



McDONALD INSTITUTE CONVERSATIONS

Social inequality before farming?

Multidisciplinary approaches to the study
of social organization in prehistoric and
ethnographic hunter-gatherer-fisher societies

Edited by Luc Moreau



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Preface

I write this preface from the state of Wyoming in the US, a state where COVID-19 has not (yet) struck as hard as it has struck other parts of the world, but where we nonetheless have been under stay-at-home orders. Those orders have given me plenty of time to think about where we went wrong, which in the case of the US is a long list. Coincidentally, I also recently re-read Machiavelli's sixteenth-century book, *The Prince*, a manual of how to ruthlessly crush opponents while administering (apparent) generosity to acquire the 'love' of the masses.

It was in this context that I read the papers in this volume. In doing so, I was struck by two facts. First, inequality's origin, development and operation are difficult to understand and yet the actions that lead to inequality are easy to implement. This shouldn't surprise us: no American baseball player mathematically calculates the arc of a fly ball, but he's still able to position himself in the right place to catch it. You can be utterly uneducated and still know how to manipulate a system to maintain exert, and abuse power. Many world leaders today are proof.

Second, I think that the papers in this volume could be some of the most valuable published in anthropology in many years. Philosophers and social thinkers have tried to understand inequality for a century; indeed, efforts to understand it precede Machiavelli. We bemoan its existence, and yet we have felt unable to grasp it, and, unable to grasp it, unable to do something about it. We muddled through the useless ramblings of nineteenth- and early twentieth-century evolutionists, who, reflecting their colonial environment, often thought that inequality was a good thing, and, if not good, an inevitable thing. Marx tried to shake them out of that complacency, but his brilliance was largely wasted during his 'second coming' in the second half of the twentieth century with so much hand-wringing about how a theory intended to explain early capitalism should also apply to hunter-gatherers (because, it must... right?), and so much politically correct posturing that led to no action – and all but disappeared when the Berlin Wall (thankfully) came down and the Soviet Union collapsed. 'Intensification' and 'complexity', words that should be stricken from anthropology's vocabulary for their uselessness (and that are thankfully rare in this volume), masked

what was really going on: exploitation, oppression, slavery... inequality in all its manifestations. Finally, I think, we have reached the point, through analyses of archaeological and ethnological data, that we might actually understand inequality.

We've passed a Rubicon. And this really matters.

The calamity that is COVID-19 has pulled back the curtain on modern society, exposing the weaknesses of its structure, laying bare the inequality between and within countries that Machiavellian leaders exploit and exacerbate for personal gain. Doing something about inequality is the challenge that will remain after COVID-19 dissipates.

These papers help by seeking the origin of inequality in a kind of society, that of nomadic hunter-gatherers, that we once considered 'the original affluent society', a classless society, or 'primitive communists'. Some argue that inequality must be there (as Marxist analysts argued in the 1980s) since it is present in our closest primate relatives, and therefore is in humanity's genetic foundation. Some see evidence of social and/or political inequality among Palaeolithic hunters, in the evidence for secret societies and in the violence of cave art. I am not convinced by this 'grimdark' vision of Palaeolithic society, and see an enormous gap between difference and inequality, between a situation where one person has more than another who nonetheless has enough and one in which society gives a person permission to enslave another.

Nonetheless, these chapters remind us that hunter-gatherers are not angels, and the same self-interest that guides an Inupiaq man to become a *umialik*, or that gave privilege to those men allowed to gather in the torch-lit gallery of Lascaux, guides Machiavelli's anonymous prince. People have different skills, and for some, those skills are political. Under the right conditions, those individuals can consolidate power, convince others to go to battle, and make their personal aggrandizement seem reasonable to the people paying its price. Palaeolithic society had its Hitlers and Stalins, its Caesars and Trumps.

But it didn't have imperialism, or empires, or palaces, or wealth hidden in tax havens. So other chapters here look for the conditions under which those 'selfish' individuals can gain power. High population density (pressure), localized and hence controllable resources,

the ability to build a coalition, which requires a sufficient concentration of population and social institutions that are conducive to creating coalitions, lack of trust in institutions, including sharing networks, to provide in times of stress – these are the conditions that permit those with political skills to pursue self-interest through the manipulation of others.

These conditions are as relevant to understanding the world of today as they are to an understanding of the Palaeolithic world. Today, however, conditions can be manipulated, for example ‘localized’ in off-shore bank accounts. Population pressure is high and will become worse as the world approaches the projected population of 11 billion by 2100. And competition is worsened by a capitalist economy that encourages ever-increasing amounts of consumption and conversion of needed resources, such as food, into higher profit margin items such as crisps and alcoholic beverages. Information is a resource, and technology makes information more available but less trustworthy. Unbelievably expensive

displays of potential force – multi-billion-dollar aircraft carriers, atomic weapons, a Space Force – signal a lack of trust in non-violent institutions to resolve the inevitable disputes that arise when people, or countries, pursue their self-interests with little regard for others. Building trust in institutions – in the UN, in voting, in the media, in government itself! – is an integral part of stopping and even reversing the arms race before it drives the world to the poor house.

Inequality is an old story, and one that we understand much better due to the efforts of anthropologists and archaeologists. It hasn’t been easy to arrive at this point. But the really hard work – implementing our knowledge – still lies ahead for us. This volume, and our prehistoric hunting and gathering ancestors tell us what needs to be done. And it is the most important work anyone could be doing in the world today.

Robert L. Kelly
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Chapter 11

Could incipient dogs have enhanced differential access to resources among Upper Palaeolithic hunter-gatherers in Europe?

Mietje Germonpré, Martina Lázničková-Galetová,
Mikhail V. Sablin & Hervé Bocherens

The dog is the only domesticated species that dates from before the origin of agriculture when human populations were living as hunter-gatherers (e.g. Germonpré et al. 2009, 2015, 2018; Thalmann et al. 2013; Freedman and Wayne 2017). Morphological and genetic analyses have shown that dogs descent from an extinct Eurasian Pleistocene wolf population or possibly several populations (e.g. Germonpré et al. 2009; Thalmann et al. 2013; Skoglund et al. 2015; Frantz et al. 2016). Although the dogs' ancestor is now known, many questions remain, such as how the first dogs could have participated in the daily life of their owners (Losey et al. 2018).

In this contribution, we first summarize two models on the origin of the dog; then we detail two canid morphotypes from the Upper Palaeolithic; next, we look to the Upper Palaeolithic sites that have evidence for the presence of incipient dogs. After that, we review ethnographic sources for dog-related practices among Northern societies and whether and how these could enhance differential access to resources and influence social status distinctions. Subsequently, we discuss what could have been the roles of early dogs in some Upper Palaeolithic societies. Finally, we propose a tentatively narrative on how the contributions of Palaeolithic dogs could have affected differential wealth and influenced social distinction among past men and women.

The domestic dog and its origin

According to Gompper (2014: 10) '...the dog can be defined as a domestic animal based on some combination of human manipulation of their reproduction, human selection on their genotypes or phenotypes, their commensal interactions with humans, and their role in the culture of humans.'

Pleistocene wolves are the single ancestors of dogs (Thalmann & Perri 2018). We must therefore

study Palaeolithic Eurasia to learn about the first dogs. Although the ethnographic record from the circumpolar North, as defined by Anderson (2017: 134), cannot be used as a direct basis for a comparison with Palaeolithic Eurasia, it can help to envisage how Upper Palaeolithic humans and animals regarded each other and interacted (cf. Robert-Lamblin 2001; Germonpré & Hämäläinen 2007; Sharp & Sharp 2015) and what forms of social life were possible under the conditions of a foraging mode of subsistence during the Upper Palaeolithic (cf. Artemova 2016).

Several hypotheses have been proposed to explain the initial steps in the domestication process of the wolf (see Germonpré et al. 2018 and references herein). According to Stépanoff & Vigne (2018), the beginning of the domestication process was related to the concept of seeing living animals as co-operating partners instead of treating the animals as material. We favour a human-initiated model in which wolf pups were adopted. Wolf denning (culling or capturing of wolf pups at dens during spring) is traditional known to be practiced in order to reduce interspecific competition for prey (Farnell 2005) or to protect herds of domestic ungulates (Lescurieux 2007; Charlier 2015). Possibly, a comparable tradition existed in some regions of Eurasia during the Upper Palaeolithic. Captive wolf pups would then be available to be raised at the Upper Palaeolithic camps for several motives and likely some pups, the most docile (cf. Pierotti & Fogg 2017: 222) and less fearful ones, could have survived until adulthood and reproduced, permitting a new selection on every next generation leading ultimately to Palaeolithic dogs (Germonpré et al. 2018). This suggests some acknowledgment of the recognition of emotional inequality among the canid puppies, and such a selection behaviour by humans (affecting the captive canids) may tell us something about the emotional behaviour of humans regarding other human

and non-human persons (cf. Losey et al. 2011). These domestic canids can but need not be the direct ancestors of recent dogs.

