

Domestication and uses of the dog in western Europe from the Paleolithic to the Iron Age



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Implications

- This paper reviews the knowledge of the history of the dog in western Europe acquired through archaeozoology.
- The first part examines the question of domestication of the wolf during the Upper Paleolithic, by highlighting the sometimes contradictory archeological and genetic findings. It also briefly lays out the different controversies regarding the site or sites of domestication of the dog in the world and the presumed dates of this major phenomenon in human history.
- The second part deals with the evolution of canine morphology from the Paleolithic to the Iron Age, integrating, for example, the latest discoveries regarding domestic coat colors in the Mesolithic.
- Finally, the presumed and attested uses of dogs throughout European pre- and protohistory are presented, including certain practices that lasted over time.

Key words: archaeozoology, canine morphology, cynophagy dog, domestication, fossil genetics

Dogs from the Paleolithic

Archaeological and genetic analyses have clearly demonstrated that the only ancestor of the dog is the wolf, and this is true across all the continents (*Canis lupus*; Olsen, 1985; Benecke, 1994; Vilà et al., 1997; Leonard et al., 2002; Savolainen et al., 2002). In fact, it would be more accurate to say wolves, since by the end of the Ice Age, this species already consisted of numerous diverse populations, at times raised to the rank of subspecies, throughout Eurasia and North America. Details of this question will be developed later.

The dog was the first animal to be domesticated by the Upper Paleolithic hunter-gatherers, but their domestication process remains difficult to understand, in terms of chronology, geographic origin, and recurrence of the phenomenon. Archaeology has defined the period in which the first dogs appeared as the Late Glacial time bracket of between 18,000 and 10,000 BC, from the Magdalenian period to the end of the Epipalaeolithic.

Evidence of morphologically transformed animals has been found in the Iberian Peninsula, Siberia, Aquitaine in France, the French Alps, central and northern Europe, and the Near East (Table 1). The wide area over which wolves were dispersed and the scattering of the places where late glacial dogs have been observed, suggest that multiple independent domestication events took place across much of the Old World (Bökönyi, 1974; Clutton-Brock, 1984; Benecke, 1994; Tchernov and Valla, 1997). Recent morphometric analyses of dogs from the southeast and north of France [Pont d'Ambon, Le Closeau, and Montespan (Figure 1); Pionnier-Capitan et al., 2011] have revealed marked morphological differences between a group of small-sized dogs originating in the West and other much larger dogs with a different physical structure from northeast Europe in the same period (Benecke, 1987; Sablin and Khlopachev, 2002, 2003); indeed, some of these “larger dogs” were probably wolves (Boudadi-Maligne and Escarguel, 2014). This study led to formally identifying two very distinct populations of dogs during the Upper Paleolithic, which potentially reflect distinct centers of domestication (Pionnier-Capitan et al., 2011). These findings support the relative fragmentation in the Late Glacial of Eurasia due to the polar and orogenic ice caps, and also the diversity and relative isolation of hunter-gather cultures from the same period (Djindjian et al., 1999). This is also in line with the common practice in hunter-gatherer societies of pet keeping, where young animals were integrated in the family group and breast fed with the children to compensate for the animals taken from nature through hunting (reviewed in Digard, 1990). This practice, demonstrating that hunter-gatherers were as capable of raising animals as the Neolithic age people (Vigne, 2000), could have played an important role in the domestication of dogs in different places (Clutton-Brock, 1984).

Late Glacial dogs displayed a wide variety of statures, from medium-sized Natoufian dogs in the Near East and their Northern Zagros contemporaries (height: 45 to 60 cm), to medium or large sizes (height > 60 cm) for dogs in eastern Europe, to very small dogs (height 30 to 45 cm or < 30 cm) in Germany, Switzerland, the east of France, and the southwest and north of Spain (Table 2). Other large canid fossils dated c. 30,000 BC found in Belgium (Germonpré et al., 2009), Siberia (27,000 BC; Ovodov et al., 2011), and the Czech Republic (24,000 BC; Germonpré et al., 2012) have been interpreted as domestic dogs 15,000 years before the others. However, analyses suggest that the morphological character considered by the authors of these discoveries as identifying domestication are instead morphological variations of the Upper Paleolithic wolves, whose morphological variability remains poorly known (Boudadi-Maligne and Escarguel, 2014).

Table 1. Evidence of animals morphologically transformed by domestication between 18,000 and 10,000 BC.

