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ABOUT THE EARLY AZILIAN WAY OF LIFE IN THE PARIS BASIN: ECONOMICAL AND SPATIAL INSIGHTS FROM ZOOARCHAEOLOGICAL DATA

This article aims at compiling zooarchaeological works on the Early Azilian site of Le Closeau (Rueil-Malmaison, dép. Hauts-de-Seine/F), which were carried out at different stages of the study. This work therefore consists in putting into perspective the spatial analyses of bone remains (Bignon 1998; 2000) with hunting practice studies (Bridault 1995; Bemilli 1998; 2000; Bignon 2003; 2008), in order to get a comprehensive picture of the economy of animal resources. The prospect of understanding the main economic objectives, from game acquisition to its processing and until its final disposal, is part of a palaeo-ethnological approach originally developed for the Magdalenian deposits of the Paris Basin (Leroi-Gourhan/Brézillon 1972; Julien/Karlin 2014). In this way, the planimetric excavation of occupation soils allows us to do a socio-cultural study in which the remains of human activities (*via* their technological significance) provide information on social behaviour. We will here attempt, through archaeozoological analyses, to shed light on the way of life of Early Azilians in the Paris Basin.

THE EARLY AZILIAN OF THE PARIS BASIN AND THE LE CLOSEAU SITE

In the regional context of the Paris Basin, the Early Azilian is a cultural entity that has delivered only very few sites to date, in comparison with Magdalenian sites (Bodu 2000; Bodu/Debout/Bignon 2006; Debout et al. 2012). The only three sites for which this cultural association is recognised are the lower level of Le Closeau, the Cave of the Horse in Gouy (dép. Eure/F; see Bodu 1995; 1998; 2000; Valentin 1995; Bodu/Valentin 1997) as well as Hangest III.1 (dép. Somme/F; see Coudret/Fagnart 1997; Fagnart/Coudret

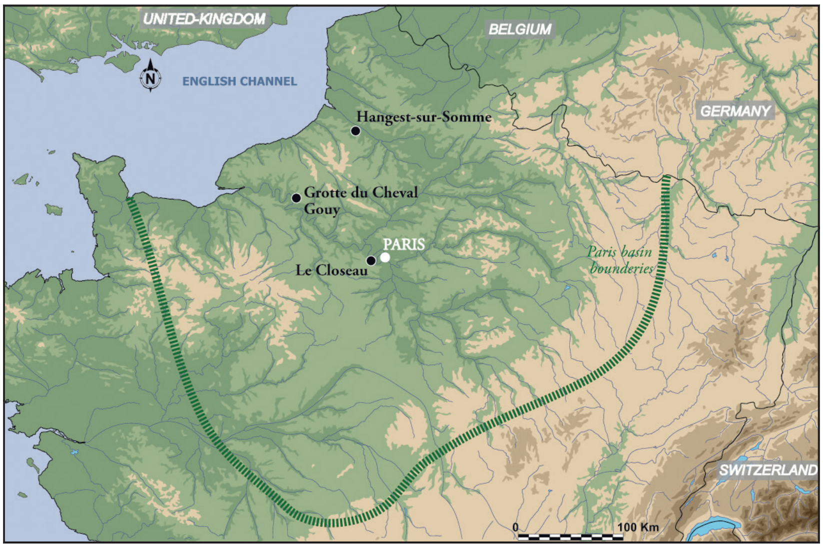


Fig. 1 Map of Early Azilian sites in the Paris Basin. – (CAD Bignon-Lau 2015).

Site	Commune	*Locus*	Lab. no.	Material	^{14}C Dates (BP)	Calibration cal. BC	Reference
Le Closeau	Rueil-Malmaison	4	OxA-5680 (Ly-166)	bone undet.	12,090 ± 90	12,223-11,796	Bodu 2000
Le Closeau	Rueil-Malmaison	4	OxA-6338 (Ly-313)	bone undet.	12,050 ± 100	12,224-11,681	Bodu 2000
Le Closeau	Rueil-Malmaison	33	GrA-18860	horse	12,510 ± 80	13,158-12,326	Bodu et al. 2006
Le Closeau	Rueil-Malmaison	33	GrA-18815	large bovid	12,480 ± 70	13,109-12,303	Bodu et al. 2006
Le Closeau	Rueil-Malmaison	46	GrA-11664 (Ly-789)	horse	12,350 ± 60	12,791-12,149	Bodu et al. 2006
Le Closeau	Rueil-Malmaison	46	GrA-11665 (Ly-790)	red deer	12,360 ± 60	12,812-12,158	Bodu et al. 2006
Le Closeau	Rueil-Malmaison	46	GrA-18816	wild boar	12,350 ± 70	12,835-12,133	Bodu et al. 2006
Le Closeau	Rueil-Malmaison	46	AA-1881	wild boar	12,423 ± 67	12,994-12,220	Bodu et al. 2006
Le Closeau	Rueil-Malmaison	46	AA-1882	cave lion	12,248 ± 66	12,598-12,003	Bodu et al. 2006
Le Closeau	Rueil-Malmaison	56	GrA-18819	cervid	12,340 ± 70	12,814-12,125	Bodu et al. 2006
Grotte du Cheval	Gouy		Gif-92346	bone undet.	12,050 ± 50	12,104-11,811	Bodu et al. 2006
Hangest III.1	Hangest-sur-Somme		OxA-4432 (Ly-86)	bone undet.	11,660 ± 110	11,785-11,340	Fagnart 1997
Hangest III.1	Hangest-sur-Somme		OxA-4936 (Ly-22)	bone undet.	11,630 ± 90	11,760-11,326	Fagnart 1997

Tab. 1 Radiocarbon dates of Early Azilian sites of the Paris Basin (after Bodu/Debout/Bignon 2006). Calibrated dates have been obtained with OxCal 4.2 – 2014.

2000; **fig. 1**). Lithic production aimed at long, regular blades for making the tool kit, and shorter, lighter blades for the manufacture of lithic points (Bodu 2000; Bodu/Debout/Bignon 2006). A number of longer blades feature low angle retouches along their edges (Bodu/Mevel 2008) and are found associated with a fairly limited range of tools (mainly short scrapers and burins). Axial lithic points (Christensen 1998) are exclusively represented by symmetrical *bipointes* (Bodu/Debout/Bignon 2006; Debout in prep.). These items are very valuable because they do characterise Early Azilian sites in the Paris Basin as in all regions of France especially well (Célérier/Chollet/Hantaï 1997; Mevel 2010). The Hangest III.1 site stands out on this topic by its hunting equipment and percussion type. Indeed, on the latter site, the backed bladelets, two notched points and one *bipointe*, as well as the »Lacan« burins hint at the Upper Magdalenian, but the use of soft stone percussion rather suggests the Early Azilian (Fagnart/Coudret 2000; Valentin et al. 2006): the cultural status of the assemblage is thus very ambiguous.

Radiocarbon dating of the Early Azilian occupations at Le Closeau and the Cave of the Horse at Gouy shows that these human groups developed during the second half of the Bølling in the Paris Basin (between 13,158-12,326 and 12,224-11,681 cal. BC; **tab. 1**). The Hangest III.1 site also seems to be chronologically different from the two other regional sites; however, radiocarbon estimates could be slightly younger and a dating of slightly before 12,000 ^{14}C-BP is more likely (Coudret/Fagnart 1997). There is actually a large overlap between the dating of Early Azilian sites and the one known for the Magdalenian occupation in the

Locus	Excavation (m²)	Number of remains	Flint artefacts	Lithic tools	Faunal remains (NR)
4	182	6,424	2,379	351	3,900
46	193	6,519	2,309	413	3,856

Tab. 2 Quantitative comparisons between *loci* 4 and 46 – Le Closeau. – (After Bodu / Debout / Bignon 2006).

region (between 13,000 and 11,800 ^{14}C-BP; Debout et al. 2012). The issue of the relative contemporaneity of these two cultural entities is well documented by the remarkable knowledge of morphosedimentary contexts of the Paris Basin developed over the past years (Antoine et al. 2000; Pastre et al. 2000). The stratigraphic analyses thus confirm the antiquity of the Early Azilian and its association to the Bølling at the Le Closeau site (Bodu 1998; 2000; Chaussé 2005): the lower level was found below the »Allerød soil«, a baseline level of that very chronozone recorded in several deposits in the Paris Basin and in the Somme Valley. As Berit Valentin Eriksen (2000) noted, we cannot exclude that there was some contemporary existence, or even coexistence, between different Azilian and Magdalenian cultural traditions.

Excavated between 1994 and 2000 on an area of 29,000 m² (Bodu 1995; 1998), Le Closeau is a key site for anyone wishing to understand the diversity of sub-stages of the Azilian, from the Bølling to the Allerød (53 *loci*). The lower level, which contained the seven Early Azilian *loci* (**fig. 2**), is of unprecedented preservation quality in the Paris Basin. Combined with extensive planimetric excavations (on an area of almost 15,000 m²), conducted by Pierre Bodu, occupations of the lower level therefore have the unique potential to support palaeo-ethnological research like the topic proposed here.

We will thus focus our research on these seven Early Azilian *loci* (an excavated total area of 1,000 m²), located on the banks of a former channel of the Seine. About 80 m apart, and separated by a sand mound, the two major occupation units (*loci* 4 and 46) seem to have had a domestic usage, as suggested by their central hearth around which the largest concentrations of lithic and faunal remains are found (Bodu 1995; 1998; Bodu / Debout / Bignon 2006). In addition, the boundaries of an inner area seem to have been marked by the presence of numerous limestone, sandstone or gritstone (*meulière*) blocks, which form a complete border in the case of *locus* 46 or a partial one for *locus* 4. *Loci* 4 and 46 also share other common characteristics, quantitatively (**tab. 2**; Bodu / Debout / Bignon 2006), or in their spatial structure (Bodu 1995; 1998; Bignon 2000): most of the flint surrounding the hearth is spread over the western half; hematite working took place north of the hearth; the cleaning of the hearth area and its surroundings led to the constitution of dumps / refuse areas outside the area enclosed by large stone blocks. The other *loci* (33, 50, 56, 57, 58) are regarded as ancillary units in contrast to the large units. Indeed, these small concentrations are mainly focused on flint knapping activities, although rare faunal remains sometimes show consumption and processing of animal parts (*locus* 56). The presence of these units surrounding the two large main units has prompted attempts to refitting flint items (Debout in prep.; pers. comm.). The first results already show a movement of elements between the ancillary activities places (*loci* 56 and 58) and between a main unit and an ancillary unit (*loci* 46 and 33). Two blades were also refitted between the major units 4 and 46 (Bodu / Debout / Bignon 2006; **fig. 2**), which does not necessarily imply the absolute contemporaneity of these two units, as it could represent material later borrowed by the occupants of *locus* 46. Furthermore, the exceptional presence of cave lion remains (*Panthera spelaea*) in *loci* 46 and 56 strongly suggests that these bones belong to one single specimen, its disposed remains hinting at a processing in different places (Bodu / Bemilli 2000). This work of linking different *loci* illustrates the occupation complexity throughout the site. We will demonstrate by the spatial analyses of the faunal remains, which is particularly focused on *locus* 46, that the complexity is the same at the scale of each unit.

