2. A dog is for hunting

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While the origins and timing of dog domestication are the focus of a number of recent studies, an equally important issue concerns 'why?'. A number of researchers nominate the value of early dogs in cooperative hunts involving larger-sized prey. But prehistoric dogs spread very rapidly to many different habitats and were likely deployed in a variety of different hunting contexts. In this paper I report ethnoarchaeological data on how dogs are deployed and influence the hunting success of smaller-sized game among contemporary forest foragers in a Central African rainforest. In this context dogs play an assisting role in some, but not all, types of hunts. Finally, I discuss how differences in dog deployment strategies might be reflected in the archaeological record and influence the composition of zooarchaeological assemblages.

Keywords: ethnoarchaeology, forest foragers, dogs, central Africa, hunting technology

Introduction

Dogs (*Canis familiaris*) are the earliest and most versatile of all domesticated animals. A number of recent studies have focused on the origins and timing of dog domestication (*e.g.* Crockford 2006; Savolainen *et al.* 2002; Sundqvist *et al.* 2006; Verardi *et al.* 2006; Verginelli *et al.* 2005; Vila *et al.* 2002). Recent mitochondrial DNA analyses, for example, suggests that dogs diverged from wolves as early as 134,000 years ago but were morphologically indistinguishable from their wild progenitors until 15,000–10,000 years ago when human populations became less mobile (Vila *et al.* 2002). Two possible routes for dog domestication are implied by molecular analyses: either a single event involving one wolf population (Savolainen *et al.* 2002; Sundqvist *et al.* 2006) or multiple events in different localities with continued interbreeding between wolves and dogs in some areas (Ciucci *et al*. 2003; Tchernov and Valla 1997; Verardi *et al.* 2006; Verginelli *et al.* 2005). Molecular and archaeological evidence are not in precise agreement regarding the timing of dog domestication. The earliest archaeological evidence for identifiable domesticated dogs date to 17,000–13,000 ^{14}C years BP and were recovered from Eliseevichi I on the Central Russian Plain (Sablin and Khlopachev 2002). Several other early finds of dog remains date between 14,000 and 12,000 BP (see Crockford 2006, 95). These and other archaeological finds in the Near East, Europe and Siberia show that early dogs were morphologically distinct from wolves, but overlapped in overall body size and form (Dobney and Larson 2006; Morey 2006; Musil 1984; Olsen 1985; Turnbull and Reed 1974). By 10,000 years ago dogs are associated with human settlements in three continents (Verginelli *et al.* 2005) and some 7,000 to 4,000 years ago show morphological differentiation in some areas (Clutton-Brock 1999; Lupo and Janetski 1994). Regardless of how and when dogs became domesticated, modern dog breeds display a high degree of phenotypic plasticity and important behavioural and cognitive differences not found in their wild progenitors (Bjornerfeldt *et al*. 2006; Crockford 2006; Hare *et al*. 2002; Miklosi *et al*. 2003; Saetre *et al*. 2004).

While a great deal of research has focused on the origins and timing of domestication, an equally important question concerns 'why?'. Most discussions point to the myriad of functions served by modern dogs in contemporary and historic societies. These include their ability to hunt, herd and guard livestock and people, transport loads, clean garbage, serve as companions and symbols of power and ritual, and their consumptive utility (*e.g.* Snyder and Moore 2006). Some, but not all, of these roles are based on traits amplified by modern selective breeding and have only recently emerged (*e.g.* Morey and Aaris-Sorensen 2002). It is not clear what niche the earliest dogs and their tame progenitors filled in prehistoric societies, but most studies cite their value in the cooperative hunting of larger-sized prey. The use of early domesticated and proto-dogs in human cooperative hunts is often viewed as an extension and modification of their pre-existing predation pattern. Contemporary wild wolves acquire most (but not all) of their prey in cooperative efforts, and it is likely that prehistoric wolves behaved in a similar fashion. Cooperative hunting involving early dogs likely targeted the same prey as their wild canid progenitors. Thus, early dogs were pre-adapted to the cooperative deployment and