The self-domestication model proposed that some wolves adapted to the human niche by scavenging on human waste dumps at postglacial permanent settlements (Coppinger & Coppinger 2001). As it is now certain that the first dogs were already living during the Pleistocene, the revised model states that wolves adapted to the human niche by feeding on garbage dumps or stored food at Upper Palaeolithic sites. Those wolves that were not fearful or aggressive adapted to the human niche and dogs evolved gradually from this subpopulation (Zeder 2012; Larson & Burger 2013; Morey & Jeger 2015). Interesting to note in this context is that in North America First Nations hunters regularly left at the kill sites parts of the game for the wolves, coyotes or foxes (Wilson 1924; Tanner 1979; Brightman 2002; Sharp & Sharp 2015) out of respect (Pierotti & Fogg 2017) or, as noted in the ethnographic record of Northern Eurasia, as counter offerings of meat to be presented to a landscape master (Anderson 2017) or for the raven who guided the hunter towards the game (Shirokogoroff 1935). At the kill sites, the contacts and interactions between Pleistocene wolves and Palaeolithic hunters were in all likelihood very limited (Germonpré et al. 2018). Furthermore, Pleistocene progenitor wolf(ves) populations could only have developed in a separate ecotype when anthropogenic refuse would have been highly predictable and abundant. This was likely not the case during the Late Pleistocene (Lupo 2019). Additional critic on the self-domestication model is related to the limited accessibility of stored food and garbage and to the behaviour of habituated wolves (Koler-Matznick 2002; Germonpré et al. 2018).

In Germonpré et al. (2018) we used the scheme provided by Sigaut (1980) on domestication to explore the diversity of the relationships between humans and large canids and highlighted the importance of a 'ritualized socialization between humans and wolves' (Stépanoff & Vigne 2018: 11). Sigaut (1980) distinguishes four main types of contributions that a wild or domestic animal can provide: behavioural contributions, energy, corporal products and signs. Also, in this chapter, we organize our survey on an adapted scheme based on Sigaut (1980). We do not want to imply with this practical scheme that during the Upper Palaeolithic the relationship between humans and their domestic canids was hierarchical; on the contrary, we wish to underline the multi-layered dimensions of this ancient companionship (cf. Anderson 2017) and to highlight that dogs played a number of different roles (cf. Hayden 2014).

Palaeolithic dogs in Upper Palaeolithic sites

We have described two morphotypes of fossil canids in the Late Pleistocene (Germonpré et al. 2009, 2012, 2015, 2017a). The Pleistocene wolf morphotype is similar in size and shape to the recent wild wolves from northern Eurasia although the snout of this fossil morphotype is on average longer and wider than the muzzle of the recent Northern wolves in our data sets. The Palaeolithic dog morphotype has a unique morphology that falls outside the size and shape variability of Pleistocene and recent Northern wolves (Galeta et al. 2020; Germonpré et al. 2009, 2012, 2015a, 2017a) (Fig. 11.1). This morphotype has a smaller skull size and a shortened snout with a proportionally wide palate and a shorter and higher mandible compared to the wild type (Germonpré et al. 2015, 2017a), features related to the domestication syndrome (cf. Wilkins et al. 2014; Morey & Jeger 2015; Sanchez-Villagra et al. 2016; Wilkins 2017). Moreover, the skulls and mandibles of Palaeolithic dogs differ from those of recent Northern indigenous dogs (Germonpré et al. 2017a). Unfortunately, postcranial skeletal elements associated with skulls or lower jaws from Palaeolithic dogs are very rare. As the mean total lengths of skull and lower jaw of Palaeolithic dogs are significantly smaller than the corresponding mean lengths of Northern wolves (Germonpré et al. 2015a: tab. 4; Germonpré et al. 2017b: tabs. 5, 7), we propose that the mean lengths and widths of the long bones are probably smaller in the Palaeolithic dog morphotype than the mean values in the Pleistocene wolf morphotype. Long bones from large canids have been described as 'dog-like in size' when at least one of their measurements falls inside the observed range of the recent Northern dogs and is smaller than the corresponding lower limit of the observed ranges in Northern wolves (Germonpré & Sablin 2017; Germonpré et al. 2017b). It is possible that the 'dog-like in size' canids could be female Palaeolithic dogs.

European Palaeolithic dogs and 'dog-like in size' canids have been reported from early and middle Upper Palaeolithic sites from Europe above 45° latitude. So far, their remains seem to be absent in natural sites and in Middle Palaeolithic sites. Their presence has been attested in following Aurignacian and Gravettian European sites, dating from before the Last Glacial Maximum (LGM: c. 26.5 to 19 ka (Clark et al. 2009)): Goyet (50°N), Předmostí (49°N) (Fig. 11.2), Kostenki-1/I (51°N), Kostenki-8/I and Kostenki-8/II (51°N), Kostenki-11/Ia (51°N), Kostenki-12/I (51°N), Kostenki-14/III (51°N) and Kostenki-21 (51°N) (Germonpré et al. 2009, 2012, 2015; Camarós et al. 2016; Germonpré & Sablin 2017; Reynolds et al. 2019). In addition, a skull from an incipient dog has been recovered from the Razboinycha cave

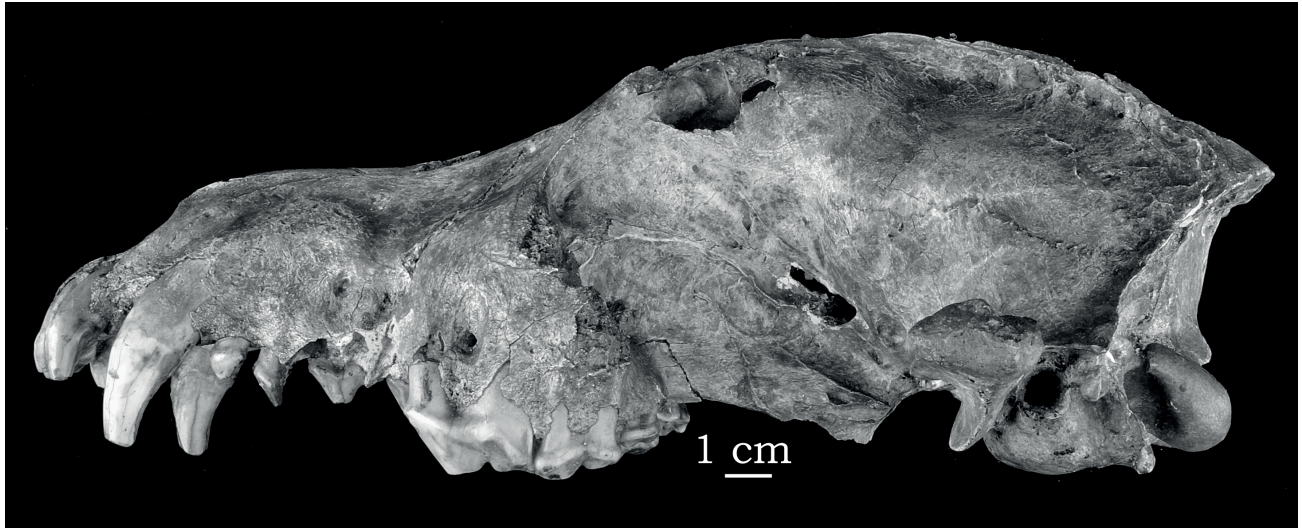


Figure 11.1. Lateral view of the Pleistocene wolf skull (total skull length: 261 mm) from the Trou des Nutons cave, Belgium. Photograph Royal Belgian Institute of Natural Sciences.



Figure 11.2. Oblique view of a Palaeolithic dog skull (total skull length: 232 mm) from the Gravettian Předmostí site, Czech Republic, with a fragment of a flat bone inserted between the front teeth. Photograph Mietje Germonpré; skull from the collections of the Moravian Museum, Brno, Czech Republic.

(51°N), a natural site in southern Siberia (Ovodov et al. 2011) and several canid skulls and lower jaws, possibly related to an early stage of domestication, were found at the middle Upper Palaeolithic Yana site (71°N) in northern Yakutia (Nikolskiy et al. 2018). However, the description of all these skeletal remains as from incipient dogs is not unequivocally accepted (e.g. Crockford & Kuzmin 2012; Morey 2014; Boudadi-Maligne & Escarguel 2014). Nevertheless, recent genetic research brought to light that the divergence between the ancestors of the recent dogs and recent wolves is very ancient and that the first steps of this domestication process likely can be situated in a time frame between 20,000 and 40,000 years ago (Thalmann et al. 2013; Skoglund et al. 2015; Botigué et al. 2017; Thalmann & Perri 2018). Remains from Palaeolithic dogs are more plentiful known from late Upper Palaeolithic European sites in Spain (Vigne 2005), France (Pionnier-Capitan et al. 2011; Boudadi-Maligne et al. 2012), Germany (Nobis 1986), Switzerland (Napierala & Uerpmann 2010), Ukraine (Pidoplichko 1998; Germonpré et al. 2009), European Russia (Sablin & Khlopachev 2002) and Siberia and the Far East (Birula 1929; Pavlov 1930; Dikov 1996; Losey et al. 2013; Germonpré et al. 2017a).

