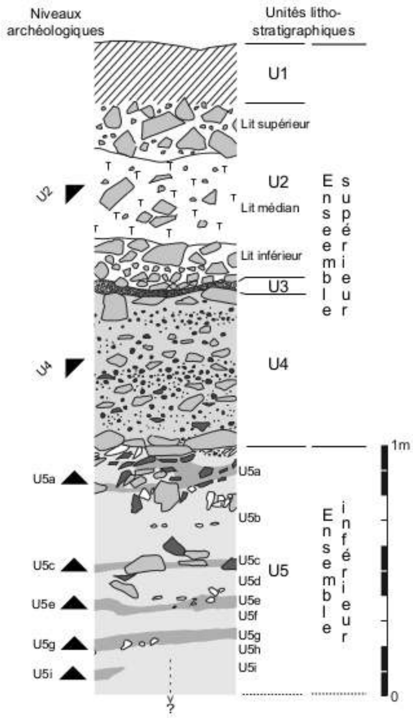
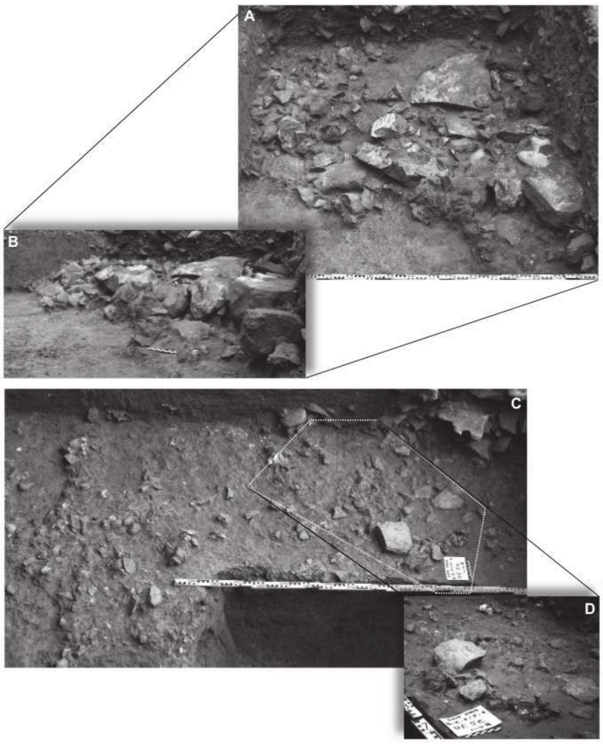


Table 1 - Description of lithostragraphic units. The description of the deposits fabrics follows the terminology proposed by Benn (1994).

Unité	Epaisseur en mètre	Texture	Structure sédimentaire	Couleur	Fabrique
U1	0.4	Sable légèrement argileux	Massive	Marron foncé (10YR 3/3)	-
U2	0.6	Blocs, cailloux et argile sableuse	Stratification rudimentaire par superposition de trois lits : 1) diamicton à support clastique riche en granules, gélifract et silex taillés (0.15 m), 2) argile sableuse à débris épars (0.3 m), 3) séries de lentilles parfois triées de sables grossiers, granules, silex taillés, gélifracts et blocs de silex à support clastique et structure fermée (0.15 m).	Marron jaunâtre (10YR 5/6)	Isotropique
U3	0.05-0.08	Sable fin bien trié légèrement argileux	Massive	Jaune brûnatre (10YR 6/8)	-
U4	0.6	Cailloux, granules et sable argileux	Stratification lenticulaire mal exprimée par superposition de passées d'épaisseur décimétrique plus ou moins fournies en cailloux	Brun (7.5YR 5/6)	Linéaire
U5	1.4	Blocs et argile ; granules localement abondants (faciès U5')	Deux faciès se relayant en toposéquence : - partie basse du site, faciès U5' : diamicton à blocs et cailloux - partie haute du site, faciès U5 : dépôts mal stratifiés par intercalation de lits sableux riches en cailloux, en blocs et en silex taillés s'intercalant dans une argile sableuse massive à débris épars. La proportion des débris naturels diminue vers la base de l'unité au profit des silex taillés	**U5'**: brun (7,5YR 5/6) **U5** : rouge jaunâtre (5YR 5/8) pour la partie supérieure, jaune olive (2,5YR 6/6) à ponctuations rouges jaunâtres (5YR 5/8) et tâches gris clair (5G 8/1) pour la partie médiane, brune (7,5YR 5/8) à tâches gris clair à la base (5G 8/1).	Isotropique (U5') ou planaire à tendance isotropique (U5)

Figure 4 - A – general view of level 5g stripped ; B – razing view of level 5g stripped ; C – partial view of level 5e stripped, the white frame corresponds to the zone covered by view D ; D – razing view of level 5e stripped. Photos D. Hérisson



9 The isotropic fabric, the matrix, the poor stone sorting and the poor bedding in unit 2 designate a deposit edified by successive debris flows (Bertran & Texier 1999). Excellent sand sorting and the sorting features observed microscopically indicate that unit 3 is a runoff deposit (Lenoble 2005). These same criteria and the abundance of the fine fraction show that this process also contributed to the edification of the base deposits (unit 5). But in the latter unit, runoff only plays a secondary role compared to solifluction. The term solifluction is used here in the sense of periglacial solifluction (Washburn 1979; Harris *et al.* 1997). It designates the slow movement of soil subjected to freeze-thaw cycles on slopes superior to 2° or 3°. This displacement, which varies from one to several centimeters per year, is perpetrated by the action of different processes, namely soil swelling during freezeup after segregation ice formation in sediments,

subsidence during thawing, the individual displacement of artefacts on the surface following the formation of ice needles and episodes of soil liquefaction during thawing. Its contribution to sedimentation is attested by the cryogenic microstructures of the deposits (lamellar or granular structure, Murton & French 1994), deformations of sandy beds (stretching and boudinage) and the lobe morphologies brought to light by the excavations (fig. 4). These lobes were observed and recorded in transition zones between the clayey facies of the zone further up and the block accumulation further down. They are made up of elongated and arched concentrations of stones and flint slabs, extending over one to two meters and disposed transversally to the slope (fig. 4). Rims such as these are observed in present day semi-desert periglacial environments subject to solifluction. The stones forming the paving behind the flows are displaced faster when they are larger and form concentrations at the flow fronts. This organization is characteristic of stone banked solifluction which generally develops on slight to moderate slopes (Bertran *et al.* 1995). The stacking of these fronts is responsible for the facies of blocks and stones observed downslope in the excavated zone. This latter thus corresponds to a zone of flow immobilization at the foot of the slope. The sorting of the coarse fraction, the reverse grading and the preferential orientation of long elements in line with slope direction indicates that unit 4 is also a periglacial solifluction deposit. The facies is not however one of lobe stacking, but is the superposition of strongly leached flows (absence of fine fraction, leaching features observed microscopically: washed zones, silty caps). These features characterize a deposit formed in a transit zone.