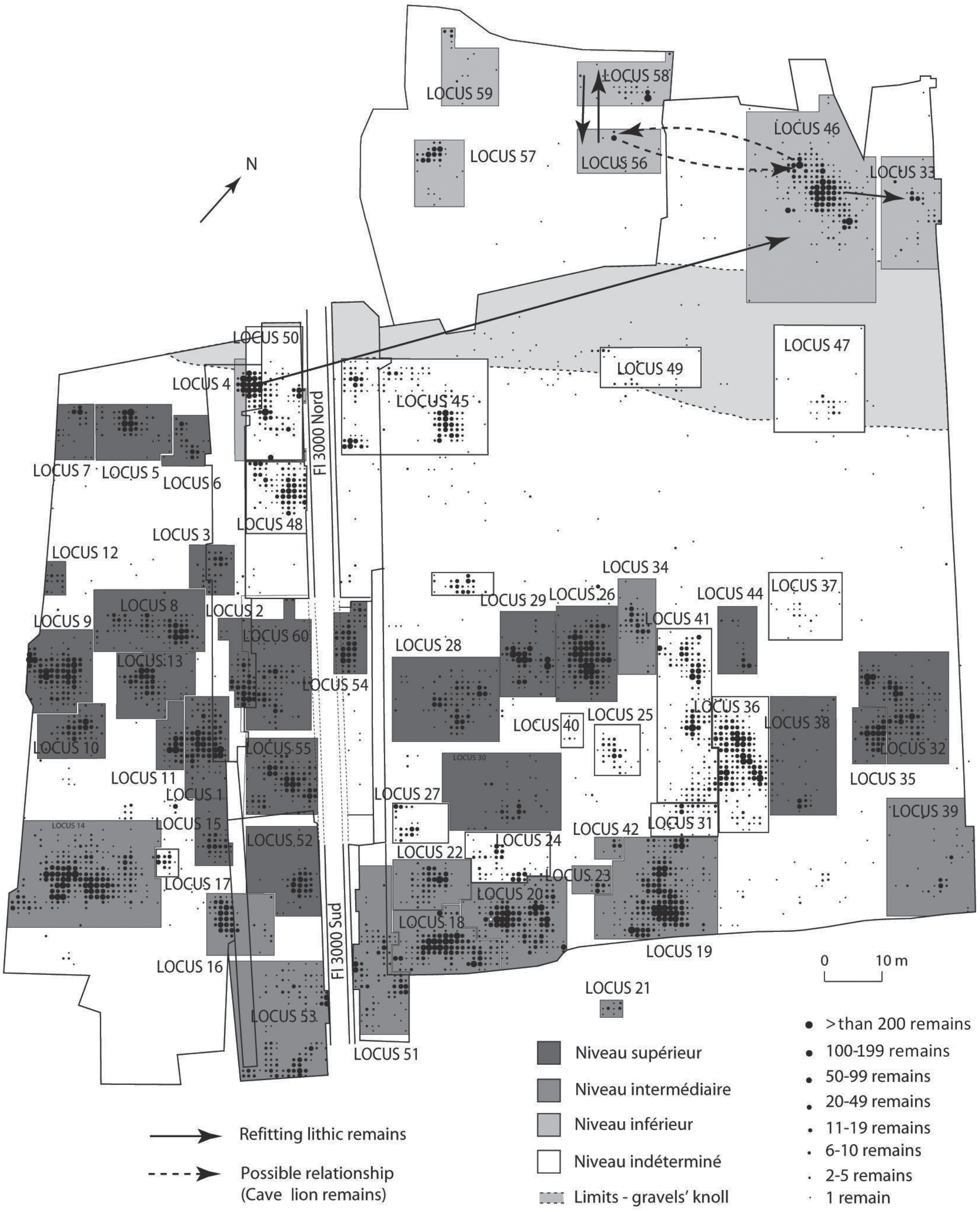


Fig. 2 Lower level of Le Closeau: seven Early Azilian *loci* (4, 33, 46, 50, 56, 57, 58) and their relationships. – (CAD Bignon-Lau 2015, after Debout et al. 2012).

THE ECONOMY OF ANIMAL RESOURCES

Faunal spectrum, key prey species and taphonomy

The faunal spectra review of the two major units will be preferred here (**fig. 3**) and specifically put into perspective with the data from the numerous Magdalenian sites. *Loci* 4 and 46 have a very similar structure in terms of quantitative representation of animal species (Bridault 1995; Bemilli 1998). These units have four species in common in order of importance, in Number of Remains (NR), as in the Minimum Number of In-

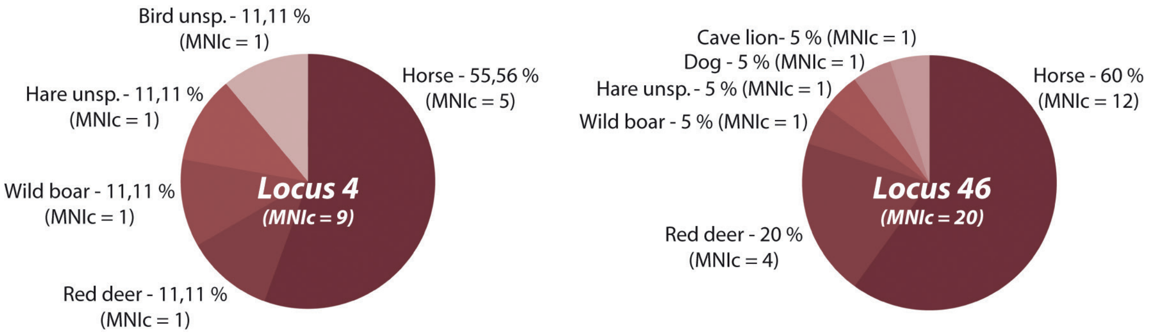


Fig. 3 Faunal spectrums of *loci* 4 (NR* = 148) and 46 (NR* = 733) – Le Closeau: Number of Remains (NR, %) *specifically identified; Minimal Number of Individuals by comparison (MNIc). – (CAD Bignon-Lau 2015).

dividuals by frequency (MNIf): horse (*Equus caballus arcelini*, *s.l.*), red deer (*Cervus elaphus*), wild boar (*Sus scrofa*), and an unidentified hare (*Lepus* sp.). The dominant presence of horse is a link with the fauna hunted by regional Magdalenian groups during the Bølling (Bignon 2007a; 2008). In terms of number of identifiable specimens and individuals, red deer comes second in *loci* 4 and 46, after horse in each case. Therefore, red deer seems to have been regularly sought at Le Closeau, although its relatively low representation assigns it to a secondary prey role. This taxon is also present in the Magdalenian spectra, but only sporadically, and often in marginal proportions, as in Marsangy (dép. Yonne / F; see Poplin 1992) or Etigny-le-Brassot (dép. Yonne / F; see Lhomme et al. 2004). More recently, it has also been identified and dated at the Magdalenian site Bonnières-sur-Seine (dép. Yvelines / F; unpublished analysis by Debout / Bignon-Lau). The presence of wild boar, albeit modest, in several Le Closeau ancient levels (*loci* 4, 46) is, however, unprecedented for the Bølling period but confirmed by two direct radiocarbon dates (**tab. 1**). The unidentified hare (*Lepus* sp.) is also relatively common on Magdalenian sites. In our comparative perspective, the identification of dog remains (*Canis familiaris*, *locus* 46; Pionnier-Capitan et al. 2011) and several remains of cave lion (*loci* 46, 58; *Panthera spelaea*; Bemilli 1998; 2000) is particularly noteworthy. These findings are at odds with the composition of the faunal record during the regional Magdalenian period in the current state of research (Bignon 2003; 2006a; 2007a; 2008).

However, nothing really indicates a palaeo-environmental rupture compared to glacial fauna still attested during the Bølling – quite the contrary. Horse is a constant throughout the Upper Palaeolithic in the Paris Basin (Bignon-Lau 2014), as well as red deer, which has also been identified on other Magdalenian sites, as mentioned previously. We just point out that, since the Middle Pleistocene, red deer are attested in both temperate interglacial forests and in the steppe-predominated complexes of the glacial phases; suggesting that this species has a very wide tolerance to moving into different habitat types according to climatic fluctuations (Sommer et al. 2008). Wild boar has an omnivorous diet and is very generally considered as the typical ubiquitous species, despite its alleged preference to thrive in wetlands (Bridault 1993; 1995); research on the spread of wild boar populations in present-day Northern Europe shows that the primary factor limiting their distribution is the availability of food resources, strongly connected to broadleaved forests (Rosvold et al. 2010; Danilov / Panchenko 2012). It is not possible to say more about the hare in Le Closeau, which was only identified at the genus level.

Beyond this, the isotopic analyses of cave lion collagen provide valuable information that confirms the complex structuring of landscapes and environmental communities during the Bølling. Indeed, it appears that the preferred prey species of these large carnivores were neither horse nor red deer, as isotope analysis only reflects the known values for reindeer (Bocherens et al. 2011). Far from the idea that these spectra can be considered as accurate reflections of palaeo-environments (presence-absence, respective proportions; see

Bignon 2003), these analyses, on the contrary, strengthen the selective nature of economic choices in terms of prey acquisition. Although it appears that the Early Azilian people at Le Closeau could potentially have hunted reindeer, this cannot be proved at the sites known so far and it is evident that horse (and to a lesser extent red deer) was favoured.