Location	Date	References
Iberian Peninsula	Early Magdalenian, c. 16,000 BC	Altuna et al., 1985 García-Moncó, 2005 Vigne, 2005
Siberia	c. 14,000 BC	Benecke, 1987 Sablin and Khlopachev, 2003
Aquitaine France	Azilian, c. 11,000 BC	Célérier et al., 1999 Pionnier et al., 2011 Boudady-Maligne et al., 2012
The French Alps	Preboreal, c. 9000 BC	Chaix 2000
Central and northern Europe		Benecke, 1987, 1994 Musil, 2000 Napierala and Uerpmann, 2012
The Near East	Early Natoufian, c. 12,500 BC	Tchernov and Valla, 1997

Generally, the skeletal markers used by archaeozoologists involve a series of characters acquired after domestication, including a reduction in size, the proportions and twist of limbs, reduction in skull size or the length of the face, and dental pathologies (Horard-Herbin and Vigne, 2005). These skeletal changes, resulting directly from domestication, do not in essence enable the initial phases of the process to be identified as they had not had time to be affirmed. Moreover, on the European Late Glacial sites, Canidae are rare and are represented by a small number of bone remains that are often fragmented and originate from different parts of the skeleton. Metric comparisons and structural analysis of the whole animal are all the more difficult to carry out, but recent developments in morphometrics, enabling a finer diagnosis, should allow rapid progress to address these questions.

Furthermore, certain genetic analyses partly disagree on the domestication process (Vigne et al., 2005). Some studies based on mitochondrial DNA and the diversity of the modern dog suggest that dogs mainly came from a Chinese center, before spreading throughout the Old World (Savolainen et al., 2002; Pang et al., 2009; also see Boyko et al., 2009 for a different genetic interpretation for Africa) whereas a recent genomic study by contrast concluded with a theory of multiple domestication events throughout Eurasia and the Middle East (vonHoldt et al., 2010). It has recently even been suggested that the dog had a uniquely European origin, based on a very doubtful hypothesis that the large Canidae of the beginning of the Upper Paleolithic in Europe and Siberia were dogs (Thalman et al., 2013). A recent review that includes archaeological, genetic, and bibliographic data shows that these contradictions result mainly from the specific history of this species and the technical limits that can now be surpassed (Larson et al., 2012). For example, modern breeds have been selected very recently (end of 19th and 20th century) from a restricted genetic pool, which is in no way representative of the ancient history of the dog. Progress in knowledge in this field comes instead from the paleogenomic approach using archaeological specimens (for example, Axelsson et al., 2013; Ollivier et al., 2013).

Dogs from the European Mesolithic

Dogs from the European Mesolithic (c. 9000 to 7000 to 4000 cal. BC according to the area considered) were marked by a high variability in



Figure 1. Upper Paleolithic small canid skeletal remains of Montespan cave in France (quasi-complete and pathological right femur: cranial-left and caudal views, Pionnier-Capitan et al. 2011; © J.-D. V., CNRS).

terms of size at least, ranging from large animals close to their wild ancestor (e.g., in the middle Mesolithic levels of Noyen dated to the seventh millennium cal. BC; Vigne and Marinval Vigne, 1988) to much smaller animals (e.g., the late Mesolithic cemetery of Téviec, Morbihan dated to the sixth millennium BC; Pionnier-Capitan, 2010). However, molecular data suggest that these animals all stem from the same main lineages, already present in Europe at the end of the last glaciations (see above), where they were very likely to have been domesticated from the local wolf sometime during the Upper Paleolithic. Paleogenetic data have also revealed that dogs present in Europe during the Mesolithic already had other phenotype transformations compared with their wild ancestors, such as the occurrence of the black coat color, totally unknown in wild wolf populations (except for populations with a history of inbreeding with domestic individuals) but present in the Mesolithic population of the Iron Gates (c. 8000 cal. BC), Romania (Ollivier et al., 2013). Some of these Mesolithic dogs were eaten, clearly demonstrated by numerous cut and burn marks observed on their bones.