10 The succession of the different terms of the sequence thus signifies aggradation and slope regularization. The first deposits observed are distal accumulations (unit 5), overlain by mid slope deposits (units 4 and 3) which are in turn overlain by discontinuous sedimentation represented by superposed debris flows (unit 2). Moreover, the angular disconformity separating this latter unit from preceding units shows that these debris flow episodes accompany the increase of a colluvium cone which covers the previously regularized slope.

3 – Preliminary dating elements

3.1 - Chronostratigraphy and estimated age of the industries

11 Sequence formation duration can be estimated by referring to palaeopedological microscopic observations. The latter can be grouped into three categories: hydromorphic features (degraded zones or oxide impregnated zones), cryogenic features (lamellar or granular structure, leaching features) and microbedded clay coatings in relation with the development of luvisols (Jamagne 2008). The thickness of clay accumulations and the horizons containing them excludes soils formed during interstadial type climatic improvement. The leached soils with which these argillic horizons are associated are thus interglacial. Three horizons linked to three fossil luviols were identified. Between these are interspersed frost structured soils, particularly at the base of the deposits where solifluction is the main agent of sedimentation. The hydromorphic traits are ubiquitous and could belong to different soil types. The superposition of an argillic horizon with a frost structured profile (granular horizon overlying a horizon with lamellar structure) thus results from a glacial-interglacial cycle. These poorly detailed results indicate a site with low

accretion formed over a long time period – three distinct glacial-interglacial cycles were recorded in the sequence. The most recent fossil argillic horizon is at the summit of the sequence where it is truncated by the uppermost deposits (unit 1). The discordant character of the deposits from this last unit, their colluvial nature and the associated recent soil show that this upper unit is formed by sediments in transit in the upslope segment subject to erosion. This is evidence of slope evolution in reaction to the hollowing of the small valley « La Grande Vallée » and the subsequent lowering of the base level. This evolution of the base level implies a long period of morphogenesis which means that the underlying argillic horizon cannot be ascribed to the Holocene. For this reason, this pedological horizon represents *a minima* a soil formed during isotopic stage 5 and the underlying argillic horizons can be respectively ascribed to stages 7 and 9. The industry collected at the base of unit 5 in solifluction deposits cannot be younger that the preceding glacial cycle, that is isotopic stage 10. An age of 350 ka is thus a reasonable estimation of the age of these industries. The discontinuous sedimentation, in particular in the upper part of the stratigraphy, points towards the probable presence of a hiatus. Therefore, the age of the deposits deduced from the palaeosoil succession is a minimum age.

12 The maximum age of the site can be estimated by taking account of the regional rate of valley incision. The dating of alluvial formations in the middle course of the nearby Creuse valley indicates a recess of the base level of 10 cm per millennium (Voinchet *et al.* 2010). The local absence of tectonic activity means that this rate and the position of the site in relation to the base level can be retained to estimate the age of the formation of the flat. This latter could thus not be older than 600 ka. The estimation of minimum and maximum ages places the industries from unit 5 in a time bracket between 350 and 600 ka, which corresponds to the second third of the Middle Pleistocene.

3.2 – Preliminary thermoluminescence dating of levels 5a and 5c

13 Thermoluminescence (TL) dating of heated flints establishes the time elapsed since the last heating of the sample in a prehistoric fire. This method directly dates a human activity, which is actually visible in the archaeological record. TL dating uses the omnipresence of ionizing radiation which results in excited electron states (charges). These are measured by thermoluminescence and provide the total accumulated dose (palaeodose), which is divided by the dose rate in order to obtain an age estimate. While the internal dose rate is determined through neutron activation analysis (U, Th, K) the precise external γ-dose-rate can not be measured because the samples are removed from context during excavation. Instead, measurements were performed with α-Al_2O_3:C dosemeters in several positions (tab.2), in order to provide an average external γ-dose-rate for each stratigraphic sedimentary unit of the site. The presence of very large flint pieces (with a low concentration of radioactive elements) and of sedimentary clay as matrix (with a high concentration of radioactive elements) results in very heterogeneous external γ-dose rates. Some samples may have been close or wedged between flint blocks, and therefore were exposed to a small γ-dose-rate, others received large doses, because their immediate sedimentological environment was dominated by clay, and they were thus exposed to high dose-rates. This categorizes the sediments as "lumpy" (Schwarcz 1994). However, the measured external γ-dose-rates are rather homogeneous, which contrasts sharply with the high palaeodose variability. The uncertainty concerning the external γ-dose for each individual sample thus lead to

a wide spectrum of ages, and entail the inevitable use of an average value. Only if several samples are dated an average age result can be calculated which is close to the actual age of the samples. The protocol followed here is described in Richter et al. (*2010* and supplement). The preliminary results of the analysis of three heated flints from level 5a are presented below with the results of three others from level 5c (tab. 2 and 3, fig. 5 and 6). HPGe-gamma spectrometry did not reveal any disequilibrium in the U- or Th-decay chains of the fine grain components of the sediments. These measurements indicate the absence of recent disequilibria and it is thus assumed that the external γ-dose rate was constant over the entire burial time of the pieces.

14 The preliminary ages appear to be divided into two groups, one around 450 ka, the other around 650 ka, with one sample from each level in the latter group (tab. 4). Due to the fact that only few samples have been analysed so far, it cannot be decided if these data represent outlier or are just extreme values of a wide age distribution. Statistically, all the samples are of the same age (2σ). This indicates that the two layers accumulated over a relatively short period of time somewhere around 500 ka.

Table 2 - External γ dose rates measured with α-Al2O3:C dosemeters.

Dosimètre N°	Niveau	Carré	Débit de dose γ (µGy a^{-1})	±
20	5a	E7s3	918	37
5	5a	D7s3/4	1358	267
42	5a	D4s1/2	888	74
6	5a	C7s4	868	66
9	5a	E7s4	979	8
11	5a	E4s2	877	62
12	5a	E4s1	852	48
47	5a	B7/B8	987	64
113	5a	C9s4	1010	35
137	5a	B7s4	825	69
34	5a	B8s2	900	38
Moyenne	**5a**		**951**	**147**
17	5c	F7s3	559	27
39	5c	E7s3	1075	68
53	5c	E4s2	1048	84
24	5c	D7s3/4	1175	43
23	5c	E4s1	924	65
57	5c	D4s1/2	937	8
Moyenne	**5c**		**953**	**214**

Table 3 - Preliminary values of TL measurements, radiochemical analysis (NAA) and dose rates.