Taphonomic parameters must be taken into account in assessing the representativeness of bone remains of the Le Closeau lower level *loci*. Now, the sand mound has clearly played a role in the differential preservation of *loci* 4 and 46, located on either side of it (**fig. 2**). Even if the main accumulation factor is the anthropic agent and if one finds no dispersion or accumulation caused by the river (Bignon 2003), *loci* 4 and 46 of Le Closeau do not share the same taphonomic features.

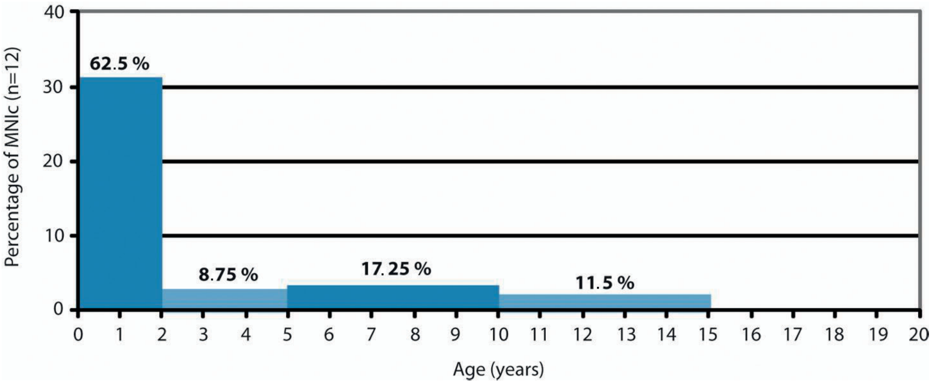
Locus 4 shows poor conservation, the primary cause of which is linked to a differential, shallow deposition of faunal remains (Bridault 1995). This translates into a strong impact of weathering on bone remains, which are also almost systematically covered with many rootlet traces. No traces of carnivore action have, however, been observed on the faunal remains, the spiral fractures of which suggest fresh bone fracturing caused by humans. This is coupled with a very likely significant alteration of animal carcasses, as evidenced by the bones with traces of fire (over 8 %; Bignon 1998). This taphonomic context, conducive to significant dissolution, caused the differential conservation of faunal remains, as attested by the absence of the horse vertebrae and ribs (see below). However, density analyses (CT; Lam / Chen / Pearson 1999) compared to the survival rate of skeletal parts (% PO) puts the impact of a differential preservation in perspective, since even if a positive correlation exists, it is not significant (Bignon 2008). Finally, the preservation conditions of *locus* 4 may have been more damaging to animal species with a more fragile skeleton than to large herbivores.

The good conservation of the bones from *locus* 46, however, suggests more favourable taphonomic conditions. The absence of weathering traces and the less patinated lithic material (compared to *locus* 4) indicate a homogeneous, faster deposition (Bemilli 2000). This process has certainly mobilised a sufficient amount of sediment to prevent the bones from being altered by rootlets, traces of which are infrequent in *locus* 46. Carnivores do not seem to have played a significant role in the unit, as few traces are associated with them (0.2 % of the NR; Bemilli 2000). However, intense human activity is noted, characterised by a high level of bone fracturing (performed on fresh bones) and a potentially substantial destruction of animal carcasses by fire (by specimen weight, 86.1 % of remains and splinters bear traces of fire; Bignon 1998; 2000). Finally, the preservation of faunal remains is good, as evidenced by the presence of rather fragile skeletal parts (vertebrae, ribs, skull), even exceptionally good in the case of horse intercostal cartilages (Bemilli 2000). Yet the comparison of density analyses (CT) with survival rates of skeletal parts (% PO) shows, as in *locus* 46, a positive, although not significant, correlation (Bignon 2008). Anyhow, in view of its best overall conservation, *locus* 46 will logically be preferred for the spatial analyses discussed later.

Game, hunting and seasonality

As it was a preferred prey of the Early Azilians, close attention will be paid to horse acquisition methods from the major settlement units of the Le Closeau site. While building on initial zooarchaeological studies (Bridault 1995; Bemilli 1998), the analysis of dental elements required a long refitting work of the series and an improvement of age references in order to get the Minimum number of individuals by combination (Vigne 1988). The age determination is based on wear / replacement reference series and, for the (deciduous and permanent) cheek teeth series, on the crown height method (Levine 1982; Bignon 2003; 2006b; 2007b). These efforts have resulted in a considerable increase in the number of individuals between the MNIf and MNIc (Bignon 2003; 2008; Bignon / Bodu 2006).

Fig. 4 Mortality profile of horses in *locus* 46 – Le Closeau. – (CAD Bignon-Lau 2015).



A higher number of horses has been identified for *locus* 46 (MNIc = 12), compared to that for *locus* 4 (MNIc = 5). In both *loci*, the slaughtered horses for the most part belong to the most extreme age groups, the juveniles and the very old adults (Bignon 2003). For *locus* 4, the MNIc is not high enough to be able to suggest a mortality profile. Nevertheless, the horses' palaeo-demographic composition is as follows:

- two foals/yearlings (0-2-year-old group), one approximately 12-month-old and another 15-month-old;
- an adult (5-10-year-old group) with an average age of 6.56 years (± 1.18);
- an adult about 9-10-year-old (5-10/10-15-year-old group);
- an old adult about 12-year-old (10-15-year-old group).

When considering the equid slaughter profile in *locus* 46 (**fig. 4**), it also appears to be characteristic of the attritional model (Levine 1982). In such a model, the youngest and oldest animals are killed because of their lack of experience or speed to escape their predators. The slaughter profiles of the attritional type more specifically match pursuit hunting or stalking, conducted individually or in very small groups (Levine 1979; Bignon 2003; Bignon/Bodu 2006). It is also clear, given the large number of foals for both *loci*, that the harems (horse family groups) have been specifically targeted by the Early Azilians (Bignon 2003). Targeting harems hints at a coherent tactical choice with pursuit hunting or stalking, aiming to potentially hit a larger number of equids per hunting expedition. Food products derived from horse can be estimated by calculating the GUI (General Utility Index; Outram/Rowley-Conwy 1998) at about 600-650 kg in *locus* 4 and about 1.4 tons in *locus* 46 (Bignon 2008).

In addition to the mortality pattern, clues about seasonality provide insights into hunting tactics (hunting objectives specific to each hunting episode) and contribute to highlight hunting strategies (hunting objectives for one or more annual cycles; see Bignon 2008; 2014). Information on the horse slaughter season was essentially obtained by the crown height method of deciduous cheek teeth (Bignon 2003; 2006b; 2007b). Both foals/yearlings in *locus* 4 delivered fairly accurate information dating their being killed between May and July (with a confidence interval of ± 1 month; **fig. 5**). More numerous clues about seasonality from *locus* 46 show that horse hunting took place in different seasons (**fig. 5**). However, the results indicate a greater occurrence for two very specific periods: either when this animal was at its weakest (in late winter-early spring), or at its most corpulent (in autumn). These identified clues about seasonality demonstrate the existence of several hunting episodes on horse family bands (harems, regularly composed by juvenile and older horses), which ultimately led to the attritional mortality profiles. The observed seasonal distribution suggests that only a few animals were slaughtered during each hunting episode, which tends to confirm the repeated implementation of pursuit hunting or stalking tactics. In this perspective, one can even consider that not all hunting episodes were successful. The seasonality of horse hunting episodes and the small number of individuals killed during each expedition could hint at individual hunting or hunts in small

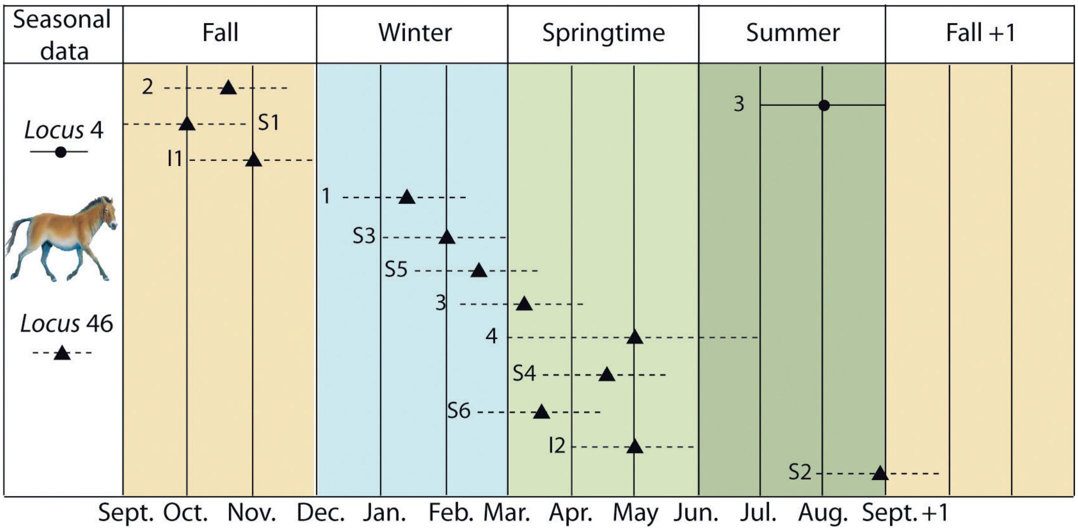


Fig. 5 Seasonal data from juvenile horses of *loci* 4 et 46 – Le Closeau. – (CAD Bignon-Lau 2015).

groups. In other words, the dominant hunting strategy of the Early Azilians from Le Closeau, in the absence of elements hinting at a change in hunting objectives, essentially consists of a succession of individual hunts on the preferred game, which are hardly profitable when linked to how often they occurred. In relation to that conclusion, the question of the status of the dog discovered in *locus* 46 arises. Either this animal is an integral part of the individual hunting pattern and the usual meat processing followed its death during a hunting episode, or this domestic canid was not alongside hunters but rather deliberately killed as prey during a hunt, which would explain the scarcity of carnivore bite marks on the bones in *locus* 46 (Bemilli 2000). While it is difficult to provide a definitive solution to all these hypotheses which are equally plausible, this case is food for thought on the emergence and use of dogs during the Upper Palaeolithic (Musil 1974; 2000; Benecke 1987; Morel/Müller 1998; Sablin/Khlopachev 2002; Savolainen et al. 2002; Street 2002; Vigne 2005; Germonpré et al. 2009; Pionnier-Capitan et al. 2011; Germonpré/Láznicková-Galetová/Sablin 2012; Boudadi-Maligne/Escarguel 2014).