Fig. 2.1 Typical forest forager dog

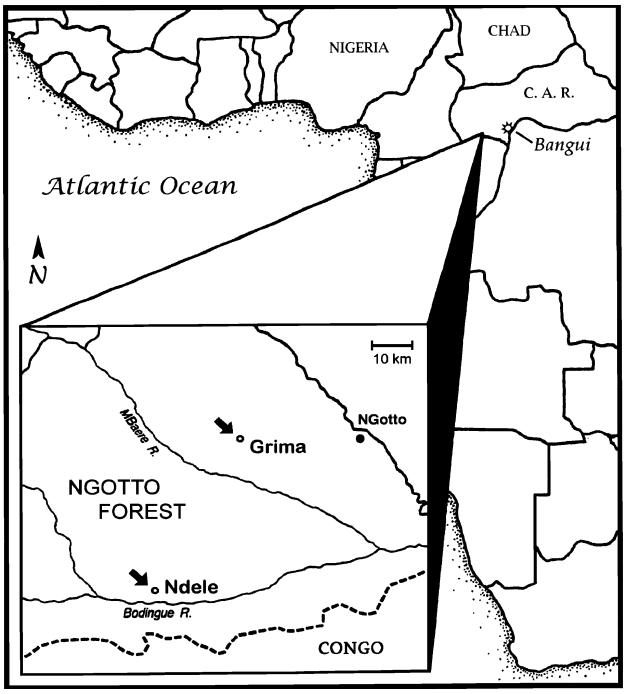

Fig. 2.2. Map showing the study area and villages

the predatory responses of specific animals. But early dogs spread very rapidly into many different habitats where they were likely deployed in many different ways and targeted a variety of different prey. A central question is how the use of dogs influenced different kinds of hunting strategies and how differences in dog deployment might be manifested in the archaeological record.

In this paper I use ethnoarchaeological data derived from Central African foragers and their dogs to explore differences in canine deployment in hunting and how these differences might be reflected in the archaeological record. The Central African dogs discussed here are ancestral to modern Basenji's, a breed recognized by professional kennel associations (Fig. 2.1). Basenji's are late arrivals in sub-Saharan Africa and possibly accompanied Bantu populations who spread east and southward some 2,000 years ago (Greyling *et al*. 2004).

Study Area

Data reported here were collected as part of an ethno-archaeological project on hunting among contemporary Bofi and Aka forest foragers in the southwestern Central African Republic (Lupo and Schmitt 2005; 2004; 2002). These data are derived from over 238 days of observation spanning several wet and dry seasons in two different villages and a series of interviews with 10 hunters (five Bofi and five Aka) about their dogs. The study focused on hunting in the villages of Grima and Ndele, located in the N'gotto Forest Reserve (Fig. 2.2). The study village of Grima is occupied by 150 Bofi foragers, while Ndele is inhabited by 111 Aka and approximately 25 Bofi foragers.

The N'gotto Forest Reserve is located in an area characterized by tropical microenvironments including rain forests, ephemeral wetlands, and wet savannas (Bahuchet and Guillame 1982). The vegetation in this area is classified as a drier type of Guinea-Congolian rainforest (White 1983) and is especially rich in *Entandrophragma cylindricum* and *E. utile* which are highly valued by logging companies (Ngasse 2003). High annual average temperatures (around 77°F), humidity (70–90%) and precipitation characterize this area. During the wet season, mid-June to October, heavy and almost daily rains fall with monthly averages sometimes exceeding 200 mm (Hudson 1990). Considerably less precipitation falls in the dry season, December through May.