Echantillon	Plateau de chauffe (°C)	DE-plateau (°C)	Paléodose (Gy)	±	b-valeur	±	U (ppm)	±	Th (ppm)	±	K (ppm)	±	eff. ext. γ (µGy/a)	cosm (µGy/a)	eff. int. α (µGy/a)	±	int. β (µGy/a)	±	total eff.int. (µGy/a)	±	total eff.ext. (µGy/a)	±	total D (µGy/a)	±	interne D (% total D)	externe γ D (% total D)
COL-051	320-420	320-365	800	17	0.86	0.01	0.42	0.06	0.32	0.05	336	24	903	135	7	1	96	9	104	9	1038	136	1142	136	9	91
COL-054	310-400	320-400	766	37	0.87	0.00	0.43	0.05	0.24	0.04	257	33	889	100	7	1	89	8	97	8	989	133	1086	134	9	91
COL-057	300-400	325-370	464	14	0.91	0.01	0.59	0.05	0.2	0.03	275	33	913	135	10	1	113	8	123	8	1048	137	1171	137	10	90
COL-050	320-400	330-400	471	20	0.94	0.03	0.22	0.04	0.23	0.03	167	20	915	135	4	1	51	6	56	6	1050	137	1109	138	5	95
COL-052	330-410	320-380	622	19	0.70	0.02	0.23	0.04	0.19	0.03	240	26	848	135	3	1	58	7	61	7	983	127	1044	128	6	94
COL-057	310-390	330-370	515	15	0.93	0.02	0.14	0.03	0.17	0.03	261	34	886	135	3	1	45	5	48	5	1021	133	1070	133	5	95

4 – The lithic industries

4.1 – Taphonomy and implication of sedimentary processes in the nature of lithic assemblages

15 Lithic industry is present in units 2, 4 and 5. There are only several dispersed pieces at the summit of the sequence. The number of pieces increases progressively and makes up most of the coarse sedimentary fraction at the base of the deposits. The remains contained in units 2 and 4 are sorted, as are natural debris. These pieces have clearly been redistributed, representing a residual fraction remobilized at each slope sedimentation period. These multiple remobilization phenomena resulted in the degradation of the pieces, which are broken with crushed or blunted ridges and sometimes with a white patina. This is not the case for objects in unit 5, particularly at the base, where archaeological remains make up the majority, if not the totality of the coarse fraction. The absence of sorting of the archaeological pieces in the deposits at the base of the slope is compatible with the hypothesis of anthropic transport. The remains were nonetheless redistributed by solifluction: the concentration of pieces in flow fronts, the transversal orientation of elongated flakes in relation to the slope within these fronts and parallel to the main slope elsewhere, as well as the decrease in size of pieces moving away from the lobes are all characteristics of redistribution by solifluction (Bertran *et al.* 1997; Lenoble *et al.* 2009). The resulting transformation of the archaeological levels remains, however, difficult to gauge as the intensity of degradations generated by solifluction is linked above all to the length of the process (Texier *et al.* 1998; Lenoble *et al.* 2007).

16 For the levels from unit 5 the microwear study of the pieces and the archaeological coherence of the series are elements which will enable us to gauge the impact of this degradation, which does not, in any way cast doubt on the age of the series which are stratigraphically well situated. As it stands, the archaeological studies show that these solifluction phenomena seem to have affected complexes which were initially homogeneous (before mobilization/transformation), corresponding at the most to several chronologically close occupations (on a Lower Palaeolithic timescale). To the naked eye the pieces are in an excellent state of preservation. Only the microwear study showed the presence of flat polish, often quite intense, of a patina sheen and of small natural chips indicating that alterations probably result from strong pressure over a long period of time rather than from brief contacts (such as those produced by trampling or falling blocks). This observation is coherent with the solifluction process identified during the geoarchaeological analysis described above. In view of the conditions of deposit formation and preservation, only the levels from unit 5 present any real archaeological interest. Our paper will logically focus on the description of these industries below.

Figure 5 - Additive (upper line) and regeneration (lower line) TL growth curves of sample COL-51. The dotted line is the scaled regeneration after the slide, which provides the palaeodose.

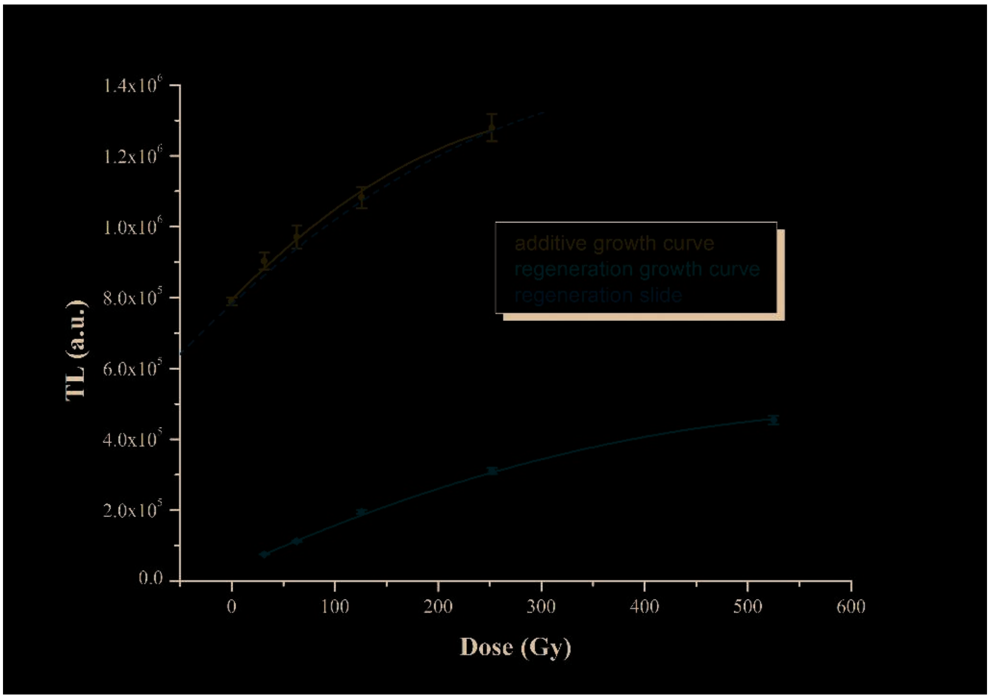


Figure 6 - Natural and additive TL glow curves of sample COL-51 with the heating plateau in grey.