Dogs from the European Neolithic

Data on ancient DNA strongly suggest a nearly complete replacement of dog populations at the onset or during the Neolithic in southeastern Europe (from 6,000 cal. BC onward; Pionnier-Capitan 2010). This phenomenon is very likely to be linked to the Neolithization process, with new dog populations probably spreading together with other domestic species (sheep, goats, cereals, and peas) and the rest of the Neolithic package coming from the Near East (Figure 2). These new populations of dogs also reached western Europe, but they never completely replaced the native populations. Dogs were scarce in the early Neolithic of Europe, with the notable exception of the Herxheim pit enclosure (western Germany, Linearbandkeramik culture, end of the sixth millennium cal. BP), where dogs were found in partial association with human remains (Zeeb-Lanz et al., 2009). The few data collected for this period suggest the animals remained relatively large, though significantly smaller than the wolf. Modifications such as shorten-

Table 2. The wide variety of Late Glacial dog statures.

Dog size	Estimate of the wither height	Origin	References
Medium-sized dogs	45 to 60 cm	Natoufian dogs in the Near East and their Northern Zagos contemporaries	Turnbull and Reed, 1974 Davis and Valla, 1978 Helmer, 1991 Dayan, 1994 Tchernov and Valla, 1997
Medium or large sizes	> 60 cm	Eastern Europe Ukraine Russia	Musil, 1974, 2000 Pidoplichko, 1969 Benecke, 1987 Sablin and Khlopachev, 2002, 2003
Very small dogs	30 to 45 cm or <30 cm	Germany Switzerland East of France Southwest of France North of Spain	Nobis, 1981 Street, 2002 Musil, 2000 Morel and Müller, 1997 Chaix, 2000 Célérier and Delpech, 1978 Célérier et al., 1999 Altuna et al., 1985 García-Moncó, 2005 Vigne, 2005

ing of the face and dental crowding were also already obvious in animals of this period. Tooth anomalies (essentially missing teeth) also frequently occurred. The decrease in size was accentuated until the fourth millennium cal. BP and culminated in the Neolithic/Chalcolithic period with the occurrence of small and very small dogs in southeastern Europe (at Borđuşani and Hârşova, Romania; Bălăşescu et al., 2003) but also in western Europe (at Bercy and many other sites of the Chasséen complex and related cultures). These small dogs are rarely found complete and are often retrieved from rubbish pits and dumping areas, which strongly suggests that they were commonly consumed, even when cut or burn marks are absent. Estimation of age based on tooth eruption and tooth wear shows that young and subadult animals were the most abundant (Pionnier-Capitan, 2010), strengthening the hypothesis that dogs were consumed in this period.

The few dogs found from the end of the Neolithic in western Europe were larger than those evidenced for the fourth millennium. The incomplete

dogs found in a mass grave at Bury in northern France were large individuals with slightly shortened faces. Analyses of their DNA showed that one of them at least was black, whereas another still retained the wild coat color (Ollivier et al., 2013). Overall, data from the Mesolithic and Neolithic period in Europe provide evidence about the evolution of dog phenotypes and also of the status of dogs during these periods. Current research is trying to improve understanding of how the two phenomena are related and also aims to highlight the role of early selection by humans in these evolutionary processes.

Dogs from the Bronze Age

Dogs from the Bronze Age are rare, but those studied from central and eastern Europe (Bökönyi, 1974), the British Isles (Harcourt, 1974), and the Italian and Iberian peninsulas (De Grossi Mazzorin and Tagliacozzo, 2000 and Sanchis and Sarrión, 2004, respectively) are generally of a homogeneous size between

40 to 50 cm with occasionally a few larger individuals, but never smaller specimens. The only region for which this is not true is Switzerland where the size of dogs also increased significantly from the late Neolithic, but where in the late Bronze Age, a population of larger, sturdier dogs remained (50 to 60 cm; Studer, 1991; Chiquet, 2009).

Dogs from the European Iron Age

During the Iron Age, the majority of the canine population remained morphologically homogeneous, with average-sized dogs ranging from 40 to 55 cm in the British Isles (Harcourt, 1974; Clark 1995), Gaul (Horard-Herbin, 1997; Méniel, 2006; Horard-Herbin, 2014), central Europe (Boessneck et al., 1971; Bökönyi, 1974; Peters, 1997), and Italy (De Grossi Mazzorin and Tagliacozzo, 2000). They were slender animals whose leg bones presented no particular modifications, such as twisting or marked sturdiness, which characterized certain morphotypes from the Roman period. Nevertheless, at the end of the Gallic period, an increase in size at the withers could be observed with the appearance of small and