Of red deer, the second most hunted species by importance in *loci* 4 and 46, there is only one individual in this first unit. However, the four individuals found in *locus* 46 suggest a greater interest by Early Azilians in this taxon. The age of these specimens (Bemilli 2000) would indicate hunting choices similar to those adopted for horses. Slaughter focused indeed on a young under 3-year-old deer and two old adults of the over 10-year-old group, in addition to a 6-8-year-old adult. No clue about seasonality is available for this taxon, but in view of the palaeo-demographic data and the conclusions reached for horses, these specimens might possibly have been killed during several hunting episodes. This way, red deer could potentially have brought hundreds of kilograms of food supplies to the occupants of *locus* 46.

Wild boar, represented by an individual in each large unit, can hardly be considered a key prey or preferred target when considering that the *loci* were frequented for at least several months (*locus* 4), if not on an annual cycle (*locus* 46). Indeed, this animal has certainly been encountered while hunting, and is therefore more related to opportunistic acquisition than to an assertive economic choice. It seems that the same conclusion can be drawn for lion, since the presence of this taxon is extremely rare since the Last Glacial Maximum (Bocherens et al. 2011), and its ferocity will have incited extreme caution. Finally, hare, which is represented by a single specimen in the two major studied units, is likely to result from an occasional acquisition, probably related to trapping activity.

The settlement pattern of Le Closeau during the Early Azilian

Economically, our zooarchaeological observations indicate that the lower level occupations of Le Closeau represent a succession of short stays at different times of the year. This occupation saw the first Azilians conduct butchery activities and dispose of non-edible body parts. The relatively high rhythmicity of occupation is likely to be related to individual hunting or hunts in small groups, hardly profitable, requiring hunters to return to the dwelling units regularly for processing the killed prey (Bignon 2008). These hunting tactics also reveal that the size of the social group that stayed regularly in Le Closeau main units was most probably quite modest. The question of animal processing methods will be explored in more detail below in our spatial analyses to reflect the dynamics of archaeological deposits.

Our zooarchaeological considerations provide a high consistency within the relatively small amount of the various remains, which strongly suggests a short-term occupation (Bodu/Debout/Bignon 2006). The small amount of lithic products in *loci* 4 and 46 (**tab. 2**) hints at an occupation period lasting not much longer than a few weeks in total and suggests a limited number of knappers (Bodu 1995; 1998; 2000; Bodu/Debout/Bignon 2006). The initial results of lithic refitting did highlight blank production sequences suggesting different levels of skill; it is, however, too soon to conclude that the occupants of the lower level of Le Closeau were family units (Bodu/Debout/Bignon 2006). In addition, the main activities were the production of projectile implements and the repair of hunting equipment as well as meat processing and hide working operations, as highlighted by traceological studies (Beyries 1998; Christensen 1998).

SPATIAL ANALYSES OF FAUNAL REMAINS FROM *LOCUS* 46

General spatial data

The analyses below were based on quantified data (weight and number of identified specimens) to capture the distribution of the faunal remains by qualitative criteria (species, anatomical segments, skeletal parts; see Bignon 1998; 2000). This is aimed at reproducing the way the butchery operations took place in the *locus* 46 area (**fig. 6A**), beginning with game segmentation. Our observations are made at the square metre scale, but counts of remains smaller than 1 cm were made at the level of 1/16th of a square metre. Four anatomic segments have been defined, including several skeletal elements: the vertebral elements (vertebrae and ribs); the cranial elements (skull, mandibles and teeth); the anterior limbs and the posterior limbs. However, some of the autopod elements (phalanges or metapodials) were not taken into consideration, since although the specific identifications were undisputable, their precise association to the anterior or posterior limbs was not sure. Through the segmentation process, our spatial analysis seeks to find some dynamics that relate to the processing and consumption-disposal phases of animal remains.

The distribution of the numbered bones (larger than 1 cm; **fig. 6B**) allows us to observe that the vast majority of these remains are concentrated within the occupation area the boundaries of which are marked by large stones. Within the area enclosed by these blocks, the homogeneous and dense distribution of bone remains smaller than 1 cm identifies this area as the preferential area of animal processing. 95 % of the burned bone remains smaller than 1 cm, associated with a gray coloration of the sediments, identify a central hearth area (D/E-268/269 square metres) visibly constituted by several contiguous small pits without stone structures (Bodu 1998; 2000). The fact that the distribution of bone remains smaller than 1 cm is confined to the limit of the stone block boundary leads us to infer that these have served to consolidate a covered structure (Bignon 1998; 2000). Outside of this domestic space, two adjacent layers to the east and

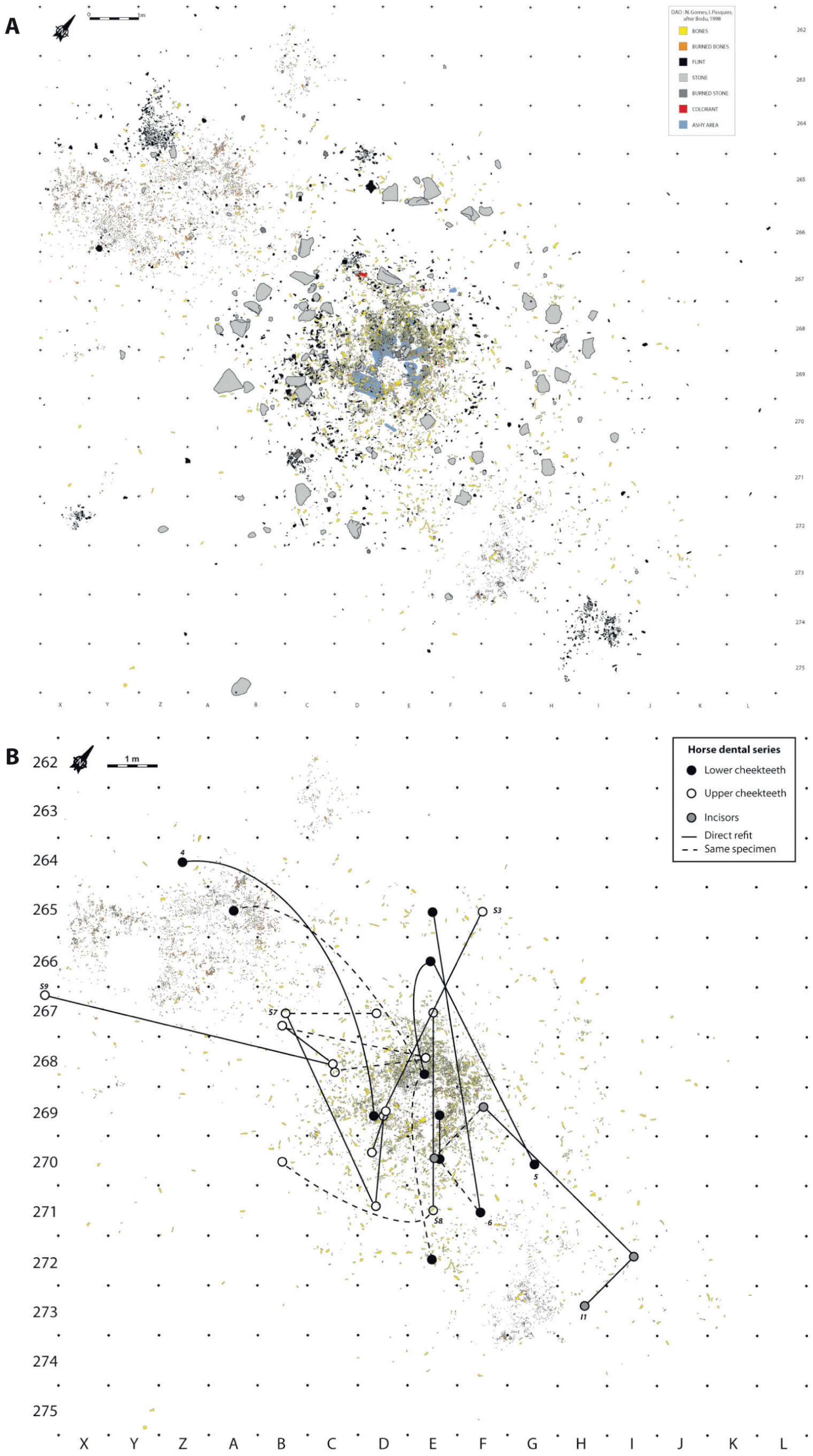


Fig. 6 *Locus* 46 – Le Closeau: **A** general distribution of remains. – **B** distribution of faunal remains larger than 1 cm and refitted dental series. – (CAD Bignon-Lau 2015).

west have been identified as dumps/refuse areas. This characterisation is strongly linked to the composition of the bone remains and matches the one found for the hearth area, but without any trace of reddening or ashy colour of the sediment (95 % of burned bone remains smaller than 1 cm; Bignon 1998; 2000; Bodu 1998; 2000). Through numbered faunal remains (**fig. 6B**), a subdivision into concentric areas by differential density appears within this covered structure. The unstructured hearth area, at the centre, delivers the highest concentration of faunal remains. In the immediate outskirts of the hearth area, far fewer bone remains form a concentric ring. Between the hearth surroundings and the area where the large stones form a relatively continuous border, a scarcity (or even interruption) of the presence of skeletal remains is observed, revealing a third concentric area. A final zone has been identified at the border of the blocks, and this is characterised by the presence of more bone remains, which form a continuous arc on more than a half of *locus* 46 (from D265 to C272). Of all the bone remains, it should be noted that the further away from the hearth area the fewer remains with burn marks were found. However, unburned remains still represent between 5 and 25 % of the specimen weight in the same area.