The above implies that already starting from the Aurignacian the Palaeolithic dog morphotype is associated with some Upper Palaeolithic societies. Interesting to add is that several Upper Palaeolithic sites with Palaeolithic dogs or ‘dog-like in size’ canids (e.g. Goyet, Předmostí, Kostenki-1/I, Eliseevichi) are characterized by the presence of male burials and/or female humanoid figurines (Pettitt 2018) and/or by direct (e.g. Praslov 2000) or indirect evidence (e.g. Germonpré et al. 2007; Shipman 2015; Germonpré & Sablin 2017; Wißing et al. 2019) of mammoth hunting. In a number of these sites, dating from the Gravettian and Epigravettian, specialization in bead and blade production, specialized exploitation of fur bearers and procurement of exotic materials, and/or architectural constructions made of mammoth skeletal elements suggest hierarchically organized societies with social differentiation (Soffer 1985). Other evidence of social differentiation exists in the European Upper Palaeolithic: the specialized knowledge related to the realism in Palaeolithic figurations shown in Upper Palaeolithic caves hints at inequalities of specialization and could imply a hierarchy of statuses within groups (Guy this volume).

The utility of indigenous dogs for Northern people

What evidence exists that dogs in hunter-gatherer and small-scale societies could enhance differential access to resources and influence social status distinctions that could vary between embodied, relational and

material types of inequality? Mattison et al. (2016: 185) define inequality as ‘differential access to power or resources, with persistent differences often resulting from hereditary privileges or formal position’. Kelly (1995) emphasizes that social inequality is inseparable from gender inequality. According to Borgerhoff-Mulder and collaborators (2009, 2011), inequality is associated with cross-generational wealth transmission among families. They define different types of wealth: embodied wealth that includes body weight, reproductive success, practical skills, productive knowledge; material wealth that includes land, livestock, household goods; and relational wealth that includes social ties in networks and symbolic goods. Although the transmission of wealth to offspring is modest in hunter-gatherers, children born in better-off families have, nevertheless, a bigger chance of becoming affluent (Borgerhoff-Mulder et al. 2009). Chaudhary et al. (2016) showed that relational wealth is heritable among recent hunter-gatherers and that cooperative alliances can be passed on inter-generationally. Hunter-gatherers societies can be subdivided in those with considerable residential mobility with their members living in smaller groups and those with larger groups residing year-round or seasonally in villages (Kelly 1995; Smith et al. 2010). Smaller hunter-gatherer societies are often considered to be more egalitarian (Kelly 1995). Egalitarian societies are described by Artemova (2016: 14) as ‘a society in which all the people have equal access to all material and spiritual values of their culture and have equal personal freedom and equal opportunities for decision-making.’ Larger hunter-gatherer groups live, in general, in larger settlements; their reduced residential mobility is strongly related to spatiotemporal resource distribution that can lead to food storage and material wealth accumulation (cf. Sahlin 1972) and can be linked to important socio-political changes (Kelly 1995). In addition to wealth, exclusive and ritual knowledge is a type of capital that can influence an individual’s place in the social life of his community, can be inherited and become a source of inequality (Smith et al. 2010; Artemova 2016).

We want to examine in this study whether dogs, which are part of the wealth of their owners, could influence cross-generational transmission of different aspects of wealth and could serve fitness interests of men and women differently. According to Hawkes et al. (2018), women have more interest in managing off-springs quality-quantity trade-offs by provisioning their children directly. In contrast, men share meat from large game they killed as public goods (Hawkes et al. 2018) and display in this way their generosity and commitment (Gurven & von Rueden 2006; Stibbard-Hawkes 2019). This latter type of meat sharing compensates the unpredictability of the hunting

of large game, benefits all and provides the suppliers highly valued reputations and marks them as distinctly esteemed social partners (Hawkes et al. 2018; Stibbard-Hawkes 2019), thus contributing to the relational and embodied wealth of the hunters.

We integrate here a non-exhaustive list on the utilities of indigenous dogs, based on the circumpolar ethnographic literature, of the four main types of 'products' (behaviour, energy, body, sign), as proposed by Sigaut (1980) that dogs can contribute to their male and/or female owners. We use subsequently the term 'role' or 'contribution' instead of the term 'product' and we add a fifth type: the prestige role of dogs (Table 11.1).

A first type of role is related to the behaviour of dogs. Several subtypes are proposed by Sigaut (1980) (Table 11.1).

- (i) food-related: Dogs can function as hunting aides because they can diminish search costs, augment prey encounter rates, drive prey into locations where they can be killed, keep dangerous animals at bay, trail wounded prey and locate carcasses of perished animals, all factors that improve hunting success (Balıkcı 1989; Abe 2005; Grøn & Turov 2007; Koster 2008; Vaté 2013; Perri 2016; Lupo 2017; Samar and Kim 2017; Roberts 2017; Oehler 2018) (Table 11.1). In hunter-gatherer societies men, in general, hunt large game that is subsequently distributed as public good; women occasionally hunt small game, which is mainly used for family provision (e.g. Blieg Bird & Bird 2008; Sharp & Sharp 2015; Hawkes et al. 2018). In Siberia, skilful hunting dogs know how to bark in different ways to inform their master about different kinds of animals and they are reputed to tell in the dreams of their owners where game can be found (Brandišauskas 2017).

However, there are downside effects of hunting with canines. In Neotropic small-scale societies, dogs can spend too much time in chasing unwanted prey species and increase encounters with predatory felines (Koster 2008a, b). In Tropical and Neotropical small-scale societies, hunting dogs die young (≤ 4 years old) (Koster & Tankersley 2012; Lupo 2017). Furthermore, it seems that the uses of dogs for hunting was rather limited in northern North America at contact times (McCormack 2018). The Hidatsa dogs, for instance, did not help in hunting (Wilson 1924). The dogs of the Mongolians nomads do not assist in hunting because of the risk that they would turn from guardians to predators (Charlier 2013).

- (ii) social aspects: In the western Subarctic during pre-contact times, women managed the dogs and cared

for the puppies (McCormack 2018); women from northeastern North American cultures sometimes breastfed puppies (Roberts 2017). The Iñupiaq people held dogs for company (Wilders 1976) and little girls treated the puppies as babies (Spencer 1959). In Siberia, the Chuckhi children (Vaté 2013) and the Oka-Soiot children (Oehler 2018) play with and socialize dog puppies, a kind of dual apprenticeship (Vaté 2013). In contrast, Mongolian nomads are rude to their dogs in order to make the animals tougher; children may not play with dogs, not even with puppies (Charlier 2015).

- (iii) defence: In various nomadic societies of Central and Northern Asia, the prime assignment of the dog is to guard the camp and the people. Watch-dogs, often tethered, warn about approaching wolves, bears and strangers and their barking has a dissuasive function (Shirokogoroff 1929; Lescureux 2007; Vaté 2013; Klovov & Davydov 2018; Oehler 2018). At Orochen campsites, dogs are tied up in a circle, so they can be easily observed (Brandišauskas 2017). According to the Chuckhi reindeer herders, people should not walk alone in the tundra without a dog (Van Deusen 1999). When people leave the camp to gather berries and mushrooms, a dog is taken along (Vaté 2013; Klovov & Davydov 2018). In Mongolia, dogs are not allowed inside the dwellings. A dog must be a good guardian and therefore must be ferocious (Charlier 2015). In fact, a dog should be docile with its owners but aggressive towards strangers, although they are taught not to be over-aggressive (Lugli 2016). Also in North America dogs are used for protection at the camps (Wilson 1924; Nelson 1983).

In the circumpolar North, dogs were also important as guardians against evil spirits (Vaté 2013; Laugrand & Oosten 2015; Samar & Kim 2017).

It should be noted that the protection from dangerous predators is a reciprocal interaction. In the Gwich'in camps, the dogs were tethered. In this way they were kept nearby and did not wander off and could so be protected from being preyed upon by wolves (Anderson et al. 2017). Also in the Russian North dogs are protected from predators by living in the human society (Klovov & Davydov 2018).

A second type of role of dogs relates to energy (Table 11.1). Dogs often helped their owners with the transport of goods as pack animals. In this way, they carried two large bags on the left and right side of their back filled with supplies or meat from kills (Nelson 1983;

Table 11.1. Comparison of dog roles (cf. Sigaut 1980) based on the ethnographic and archaeozoological (Upper Palaeolithic) record (non-exhaustive list). Key: l – living; d – dead; + – clear evidence; (+) – likely; ? – possible.