The Aka and Bofi are two related, but ethnolinguistically distinct, groups of forest foragers. Despite the differences in their language, the Bofi claim a close ancestral relationship to the Aka, and there are many material similarities between the two groups in house construction, hunting and subsistence technology. There are no differences between the Bofi and Aka in hunting technology or how dogs are deployed. The Bofi and Aka have interdependent and multidimensional relationships with settled farmers who occupy permanent villages. This relationship has economic, social and religious dimensions, but the exchange of forest products, such as meat and honey for manioc and other products, is the most visible and prominent aspect of this relationship. The relationship between foragers and settled farmers is believed to be very old and extend back some 2,000 years to when Bantu horticulturalists arrived in the area.

The Bofi and Aka occupy permanent residential camps and a series of temporary forest camps throughout the year. Permanent residential camps are maintained next to farmer villages and may be occupied for up to six months or longer by segments of the forager population. The foragers also use a series of temporary forest hunting camps as bases for procuring forest resources for trade and consumption. These camps may be occupied for up to several months by a single family or larger population aggregates.

About one half of the diet is obtained from gathering wild products and hunting animals. Gathered products include wild plants such as koko (*Gnetum africanum*), several different species of wild yam (*Dioscorea* sp.) and mushrooms (Pleurotoidea). A variety of fruits and nuts are consumed including *Trecula africana*, *Irvingia robur* and *Irvingia gabonensis*. Insects, including termites, caterpillars and butterfly pupa, and land snails comprise important collected resources. Honey from several species of honeybees and stingless bees is also highly valued (Kitanishi 1995). Hunting is considered an important activity and meat is a highly prized source of food. Meat is obtained by hunting and, on rare occasions, scavenging wild prey. The most common prey are less than 10kg in live weight and include blue duikers (*Cephalophus monticola*), giant pouched rats (*Cricetomys emini*), brushy-tailed porcupine (*Atherurus africanus*), guenon monkeys, small carnivores, reptiles and birds**.** Medium-sized prey (10 to 25kg) includes Bay and Peters duikers (*C. dorsalis, C. callipygus*), which are uncommon in and around Grima, but are encountered more frequently near Ndele**.** Larger-sized prey (>25kg), such as yellow-backed duiker (*C. silvicutor*) and river hog (*Potamocherus porcus*), are uniformly uncommon in this area. The largest traditional prey, elephant (*Loxodonta africana*), is currently rare and protected by law.

The Bofi and Aka use a wide variety of communal and individual hunting techniques to obtain prey. The best known of the communal techniques is the net hunt which involves men, women and children using hand made fibre nets (Harako 1976; Lupo and Schmitt 2002; 2004; Terashima 1983). While a variety of resources are encountered and pursued during these hunts, nets target dense but randomly distributed terrestrial prey that can be easily flushed, especially blue duikers. Individual hunting can involve one to three people and includes the use of spears, traps, snares, crossbows and hand capture. The most common prey taken with spears are medium and larger-sized duikers that are too large to be caught in nets and other animals that are difficult or dangerous to handle, such as porcupine, and small carnivores. The hand capture of prey involves the use of fire, dogs, and digging implements and is aimed at animals that are fossorial, solitary and non-aggressive, such as giant pouched rats, pangolins and tortoises. Snares made from fibre or metal cable are not a traditional hunting technique used by foragers, but the use of this technology is increasing despite the high cost of the cable. Snares are usually generic in form (*i.e.* simple noose form snare) but are scaled to the size of the animal and target a wide range of prey, especially those known to use habitual runways or trails (see also Lupo and Schmitt 2005; Noss 1995; 1998). Small traps are not very common and include devices designed to entrap prey via complete enclosure. Only two kinds of traps are used with any regularity: a small fibre purse trap largely used to obtain porcupine and rat and a woven cone trap used to procure murid rats and mice (see Lupo and Schmitt 2005). In the past, crossbow hunting with poisoned darts was used to procure arboreal animals such as monkeys, bats and birds, but now most of these animals are largely hunted with guns. Only one forager in our study sample owned a gun, which was in disrepair, but village farmers will often hire foragers to hunt and lend them their guns.