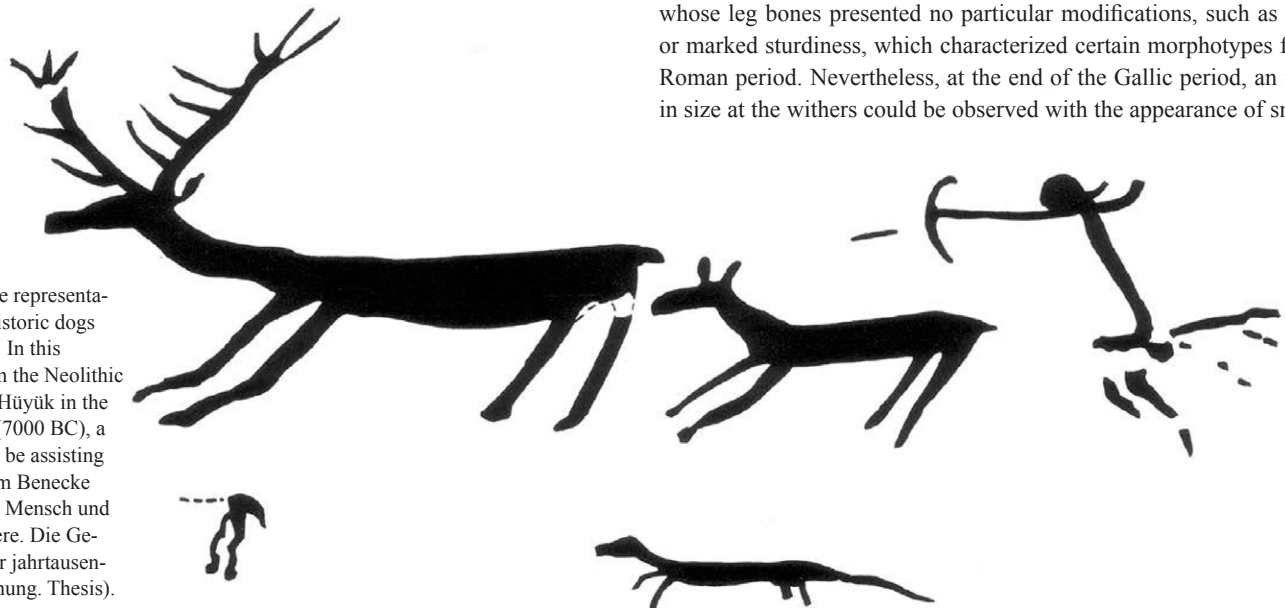


Figure 2. The representations of prehistoric dogs are very rare. In this example from the Neolithic site of Catal Hüyük in the Near Orient (7000 BC), a dog seems to be assisting the hunt (from Benecke N. 1994, *Der Mensch und seine Haustiere. Die Geschichte einer jahrtausendalten Beziehung.* Thesis).



Figure 3. Extremes of dog mandible size on the Gallic site of Levroux (second century BC, Iron Age, France © MPH).H).



Figure 4. Face shortening of a dog skull (bottom) on the Gallic site of Levroux (second century BC, Iron Age, France © MPH).H).

large dogs (Figure 3). Taking the example of Gaul, the first phenomenon during the second century BP was the appearance of small dogs in certain habitats only, namely those of aristocrats, and in certain sanctuaries (Méniel, 1984; Horard-Herbin, 1997). These small individuals were isolated and always associated with a medium-sized population from which they seemed not to have originated. According to the current state of knowledge, only three sites of Celtic Europe show a bipartite distribution of wither heights, a large number of individuals, and all the intermediate sizes: Levroux (Indre, France) and Manching and Berching-Pollanten, both in the same region of Bavaria (Germany; Peters, 1994). On the site of Levroux, some skulls show a marked shortening of the face associated with dental pathologies (Figure 4). Indeed, some teeth are missing or overlapping, which is firm evidence of face shortening, but there is no sign of limb bone modification. The highlighting of these specific breeding places is an interesting observation in regards to the ancient authors who indicated that specialized dog breeding existed in Gaul and Great Britain (mainly for hunting or war dogs, Strabon Géographie IV, 5–2 chap. V and Pline Histoire naturelle VIII, 148).