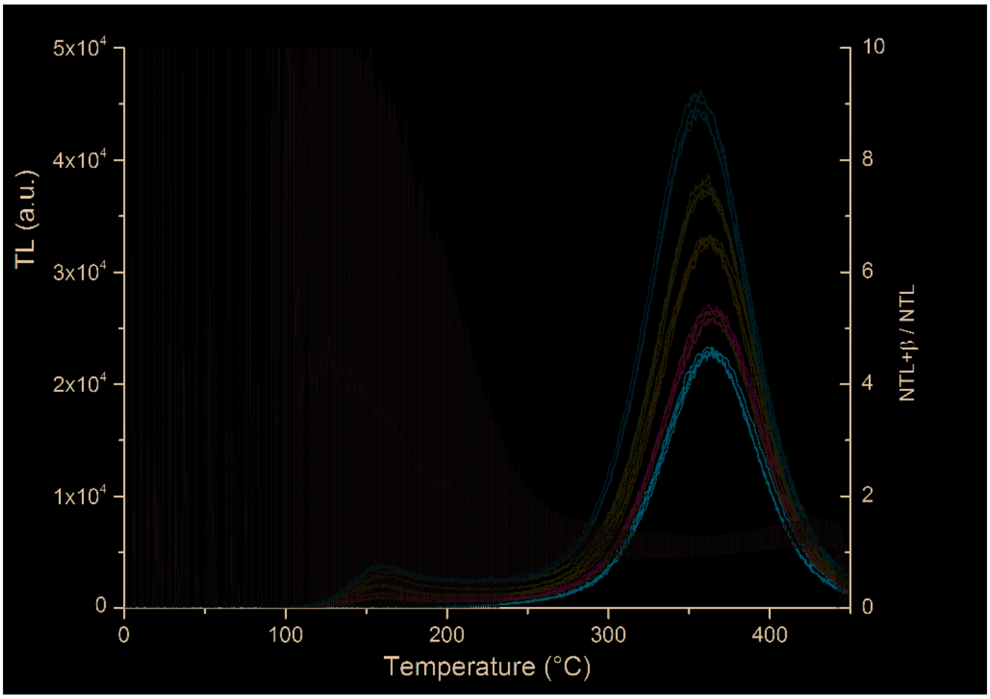


Table 4 - Preliminary results of TL measurements and resulting preliminary ages.

Echantillon	Niveau	Carré	Paléodose (Gy)	Débit de dose interne (µGy a⁻¹)	Débit de dose total (µGy a⁻¹)	Age (ka)	±
COL-51	**5a**	D6 s2	500	104	1142	**440**	**60**
COL-54	**5a**	E5 s2	766	97	1086	**700**	**90**
COL-57	**5a**	D6 s4	464	123	1171	**400**	**50**
COL-50	**5c**	E6 s4	471	56	1106	**430**	**60**
COL-52	**5c**	E6 s2	622	61	1044	**600**	**80**
COL-62	**5c**	E6 s1	515	48	1070	**480**	**60**

4.2 – Lithic raw material provenances

17 The Colombiers region makes up the southern extension of the Upper Turonian with large siliceous slabs which extends from the south Touraine region. This flint was widely exploited during the recent and final Neolithic in regions stretching from the northeast of Vienne to Grand-Pressigny (Indre-et-Loire). This Upper Turonian tabular flint is the main raw material used at La Grande Vallée. At Colombiers this material sometimes contains inclusions of macro-bioclasts, generally vegetal (mosses). This appears to be a local feature in the region around Châtellerault. Apart from this widely used flint, several other type of lithic raw materials were used by prehistoric groups, such as Jurassic flint (Bajocian) which could come from the Poitiers region, twenty kilometers to the south, or from the Clain or Vienne alluvial deposits close to the site. One Fontmaure jasper flake from Vellèches, 30 km to the north, was found at the site. Several pieces in glossy sandstone or high quality purple to violet quartzite are of unknown provenance. The quartzite may come from Fontmaure, but we cannot be sure. One handaxe made of Tertiary millstone which is an abundant raw material in the eastern half of the department. The nearest buhrstone source is less than 10 km from the site. In sum, the Acheuleans from La Grande Vallée exploited a radius of at least 30 km around the site for raw material procurement. The most reliable data concern the Fontmaure jasper as the outcrop is very localized. However, as mentioned above, most of the lithic raw materials are local and readily available a hundred meters or so above the excavated zone.

4.3 – Characteristics of the lithic industries from unit 5

Table 5 - Global counting of lithic industries coming from unit 5 after the first three-year excavation.

Niveau	Artefacts non brûlés	Artefacts brûlés	Total des artefacts	dont bifaces	% biface	dont ébauches	dont supports retouchés	% supports retouchés	dont nucléus	% nucléus
5a	11464	475	11939	29	0,24%	10	89	0,75%	14	0,12%
5c	2320	164	2484	12	0,48%	3	47	1,89%	4	0,16%
5e	2431	251	2682	12	0,45%	11	35	1,30%	4	0,15%
5g	1148	127	1275	11	0,86%	3	33	2,59%	5	0,39%
5i	143	17	160	0	0,00%	0	2	1,25%	1	0,63%
Total U5	17506	1034	18540	64	0,35%	27	206	1,11%	28	0,15%

18 In the scope of this paper we will treat the assemblages from the different levels of unit 5 as a single entity in order to expose the main common features of the industries. After the first three years of excavations, 18,540 lithic pieces had been found with 1,034

burnt elements from all the unit 5 levels (tab. 5). All stages of the chaînes opératoires are represented, from raw material acquisition (cf. § 4.2) to tool discard. Three types of blocks were selected for the predominant productions in Upper Turonian flint: large slabs (up to 2 m long and 8 to 30 cm thick), small slabs (about 30cm long and 3 to 7 cm thick) and flat oval shaped nodules of variable dimensions.

19 The main site objective can clearly be identified as handaxe production (fig. 7). Three chaînes opératoires were applied to this production.

20 The first begins with the selection of slabs of small dimensions. These are shaped by a series of removals (alternating or not) with a hard hammerstone to form an active zone. A back corresponding to the edge of the slab and a base are reserved in order to be used as a prehensive zone (fig. 7.4). The active zone is sometimes subjected to a second shaping phase which regularizes and refines the cutting edge angle using more tangential soft hammer percussion. The type of handaxe obtained is asymmetrical with a characteristic V shaped section due to the conservation of a prehensive slab edge zone.

21 The second chaîne opératoire begins with the selection of small and medium sized oval-shaped nodules. The presence of many roughouts attests initial shaping by a series of hard hammer removals often carried out following a “side to side” pattern. A second finishing phase is conducted using soft, organic and tangential percussion, as indicated by the thin shaping flakes with little developed conchoidal zones, butt morphology, the sagittal curve and the morphology of the scars present on the handaxes. Some pieces have a cortical area at the base, reserved for gripping.