Forest Dogs

Dogs are kept by the foragers and farmers in both villages, but are not particularly numerous. Among foragers approximately 50% of the households had one or two dogs. Few households ever had more than two unless a female dog had just given birth. Dogs are generally roughly treated and puppies only slightly less so. It is not uncommon to see these animals kicked, hit or thrown out of huts. Puppies learn early to approach humans with extreme caution. On rare occasions dogs are intentionally killed because they are no longer able to hunt or have become a nuisance. One forager reported that his dog was intentionally killed by a farmer because it came too close to his house. Nevertheless, dogs and puppies are named and encouraged to thrive.

Hunters report that dogs are kept solely as hunting aids. A dog is fairly inexpensive even by local standards; an adult male can be purchased for the equivalent of half a small duiker carcass (about $1.00 US), and a female may cost a little more because of her reproductive abilities.

Bofi and Aka hunters laughed at the suggestion that dogs might be companions/friends or family members, although most acknowledged that dogs provided a valuable service in helping to obtain prey. While all hunters acknowledged that dogs kept sites clean and worked as garbage disposals, they did not cite this as an important benefit to owning a dog. No hunter cited protection in the forest as a function fulfilled by dogs; dogs often accompany foraging groups comprised only of women and children into the forest, but the dogs are taken only to help hunt for small prey that might be encountered. All hunters denied eating dog, but some reported that they knew of someone who did. On one occasion, we discovered a dog humerus fragment in a foragers garbage midden mixed with other food bones, but it was not clear how the bone got there. Both the foragers and villagers believe that dogs and other animals possess spirits and can haunt the living. Dogs are also viewed as a common physical form taken by sorcerers and witches.

While some dogs are acknowledged to be better at hunting then others, hunters reported that there were no differences between males or females in hunting ability. No attempt is made to control or regulate breeding to improve the abilities of the dogs. All dogs are trained

Fig. 2.3 Most dogs are always alert to feeding opportunities and place themselves in close proximity to food processing areas and people (especially children) who are eating.

to hunt beginning at six months of age. Young dogs are given an herbal concoction, which is put up their nose and purportedly enhances their ability to find and chase prey. Young dogs are also often taken into the forest with adult dogs and learn by observation and participation.

Dogs are provisioned and what they eat depends on their hunting success. Those that are successful are fed some of the kill in the forest, usually parts of the internal organs and blood when the animal is butchered. After the kill has been transported, prepared and consumed at camp, the dog may be given small amounts of meat and bones, usually the cranium after it has been picked clean by the foragers. If the hunt was unsuccessful, the dog is not fed meat and may not be given food of any kind. Most people said that garbage was the food of the unsuccessful hunting dog. We observed people giving dogs small bits of manioc, corn, yam and other vegetable products on several occasions even when meat was available for consumption. In camp, dogs position themselves in close proximity to food preparation areas and quickly snap up any small bits of food that are accidentally dropped. Dogs also station themselves close to very small children who may accidentally drop food (Fig. 2.3). During the wet season when hunting returns are generally poor and meat is harder to find for everyone, dogs tend to become weak and very thin.

All dogs are very lean and perpetually hungry. As such hunters occasionally loose prey when it is entirely or partially consumed by the dog before the hunter retrieves the carcass. Interestingly dogs do not feed themselves by hunting for small prey, even though they are quite capable. They usually stay in close proximity to the village or camp and, surprisingly, often show reluctance to go on hunts. On several occasions we observed hunters, dragging and even carrying the dogs into the forest to go hunting. A dog's reluctance to go hunting and procure prey may be linked to the danger the forest poses towards them. Dogs live fairly short lives in this area. While a variety of parasitic diseases can kill dogs (Nozais 2003), most deaths are attributable to other causes. Respondents reported that most dogs lived only two or three years and the oldest dog anyone could recall lived approximately five years. Most die in the forest and simply do not return from hunting trips. The most common cause of death is snakebite, followed by hunting accidents or being killed by leopards or other carnivores. Hunting accidents involves dogs accidentally being speared or hacked with a machete while attempting to flush an animal from brush or a fallen log. Moreover, some dogs were seriously injured and a few eventually died after accidentally tripping metal snares. Occasionally, an injured or sick dog dies in camp and is buried. Hunters reported that they buried dogs out of respect because they helped hunt and obtain meat.