	Recent northern dog ethnographic record	Palaeolithic dog archaeozoological (UP) record
<i>Behaviour</i>	(i) food-related	
	hunting aide (l)	+
		Morey (2010), Perri et al. (2015), Shipman (2015), Perri (2016), Lupo (2017)
	hunting aide by dreaming (l)	+
		Brandišauskas (2017)
	(ii) social	
	managing/handling (l)	+
		Wilson (1924), McCormack (2018)
	compagnon/pet (l)	+
		Spencer (1959), Wilders (1976), Oswalt (1979), Vaté (2013), Oehler (2018)
	(iii) defence	
	guarding/sentinel (l)	+
		Wilson (1924), Shirokogoroff (1929), Nelson (1983), Lescureux (2007), Vaté (2013), Loovers (2015), Charlier (2015), Lugli (2016), Brandišauskas (2017), Klovov & Davydov (2018), Oehler (2018)
	berry picking aide (l)	+
		Vaté (2013), Klovov & Davydov (2018)
	guarding against evil spirits (l)	+
		Vaté (2013), Laugrand & Oosten (2015), Samar & Kim (2017)
	dogs protected by humans (l)	+
		Laugrand & Oosten (2015), Anderson et al. (2017), Klovov & Davydov (2018)
<i>Energy</i>	transport/pack animal (l)	+
		Wilson (1924), Spencer (1959), Prokof'yeva et al. (1964), Black (1973), Nelson (1983), Balikci (1989), Speth et al. (2013), Loovers (2015), Sharp & Sharp (2015), McCormack (2018)
	dog races (l)	+
<i>Body</i>		Ivanov, Levin & Smolyak (1964), Ivanov, Smolyak & Levin (1964), Samar & Kim (2017)
	fur (d)	+
		Bogoras (1904), Black (1973), Balikci (1989), Issenman (1997)
	wool (l)	+
		Teit (1900), Sokolowa (1982), Solazzo et al. (2011), Hayden (2014)
	meat (d)	+
		Spencer (1959), Black (1973), Brightman (2002), Laugrand & Oosten (2015), Charlier (2015), Roberts (2017)
	fat (d)	+
		Klovov & Davydov (2018)
	long bones (d)	+
		Teit (1900)
	saliva (l)	+
		Rasmussen (1932)

Table 11.1 (cont.).

		Recent northern dog ethnographic record	Palaeolithic dog archaeozoological (UP) record
Sign	visual display/amulet (dentition, bones) (d)	+	+
		Rasmussen (1932), Black (1973), Samar (2009)	Gvozdozer (1995), Germonpré et al. (2012)
	sacrifice/ritual (body) (d)	+	(+)
		Henry (1809), Jochelson (1905), Black (1973), Yamada (2001), Samar & Kim (2017)	
	symbolic meaning colour red (d)	+	+
		Vasilev (1948), Laestadius (2002), Samar (2009)	Street et al. (2015), Reynolds et al. (2019)
	spiritual guide/mediator (body) (d)	+	(+)
		Teit (1900), Jochelson (1905), Kretschmar (1938), Popov & Dolgikh (1964), Black (1973), Schwartz (1997), Yamada (2001), McCormack (2018)	Street et al. (2015)
	ritual (head/skull) (d)	+	+
Prestige		Black (1973), Akino (1999), Lugli (2016), Oehler (2018)	Polikarpovich (1968), Sablin & Khlopachev (2003), Germonpré et al. (2009, 2012, 2017b)
	status (l)	+	(+)
		Teit (1900), Ivanov et al. (1964), Black (1973), Oswalt (1979), Nelson (1983), Hayden & Schulting (1997), Koster (2012), Hayden (2014), Prentiss et al. (2014), Oehler (2018)	
	being fed/controlled diet (l)	+	+
		Shirokogoroff (1929), Prokof'yeva et al. (1964), Black (1973), Sharp (1976), Sokolowa (1982), Nelson (1983), Balikci (1989), Brightman (2002), Abe (2005), Laugrand & Oosten (2015), Sharp & Sharp (2015), Lugli (2016)	Bocherens et al. (2005)
	cleaning human excrements (l)	+	(+)
		Shirokogoroff (1929), Brightman (2002), Willerslev (2007), Charlier (2015), Laugrand & Oosten (2015)	
	fish based diet (l)	+	?
		Prokof'yeva et al. (1964), Black (1973), Sokolowa (1982), Brightman (2002)	
	dog sharing (l)	+	(+)
		Spencer (1959), Stepanova et al. (1964), Wilders (1976), Balikci (1989), Brandišauskas (2017), Oehler (2018)	

Balikci 1989). Estimates, based on ethnographic data from North America, for the weight of a dog back pack range from 15 to 20 kg (Speth et al. 2013; Loovers, pers. comm. 2016). In many hunter-gatherer societies, it is the women that have the burden of carrying goods and looking after transport (Wilson 1924; Sahlins 1972; McCormack 2018; Loovers 2015), so pack dogs, which haul fire wood, water and belongings, can ensure that women have to carry less or can help to move extra possessions. Moreover, pack dogs have been shown to permit long hunting expeditions since hunters could

stay out overnight thanks to the supplies carried by the dogs (Sharp & Sharp 2015).

In Siberia, among the Nivkh, Orochen and Ulcha, dog races were held during the celebration of the bear festival (Ivanov, Levin & Smolyak 1964; Ivanov, Smolyak & Levin 1964; Samar & Kim 2017) (Table 11.1). There is no hard evidence for the existence of sleds in the Upper Palaeolithic; the oldest unambiguous remains of sleds date from the Early Holocene (e.g. Pitulko & Kasparov 1996), so the specifics of dog teams will not be detailed here. Nevertheless, it cannot be

excluded that sled dogs already existed by the end of the Pleistocene (Pitulko & Kasparov 2017). Interesting to add here is that sled dogs are not regularly used as watchdogs since they scarcely bark (Strecker 2018).

Herding performed by dogs is not discussed here since it has no bearing on the utility of Palaeolithic dogs.

A third type of dog contribution is related to corporal products and includes the utilization of dog skin and consumption of dog meat (Table 11.1). Circumpolar women use wolverine, wolf, fox and dog skins for decorative borders, to make trousers and to apply ruffs around the hood or sleeves of parkas, because the long and uneven guard hairs of these carnivores repel frost (Balikci 1989; Issenman 1997). The Nivkh used dog skin to line cradles and wrap babies (Black 1973). The Koyukon did not use dog skin because it has a strong smell; furthermore, since dogs are close to people their fur would revive the lost affection with the domestic animal (Nelson 1983). Northwest Coast Indians bred special wool dogs, the wool of which was used for weaving prestigious blankets and capes (Teit 1900; Solazzo et al. 2011; Hayden 2014). Also, in Siberia the wool of dogs was used (Sokolowa 1982).

In times of starvation, the Inuit ate dogs (Laugrand & Oosten 2015). It seems that the Inland Inupiaq people consumed dogs, especially puppies, more regularly (Spencer 1959). For the Rock Cree, dog meat was an emergency food (Brightman 2002). The societies from northeastern North America ate their dogs in times of scarcity and during ceremonies (Roberts 2017). For the Chipewyan, the dog is inedible due to the fact that dogs eat anything (Sharp 1976). The Nivkh consumed dog meat in a ritual context (Black 1973). Mongolian nomads sometimes taste dog meat as a medicine (Charlier 2015). In the Russian North, dog fat can be used as a medicine for lung diseases (Klokov & Davydov 2018).

The Mid-Fraser peoples made fish hooks from dog bones (Teit 1900). Among the Copper Inuit, the saliva of a dog was considered as a medicine for certain illnesses (Rasmussen 1932).

The fourth role of dogs corresponds to signs. However, in contrast with Sigaut (1980), we propose to limit this type not only to the complete body of the animal, but include also blood and skeletal parts, like teeth and skulls. Therefore, some functions grouped under this type could overlap with bodily functions. The bones, dentition and blood of dead dogs can have a special meaning. For the Copper Inuit, the wearer of an amulet made of the bones of a dog will be revenged by the soul of that dog, if murdered (Rasmussen 1932). Among the Nivkh, infertile women and women desiring another child wore dog tooth amulets (Black 1973). The Ulchi hung up dog canines as protection above

the bed of a new-born child (Samar 2009). The above examples hint that body parts of dogs had a protective role in Northern societies.

Several peoples of East Asia such as the Nivkh, Nanai and Ainu raised a bear cub, captured after its mother was killed, in order to have a bear feast when it had grown up (e.g. Batchelor 1909; Kitagawa 1961; Yamada 2001; Willerslev et al. 2015). When the animal became adult, it was killed during a sending-away ceremony. The Nivkh men sacrificed dogs so that the souls of these animals could guide the soul of the bear killed at the festival to the place where the Master of the Mountain/Forest, who is the owner of the game, dwells (Yamada 2001; Black 1973). The sacrificed dogs' heads were hung on trees around the location of the ritual deposition of the bear skull and bones (Black 1973). Also, the Oroks ritually killed dogs as a part of their bear festival (Samar & Kim 2017). In Northern small-scale societies, people often adorned the killed bear with the colour red (ochre, alder bark juice, blood). Such anointment was not limited to the bear; sometimes the hunters, their wives, the guests and the dogs present at the bear hunt, killing or feast were daubed with the colour red (for details see Germonpré & Hämäläinen 2007). The Saami put alder bark juice on their dogs during the bear hunt (Laestadius 2002). The Nanai placed, during a bear feast, wood shavings smeared with blood of a dog through a hole inside the skull of the bear (Samar 2009). Before the ritual deposition of the cleaned bear remains, the Orochi covered the bear skull with dog blood (Vasilev 1948).