Another interesting phenomenon should also be noted at the end of La Tène period where, on a few European Celtic sites, very small dogs appeared that could be qualified as dwarf. They were extremely rare, isolated among populations from which they could not have stemmed, and their sizes being outside all the size ranges known in the Iron Age. This is the case for the only complete skeleton of a dog measuring 27 cm at the withers from the Oppidum of Rheinau, Switzerland, and whose presence has been interpreted as an import of a pet from the Mediterranean region (Schibler et al., 1999; Schreyer and Steppan, 2000). This hypothesis is in line with those developed by several authors suggesting that these dwarf lapdogs, much appreciated by Roman ladies, originated from the Roman Empire (Harcourt, 1974; Bökönyi, 1991; Von den Driesch, 1992; Cram, 2000). They would have been offered to the upper classes of the Celtic society by the Romans, in the same way as observed for horses, and attested to by certain ancient authors (Méniel, 1996; Lepetz, 1997; Horard-Herbin, 2000a,b). Included with luxurious gifts, they would have had an exceptional value and status.

The limitation of this import hypothesis is that on examining the range of wither heights of dogs in Italy from the Neolithic to the end of the Roman period (De Grossi Mazzorin and Tagliacozzo, 2000) or dogs from Pompei (Zedda et al., 2006), no dwarf dogs less than 29 cm can be observed during what is known as the Early Roman period (third century BC

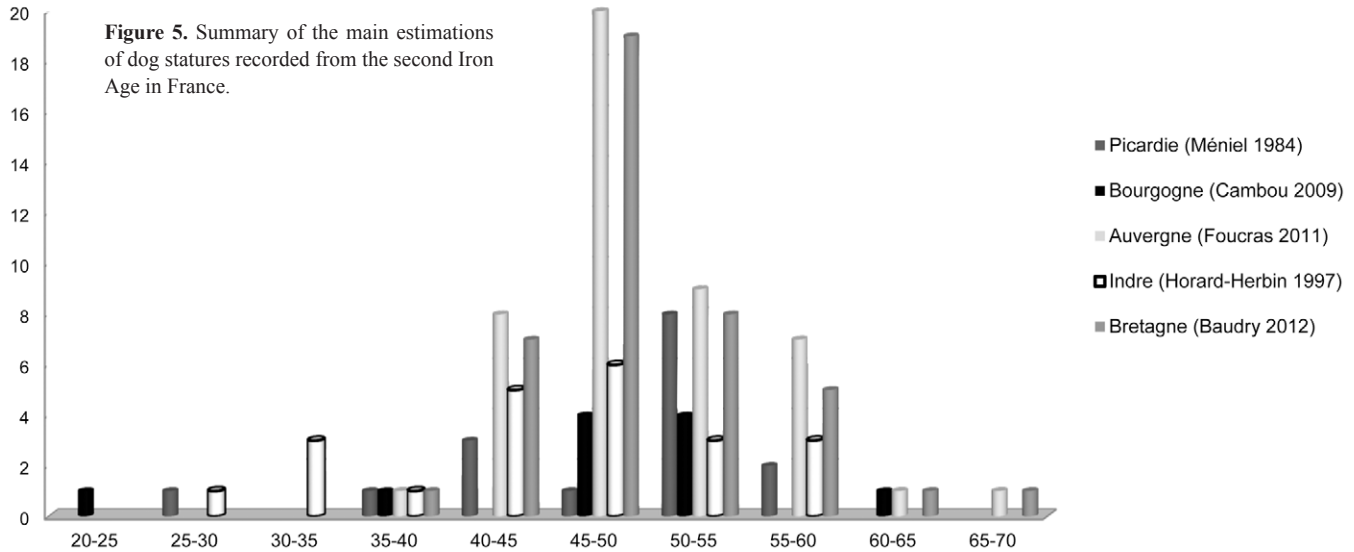
to second AD corresponding to our chronology of the Iron Age and the Early Roman period), and those smaller than 25 cm only appeared at the end of the Roman Empire (third to sixth century AD; De Grossi Mazzorin and Tagliacozzo, 1997, 2000). On the other hand, dwarf dogs (20, 22, and 23 cm) have been found in Germany (Lepetz, 2012), Hungary (Bartosiewicz, 2002), France (Oueslati, 2002; Gardeisen et al., 2011), and Great Britain from early Roman times. For the latter, Cram (2000) observed that these dogs were smaller than their contemporaries in Italy. This is clear evidence that the hypothesis of dwarf Roman dogs being imported is not pertinent for the Iron Age, and the function, origin, and means of circulation of dwarf dogs at the Celtic European scale remain unknown.