Hunt Parameters	With a Dog	Without a Dog
Number of hunts	46	82
Proportion successful	0.43 (20)	0.34 (28)
Proportion unsuccessful[a]	0.39 (39)	0.50 (41)
Proportion rat escapes	0.13 (13)	0.16 (13)
Proportion dog eats prey[b]	0.04 (2)	0
Average time to kill prey[c]	29 mns	49.50 mns
Average time to break[d] off pursuit	13.11 mns	9.27 mns

a. Unsuccessful hunt includes all hunts abandoned either because the rat was too deeply embedded in the burrow or the burrow was deemed empty after closer inspection.
b. Cases where the dog captured the rat and completely consumed it before the hunter could reach the dog.
c. Mns=minutes.
d. Average time to break off pursuit includes cases where the burrow was abandoned (as defined above) and where the rat was pursued after running fleeing the burrow and ultimately escaped.

Table 2.1 Comparison of giant pouched rat hunting success with and without a dog

Hunt Parameters	With Dog	Without Dog
Number of hunts	35	13
Proportion successful hunts	0.45	0.46
Proportion unsuccessful hunt	0.55	0.54
Average time to kill prey[a]	44 mns	101.33 mns
Average time to break off pursuit	22 mns	3.6 mns

a: Mns=minutes.
In one case of a successful hunt, the dog consumed ½ of the porcupine before the hunter could reach the dog.

Table 2.2 Comparison of porcupine hunts with and without a dog

Hunting and Dogs

The forest dogs play important assisting roles in some, but not all, of the hunting techniques used by the Bofi and Aka (see Lupo and Schmitt 2005). In this cultural context, dogs are deployed as individuals or work in small groups (three to four dogs). The dogs are considered to be 'barkless', but are not mute and can make low barking noises. However, the dogs are not used to scare or distract prey by barking or attacking animals. Most of the prey in this area are specialized in concealment and can only flee predators over short distances (Kingdon 1997). Consequently, the dogs are largely used to flush prey from heavily vegetated thickets, logs or burrows (Hudson 1990; Lupo and Schmitt 2005).

Dogs are considered particularly useful in the hand capture of giant pouched rats. Foragers, especially women, often complained that they were unable to hunt giant pouched rats on particular days because they didn't have a dog with them. Giant pouched rats are procured by finding the entrance hole to their underground burrow and are extracted by digging or smoking them out. Dogs do not usually locate the burrows for the hunters, nor do they help dig out the animal, but they will chase and catch the rat if it escapes from the burrow. Table 2.1 compares rat hunting success with and without dogs. Dog-assisted rat hunts have a higher success rate and take less time than those without dogs. Hunters with dogs abandoned fewer hunts than those without dogs and were more persistent in pursuing a rat after it was encountered than those without dogs. Dogs make very little difference in the proportion of hunts in which the rats escapes. Note that on at least two occasions the dog completely consumed the rat before the hunter could reach the animal.

Porcupines are hunted with spears, by hand and with small traps. Dogs often assisted in these hunts but, again, did not usually locate the porcupine for the hunter; rather the hunter identifies a possible thicket, log or hole and calls the dog over to investigate. The dog assists by chasing the animal after it is located. Table 2.2 shows that the vast majority of the porcupine hunts were dog assisted; the sample of hunts without dogs is quite small. As shown, the use of dogs has very little impact on hunting success (as measured by the proportion of successful hunts) or the proportion of hunts when the prey escapes. But hunters with dogs take less time to kill the porcupine than those without dogs, and hunters with dogs were more persistent than those without dogs. We only observed one instance of a successful hunt where the dog consumed half the porcupine before the hunter could reach the animal.