The ethnographic literature of the circumpolar North abounds with beliefs that human souls need the souls of dogs to accompany them (e.g. Kretschmar 1938; Schwartz 1997). In Northwest northern America, when their master died, dogs were sacrificed by men (cf. McCormack 2018) and their carcasses were hung from poles near the grave (Teit 1900). Also, the Siberian Koryak had this tradition (Jochelson 1905). During Ket and Nivkh funerals, men sacrificed dogs, often by strangulation, so that the dog souls could guide the human soul to the after-world; the meat of the killed dogs was eaten (Popov & Dolgikh 1964; Black 1973).

The dogs themselves can receive a specific treatment upon death. Mongolian nomadic pastoralists, before displacing their dead dogs, put a piece of fat, butter or some milk in their mouth; their tail is chopped off and put under the snout during burial (Lugli 2016). The Oka-Soiot hunters place also butter or something delicious in the dog's mouth upon burial, to feed it for the road (Oehler 2018). Some Ainu had a dog-sending ceremony for dead dogs; the remains were deposited together with offerings of among others dried fish; a hole in the head permitted the spirit of the deceased

dog to pass through (Akino 1999) (Table 11.1). In the North, not only dogs, but also wild canids could be given food after they died. Foxen and wolves, after being trapped and skinned, could receive a specific treatment. The Koyukon people placed a bone between the front teeth of a skinned fox and put a piece of dried fish in the mouth of a skinned wolf (Nelson 1983).

In North America and Siberia, dogs were also sacrificed by men as an offering to calm down bad weather or as an offer to the Supreme Being (Henry 1809; Jochelson 1905; Black 1973).

We add here a fifth type of dog contribution: the prestige role of dogs (Table 11.1). Keeping dogs is a costly affair. In societies that use dogs in hauling, dogs are more frequently provisioned than among those societies that utilize dogs in non-hauling activities (Lupo 2019). A detailed account of how frequently dogs are being fed and with what resources as reported in the ethnographic record is detailed in Lupo (2019, Appendix 2). According to Chikachev (2004, in Klovov & Davydov 2018), a dog team of 10 sled dogs consumed almost 4 tons of fish each year. Families of the Northwest coast of North America fed each of their dogs about a kilogram of salmon every day (Hewes 1973). Dogs living in northern climates need adequate nourishment to maintain thermal neutrality in cold weather (Lupo 2019). Not all hunter-gatherer families have dogs, since dogs required a lot of food. In general, hunters have one, two or three (Wilders 1976; Loovers 2015; Oehler 2018; Lupo 2019). Therefore, dog ownership could indicate wealth and status and be related to increasing social inequality among hunter-gatherers (Prentiss et al. 2014). In North America and Siberia, hunter-gatherers also kept wild-born animals, such as eagles, crows, foxes, bears, wolves, deer and bison, as pets (e.g. Shirokogoroff 1935; Heizer & Hewes 1940). According to Hayden (2014), domestic and wild-born pets acquire a lot of food; raising them demands a lot of resources and only wealthy families can afford to do so. The keeping of tamed and domestic animals can thus be part of a form of status display (Hayden 2014). The dog was for the Nivkh an important status symbol (Black 1973). A high number of dogs in a family was a sign of wealth. As much as 40 dogs were kept; they were fed fish and seal fat (Ivanov, Levin & Smolyak 1964). Well-trained dogs could contribute to the hunting success of their master and increase his social status. The Koyukon people bestow prestige on the owners of well-trained dogs (Nelson 1983). The Oka-Sioit hunters lent their talented hunting dogs without expecting a share of the game (Oehler 2018). Dogs were killed as a sacrifice upon the death of their master, displaying individual wealth (Teit 1900; Hayden & Schulting 1997).

Although dogs are often considered to have a similar diet as their owners (e.g. Guiry 2013), the ethnographic record from the circumpolar North shows that dogs are regularly fed selection of undesirable food that is unpopular with humans, like reindeer and moose longs and stomachs (Nelson 1983; Sharp & Sharp 2015), reindeer meat with a lot of parasites (Sharp 1976), unpalatable glands (Balicki 1989), worn-out clothing made from the skin of prey animals (Laugrand & Oosten 2015), cooked old meat, hooves, intestines, periosteum and blood (Abe 2005) or family's leftovers (Lugli 2016); dogs could, in this way, contribute to cleaning waste (Shirokogoroff 1929). Dogs eat also human excrements (Shirokogoroff 1929; Brightman 2002; Willerslev 2007; Charlier 2015, Laugrand & Oosten 2015). Furthermore, the composition of the dog food varies seasonally (Oehler 2018). However, dogs cannot live long on garbage; their diet must therefore be supplemented (Lupo 2017). Especially, dogs used for hauling require a diet with high levels of fat and protein (Lupo 2019). Often in hunter-gatherer societies, fish and hare are considered to be the most appropriate dog food (Prokof'yeva et al. 1964; Black 1973, Sokolowa 1982; Brightman 2002).

People without dogs were considered to be poor and depended on others to travel (Spencer 1959). The village grouped its dogs if there was a need to travel by dog team (Wilders 1976). When the Netsilik needed more dogs for a long journey they borrowed them from close relatives (Balicki 1989). The Yukagirs households combined their dogs to transport their belongings (Stepanova et al. 1964).

In Greenland, poor people wore parkas made from dog skin, a distinction that, according to Oswalt (1979), indicated some inequality in the society. Possibly, poor people used for this the skins of ill-fed, free-roaming dogs, while the fur of the more prestigious dogs could have been used for better clothing (Haynes pers. comm. 2018).

Indigenous dogs and social inequality

It seems that, in general, northern people had at the most a few dogs per household. Dogs could guard their owners, act as companions and hunting aides, assist with body and soul in feasts and ceremonies, be used as fur, tool and food source and play a prestige role. People who had dogs could travel more easily. According to McCormack (2018), in Athapaskan and Algonquian societies, the use of dogs for hunting was limited and dogs were typically used for packing and hauling (see also Lupo 2019). In some groups the women took care of the dogs, in others, men handled dogs, children socialized puppies and were socialized

by them. Generally, there is lack of evidence for eating dog on a regular basis. It seems that trained dogs were not sold nor traded, although dogs, mostly puppies, were given away or exchanged by women (Wilson 1924; Shirokogoroff 1929; Spencer 1959). From the above, it is clear that dogs played important socio-economic, emotional and ritual roles in Northern societies. In some parts of the North, dogs held an ambiguous position. Talented, good-hunting dogs were respected but dogs were also considered dirty because of their feeding on human excrements, their sexual practices and their smell (Brightman 2002; Willerslev 2007). Nevertheless, dogs could signal prestige and status since especially wealthier households could afford keeping many dogs (Prentiss et al. 2014). Furthermore, a positive correlation exists between highly ranked male hunters and highly ranked dogs in small-scale societies (Koster & Tankersley 2012). Orochen hunting teams invite a lucky hunter to make his trained dogs available for the whole group; such sharing strengthens the friendship among hunters (Brandišauskas 2017). Dogs sometimes were shared among people from a same settlement or nearby settlements to help those with less dogs with hunting or transport, without expecting a return (Shirokogoroff 1929; Spencer 1959; Stepanova et al. 1964; Wilders 1976; Oehler 2018). An advantage of such lending could be that the owner must not feed the dog as long as the animal is with the borrower. An obvious gain is that lending dogs strengthens social relations and friendships (cf. lending of donkeys: Marshall & Weissbrod 2009) and could induce cooperative behaviour (Barclay 2013). So, talented dogs could add to relational forms of wealth of their owners. This type of wealth is less easily passed on to the next generation than material aspects of wealth (Smith et al. 2010) but can be transmitted nevertheless (Kelly 2010; Chaudhary et al. 2016). Dogs play an important part in rituals and it is possible that the executors of these rituals transmitted their privileged knowledge concerning dogs to the next generation (cf. Borgerhoff-Mulder et al., 2009). Such monopolized knowledge could contribute to trans-generational social differentiation (cf. Hayden 2008; Artemova 2016).