At the same time, during the second Iron Age, large dogs reaching a maximum wither height of 65 cm were found in Europe, corresponding approximately to the size of a Gordon Setter, but which had still not reached the 75 cm height of a very large dog (taller than a wolf), which did not appear until the Roman period (Lepetz, 1996). These large dogs were found in Belgium (Epraves; Boessneck et al., 1971) and Germany (Méniel, 1984) and very rarely in Gallic settlements with less than 10 individuals measuring more than 60 cm (Horard-Herbin, 2014). It is difficult to determine whether these dogs represent the upper limit of the size range of middle-sized populations, stemmed from slightly larger populations persisting in certain regions (in Austria, on the Durezza cave site, the size range of dogs from the first Iron Age was from 49 to 64 cm; $n = 126$; Galik, 2000), or were the result of specific breeding that has not been identified through archaeology yet, such as war dogs mentioned by ancient authors. In general, studies investigate samples that are too small to enable definition of a population, and only with the development of genetic studies will light be shed on this question.

In any case, the very small and very large individuals are extremely rare (Figure 5), and it is complex to determine whether their morphotypes, identified as specific through our archeozoological analyses, are in fact linked to a specific status. It has been established that some individuals were incinerated with their “master” in a funeral context, while others were simply eaten, and the fate of some of them did not differ fundamentally from that of medium-sized dogs, as explained below.

In the majority of the contexts studied, the Celts lived with a pack of dogs of similar morphology. However, from the skeletal evidence available, it is clear this was the beginning of selection of certain morphotypes, as illustrated by the shortening of the face of certain skulls and the associated pathologies, and the diversification of wither height. This is reflected

Size at withers in cm (n=138)



in the 30 or so “races” of dogs cited by ancient authors and for which iconographic representations have remained. In the texts, they are characterized by their geographic origins and by the services they provided: pet, hunting dog, war or guard dog, some coming from Gaul such as the *Vertagus* or the *Ségusien* hound (Harcourt, 1974; Peters, 1994).

As for the earlier periods, the difficulty lies in attempting to characterize specific morphotypes simply from morphological criteria and to link them to a precise use because, on the one hand, our documentation is often fragmented or incomplete and, on the other hand, we do not have access to the criteria that currently enable a race to be defined (e.g., shape of ears and tail, color, and type of coat). Moreover, genetic analyses have not yet been developed for the Iron Age regarding these interesting questions.

Uses of the Dog through Time

Across the vast range of potential uses of dogs, unfortunately few are perceivable through archaeology, in particular when examining their relational functions with humans (Table 3). The presence of dogs living and evolving in the environment close to human settlements has clearly been attested through the relatively frequent discovery of canine coproliths in the heart of dwellings of the early Neolithic and occasionally in Iron Age sanctuaries. Their well-documented taste for meat-based scraps has left multiple and recurrent traces on bone remains left by humans, and their presence has thus been highlighted since the Epipaleolithics on the Natoufian sites of north and south Levant (Vigne and Guilaine, 2004). These traces clearly reflect their function of waste disposal and cleaning, well attested in indigenous societies traditionally living with dogs, where animals fended for themselves and procured their own food (Digard, 2006a). Recent developments in isotopic analysis have even enabled their diet to be known because on the Gallic site of Levrux (Indre, France), the nitrogen and carbon isotope ratios of bone collagen of eight tibia bones suggest that the pigs and dogs in this village could have constituted a separate food chain (Frémondeau, 2012). It appears that the dogs had preferential access to scraps from butchering pork, which they consumed widely, but not to other species such as sheep, goats, or cattle (Frémondeau et al., 2013).

Other functions including protecting people and belongings, hunting, war, work (travois, as pack or draft animals), entertainment (pets or dog fighting) or warmth cannot be categorically demonstrated through archaeological bone evidence alone (Digard, 2006a,b). Nevertheless, it is essential to distinguish the Paleolithic hunter-gatherer societies from those of breeders-farmers in their relationships with dogs, which were inevitably different than those with meat-producing animals. During their domestication, it was probably their collective intelligence and their ability to help humans around game that brought wolves and humans closer together in a hunting lifestyle, undoubtedly very different to that of farmers (Vigne, 2012).

Table 3. Potential uses of the dog from archaeological, ethnological, and literal sources (Greek and Latin authors, according to Poplin, 1988; Milliet, 1994, 2004; Vigne and Guilaine, 2004; Digard, 2006a; Méniel, 2006).