22 The third chain is a combination of debitage and shaping (as defined by Brenet 2011). A first stage consists of producing large flakes which are then shaped at a later stage. For this, prehistoric groups selected large nodules or plaques which they fractured before debitage. These selected elements (plaque or nodule fragments) were debited following unifacial unipolar or centripetal schemas or by progressive alternating removals, sometimes leading to the formation of a hinge all around the edge of the block. The flakes produced are often very large and thick and are used in turn for the second stage of handaxe fabrication, i.e., shaping. In some cases the flakes are first crudely shaped using a hard hammer, as for the second chaîne opératoire described above. In all cases, a finishing phase using a soft hammer is carried out and the active zone on the distal part of the tool is particularly well rfined (fig. 7.1, 7.3, 7.5). Most of the handaxes on flakes do not have a reserved proximal unworked zone but often retain the “memory” of the transverse dissymmetry of the flake blank.

23 In addition to the elaboration of bifacial implements, sidescrapers and other types of tool were also made from flakes-debris issued from shaping, from debitage flakes or occasionally from frost cupules. The sidescrapers are mostly simple (fig. 9.8, 9.12) with regular, non-invasive retouch, apart from for the thicker blanks where retouch is more invasive. Some sidescrapers display thinning around the conchoidal zone. The toolkit also contains several denticulates, large notches and other elements most aptly described as choppers (fig. 7.6).

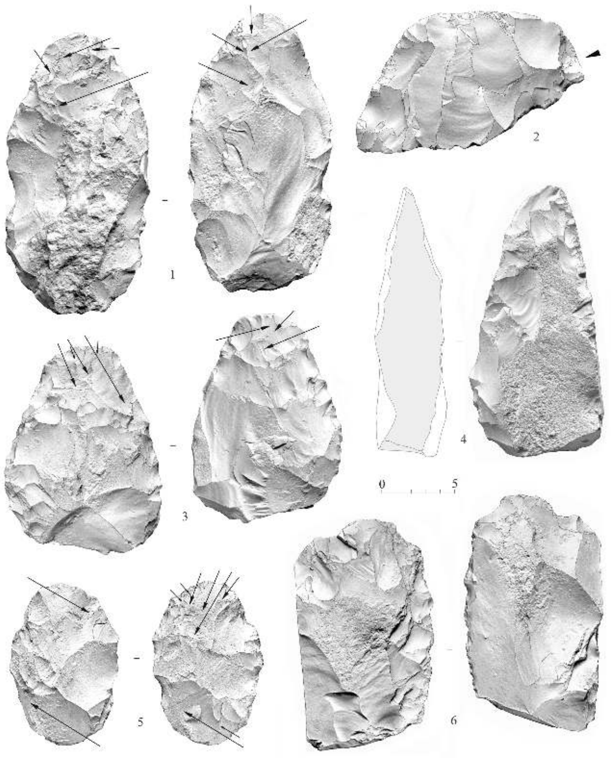
24 An interesting aspect of the debitage is the quest for a certain number of elongated products, although they remain relatively rare. These pieces were extracted from naturally angular ridges on slab edges, yielding one to three laminar flakes (fig. 8.2, 8.3,

8.7). These laminar flakes may have been used as they were, with no subsequent retouch, like debitage or handaxe shaping flakes.

25 The acquisition and handaxe and tool production phases are particularly well documented at the site but it is also imperative to focus on the use and discard of these pieces. These fundamental phases are attested by the presence of "tranchet blow" flakes and their corresponding scars on abandoned handaxes. The preliminary microwear study brings important results and key elements for discussing the functions of these implements before they were discarded.

Figure 7 - Bifacial productions of unit 5 of la Grande Vallée: 1, 3, 5 – handaxes ; 2 – tranchet blow flake ;

4 – bifacial artefact with a back ; 6 – large scrapper or «tranchoir». Drawings J. Airvaux.



4.4 – Use-wear analysis of the lithic industry from unit 5

26 After a preliminary examination of several hundred products and retouched tools with the naked eye and the stereomicroscope, 52 pieces were selected for a use-wear analysis, either because they presented possible or obvious use-wear traces or because they were well preserved compared to the rest of the collection. This sample is made up of flakes, retouched flakes, a core, a chopping-tool and bifacial pieces coming from the unit 5 (a, c, e and g). A stereomicroscope (with magnifications of 10 to 30 x) and a metallurgical microscope (100 to 200 x) were used to look for the different types of use-wear (edge damage, rounded edges, polish, striations), by applying the method proposed by S.-A. Semenov (1964) then followed by by R. Tringham *et al.* (1974) for low power approach and L.-H. Keeley (1977) or P. Anderson-Gerfaud (1981) for high power approach. An experimental reference collection of wear due to use, hafting, transport

and alteration (Claud 2008; Claud *et al.* 2009) was used in order to compare archaeological traces with well-defined experimental traces.

27 Nineteen pieces out of the selected sample show use-wear traces - scrarring, crushing and abrasion traces - and a total of 21 active areas were recorded. The more frequent traces are those due to percussion on hard materials (fig. 10) but the high frequency of these traces is probably due to the differential preservation of the different use-wear traces. Indeed, post depositional surface and edges modifications (natural crushing, rounded edges, scarring, patina sheen, bright spots and striations), probably mainly resulting from a mechanical origin, are intense and likely to have destroyed the less developed use-wear traces. Nonetheless, several pieces show edge damage due to cutting soft to medium hard materials. Lastly, use-wear traces of a mixed action (percussion and cutting) on medium hard materials were also identified.

28 In spite of the absence of use polish, it was possible to distinguish two main categories of materials worked (organic *versus* mineral) and to propose some functional hypotheses for most pieces, based on low power approach and especially the presence or absence of some macro-traces, such as crushing traces, on both archaeological and reference pieces. It is thus very probable that most of the tools were used in a butchery context, either for meat cutting, or for dismembering. The pieces used for percussion are generally heavy, with a thick and comfortable prehensive area opposite to a cutting edge with no point (fig. 10). These are indifferently either non-retouched blanks or tools such as sidescrapers or bifacial pieces. On the other hand, the tools that were used only for cutting actions are lighter and present a convergent active area (two handaxes and a convergent sidescraper).

29 The traces observed on the seven remaining pieces (including several bifacial pieces and a core) indicate their use for percussion on a hard mineral matter. Some of them are similar to those occurring on experimental debitage flint hammers (Claud *et al.* 2010; Thiébaut *et al. 2010*). This kind of percussion traces has been frequently observed on Lower Palaeolithic handaxes (Wymer 1964; Keeley 1980, 1993; Mitchell 1998; Wenban-Smith & Bridgland 2001).

Figure 8 - Debitage elements of unit 5 of la Grande Vallée: 1 – unipolar core ; 3 – core which produced two laminar flakes thanks to the angular edge of the slab ; 8 – bipolar core ; 10 – centripetal core ; 2, 7 – laminar flakes ; 4, 5, 6, 9 – debitage flakes. Drawings J. Airvaux.