We propose here that dog husbandry signals material wealth and social status since dog feeding is very costly and competes with human food especially in those regions where food availability is seasonal (cf. Ingold 1980; Lupo 2019), but probably dog ownership does little to accumulate material wealth for households (cf. Russell 2012). In addition, we tentatively propose that dogs can contribute to aspects of the relational wealth of their male owners: talented dogs can increase the prestige of their masters by contributing to the hunting success of their masters and because they

can be lent to help others with hunting. In addition, dogs permit longer journeys that could facilitate the acquirement of exotic goods and the enlargement of the network of their owners. Moreover, the important part dogs play in rituals could be linked to secluded knowledge. These are all benefits that can subsidize the relational and embodied wealth of male dog owners. Therefore, it is plausible that (talented) dogs attribute to social inequality and serve the fitness interests of their male masters. We cautiously suggest that dogs can augment the embodied wealth of their female owners through their role in transportation by reducing the physical stress their female masters must endure and through their defensive role at camp sites and berry and mushroom gathering localities by protecting their owners and her children from physical violence. In addition, the lending of dogs to help others with less dogs and the exchange or giving away of puppies could increase the relational wealth of female owners. Thus, likely dogs could influence social inequality and improve the health outcome of their female masters and children and thus increase the fitness interests of women with dogs.

The utility of Palaeolithic dogs for Upper Palaeolithic people

We want to consider whether Palaeolithic dogs could have enhanced differential access to resources, attributed to the accumulation of wealth and influenced the social inequality of their owners. Therefore, we revise the possible uses of the contributions that could have been delivered by Palaeolithic dogs (cf. Sigaut 1980), examine the registration of such dog contributions in the archaeozoological record from the European Upper Palaeolithic and compare these with data from the ethnographic literature (Table 11.1). The ethnographic evidence permits to conceptualize a set of predictive statements regarding relationships between the presence of dogs, the acquisition and maintenance of differential wealth and the probability that some forms of inequality could have emerged in Pleistocene Europe, before agriculture. From the ethnographic data we deduce that ownership of dogs, because of the feeding costs, confer status to their masters. Viable arguments, however, cannot be found for dogs having a causal role in the development of material wealth, although dog husbandry can reflect material wealth. On the other hand, talented hunting dogs, and maybe also the privileged knowledge concerning rituals involving dogs, could increase the relational wealth and serve the fitness interests of male dog owners. Pack and guard dogs could augment the embodied and relational wealth and enhance the fitness interests of their female

masters. We conclude with a simplified narrative on the influence of dog ownership on different forms of wealth and social status during the Upper Palaeolithic.

The first type of role is related to the behaviour of Palaeolithic dogs and includes several subtypes (Table 11.1).

- (i) food-related: Dogs play in many forager societies an important role as hunting aide. For detailed analyses concerning the use of Palaeolithic dogs for hunting, the reader is referred to Perri (2016) and Lupo (2017). The debate whether Palaeolithic dogs were already fellow hunters of Upper Palaeolithic hunter-gatherers is difficult to demonstrate (Morey 2010) and is not closed yet (Shipman 2015; Perri et al. 2015). However, if Palaeolithic dogs would have contributed to the hunting of large game, there should be evidence of intentionally feeding them and of efforts to promote their longevity (Lupo 2017).
- (ii) social aspects: Remains of two dogs are associated with the double human burial of the Magdalenian Bonn-Oberkassel site in what is now Germany. One Magdalenian dog suffered from a fatal canine distemper infection. Several enamel hypoplasia lines on the dentition suggest that the dog was seriously ill when it was between five and six months old, it died when it was about seven months old (Janssens et al. 2018). Its masters must have been taken care of the pup, otherwise the animal would not have survived so long. The authors propose that the inferred supportive care was based on compassion or empathy and that the Bonn-Oberkassel dog could suggest an emotion-driven human-dog bond (Janssens et al. 2018). Alternatively, the supportive care was maybe motivated by the fact that its owners wanted to promote the pups' longevity because it was sired by or belonged to the litter of talented hunting dogs.
- (iii) defence: It can be expected that the presence of Palaeolithic dogs at camp sites and at berry or mushroom gathering localities conveyed some selective advantage to the people. These palaeo-dogs could have been very useful as sentinels, by warning of the approach of predators or unfamiliar humans through vocalizations; this would have provided protection to the inhabitants of the camps and the gatherers collecting at a distance from the settlements, likely women and children.

The Gravettian Předmostí site in the Czech Republic, dated at c. 28,500 years ago (Germonpré et al. 2017b), is mostly bekknown for its rich human assemblage, extracted from different burial

contexts and composed mainly by remains from young people (Klíma 1991; Brůžek & Velemínská 2008). An isolated human pelvis, found outside the mass grave, shows a large puncture. Most likely, a sharp, pointed object perforated the pelvic bone and probably also the abdominal cavity and caused the violent death of this person (Klíma 1991). This evidence of interpersonal violence suggests that large Palaeolithic dogs could have been useful as guards at Předmostí to protect against physical assault. It appears, based on the cementochronology of the dentition of several species (Nývltová Fišáková 2013) and the extended and intensive occupations (Svoboda et al. 1994), that Předmostí was inhabited during all seasons. The mammal assemblage of Předmostí is dominated by mammoth remains, including mammoth calves ranging in age at death of a few days to several months old (cf. Musil 1968). Mammoth meat was likely a staple food of the inhabitants of the site (Oliva 1997; Bocherens et al. 2015). The processing of mammoth meat and fat must have been very time-consuming. The Palaeolithic dogs could have helped to protect the stored mammoth resources at the Předmostí site against plunderers (cf. Wengrow & Graeber 2018). In the first phases of the domestication process, it is likely that the Palaeolithic hunter-gatherers did not place a strong selective pressure on the canids that would have led to a body size reduction (Sablin & Khlopachev 2003; Pierotti & Fogg 2017). A recent study of Zapata et al. (2016) comparing a genome-wide association mapping for fear and aggression traits across dogs from diverse breeds with the genetic variation in extant wolf populations revealed that reduced fear and aggression alleles are more frequent in modern dog breeds than in wolves, consistent with a selection of reduced fear and aggression variants during the domestication process. In addition, the reduced fear/aggression allele is often in perfect linkage disequilibrium with the allele for increased-body size. This could suggest that a selection of less fearful/aggressive individuals accorded with animals with a large body size. Those large and less fearful/aggressive domestic canids probably were suitable for the protection against apex predators (Zapata et al. 2016), especially during the early and middle Upper Palaeolithic. The Palaeolithic dogs could have helped their masters to control local populations of large carnivores, such as cave hyenas and cave bears, which went extinct during the early and middle Upper Palaeolithic (Stiller et al. 2014; Stuart & Lister 2014), cave

lions, which became locally extinct in Europe between approximately 30,000 years and 19,000 years ago (Stuart & Lister 2011) and Pleistocene wolves. In this way, life became safer for children (Germonpré et al. 2018) and competition for prey diminished (cf. Grøn & Turov 2007), possibly increasing the hunting success rate of the Upper Palaeolithic dog masters. Once apex predators like the cave hyena and cave lion became rare or extinct, selection of larger individuals would have been less useful (cf. Germonpré et al. 2009).

A second type of role of palaeodogs is related to energy (Table 11.1). According to Maier et al. (2016), Upper Palaeolithic hunter-gatherers living at higher latitudes, north of the timberline and in the zone of the continuous permafrost, had to adapt to a cold and dry climate in a treeless landscape and needed to travel long distances to satisfy their daily requirements. Palaeolithic dogs could potentially have been very suitable for the logistical and residential mobility of their people, helping with the transportation of gear, firewood, lithics, body parts of prey, etc. (Germonpré et al. 2017a).

It is interesting in this context that all early and middle Upper Palaeolithic sites where remains of Palaeolithic dogs and ‘dog-like in size’ canids are present north of timberline and in the zone of continuous permafrost at latitudes above 45°N. Pack dogs can permit long expeditions since hunters could stay out overnight thanks to the supplies carried by the dogs (cf. Sharp & Sharp 2015) and in this way, could make it easier for their masters to obtain information and non-local goods. Distinct skeletal evidence for the use of dogs as pack animals, sled-dogs or travois-pulling dogs could be anticipated in the archaeological record (Morey 2010). Deformed spinous processes found on vertebrae from prehistoric dogs have been proposed to result from carrying burdens on their back (e.g. Warren 2000), although diagnostic alternatives should be considered (Lawler et al. 2016). At the Gravettian Předmostí site, the limited presence of canid vertebrae affected by spondylosis deformans does not support an argument for the use of domestic canids as pack animals. Such inferences as pack dogs should be deduced from other skeletal elements, including analyses of entheses on long bones (Germonpré et al. 2016). In addition, the low incidence of spondylosis deformans at the Předmostí assemblage suggests that the large canids from this site did not become very old. Indeed, preliminary results from age estimations based on dental wear show that most large canids from Předmostí died when they were between four and six years old (Germonpré, unpublished data).