Use of the animal	Archaeo-zoological sources	Literal sources (ancient authors)
Tracking partner, help in hunting		yes
Waste disposal and coprophagy	yes	
Sociability, company, bilateral commensality	yes	yes
Protection of people and belongings		yes
Living heating system		
Help at war		yes
Dog fights		
Carrying or drawing loads –pack and draft animals		
Guarding and driving herds		
Supplying raw materials (droppings, hair)		
Therapeutic source		yes
Meat, fat, marrow (?)	yes	
Hides, pelts	yes	
Bones	yes	
Ritual functions in cultural contexts	yes	yes
Sacrifice in a burial context	yes	
Offering in a burial context	yes	



Figure 6. Cuts of different dog foreleg bones (scapula, humerus and ulna) reflecting removal of meat and disarticulation (site of Levroux, second century BC, Iron Age, France © MPH).H).

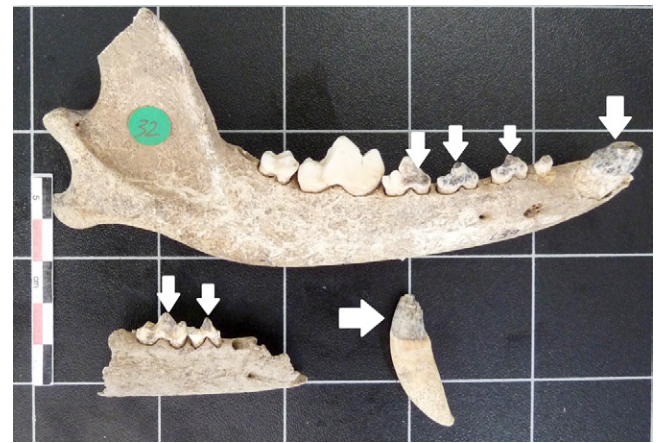


Figure 7. Burn marks on canines and premolars of an adult dog and a puppy due to spit roasting (site of Levroux, second century BC, Iron Age, France © MPH).H).

Nevertheless, archaeozoology does provide much evidence of the use of dogs once dead. The first very concrete use was as a raw material. Skinning and pelting have been brought to light through a characteristic selection of parts of the skeleton (skull, caudal vertebrae, and extremities of limbs) associated with specific cut marks and occasionally with other fur-bearing species. On certain sites, evidence of skinning has been found since the Paleolithic, like at Pont d'Ambon (Maud Pionnier-Capitan et al., 2011). Although this activity has frequently been demonstrated on most inhabited sites throughout the different periods, the remains of dog hide are extremely rare. Nevertheless, two specimens from the first Iron Age were identified on the site of Hallstatt (Austria), where the preservation of perishable materials was exceptional (Ryder, 1990). The use of dog bones to make objects or jewelry was rare but has been evidenced throughout the Neolithic to the Bronze Age in Hungary (Vretemark and Sten, 2010) and the Iron Age in Gaul.

Other functions are more symbolic. Individual and group burials of dogs, which were often adult, have been discovered from the Neolithic up to the end of the Hallstatt era in different regions of Gaul (San Juan et al., 1994; Auxiette, 1997; Putelat, 2007; Baudry, 2012), Italy (Wilkens, 2006), and the British Isles where either isolated adults or groups of puppies have been found (Hambleton, 2008). In Gaul, they were sometimes buried in silos, sanctuary enclosures or pits in rural environments, or wells or pits in villages, and the deposits were monospecific or plurispecific. These skeletons were sometimes reorganized after an initial phase of decomposition allowed the bones to be collected, a well-attested ritual for other species in Gallic sanctuaries with the decomposition juices feeding the chthonian divinities (Brunaux, 1986). Sepulchres of whole or incomplete dogs were probably the symbol of passage to other worlds, as the dog was considered a mediator in many mythologies (Licari, 2006). Complete skulls were sometimes placed in graves in rural settlements, or at the entrance of the sanctuary (Foucras, 2011), probably symbolizing the guard role of the dog. This type of deposit of dog carcasses or figurines close to houses, temples, or palaces is observed in different archaeological and iconographic contexts (Licari, 2006).