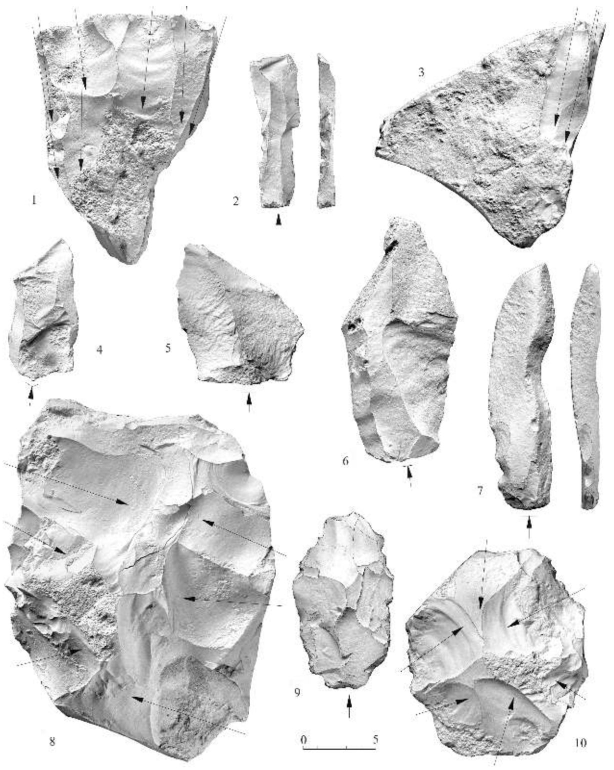


Figure 9 - Retouched end-products of unit 5 of La Grande Vallée : 1, 2 - double scrappers ; 3, 4, 5, 8, 9 - simple scrappers ; 6, 7, 13 - double convergent scrappers ; 10, 11 - denticulates ; 12 - double convergent scrapper with thinning on lower face ; 14, flake with a large notch ; 15, 16 - end-scrapper ; 17 - liminal retouched flake. Drawings J. Airvaux.

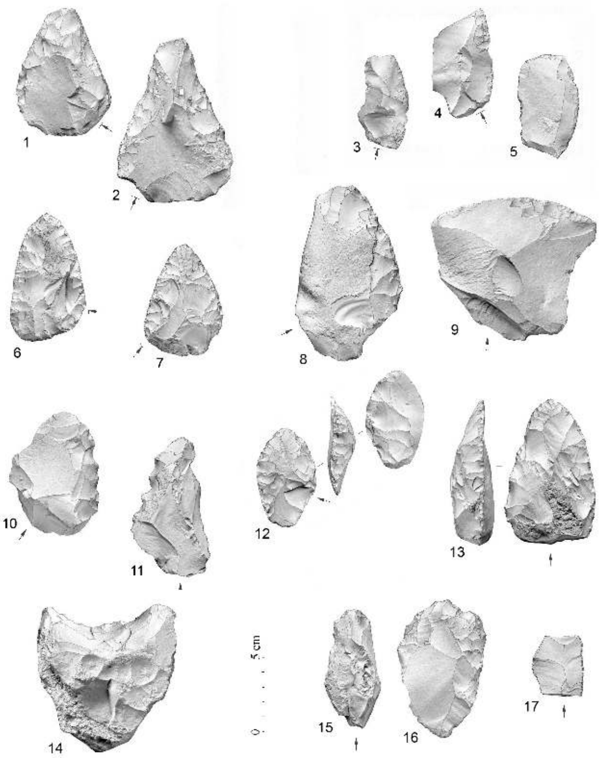
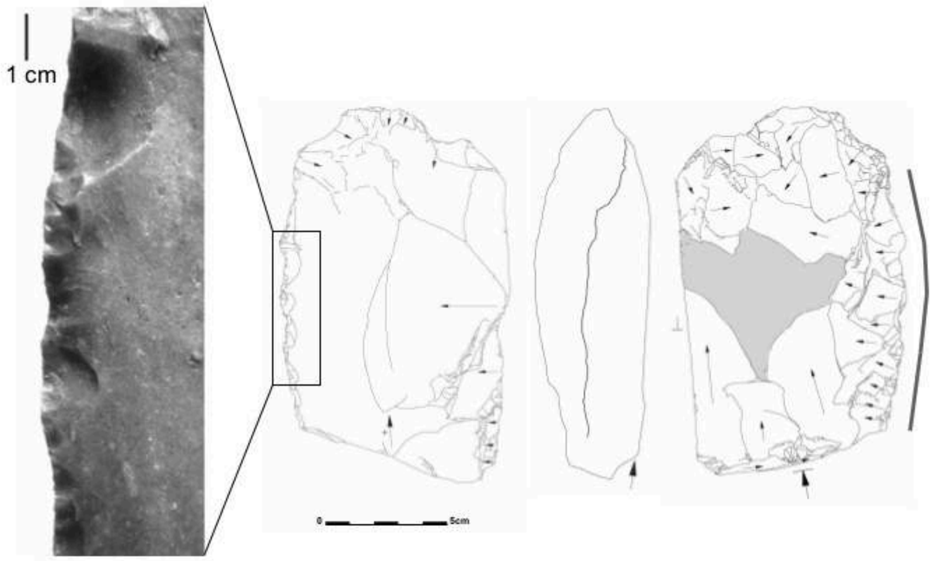


Figure 10 - Large scrapper used to chop a hard organic material, probably for butchering. It shows large bifacial scarrings, that are mainly semi-circular and with a step termination. The long active area is opposed to a prehensive zone formed by a plan fracture of the original slab, forming a real back.



Conclusions

30 The open-air site of La Grande Vallée is in a very singular location and geological context. Unit 5 on the structural flat contains preserved archaeological levels due to the presence of significant slope deposits which sealed the complex. After Acheulean occupations, the archaeological levels were mobilized by solifluction. This phenomenon modified the spatial distribution of the remains abandoned by Hominids without any stratigraphic interference. Geological observations point towards an age of 350-600 ka for the archaeological levels, which corresponds to the second third of the Middle Pleistocene. This estimation is confirmed by preliminary thermoluminescence dates which tend to situate levels 5a and 5c in a 400-500 ka time bracket. It is probable that ongoing dates for the lower levels (5e, 5g and 5i) yield similar ages.

31 Although the fauna was not preserved, microwear studies and the presence of abundant burnt flints show that the site was not a simple workshop but also hosted other subsistence activities. The site of La Grande Vallée contains a diversified lithic industry with wide typological variety which corresponds to relatively well-defined and stabilized morpho-functional concepts, as well as clear and repetitive chaînes opératoires. The quality of this industry implies the existence of a long anterior evolutionary process. The industry from La Grande Vallée also confirms the ability of Acheulean groups to adapt to raw material variability: pebbles from southern regions, narrow and elongated nodules from western regions, large flint slabs from the Upper Turonian at La Grande Vallée, as is the case throughout the Seuil, Poitou and south Touraine region.