The oldest, undisputed remains of sleds date from the Early Holocene (e.g. Pitulko & Kasparov 1996). At the early Holocene Zhokov site in arctic Siberia, the presence of sled dogs suggests that their origin could date back from the end of the Pleistocene (Pitulko & Kasparov 2017). Moreover, a bone tool found at the late Palaeolithic Siberian Afontova Gora sites is reminiscent to toggles from sled dog harnesses (Pitulko & Kasparov 2017). Interesting to add here is that the mammal assemblages from the Afontova Gora sites contain remains from canids described as domestic dogs (Pawlow 1930; Germonpré & Sablin 2017a).

Corporal products of Palaeolithic dogs, the third type proposed by Sigaut (1980), could have converted advantages, such as fur for clothing, meat and fat for food, long bones and teeth as the raw material for the fabrication of tools (Table 11.1). The interest of Upper Palaeolithic people in bodily products from Palaeolithic dogs can be deduced from canid bones bearing marks of human manipulation. So far, human traces on canid remains from Palaeolithic dogs or ‘dog-like in size’ canids have not been observed that could be related to the recuperation of fur. However, it is worth mentioning here that several Upper Palaeolithic sites include important amounts of large canid bones that indicate the use of large canid pelts to tailor cold weather clothing (Collard et al. 2016; Wilczyński et al. 2015). One bone from the Gravettian Předmostí site, a tibia described as ‘dog-like in size’, formed likely a raw source and was probably cut as part of a *chaîne opératoire* of tool making (Germonpré et al. 2017b). At Předmostí, there is no clear evidence of dog meat consumption, although it is likely that Pleistocene wolves and ‘wolf-like in size’ canids were eaten occasionally (Germonpré et al. 2017b). Cynophagy was practiced at the late Upper Palaeolithic site of Pont-d’Ambon (France) (Pionnier-Capitan et al. 2011).

The fourth canid role is related to signs (Table 11.1). Specific human treatments of skeletal remains and the information that can be deduced from the unusual placement of these remains at several Upper Palaeolithic sites hint at the symbolic and ritual importance of certain species (Germonpré & Hämäläinen 2007; Livarda & Madgwick 2018). Human-modified teeth have been proposed to be exponents of the collective symbolic imagination (White 2007). The symbolic meaning of the colour red likely emerged very early, in the African Middle Stone age (Watts 2002; Hovers et al. 2003). Red ochre is often associated with Upper Palaeolithic human burials, female figurines and fossil bear remains, and has been related to rituals (e.g. Germonpré & Hämäläinen 2007; Svoboda 2008a; Pettitt 2010). Interestingly, at the Russian

Gravettian Kostënki-21 site (southern assemblage), the only mammal bone associated with ochre is the maxilla of a 'dog-like in size' canid (Reynolds et al. 2019). Decorated wolf/dog metapodials and copies of these bones carved out of mammoth ivory testify to the symbolic significance large canids held for the people from the Russian Avdeevo site, dating from the Gravettian (Gvozdover 1995).

At the Gravettian Předmostí site, several canid remains bearing sign-related modifications have been unearthed (Germonpré et al. 2012, 2017b). A few Palaeolithic dog skulls from the Předmostí assemblage were at the time of their death manipulated and modified by prehistoric humans: their braincases were perforated (Germonpré et al. 2012), in a way akin to the perforations executed during bear, wolf and dog sending-away ceremonies of the Ainu (Akino 1999; Walker 2005) or during Khanti bear rituals (Jordan 2003). Another Palaeolithic dog was inserted a bone fragment between its front teeth (Germonpré et al. 2012; Germonpré et al. 2017b) (Fig. 11.2), reminiscent of the food Mongolian and Oka-Soiot dogs receive upon burial (Lugli 2016; Oehler 2018) or the gifts wild canids receive by the Koyukon people after being skinned (Nelson 1983).

At Eliseevichi, a Russian Epigravettian mammoth site dated at c. 17,000 years, a skull from a Palaeolithic dog was found in a hearth near a concentration of mammoth skulls (Polikarpovich 1968). Its braincase is perforated at both sides. Cut marks occur on the zygomatic and frontal bones. Both carnassial teeth were removed by damaging the alveolar rims. The location of the skull and the manipulations this animal underwent suggest a ritual context (Sablin & Khlopachev 2003; Germonpré et al. 2009; Demay 2019).

The Magdalenian double burial of Bonn-Oberkassel include skeletal elements of two dogs. The human skeletons and the remains of the young dog that suffered from canine distemper were sprayed abundantly with red ochre. One tooth pertains to an older and smaller dog (Street et al. 2015; Janssens et al. 2018). Possibly, these dogs died at the same time as the man and the woman. Maybe, they were sacrificed so to be interred together with the dead humans to take the role of spirit guide into the after world (Street et al. 2015). Whatever is the interpretation of this collective burial, it forms indisputable evidence that the dogs, of which at least one had received considerable care before its death (Janssens et al. 2018), were part of the life and death of Upper Palaeolithic hunter-gatherers.

The anthropogenic handling and modification of Palaeolithic dog remains from the above-mentioned sites testify of the special symbolic connotation and

ritual importance these domestic canids held within some Upper Palaeolithic societies. It has been proposed that elaborate rituals can be related to the monopolization of special knowledge, can provide mechanisms for social differentiation and can produce authority positions (Owen & Hayden 1997; Artemova 2016), although there is no direct evidence of this relating to the dog rituals described above.

An additional type of contribution is the prestige role of Palaeolithic dogs (Table 11.1). The cost of managing Palaeolithic dogs by Upper Palaeolithic hunter-gatherers must have been high and probably this was only possible during times and at locations when surplus food, which could be stored in pits or on scaffolds, would be available and/or when the advantage of having dogs would outweigh the costs of keeping them. The pre-LGM Palaeolithic dogs and 'dog-like in size' canids are mostly found in sites with a preponderance of mammoth remains and/or with evidence of mammoth hunting such as the Gravettian Předmostí (Czech Republic) and Kostënki-1 (Russia) sites (e.g. Germonpré et al. 2012; Germonpré & Sablin 2017). Also, several Epigravettian mammoth sites from the central East European plains, like Mezhirich, Mezin, Yudinovo and Eliseevichi, delivered remains from Palaeolithic dogs and 'dog-like in size' canids (Sablin & Khlopachev 2002; Germonpré et al. 2009; Germonpré & Sablin 2017). Ethnographic data reveal that the specialist hunters of forest elephants had tremendous prestige, held secret knowledge transmitted to them by their fathers (Bahuchet 1985), and were much appreciated for their high contribution to meat sharing (Duda 2017). During the Aurignacian, the Gravettian and the Epigravettian, mammoth meat was regularly consumed in Western, Central and Eastern Europe (e.g. Bocherens 2015; Germonpré et al. 2008; Wißing et al. 2019). Mammoth ivory was used as a source of tools, ornaments and statuettes (Gaudzinski et al. 2005; Khlopačev 2006; Khlopachev 2013; Wolf & Vercoutere 2018; Borgia 2019; Lázníčková-Galetová 2019). Gravettian human burials were often covered by mammoth scapulae (Svoboda et al. 2008b). The mammoth was part of the life and death of Upper Palaeolithic people (Barkai 2019; Hussain 2019). Probably, the men who led the hunts on this meaningful and weighty mammal must have been experienced. Palaeolithic dogs could have helped these specialists with the sharing of the meat of the killed animals by transporting body parts from the kill sites to the residential camps where the meat from the hunted mammoths could be distributed. In this way, the incipient dogs could have contributed to the prestige of the mammoth killers. At camp sites, it seems that the diet of the Palaeolithic dogs was controlled. The

reconstruction of the diet of several Palaeolithic dogs from the Gravettian Předmostí site revealed that the Palaeolithic dogs were fed reindeer and muskox meat. The absence of mammoth in their diet suggest that, in contrast with other carnivores, they did not have access to mammoth carcasses and thus likely were tethered for at least part of the time (Bocherens et al. 2015). This could suggest that they also functioned as sentinels. The abundance of the mammoth, a preferred food of the Předmostí human (Bocherens et al. 2015) and other early modern humans (Drucker et al. 2017; Wißing et al. 2019), permitted that animals that likely were hunted for other resources, e.g. reindeer which's skin was undoubtedly sought for tailoring cloths and making tent coverings, were available as food for Palaeolithic dogs. In addition, it seems that also the diet of domestic canids from Late Glacial sites was controlled by humans (Baumann et al. 2020). Recent studies on stable isotopes of faunal remains from the Epigravettian Mezhirich site in the Ukraine and Magdalenian sites in Central Europe showed that some, but not all large canids did consume mammoth meat (Drucker et al. 2014, 2018; Baumann et al. 2020). The dog-like canids had a diet dominated by reindeer and horse (Baumann et al. 2020).