These observations allow us to reveal a first series of interpretations pertaining to the use of space in *locus* 46, the resulting activity management and dynamics of bone deposits. The structure that defines the habitat and the presence of a central hearth area conditioned the concentric distribution of the remains. As such, the area virtually devoid of any bone remains reveals the circulation path within *locus* 46 around the hearth. The low presence of any type of remains is most marked in the north-west quarter within the unit, which could also have served as a resting area (**fig. 6A**). The human circulation is also visible in the outside dumps/refuse areas: to the west, the continued absence of remains between C266 and E265 suggests an exit; to the east, it is rather a set of remains spreading from the outskirts of the hearth to the dump/refuse area that lead us to locate a second exit between D272 and F272. Subsequent analyses will help with the identification of this south-east exit, but the feature's distinct characteristics raise questions on their simultaneous, alternate or consecutive use to suit different stays that occurred in this unit.

In addition, the spatial organisation of faunal remains does not only arise from structural constraints, it is also the result of disposal strategies aimed at maintaining the organisation of inhabited space. These disposal strategies can be defined as the combined effects of maintenance (displacing remains) and disposal (by voluntary combustion of bones). To this end, while it is likely that several Azilians took part in the butchery activities, all could not stand in one place, especially above the hearth area. The middle of the space inside *locus* 46 was a very busy area, but the millimetric remains found anywhere within the structure suggest that a partial cleaning was conducted. As shown by some refitted dental series (**fig. 6B**), several types of movements are observed between elements: hearth area to immediate surroundings area, hearth area to stone block border, hearth area or its immediate surroundings to external disposal areas (to the east or west). These movements of remains are the product of cleaning, a certain concern for maintenance of working or resting places, which would explain the overrepresentation of fauna at the hearth area (and the fact that only 15 % of the numbered remains are burned). This gathering of faunal remains in the middle of the occupied space is to be related with their recurring use as fuel: one third of the fauna by specimen weight was burned (Bignon 1998; 2000). Beyond such use, it is not contradictory to think that the intention of the first Azilians was both to eliminate a large part of the volume of bone waste, but also to avoid attracting predators to occupations. Through the combustion process, heavily burned millimetric remains helped delimitate the hearth area and identification of the outer dumps/refuse areas.

In addition to general observations on a more dense faunal distribution in the eastern half of *locus* 46, it is noticeable that knapped flints are in contrast more present in the western half (Bodu 1998; 2000). While fracturing operations were still carried out, as evidenced by the abundance of millimetric fragments, many blade products were discovered at the hearth area and in the western half of the unit

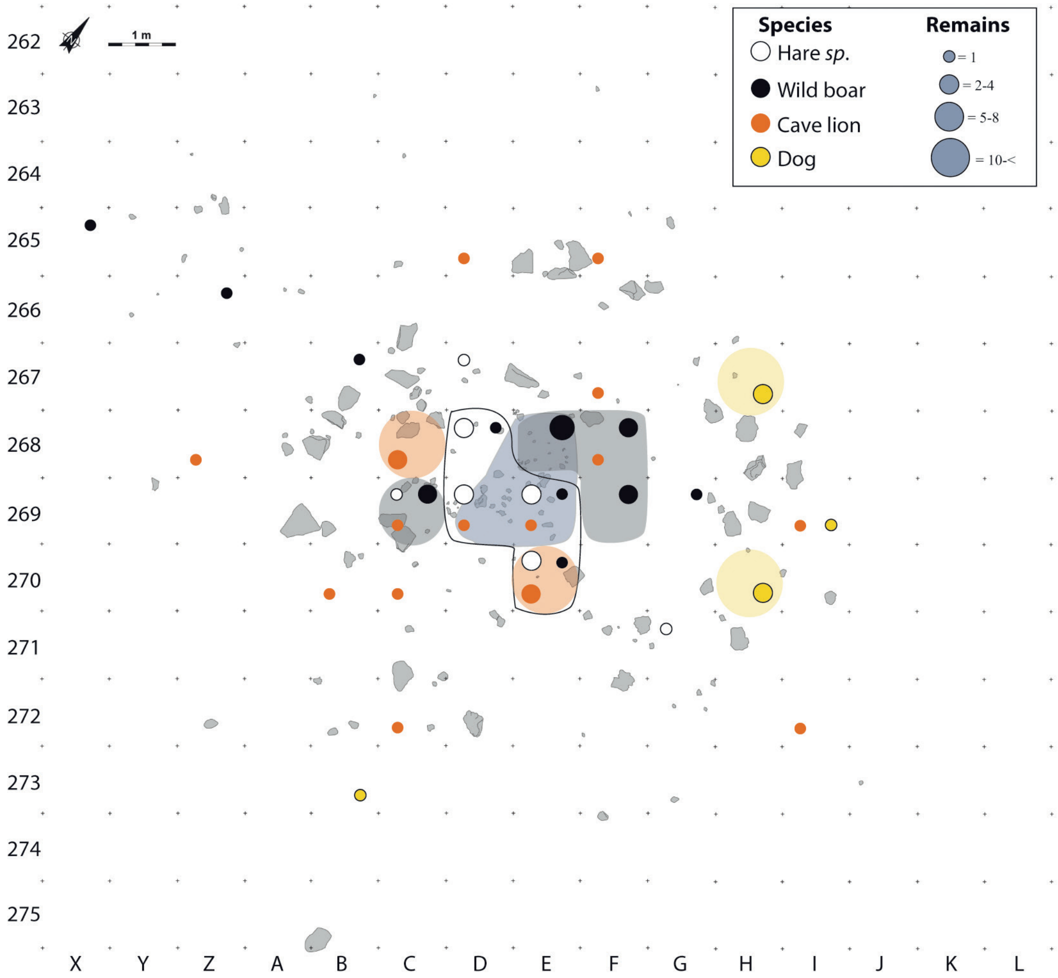


Fig. 7 Distribution of poorly represented species. – (CAD Bignon-Lau 2015).

(Bodu/Mevel 2008). Now, the traceological studies have shown that meat cutting operations (on blades with marginal retouches) and hide processing (mainly on retouched blades) were carried out (Beyries 1998; Christensen 1995; Bodu/Mevel 2008). This information complements the spatial distribution pattern related to butchery activities and the work on animal remains in general.

Distribution of poorly represented species

The species which are identified by a small number of remains help to understand spatial dynamics related to animal processing (Bignon-Lau et al. 2013; **fig. 7**). For example, hare remains (*Lepus* sp.) offer a fairly low dispersion within *locus* 46: they are mainly concentrated at the central hearth (D-E268-269) and its southern and western surroundings. Despite the many missing bones there, it was not possible to identify any remains for this species in the outer dumps/refuse areas.

Compared to the distribution of hare remains, the distribution of wild boar remains appears much less compact and homogeneous. Within the inner space of *locus* 46, the largest concentration is located north of the hearth area and along its north-east periphery, but some remains were found in a marginal position south of the hearth. Outside, only the western dump/refuse area contains a few disposed remains. It should be noted that Céline Bemilli (1998; 2000) suggested wild boars were brought in in quarters, given the many absences in anatomical representation and imbalances in the lateralisation of present skeletal elements. Precisely for the same reason, this assumption was also made to characterise how cave lion was brought to this unit. The distribution of lion bones is also noteworthy, being relatively heterogeneous south of the hearth area. Besides, it is in these spaces that the sawed phalanges of this big cat were discovered (C268, C270). However, other autopod remains (fragments of phalanges with cut marks and metacarpals) were identified north of the hearth, in the north-east of the stone border (possible indication of an import or use of pelt?). The few remains discovered outside of the occupation structure are metapodial (C272, I272) or radius (Z268) fragments.

Unlike other minority species, dog remains are not located in the internal space of the occupation, but mainly in the east, pushed away to the stone border (metapodials and phalanges, H267, H270; mandible, I269). A second, isolated lower molar, relating to the mandible found in I269, was identified near the south-east exit (B273).

After the spatial analysis of minority species, it appears that no valid distribution pattern can be identified for all these taxa. In contrast, butchery activities indicate that several working areas existed, or occasionally co-existed, within the occupation structure of *locus* 46. This plurality of animal processing areas may be put in relation with the fact that anatomical portions of several large mammals might have been selectively brought in. As for the most common species (horse and red deer), it is thus significant to determine whether a differential distribution by skeletal segment is noticeable.

Distribution of red deer remains

The examination of the spatial distribution of the segments will begin with the few cranial (n = 22) and vertebral (n = 22; **fig. 8A**) elements. At the heart of the occupation unit, remains relating to the cranial segment are concentrated in the hearth area and at the south-east exit. An isolated specimen is present in the east of the circulation path, very close to the only two remains located north of the stone circle. We see that the cranial remains were preferably disposed in the western dump / refuse area, perhaps in several stages as their fragmented distribution would suggest. As for the vertebral remains, they are, like the cranial segment, concentrated at the hearth, but are also found further east in the immediate vicinity of the combustion area. With the exception of a specimen south-east of the circulation path, only the eastern area of dumping has received disposals from the red deer vertebral segment.

More deer remains have been identified for the anterior (n = 31) and especially the posterior (n = 55; **fig. 8B**) limb segments. The stronger presence of anterior limb elements is observed at the centre of *locus* 46. It is, however, noteworthy that the northern edge of the hearth area contains some remains, and that some others were found to the south of the circulation path (C270, F270). It is at the north-west edge of the stone border that anterior limb remains are particularly present; apart from this, they are totally absent at the edge of the occupation in its eastern half. For the same anterior bones, it seems that they were rarely disposed in dumps / refuse areas, in the east as in the west, revealing some balance in these maintenance strategies.