32 This overview of the preliminary results from the first three years of excavations reveals the interest of this site for our knowledge of the first inhabitants of Europe and the assessment of early cultures. Indeed, in spite of a century and a half of research into the subject, the Acheulean and the evolution of the Acheulean remain difficult to grasp, as was recently underlined by E. Nicoud (2011) and numerous authors before that, like A. Tuffreau (2004), among others. In this context, any new discovery concerning this early period is fundamental and adds to a limited corpus of sites, providing new and valuable elements for discussing the nature and the significance of very early assemblages.

BIBLIOGRAPHY

AIRVAUX J. 1983 - Les industries acheuléennes de la région de Jarnac, Charente, I. Les hachereaux. *Bulletin de la Société Préhistorique Française*, 80, 2, p. 47-56.

ANDERSON-GERFAUD P. 1981 - *Contribution méthodologique à l’analyse des microtraces d’utilisation sur les outils préhistoriques*. Bordeaux : Université de Bordeaux I, 1981. 314 p., Thèse de 3ème cycle.

BENN D.I. 1994 - Fabric shape and the interpretation of sedimentary fabric data. *Journal of Sedimentary Research*, A64, 4, p. 910-915.

BERTRAN P., FRANCOU B. et TEXIER J.-P. 1995 - Stratified Slope Deposits: the Stone-banked Sheets and Lobes Model. *In* : Slaymaker O. (Ed.), *Steepland Geomorphology*. London: Wiley & Sons, p. 147-169.

BERTRAN P., HÉTU B., TEXIER J.-P., VAN STEIJN H. 1997 - Fabric characteristics of subaerial slope deposits. *Sedimentology*, 44, p. 1-16.

BERTRAN P. et TEXIER J.-P. 1999 - Facies and microfacies of slope deposits. *Catena*, 35, p. 99-121.

BOURGUEIL B., CARIOU E., MOREAU P. 1976 - Carte Géologique au 1/50 000 de Vouneuil-sur-Vienne, BRGM.

BRENET M. 2011 - Variabilité et signification des productions lithiques au Paléolithique moyen ancien. L’exemple de trois gisements de plein-air du Bergeracois (Dordogne, France). Bordeaux : Université de Bordeaux 1, 482 p. Thèse de Doctorat.

CARBONELL E., MOSQUERA M., OLLÉ A., RODRÍGUEZ X.P., SAHNOUNI M., SALA R., VERGÈS J.M. 2001 – Structure morphotechnique de l´industrie lithique du Pléistocène inférieur et moyen d´Atapuerca (Burgos, Espagne). *L´Anthropologie*, 105, p. 259-280.

CLAUD É. 2008 - *Le statut fonctionnel des bifaces au Paléolithique moyen récent dans le Sud-Ouest de la France. Étude tracéologique intégrée des outillages des sites de La Graulet, La Conne de Bergerac, Combe Brune 2, Fonseigner et Chez-Pinaud / Jonzac.* Bordeaux : Université de Bordeaux 1, 546 p. Thèse de Doctorat.

CLAUD É., BRENET M., MAURY S. et MOURRE V. 2009 - Étude expérimentale des macro-traces d’utilisation sur les tranchants des bifaces : caractérisation et potentiel diagnostique. *Les Nouvelles de l’Archéologie*, 118, p. 55-60.

CLAUD É., MOURRE V., THIÉBAUT C. et BRENET M. 2010 - Le recyclage au Paléolithique moyen. Des bifaces et des nucléus utilisés comme percuteurs. *Archéopages*, 29, p. 6-15.

DESPRIÉE J., VOINCHET P., TISSOUX H., MONCEL M.-H., ARZARELLO M., ROBIN S., BAHAIN J.-J., FALGUÈRES C., COURCIMAULT G., DÉPONT J., GAGEONNET R., MARQUER L., MESSAGER E., ABDESSADOK S., PUAUD S. 2010 - Lower and middle Pleistocene human settlements in the Middle Loire River Basin, Centre Region, France. *Quaternary International*, 223-224, p. 345-359.

FRITSCH R. 1972 - La station acheuléenne des Terriers près de La Revaudière (commune d’Yzeures-sur-Creuse, Indre-et-Loire). *Revue Archéologique du Centre,* N° spécial Colloque d’Argenton, p. 8-14.

GERMOND G. 1982 - Une station acheuléenne au bord de la Dive du nord dans les Deux-Sèvres. *Bulletin de la Société Préhistorique Française*, 79, 10-12, p. 291-304.

GRATIER M. et MACAIRE J.-J. 1981 - Les alluvions anciennes de la Creuse à Yzeures-sur-Creuse (Indre-et-Loire). Paléoenvironnement et préhistoire. *Gallia Préhistoire*, 24, 1, p. 229-238.

GUILLIEN Y. 1941 - Les sablières de Jarnac. *Bulletin de la société archéologique et historique de la Charente*.

HALLEGOUËT B., HINGUANT S., GEBHARDT A., MONNIER J.-L. 1992 - Le gisement Paléolithique inférieur de Ménez-Drégan 1 (Plouhinec, Finistère). *Bulletin de la Société préhistorique française*, 89, 3, p. 77-81.

HARRIS C., DAVIES M.C.R. et COUTARD J.-P. 1997 - Rates and processes of periglacial solifluction: an experimental approaches. *Earth Surface Processes and Landforms*, 22, p. 849-868.

JAMAGNE M. 2008 - Luvisols. *In* : Baize D. et Girard M.-C., *Référentiel pédologique*. Quae éd. : p. 223-232.

KEELEY L.H. 1977 - The functions of Palaeolithic flint tools. *Scientific American*, 237, p. 108-126.

KEELEY L.H. 1980 - *Experimental Determination of Stone Tool Uses*. Chicago : The University of Chicago Press, 212 p.

KEELEY L.H. 1993 - The utilization of lithic artifacts. Microwear analysis of Lithics. *In:* Singer R., Gladfelter B.-G. and Wymer J.-J. (Eds.), *The lower Paleolithic site at Hoxne, England*. Chicago : The University of Chicago Press, p. 129-138.

LENOBLE A. 2005 - *Ruissellement et formation des sites préhistoriques : référentiel actualiste et exemples d'application au fossile*. Oxford : British Archaeological Report International Series, n° 1363, 212 p.

LENOBLE A., BERTRAN P., BOULOGNE S., MASSON B. et VALLIN L. 2009 - Evolutions des niveaux archéologiques en contexte périglaciaire : apport de l'expérience Gavarnie. *Les Nouvelles de l'Archéologie*, 119, p. 16-20.

LENOBLE A., BERTRAN P. et LACRAMPE-CUYAUBÈRE F. 2007 - Solifluction-induced modifications of archaeological levels: simulation based on experimental data from a modern periglacial slope and application to French Palaeolithic sites. *Journal of Archaeological Science*, 35, p. 99-110.