Differential burial types, specialization in production and /or remains of monumental architecture at these Gravettian and Epigravettian sites suggest a developed system of ranking among these Upper Palaeolithic societies (Soffer 1985; Wengrow & Graeber 2015). The Palaeolithic dogs from these sites were rather large, having an estimated body mass of about 36 kg (Germonpré et al. 2015); the fact that they required a lot of food could in itself have signalled the status of their masters. Post-LGM Palaeolithic dogs found at several Western and Central European sites are smaller (Nobis 1986; Chaix 2000; Vigne 2005; Pionnier-Capitan et al. 2011; Napierala & Uerpmann 2010), having estimated shoulder heights ranging from 30 to 45 cm (Pionnier-Capitan et al. 2011). Their smaller body size, compared to pre-LGM palaeodogs, could have permitted that they were nimble hunting companions, 'light enough to run over packed snow' (cf. Roberts 2017: H1). The assemblages at these post-LGM sites are dominated by mammals as reindeer, red deer, roe deer, ibex, aurochs and/or horse; the woolly mammoth, woolly rhinoceros and large carnivores such as the cave hyena, cave bear and cave lion were already extinct or had become scarce by that time. In these conditions, smaller dogs would have been more opportune, because they would require less food (Germonpré et al. 2012). This could maybe imply that their influence on status and prestige of their masters could have had less bearing.

Palaeolithic dogs and social inequality

Thanks to their Palaeolithic dogs, Upper Palaeolithic hunter-gatherers could have accessed a larger variability of resources, improved their living conditions, managed better their environment and facilitated their mobility. The competence necessary to conduct ceremonies in which Palaeolithic dogs played a ritual role could suggest that a monopolized knowledge, which could have been hereditary, was present in some Upper Palaeolithic societies.

Palaeolithic dogs must have been very costly to keep, and only wealthy families must have been able to do so. Likely, dog husbandry signalled material wealth. Households probably could have taken care of only a limited number of Palaeolithic dogs. However, in a given region the dog population size must have been large enough to be viable and it is likely that incipient dogs, probably puppies, were readily exchanged. Laikre et al. (2016) proposed that the metapopulation effective size of Fennoscandian wolves should amount to at least 500 for long-term genetic viability, so we tentatively assume that in a given region the effective population size of Palaeolithic dogs could sum up to 500. We consider it plausible that during seasonal gatherings at aggregation sites, puppies, maybe foremost male dogs (cf. Phung et al. 2019), were traded or exchanged. Palaeolithic dogs were likely not a scarce good. Talented dogs and their offspring, on the other hand, must have been much valued. The presence of large Palaeolithic dogs and 'doglike in size' canids at residential sites, such as Předmostí, Kostenki-1/I and Eliseevichi, with male burials and/or female figurines (cf. Pettitt 2018) and with evidence of specialization in ivory bead and tool production, exploitation of fur bearers, procurement of exotic materials, and mammoth hunting – features that likely refer to some sort of social complexity – is perhaps not a coincidence. Nevertheless, there is evidence that Palaeolithic dogs lived already together with humans during the Aurignacian (Germonpré et al. 2019). The beginnings of the domestication process of the wolf were likely driven by many motives, not just prestige and status (Germonpré et al. 2018) and could have arisen in egalitarian societies.

Based on the ethnographic and archaeozoological evidence, we summarize here a tentatively narrative on how the utilities of Palaeolithic dogs could have contributed to the daily life of past humans, how this could have enhanced differential access to resources, how it could have affected differential wealth and how this could have influenced social distinctions among men and women of the Upper Palaeolithic. We proposed that, initially, wolf pups were adopted

and raised primarily for their significance in the cosmology of some Upper Palaeolithic societies, their ritual importance and their fur (Germonpré et al. 2018). Women must have played a primordial role in this by caring for and feeding the blind, helpless wolf pups and by dressing the skin of the (young) adult wolves for cold adapted clothing for themselves, their children, spouse and other dependents. The grown captive wolves were probably killed by men during rituals and for fur harvesting. The costly keeping of these animals must have signalled status and the raising of these canids likely increased the embodied and relational wealth for both the women and men who owned captive wolves. In a next step, early Palaeolithic dogs could have guarded camp sites, hauled firewood and water and accompanied women and children on gathering trips, and in this way augmented the embodied and relational wealth of their female owners. Palaeolithic dogs could have transported big chunks of meat from large game, such as the highly esteemed mammoth, from the kill sites to the residential sites and acted thus as a kind of partner of the male hunters by helping to share highly valued benefits. This aid must have increased the social standing of successful hunters of big game. In addition, by carrying additional supports, Palaeolithic dogs permitted their masters to undertake longer journeys which helped to obtain exotic goods, support and information and to develop extensive long-distance networks, adding to the relational wealth of their male owners. Furthermore, talented Palaeolithic dogs could have been lent to needy people. Such a sharing could have signalled the generosity of the male and female dog owners and augmented their reputation (cf. Stibbard-Hawkes 2019). Probably in a later phase, maybe in the Late Glacial, Palaeolithic dogs became real hunting companions; this would advance the embodied and relational wealth and augment the social status of their male masters.

We propose that from the early beginnings of the wolf domestication, canids had the capacity to augment the embodied and relational wealth and the social status of their male and female owners. Thanks to intergenerational transmissions of these assets, Palaeolithic dogs helped to increase the fitness interests of their masters. Although ownership of Palaeolithic dogs was probably not crucial for the development of non-egalitarian hunter-gatherer societies, the presence of palaeodogs could, nevertheless, have contributed to the enhancement of inequality in the Upper Palaeolithic. Domestic canids probably influenced more the social status of their masters in those Upper Palaeolithic economies that were based on large game hunting and important food storage, that had reduced residential

mobility but pronounced logistical mobility and in which ceremonies were regularly held.

Further research, though, is necessary to confirm and extend this simplified narrative. However, in our opinion, due to the poor archaeological record it would be hard to discern direct evidence that the ownership of Palaeolithic dogs would benefit individuals. Furthermore, we believe that the balance of advantages and costs of Palaeolithic dog husbandry depended on climatic variables and environmental characteristics and that a positive outweigh was probably more pronounced in more northern regions (see also Schnitzler & Patou-Mathis, 2017).

Conclusion

With this chapter we want to illustrate how Palaeolithic dogs could have contributed to a better life for their masters and whether this could have enhanced social inequality among the Upper Palaeolithic hunter-gatherers. By comparing the ethnographic and archaeozoological record, we propose that Palaeolithic dogs could have functioned as sentinels, attributed to a less-strenuous mobility, acted as social companions and hunting aides, been kept for their fur, bones, meat and fat, participated with body and soul in feasts, ceremonies and rituals and been prestige displays. It is clear that the roles Palaeolithic dogs played in the symbolic and ritual realm were very important; it is these functions that are best registered in the archaeozoological record of the Upper Palaeolithic (Table 11.1). The feeding of the Palaeolithic dogs must have been a burden for their masters and keeping many dogs could have been a display of high status (cf. Driscoll 2010). Furthermore, it cannot be excluded that a sharing practice of dogs existed among some of the Upper Palaeolithic hunters-gatherers. Although Palaeolithic dogs did not help to accumulate material wealth, they likely enhanced differential access to resources, increased the embodied and relational wealth and fitness benefits of their masters and, although they were not a crucial factor, they could have attributed to some form of social inequality in Upper Palaeolithic societies. It can be hoped that a multidisciplinary approach, including osteometrical, archaeozoological, biogeochemical and genetic methods, can result in a better understanding of the enduring impact of the interactions between Upper Palaeolithic peoples and their dogs on both species and others.

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Social inequality before farming?

Archaeological investigations over the past 50 years have challenged the importance of domestication and food production in the emergence of institutionalized social inequality. Social inequality in the prehistoric human past developed through multiple historical processes that operate on a number of different scales of variability (e.g. social, economic, demographic, and environmental). However, in the theoretical and linguistic landscape of social inequality, there is no clear definition of what social inequality is. The lifeways of hunter-gatherer-fisher societies open a crucial intellectual space and challenge to find meaningful ways of using archaeological and ethnographic data to understand what social inequality exactly is with regard to variously negotiated or enforced cultural norms or ethos of individual autonomy. This interdisciplinary edited volume gathers together researchers working in the fields of prehistoric archaeology and cultural and evolutionary anthropology. Spanning terminal Pleistocene to Holocene archaeological and ethnographic contexts from across the globe, the nineteen chapters in this volume cover a variety of topics organized around three major themes, which structure the book: 1) social inequality and egalitarianism in extant hunter-gatherer societies; 2) social inequality in Upper Palaeolithic Europe (c. 45,000–11,500 years ago); 3) social inequality in prehistoric Holocene hunter-gatherer-fisher societies globally. Most chapters in this volume provide empirical content with considerations of subsistence ecology, demography, mobility, social networks, technology, children's enculturation, ritual practice, rock art, dogs, warfare, lethal weaponry, and mortuary behaviour. In addition to providing new data from multiple contexts through space and time, and exploring social diversity and evolution from novel perspectives, the collection of essays in this volume will have a considerable impact on how archaeologists define and theorize pathways both towards and away from inequality within diverse social contexts.

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