Dogs were less useful on communal net hunts even though they were frequently present (also see Turnbull 1965). Hunters reported that dogs often help chase prey into the net and catch the animal, but sometimes the dog actually chased the animals the wrong way (*i.e.* out of the nets). Table 2.3 shows that dogs have a less appreciable

Hunt Parameters	With Dog	Without Dog
Number of hunts	38	8
Proportion successful hunt[a]	100	100
Proportion unsuccessful hunt	0	0
Average hunt length[b]	277 mns	282 mns
Average number prey taken	4.83	6.87
Average number of prey escapes	3.2	2.25
Average number of dogs per hunt	2.23	0

a: Successful net hunts are defined as those where at least one animal was taken in the nets. On hunts where dogs were present, the dogs may or may not have directly assisted in these captures.
b: Mns= minutes.
There were no known cases in which the dog consumed the prey before the hunter reached the animal.

Table 2.3 Comparisons of net hunts with and without dogs

influence on net hunting success. Net hunts with dogs tend to be slightly shorter than those without dogs, and net hunts without dogs actually took more prey on average than those with dogs. Slightly more animals escaped the nets on hunts with dogs than those without dogs. The lack of influence that dogs have on net hunting success is not surprising. Previous studies of forest foragers show that net hunting success depends on the number of nets and human participants rather than the number of dogs (Harako 1976; Lupo and Schmitt 2002; 2004; Terashima 1983).

Given their usefulness on other types of hunts, one might question why dogs are present on net hunts. Net hunts in this context are best viewed as general hunting opportunities rather than single task events (Lupo and Schmitt 2002; 2005). People who go on net hunts frequently pursue other hunting opportunities as they arise, such as chasing porcupines or hunting rats. People on net hunts frequently encounter medium and larger-sized prey that is too large to be caught in the nets and must be pursued on foot with spears and dogs. Dogs are useful on these occasions for their ability to track the wounded animal through the forest. As an added advantage, if a dog happens to help another person on the net hunt obtain prey, the owner of the dog is entitled to a share of the bounty.

In general, forest dogs play only a minor assisting role in hunting success among forest foragers. The use of dogs increases the success rate of hunting certain kinds of prey, but they have a less appreciable affect on cooperative net hunts. Unfortunately, the data set for other types of hunts, such as spear hunting, is quite limited and precludes the possibility for examining how dogs influence the success of these types of hunts. Nevertheless, the modest increase in hunting success associated with the use of dogs, the small numbers of animals owned by people and the relative lack of investment in them suggests dogs are not as highly valued as hunting tools as they might be in other ecological contexts.

Osteological and Archaeological Consequences

Although forager dog burials or skeletons were not examined as part of this study, it is reasonable to hypothesize how some of the circumstances described here might be manifested in different kinds of osteological and archaeological evidence. First, because many dogs die in the forest, only a small number of dog burials involving a fairly young population should occur at residential camps. In the Central African case, dog mortality is high from natural predators and hunting techniques that involve a close proximity between hunter, weapon and dog. Depending on the prey, hunting techniques and method of deployment, hunting can be dangerous even when the prey is not large-sized or particularly aggressive. Ikeya (1994) reports a similar pattern in dog mortality among the San in the central Kalahari. A high mortality resulting from hunting accidents might also explain why so few early dog burials are found in archaeological contexts.

Second, dog burials will likely be found in close proximity to human burials and living spaces. In the context described here, people lack formalized cemeteries and the dead are often interred behind huts or living areas; dogs are often buried in the same general location resulting in close spatial proximity between dog and human graves. However, it is important to note that in this context the proximity of burial location to the house and other family members does not reflect a similarly close position of the dog within the family.