LHOMME V. 2007 - Tools, space and behaviour in the Lower Palaeolithic: discoveries at Soucy in the Paris basin. *Antiquity*, 81, p. 536-554.

MITCHELL J.-C. 1998 - *A use-wear analysis of selected british lower Paleolithic Handaxes with special reference to the site of Boxgrove (West Sussex). A study incorporating optical microscopy, computer aided image analysis and experimental archaeology*. Oxford: Somerville College, 1998. 604p. Dissertation submitted for the degree of Doctor of Philosophy.

MURTON J. et FRENCH H.M. 1994 - Cryostructures in permafrost, Tuktoyaktuk coastlands, western arctic Canada. *Canadian Journal of Earth Science*, 31, p. 737-747.

NICOUD É. 2011 - *Le phénomène acheuléen en Europe occidentale : Approche chronologique, technologie lithique et implications culturelles*. Aix : Univ. Aix-en-Provence, 2011. 483 p. Thèse de Doctorat.

PARFITT S.A., Ashton N.M., LEWIS S.G., ABEL R.L., RUSSELL COOPE G., FIELD M.H, GALE R., HOARE P.G., LARKIN N.R., LEWIS M.D., KARLOUKOVSKI V., MAHER B.A., PEGLAR S.M., PREECE R.C., WHITTAKER J.E., STRINGER C.B. 2010 - Early Pleistocene human occupation at the edge of the boreal zone in northwest Europe. *Nature*, 466, p. 229-233.

PATTE E. 1941 - *Le Paléolithique dans le Centre-Ouest de La France*. Paris: Masson, 207 p.

PATTE E. 1956 - *Remarques sur les excursions du congrès préhistorique de 1956*. Congrès préhistorique de France. Compte rendu de la XVe session, Poitiers-Angoulême 15-22 juillet, 1956, Société Préhistorique Française.

PATTE E. 1972 - Les alluvions de la Charente de Saint-Amand-de-Graves à Saint-Même. *Mémoire de la société archéologique et historique de la Charente*, p. 167-191.

PIPERNO M. (Ed.) 1999 - *Notarchirico, un sito del Pleistocene medio antico nel bacino di Venosa*. Venosa : Osanna, 621 p.

RICHTER D., MOSER J., NAMI M., EIWANGER J. et MIKDAD A. 2010 - New chronometric data from Ifri n'Ammar (Morocco) and the chronostratigraphy of the Middle Palaeolithic in the Western Maghreb. *Journal of Human Evolution*, 59, p. 672-679.

ROBERTS M.B., PARFITT S.A. et POPE M.I. 1997 - Boxgrove, West Sussex, rescue excavations of a lower Palaeolithic landsurface (Boxgrove project B, 1989-1991). *Proceedings of the Prehistoric Society*, 63, p. 303-358.

SANTONJA M., LÓPEZ N., PÉREZ-GONZÁLEZ A. (Eds) 1980 - *Ocupaciones achelenses en el valle del Jarama (Arganda, Madrid).* Madrid : Arqueología y Paleoecología, 1, Diputación Provincial.

SCHWARCZ H.P. 1994 - Current challenges to ESR dating. *Quaternary Science Reviews*, 13, p. 601-605.

SEMENOV S.A. 1964 - *Prehistoric technology; an experimental study of the oldest tools and artefacts from traces of manufacture and wear*. London: Cory, Adams et Mackay, 211 p.

TEXIER J.-P., BERTRAN P., COUTARD J.-P., FRANCOU B., GABERT P., GUADELLI J.-L., OZOUF J.-C., PLISSON H., RAYNAL J.-P. et VIVENT D. 1998 - TRANSIT, an experimental archaeological program in periglacial Environment : problematic, methodology, first results. *Geoarchaeology*, 13, 5, p. 433-473.

THIÉBAUT C., CLAUD E., MOURRE V., CHACÓN G., DAULNY L., ASSELIN G., BRENET M. et PARAVEL B. 2010 - Nucléus et bifaces présentant des traces de percussion au Paléolithique moyen. Quelles fonctions et quelles implications techno-économiques ? *Palethnologie*. http://www.palethnologie.org/images/stories/2010/fr-FR/Varia-2010-Thiebaut-FR.pdf

TRINGHAM R., COOPER G., ODELL G., VOYTEK B. et WHITMAN A. 1974 - Experimentation in the Formation of Edge Damage. A New Approach to Lithic Analysis. *Journal of Field Archaeology*, 1, p. 171-196.

TUFFREAU A. 2004 - *L’Acheuléen : de l’Homo Erectus à l’homme de Néandertal*. Paris : La Maison des Roches, 122 p.

TUFFREAU A., LAMOTTE A., GOVAL E. 2008 - Les industries acheuléennes de la France septentrionale. *L’Anthropologie*, 112, p. 104-139.

VOINCHET P., DESPRIÉE J., TISSOUX H., FALGUÈRES C., BAHAIN J.-J., GAGEONNET R., DÉPONT J., DOLO J.-M. 2010 - ESR Chronology of alluvial deposits and first human settlements of the Middle Loire Basin (Region Centre, France). *Quaternary Geochronology*, 5, 2-3, p. 381-384.

WASHBURN A.L. 1979 - *Geocryology: A survey of periglacial processes and environments*. London: Edward Arnold, 406 p.

WENBAN-SMITH F., BRIDGLAND D. 2001 - Palaeolithic Archaeology at the Swan Valley Community School, Swanscombe, Kent. *Proceedings of the Prehistoric Society*, 67, p. 219-259.

WYMER J. 1964 - Excavations at Barnfield Pit, 1955-1960. *In*: Ovey C.-D. (Eds.), *The Swanscombe Skull. A Survey of Research on a Pleistocene Site*. London: Royal Anthropological Institute of Great Britain and Ireland, Occasional Paper, 20, p. 19-61.

ABSTRACTS

Preliminary results of the first three years of programmed excavation on « La Grande Vallée » at Colombiers in Vienne are presented in this paper. The study of the stratigraphic sequence investigated on three meters deep highlighted the presence of five archaeological levels attributable to Lower Palaeolithic. Archaeological and pedostratigraphic results as well as thermoluminescence on burnt flint converge on an age for lithic industries between 400 and 500 ky. Although deprived of faunal elements, the high wealth of the site is indisputable and gives a new perspective on the knowledge of the settlements in the center-westerner zone of France during this period. Lithic assemblages show a large typological variety with morpho-functional concepts of relatively stabilized tools, as well as specialized and repeated « chaînes opératoires ». Links between the industries of Poitou and those of northern and southern regions indicate the

high capacity of accomodation of Acheulean groups to important variations in the presentation and the nature of lithic raw materials.

INDEX

Keywords: Acheulean, Lower Palaeolithic, handaxe, Middle Pleistocene, statigraphy, formation processes, taphonomy, TL datings, usewear analysis

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