Like anterior elements, the fragments of the posterior segment are massively represented at the hearth area. At the periphery of the hearth, it was possible to recover remains from the latter segment in almost the entire circumference. However, their south-eastern distribution within the structure (as far as the exit) seems even more pronounced. As such, despite a wide collection at the hearth level, we can see that the anterior segments tended to be exploited in the north-east, while the posterior segments were mostly exploited in

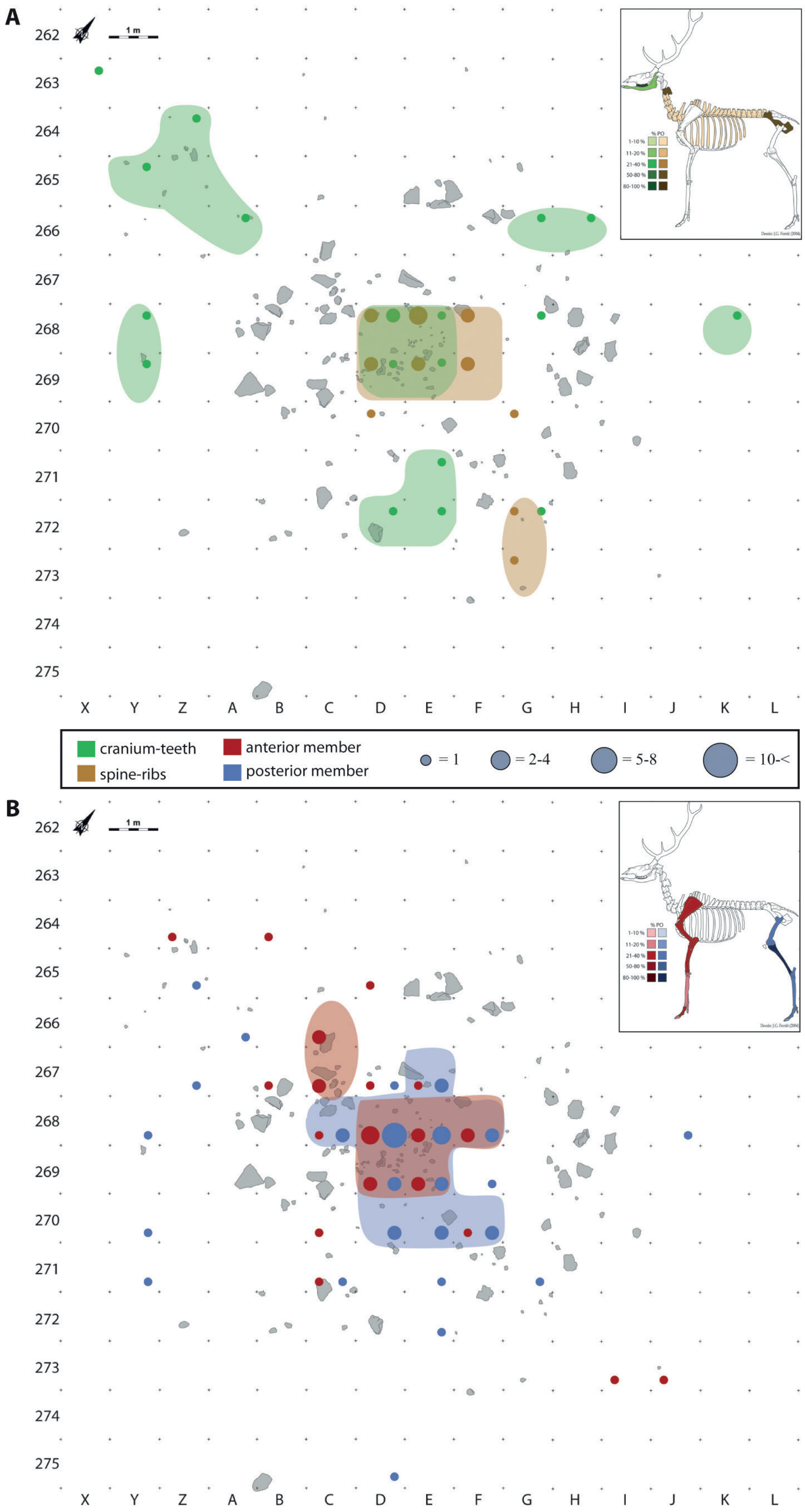


Fig. 8 Distribution of red deer remains (*Cervus elaphus*) in *locus* 46 – Le Closeau: **A** skeletal elements of spine and ribs. – **B** skeletal elements of anterior and posterior members. – (CAD Bignon-Lau 2015).

the south-east. Moreover, it is in this very area that the only remains connected to the stone circle are observed. As for the discharge strategies towards the outer areas, it is obvious that the western dump/refuse area was very clearly favoured. Some isolated remains south and south-west seem to result from occasional disposals. In the absence of remains smaller than 1 cm, one cannot infer that these outer areas were animal processing areas.

Distribution of horse remains

We will begin the study of the spatial distribution of horse (**fig. 9A**) by the vertebral (n = 47) and cranial (n = 200) segments. Their clear difference in number is related to the numerous teeth and their degree of fragmentation. The cranial segment distribution within *locus* 46 is very widespread, but even in this configuration, the highest rates are recorded at the hearth area. In the domestic space, however, two other activity areas specifically contain the remains of this anatomical part, one in the east (F-G268-269) and the other in the south-east (D270, E270-272). The continuous distribution in the latter area between the hearth and the south-east exit relates to an area where many skulls and mandibles were fractured, releasing a large amount of lower and upper dental elements. It is remarkable that some red deer skull fragments were also observed precisely at the south-east exit (**fig. 8A**). In this location, the repetition of the same objectives may indicate the seeking of more light (sunlight), potentially increased at the south-east exit. Compared to the domestic space, very few cranial segment remains were found at the stone border, the most significant presence being located in the north and south-east. Thus, even if the cranial segment remains are fairly well represented in both dumps/refuse areas, these elements have been disposed slightly more often in the one located to the west.

The vertebral remains, which are far less numerous, have a less wide dispersion: they are mainly concentrated south of the central combustion area. Some remains were found, to a lesser extent, along the immediate hearth periphery, while only one element was found further north in the stone border. Finally, only the western dump/refuse area received a few vertebral remains disposed outside the occupation area. Since they form two distinct sets, they possibly reflect a succession of disposals. Anyway, it can be observed that these outer disposals are in contrast to those of deer for the same vertebral segment, which took place in the eastern dump/refuse area only.

In our spatial analysis, the elements of the anterior (n = 99) and posterior (n = 100) limbs provide similar numbers, though survival rates indicate that some long posterior bones have better chances of being preserved (% PO; **fig. 9B**). Outside the central area of the hearth, these segments show a distribution that does not overlap with the internal distribution of elements of the cranial segment (including concentrations in the east and south-east). The remains of the anterior limb are well represented at the central hearth, but they are also found in numbers to the north-west and south of it. Logically, at the stone circle, we find this category of remains rather to the south and west, although they are not absent in the east. Although a few elements were recorded in the eastern dump/refuse area, the western one was clearly preferred for bringing horse anterior limb elements outside. There is little difference between the anterior and posterior elements in their respective distributions. Indeed, for the posterior anatomical region, the highest concentrations are within the eastern half of the hearth area and east of its immediate surroundings. These densities are in contrast to the few isolated remains found at the stone border of *locus* 46. As with anterior limb remains, we note that the western dump/refuse area was the preferred one for the disposal of elements from the posterior limb segment of horse.

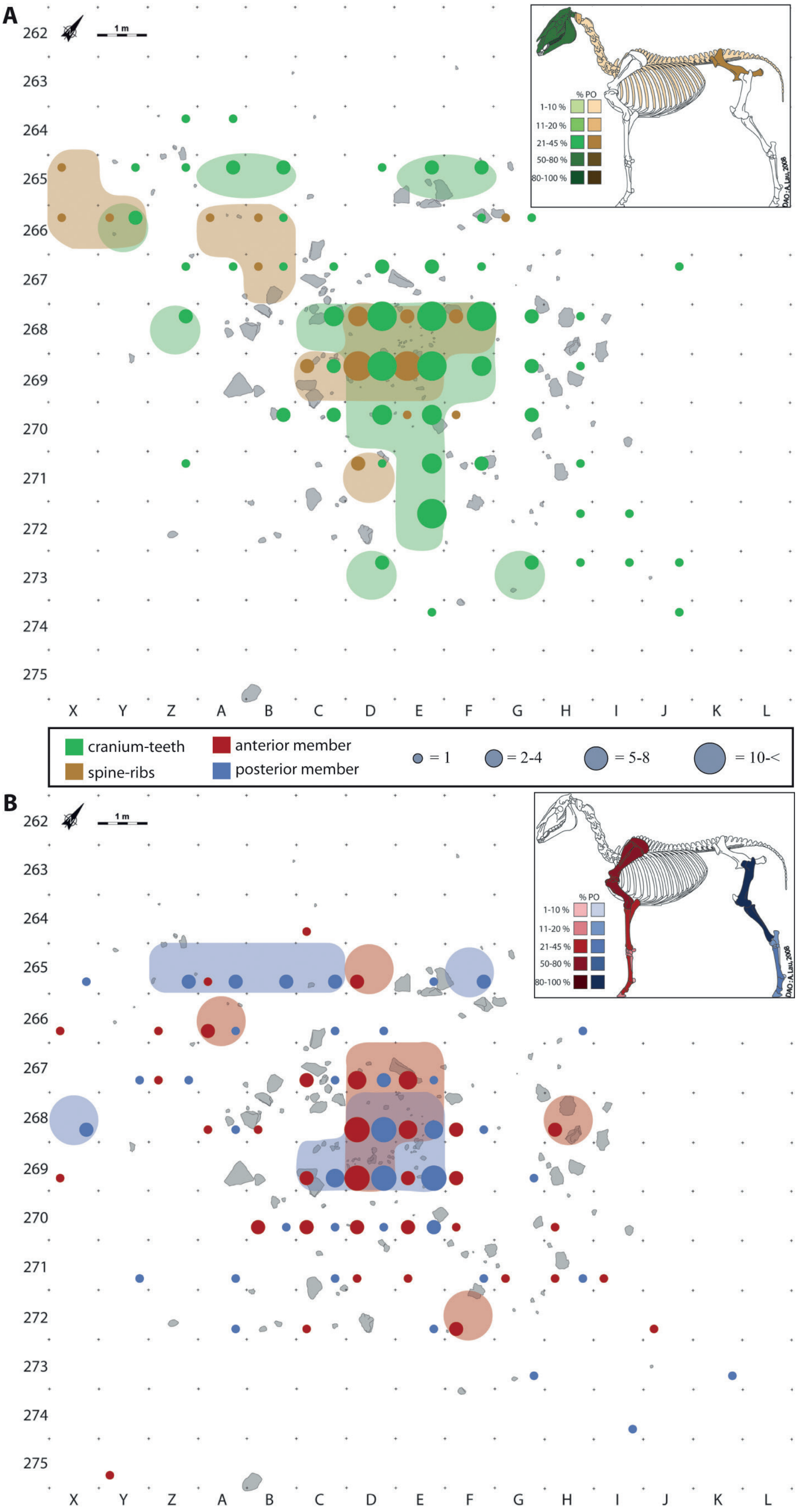


Fig. 9 Distribution of horse remains (*Equus caballus arcelini*, *s.l.*) in *locus* 46 – Le Closeau: **A** sketelal elements of spine and ribs. – **B** skeletal elements of anterior and posterior members. – (CAD Bignon-Lau 2015).