Other burials very clearly associated dog and human remains physically and symbolically in the same space according to different methods, including interlocked corpses or complete or partial corpses laid out in sepulchre enclosures or silos. This phenomenon can be observed extensively, both geographically and chronologically, as the oldest examples date from the Epipaleolithic in the Near East (Mallaha, c. 11,500 BP, Davis and Valla, 1978; and Hayonim c. 11,000 BP, Tchernov and Valla, 1997 as cited by Vigne and Guilaine, 2004). These practices, whether in the case of burials, or incinerations where pets were laid on the funeral pyre with humans (Iron Age, Méniel, 2002), clearly indicate a great closeness between the two, with a status close to that given to our modern-day pets. Associating a dog with a human sepulchre could have been a way of perpetuating the role of the animal as guardian postmortem, thus continuing its role of benefit to the deceased. It is in this funeral context of the second Iron Age that the duality of the status of the dog was particularly strong, with certain animals being burned and buried with a human, while others figured as pieces of meat, simple food offerings (Méniel, 2002). As some of the animals buried were small dogs distinguishable by their original morphology (see above), it raises the question of specific morphotypes that determined a function and thus differentiated certain individuals.

The last well-attested use of dogs was as a meat-producing animal. This has been brought to light by cut and burn marks similar to those found on traditional meat species. The remains of cut up (Figure 6) and cooked dog were found in domestic rubbish heaps, systematically associated with other eaten animals, demonstrating the fact that they were featured on the same tables. Here again, evidence of these practices exists in Europe from the Upper Paleolithic (as on the site of Pont d'Ambon, Pionnier-Capitan et al., 2011), continuing throughout the Neolithic, Bronze Age (in Hungary, Vretemark and Sten, 2010), and Iron Age [in Slovakia (Chrószcz et al., 2013), British Isles (Hambleton 2008), and Gaul (Méniel, 2006; Horard-Herbin, 2014)], even though all the study sites do not systematically provide enough information to document this subject. In fact, the scarcity of dog remains, the wide variety of functions of dogs, and the butchery methods limit the number of remains showing cut marks, and there is no precise reference system to characterize the meat or other raw materials removed based only on the marks left by the butchery process. In the context of Iron Age funerals, evidence demonstrates deposits of

dog meat in tombs, and heads of puppies and dogs eaten grilled or roasted (Figure 7) appeared to be a choice cut as in domestic contexts (Méniel, 1998, 2001). Dogs were consumed when young, either as puppies of a few months old or when they reached adult body weight, and they were managed in a similar way to pigs in the setting of certain Gallic farms that mainly produced livestock for meat (Horard-Herbin, 1997). Cynophagy is a practice that steadily declined with the new culinary habits of the Roman world, until it gradually stopped, for example, in Gaul in the second century AD (Lepetz, 1996).

General Conclusion

This general and partial approach to the evolution of dogs in Europe from the Paleolithic to the Iron Age shows to what extent certain questions regarding this species reoccur across time. In particular, at the beginning of the Neolithic and at the end of the Iron Age, indigenous lines and exogenous inputs can be observed. It would be interesting to characterize these new dogs from the point of view of their bone morphology (e.g., size, robustness, and proportions) and their genetic characteristics (e.g., origins and coat color) to measure their impact on the population in place over the long term (e.g., cohabitation, replacement). These elements are also necessary to draw a link between specific morphotypes and functions as certain modern-day societies (e.g., South Korea) have races of dogs for meat production (Milliet, 1995), even though the term race is completely inappropriate for the periods of interest. (The term race refers to a population of the same species having distinct hereditary, morphological, and physiological characteristics according to the standards defined in the herd and flock books drawn up since the 19th century. For all earlier periods, the more appropriate term morphotype should be used.)

Moreover, the continuity of the use of dogs over time and space reflects both the permanence of their symbolic interaction with humans, when being placed in the sepulchre for example, and also a degree of pragmatism in the variety of their uses, in particular for food, without presenting a contradiction for the societies that bred them. It was during the Roman period that the variability of “races” greatly developed, induced directly by the morphology, with racing, war, and lapdogs, for example, while at the same time, statuses appeared more set. Like for all other domestic species, this morphological diversification resulting from anthropic selection increasingly marked over time encountered other fluctuations during the Middle Ages and modern times. The 404 breeds of dog currently described [According to the FCI (International Cynological Federation), Goffin et al., 2011] are the result of very recent selection dating mainly from the 19th century and are characterized by morphological types and precise uses, like in the texts of ancient authors.

The new techniques of genetic analysis, whose capacities and degree of resolution are infinitely more powerful than a few years ago, should soon enable the complexity of the history of western European dogs to be addressed, a history deeply interplaying and in symbiosis with that of humans.

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