Spatial organization of animal processing in *locus* 46

The different stages of animal processing seem to have taken place in the occupation area: disarticulation, meat removal, fracturing of long bones to retrieve the bone marrow, as well as skin processing (according to traceological studies and the presence of hematite and many scrapers). Our analyses have shown the differential distribution among identified species and a certain variability in the distribution of various anatomic segments by species. While taking into account the destruction caused by the burning of faunal remains, the imbalances in the skeletal representation of taxa are potentially related to various factors (Bemilli 2000; Bignon 2008): leaving some bulky portions (e. g. the vertebral elements) on the hunting site, differential importation (previous consumption), potential exportation (deferred consumption). Whatever the combination of these factors, and even if some rare animals were potentially brought into *locus* 46, what was processed there is related to the more portable fleshy parts: skulls and upper parts of the appendicular skeleton, especially of posterior limbs. The broken bone fragments, which are evidence of the final phase of butchery activities, are concentrated in the central hearth area for most species (and their different segments). Carnivores are the only notable exceptions to this pattern of spatial distribution: lion is rather distributed south of the hearth, while the few remains of dog were found in a marginal position to the east (**fig. 7**). This distribution provides information on the intermittent operation of the combustion zone as unburned remains were discovered there. This central area appears to have alternately hosted butchery activities, as did the whole interior space, which is attested by the homogeneous distribution of bone remains smaller than 1 cm. This type of tiny remains results from the fracturing phase of the long bones, notably to retrieve the marrow. Before these final steps of butchery processing took place, the distribution of marginally retouched blades to the west of the hearth seems to indicate that most meat removal operations were conducted there (Bodu / Mevel 2008). Evidently, hide working also took place there using retouched blades.

Despite a variable spatial distribution, more noticeable for minority species, the overlapping of horse or red deer segments in the same space is very common. These spatial overlaps highlight the spread over time of different butchery operations, which were alternatively implemented. This is the time of various identified hunting episodes, but also the time when the occupation runs out of domestic space to synchronously process all or part of the animals brought in. In that sense, the distribution of faunal remains is also the product of maintenance strategies that led to movements. We can thus explain the overrepresentation of bone remains in the combustion zone and the presence of elements that were pushed away to the stone borders of the occupied unit. The maintenance strategies also sought to reduce the mass of bone disposals by their recurring use as fuel. Nevertheless, these maintenance operations were neither systematic nor very regular as a major circulation path is still noticeable, and some concentrations or distribution absences (F270; **fig. 9A**) could hint at the physical location of the occupants. Moreover, we observe that some concentrations of flint are not covered by faunal remains within (C267, D67) or outside (X-Z263-264, H-I274-275) the occupation.

The spatial distribution of remains provides valuable insights into the primary position of animal processing operations, and their partial movement to a secondary position toward the hearth and the structural limit of the unit, but the deposit dynamics reveal a third state. The operation of the central combustion zone produced a rate of 95 % burned remains, a percentage only found in two outer areas in the east and west, which have been interpreted as dumps / refuse areas. The bone remains of these outer areas are the final stage of animal processing, the end of the maintenance strategies employed by the Early Azilians. As the differences between segments or between species have shown (**figs 7-9**), the constitution of these dumps / refuse areas was the subject of variable choices between selected areas or respective proportions. These observations also hint at a recurrent use of these outer disposal areas in a sequence of several points in time.

FINAL DISCUSSION

Function of the sites, economy and ways of life of Early Azilians

At this point of archaeological discoveries, the occupations at Le Closeau may give the best insights into the function of Early Azilian sites of the Paris Basin. The groups stayed at the site for various occupations the main objectives of which were to prepare hunting episodes and process various animal products for food and technical purposes (skin working). The occupation levels of *loci* 4 or 46 seem to be the result of several short stays, estimated for each at about one month in total based on lithic product quantities (Bodu 1995; 1998; 2000; Bodu/Debout/Bignon 2006; Bignon/Bodu 2006), during around one year (horse hunting episodes occurred at all seasons). This feature contrasts with the intensity of the processing phases of animals which were killed through individual hunting (Bignon 1998; 2000; 2008). However, clues about seasonality regarding horses show that the formation of the large units (*loci* 4 and 46) is the result of regular reoccupation at different times of the year (Bignon 2003; 2008; Bignon/Bodu 2006; Bodu/Debout/Bignon 2006). These short successive but efficient stays are very likely to be connected with small social groups, perhaps family groups, as suggested by the hunting strategy and the observation of different skill levels in flint knapping (Bignon 2003; 2008; Bodu/Debout/Bignon 2006).

The socioeconomic organisation of the Early Azilians relates to an original combination of logistical and residential mobility (**fig. 10**). A series of observations indicates a clear anticipation of needs (compatible with logistical mobility), associated with a succession of short stays of small social groups suggesting a high mobility (typical of residential mobility), highlighted by the exploitation of animal resources and the results of their spatial analysis. The definition of the way of life of these Early Azilians is thus relatively unsatisfactory in terms of Lewis R. Binford's terminology (1978; 1983), which is also a result of the low number of sites discovered in the region. Despite these difficulties, we have suggested that the Le Closeau units were part of a network of similar camps, forming a regular grid in a rather limited territory (Bodu/Debout/Bignon 2006; Bignon 2008). This assumption is based on the fact that despite the repeated hunting episodes and food reserves, the stays were short, and it seems that the intervals between them were brief as well (especially in *locus* 46).

In the Paris Basin, it appears that our glimpse of the Early Azilians' way of life stands in stark contrast to the one observed for Upper Magdalenian groups. The latter implemented a hunting strategy for two preferred prey species, horse and reindeer, a strategy with a high degree of planning, as is also indicated by their other technical sub-systems (Audouze et al. 1988; Bignon 2007a; 2008). These hunting practices determine the mobility and size of hunter-gatherer groups, in relation to the dispersion-aggregation rhythms of key resources (Bignon 2003; 2008; Bignon/Enloe/Bemilli 2006). The high number of hunters, their collective tactics, the simultaneous slaughtering and processing of many carcasses and the storage of food clearly suggest the existence of large social groups during the Magdalenian in the Paris Basin. This socioeconomic system implies a differential participation of society, and therefore, a mobility that is partly logistical (Bignon 2003; 2007a; 2008). But that does not mean that the Magdalenian territorial expansion necessarily encompassed the whole Paris Basin; on the contrary, it seems to have occurred, at least at certain times, in micro-regions such as the Seine-Yonne confluence area where a maximum amount of resources were concentrated (Debout et al. 2012).

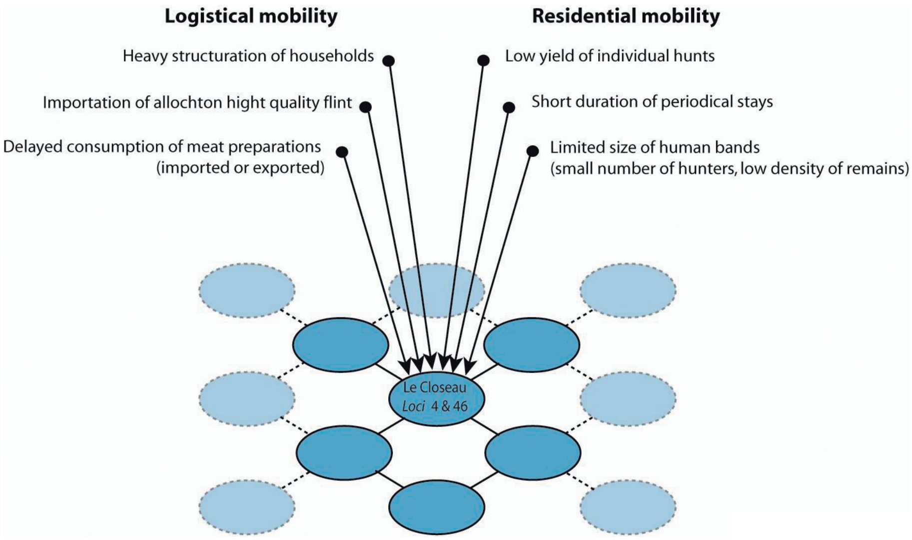


Fig. 10 Mobility and settlement network of Early Azilians in the Paris Basin. – (CAD Bignon-Lau 2015).

From the Magdalenian-Early Azilian transition to their likely co-occurrence

Between the Magdalenians and the Early Azilians of the Paris Basin, there are some shared features in flint knapping, hunting activities, occupation structures. The same applies to supply strategies in lithic raw materials and the production of regular blades resulting from a mode of production with high technical requirements (Bodu 2000; Valentin 2008). Hunting focused on horse harems is also shared by these two cultural entities (Bignon 2003; 2008; Bignon/Bodu 2006). The use of stone borders in dwelling structures of *loci* 4 and 46 was also quickly compared to units P15 and W11 of Étiolles (dép. Essonne/F; Bodu 1998; 2000; Bodu/Debout/Bignon 2006).

However, detailed examination reveals that discrepancies between these Late Glacial entities are predominant and even qualify the shared features. As for the knapped flint, the use of soft stone as hammerstone throughout the production process by the Early Azilians is a highly identifiable trait (Bodu/Valentin 1997; Bodu 1998; 2000; Valentin 2000; 2008). Furthermore, the characteristics of the *bipointe*-shaped axial projectile implements of the Early Azilians do not match those of the regional Magdalenians' points, the forms of which seem closer to Creswellian or Hamburgian points (Schmider 1992; Weber 2003; 2006; Debout et al. 2012; Debout in prep.). Blades with marginal retouches and the retouched blades discovered at Le Closeau are other specificities that do not exist in the regional Magdalenian. Moreover, even if horses were hunted by both prehistoric cultures and despite unbalanced Magdalenian/Early Azilian site frequency, the respective hunters implemented significantly different tactics, and these behaviours were part of different hunting strategies (preferred prey, range of prey; Bignon 2008). As for the use of stone borders in occupation structures, these behaviours seem to be closer to the exception than the rule in the Late Glacial Paris Basin, since the sites and the units mentioned above are the only examples that we know at present. Unlike the Early Azilian, numerous regional sites, some of which have several occupation levels, e.g. Étiolles, failed to provide a link. In addition, it is clear that neither the spatial dynamics highlighted above for the lower level of Le Closeau nor the way of life provide conclusive arguments in bridging the gap between Upper Magdalenian and Early Azilian in this region.

However, some authors have raised the possibility of an affiliation between these cultural entities (Bodu 2000; Valentin 2000; 2008; Weber 2012; Mevel 2013). This affiliation would be part of the »Azilianization« process – a gradual, evolutionary phenomenon of European societies during the Bølling-Allerød Interstadial.

This is according to a Magdalenian-Azilian transition scenario, the main steps of which have been described as follows (Valentin 2000; 2008; Mevel 2013):

1) the very beginning of the phenomenon is dated to the end of the Bølling (12,000 ^{14}C-BP);
2) from that moment on, climate change is causing environmental change;
3) social transformation follows, first in the form of the Cepoy-Marsangy facies (Valentin 1995) and then through the emergence of Early Azilians;
4) Early Azilians spread throughout Europe by a diffusion process, from the oldest emergent settlements such as in the Paris Basin (Mevel 2013), following the ancient trade routes of their Magdalenian ancestors.

An entire article could be devoted to discussing the developed arguments for this model. However, here we will only sketch the outlines of a series of critical remarks that support a plausible »Magdalenian-Azilian« co-occurrence in the Paris Basin:

1) Timeline: As recognised by Ludovic Mevel (2013), many dates from the Magdalenian and Early Azilian are included in the Bølling radiocarbon plateau; the dates of *locus* 46 in Le Closeau (**tab. 1**), which is the most reliable *locus* due to its preservation, are also the oldest dates. In the absence of sufficient chronological resolution, even with the current calibrations, we cannot say more than to acknowledge that there is a temporal overlap between these two prehistoric cultures, from 12,500 ^{14}C-BP to 11,950 ^{14}C-BP.
2) Climate-environment: following a strong global warming that initiates the Bølling, this chronozone is characterised by high instability, marked by large amplitude oscillations, which led to the strong cooling that characterises the Dryas II (Björck et al. 1998; Svensson et al. 2006; Weninger/Jöris 2008; Blockley et al. 2012). With the exception of the initial strong warming signal, no other major triggering event is therefore distinguishable during the Bølling period, especially without fine chronological resolution. As to environmental changes, slight variations in plant communities during the Bølling have been recorded, but the structuring of open, steppe-dominated landscapes showed great stability (Leroyer/Allenet/Chaussé 2005; Leroyer/Allenet de Ribemont 2009). Concerning animal species, we already saw that it was difficult to identify a clear break in the Early Azilian spectra.
3) Transformation of societies: The Magdalenian »Cepoy-Marsangy« facies (Valentin 1995) is characterised from the lithic equipment point of view by substituting backed points for backed bladelets on spear points. This facies, however, raises an issue, as no site where it is present has an impeccable stratigraphic context. Moreover, the presence of bladelets, even if rare, is attested (Valentin et al. 2006). The sites in this facies, seen as a transitional episode, do not have a reliable chronological baseline (Valentin et al. 2006), which leads us to question the very existence of the facies; other options suggest favouring the influence of other northern cultural groups (Debout et al. 2012). Again, insufficient chronological resolution cannot support the hypothesis of a gradual evolution: while the Marsangy dates are indeed around the end of the Bølling (12,120 ± 200 ^{14}C-BP, 12,140 ± 75 ^{14}C-BP), there are no dates for Cepoy (dép. Loiret/F) nor for Tureau des Gardes 7 (dép. Seine-et-Marne/F), and the Étigny-the Brassot date is very similar, perhaps even earlier than *locus* 46 of Le Closeau (Debout et al. 2012). Finally, L. Mevel (2013) comes to the conclusion that it is currently impossible to classify the deposits of the Paris Basin in the timeline.
4) The diffusion of Early Azilians: two »epicentres« are speculated in the diffusion process of the first Azilian societies, Le Closeau (Paris Basin) and Monruz (canton of Neuchâtel/CH). The first challenge to this hypothesis is that the lithic characteristics of these two sites are different (Mevel 2013). Also, if there was indeed a transformation of large social Magdalenian groups, why are there so few sites matching the Early Azilian? Indeed, one would have expected a proliferation of sites with regard to the Early Azilian way of life and high mobility in this case.

We can see many arguments and archaeological facts that may object to key points that underpin the Magdalenian-Azilian transition scenario in the Paris Basin. In the absence of better evidence, it would be better to leave this issue open to all plausible hypotheses until new sites are discovered and/or compelling arguments are developed.

Epistemology and design of cultural change in prehistory

This discussion has not so much to do with the question whether Azilian societies came after the Bølling Magdalenians during the Allerød, since multiple stratigraphic sequences in several regions establish the chronological order of these cultural entities. In our opinion, the real issue is epistemological, namely how the issue of cultural change is understood in prehistory. By tracing its epistemological reflection back to the foundations of the discipline, the enlightening work of Virginie Guillomet-Malmassari (2009; 2012) has shown the opposition between two conceptions of the evolution of prehistoric society, some advocating continuity and others focusing their models on change.

The immediate formulation of the issue of evolution of Magdalenian and Azilian societies from the perspective of a cultural transition exclusively positions the scientific discussion in the model of an evolutionary continuity (Guillomet-Malmassari 2009; 2012). According to this design of phylogenetic continuity, the evolution of societies is linear, driven by slow and gradual processes. The notion of affiliation, rooted in technological discourse, therefore means that each industry is the root from which the following industry grows[1]. The word »transition« expresses the gradual nature of this linear affiliation, and consequently the instability resulting from a mixture of cultural traits, which at both ends of the evolutionary process are distinct and stable. Thus, the transitional model of Late Glacial societies like the Cepoy-Marsangy facies or the Early Azilian can only be conceived of as steps leading to the transformation of Azilian societies during the Allerød. In short, the transitional issue in prehistory aims to primarily follow the initial undertaking of the discipline, which is its own chronological construction.

Such is not the goal of evolutionary discontinuity interpretative models, which insist on the recognition of breaks in which cultural changes are more sudden and radical (Guillomet-Malmassari 2009; 2012). It is in this perspective that we would like to suggest two alternatives that should fuel discussions and broaden the framework for reflection. First, nothing prevented the possibility of a migration of Early Azilian societies from outside the Paris Basin into this territory, whether they co-existed with Magdalenians or not. Indeed, one cannot rule out that the vast geographical area currently corresponding to the Channel could have been a cultural melting pot, where people developed hunting weapons with axial implements in the same manner as other, more northern entities (Creswellian, Hamburgian) did. Secondly, we will formulate a plausible hypothesis in light of current data that is in the perspective of a non-linear (or multi-linear) evolution of the Late Glacial societies. This hypothesis assumes that as the result of fission-fusion events, which are classically recognised among hunters-gatherers (Ingold 1996), some groups from the Upper Magdalenian emancipated themselves to form what we call today the first Azilians. This cultural tipping point can be explained by the interrelations between the hunting methods, the social morphology and the exploited environments, which are all closely linked (Bignon 2008). The image of the kaleidoscope, used by Claude Lévi-Strauss (1990) to describe structural rearrangements, illustrates how changing one parameter leads to a tipping point for the entire system. This model thus moves away from the linear transition since the emergence of the Early Azilian does not imply the disappearance and replacement of Magdalenians, because the ways of life of these cultural entities are so contrasting that they could have coexisted in the Paris Basin. Our parallel evolutionary model of the Magdalenians and the Early Azilians is fuelled by Jacques Pelegrin's (2000) observations, which linked the changeover of flint production (the adoption of soft hammerstones and of backed points) to the loss rates of projectile implements and to the acquisition methods of animal resources. However, our work has shown that the profitability of hunts could be separated from the structural change of the environment, by adopting different hunting tactics, i. e. by economic choices leading to different ways of life.

Acknowledgements

At first, I would like to thank Pierre Bodu for giving me the opportunity to work on such incredible Early Azilian occupations, it has been a great chance for me and it is still a privilege. I warmly thank Boris Valentin, Ludovic Mevel and Sylvain Griselin, the heads of the French research program PCR »*Paléolithique final et Mésolithique dans le Bassin parisien et ses marges Habitats, sociétés et environnements*« for giving me the financial support to have this article translated into English. I am grateful to Julien Vergnes who realised this translation, and to Anita W. Lau-Bignon for her advise to realise illustrations. Finally, I would like to thank the organizers of the A5.b session of the UISPP in Burgos, Sonja B. Grimm, Ludovic Mevel, Iwona Sobkowiak-Tabaka, and Mara-Julia Weber, for their invitation to participate in the meeting and its publication.

Note

1) Prehistoric »cultures« do not have the same meaning as in ethnology; at best, they are technological traditions the attributes of which are appropriately identified and on which names are affixed, without being able to ascertain the cultural characteristics that one confers to the notion of ethnicity (Valentin 2008).

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Summary

This contribution aims at completing the current knowledge concerning the Early Azilian period in the Paris Basin. This area has been densely occupied by the groups of the Upper Magdalenian. By contrast, Early Azilian sites known to date are scarce but show good archaeological preservation. It is particularly the case of the Le Closeau site, located at the bottom of the Seine Valley. It has been possible to carry out a complete palaeo-ethnographic investigation, as it has been done previously on the famous Magdalenian sites of Pincevent and Etiolles, for example. The focus of this paper lies on zooarchaeological studies of hunting practices combined with spatial analyses. Our results enable us to accurately document the Early Azilians' palaeo-ethnography and to highlight the singularity of their way of life.

Keywords

Paris Basin, Early Azilian, zooarchaeology, palaeo-ethnological approach