Third, the presence of hunting related injuries on skeletons are likely reflect the range of hunting activities pursued by the dog. In this context, injured lower forelimbs are common and sometimes involve breaks through the radius/ulna inflicted by machetes or knives. Another common injury involved missing forepaws from being caught in metal snares. This usually involved paws being dismembered at or just below the carpals. While these injuries were inflicted with metal tools, it is likely that similar hunting injuries could result from stone tools whenever the hunt results in a close proximity between the dog and hunter. Other types of injuries are inflicted by people who intentionally hit the dogs with sticks, riffle butts and knives when the dogs got too close to the animal being butchered, refused to release a carcass or simply got in the way. These injuries appear to represent serious superficial wounds, but it is possible that underlying fractures occurred on the nasal, orbital, maxilla and frontal areas. Since the dogs often survived these injuries, the

damage would possibly be reflected by bone regrowth on the underlying bone.

Finally, seasonal variability in the availability of meat and differences in hunting ability mean that dogs are likely to have a high vegetable component in their diet, which should be identifiable via stable isotope analysis (*e.g.* Clutton-Brock and Hammond 1994; Clutton-Brock and Noe-Nygaard 1990). Ethnographic evidence from other parts of Africa show that hunting dogs are intentionally fed diets high in vegetable components rather than meat, based in part on the belief that this will make them better hunting dogs (*e.g.* Bohannan and Bohannan 1966). Evidence for malnutrition in the form of enamel hypoplasia, poor bone formation and Harris lines should also be apparent in the Central African dog populations discussed here. Interestingly, the degree and severity of malnutrition suffered by the dogs can also serve as a litmus test for evaluating resource stress among human populations. In the case example discussed here, dogs are considered quite expendable and when food is in short supply the dogs simply go without. Consequently during periods of long-term stress (on an annual scale or longer), one might expect the immediate demise of dog populations, while human populations persist.

Conclusions

This ethnoarchaeological example is largely characterized by single dog deployment in the acquisition of small prey. In this context, the use of dogs increased hunting success in only a few instances, yet dogs are viewed as valuable albeit highly expendable hunting aids. But ethnographic and historic data within continental Africa and other parts of the world show that dogs are highly versatile in 'prey target', can be deployed in a variety of different ways, and their value and use is highly variable (*e.g.* Ikeya 1994; Nobayashi 2006; Snyder and Moore 2006). Understanding the differences in how contemporary dogs are deployed and influence hunting strategies can shed light on how and why early and proto-dogs spread so rapidly among prehistoric populations. A related and equally important issue concerns how different deployment strategies influence the archaeological record. While the influence of dogs (and related canids) on bone survivorship and taphonomy is fairly well known (*e.g.* Hudson 1993), the impact of different dog deployment strategies on human behaviour as manifested in zooarchaeological assemblages remains underexplored. One might hypothesize, for example, that increases in the efficiency of one type of hunt resulting from the use of dogs may impact the diet by narrowing the range of species taken by human hunters. Over time, the increased use of dogs in specific hunts could result in the localized depression of certain prey and be manifested in the composition of zooarchaeological assemblages. Recent research among contemporary hunters using dogs points to other less obvious ways that the deployment of dogs might influence the taxonomic composition and mortality profiles of zooarchaeological assemblages. For example, research among the San in the central Kalahari shows that a shift from single dog deployment to hunting with packs resulted in a concomitant change in the range of target prey (Ikeya 1994). Similarly, Nobayashi (2006) found that dog assisted hunts among traditional hunters in Taiwan produced differences in the age structure of wild boars (*Sus scrofa taivanus*) in comparison to other hunting techniques that did not use dogs, such as snares. Dogs assisted hunts take more adult male wild boars than naturally found in the wild boar population. Identification of prehistoric patterns of dog deployment in hunting may also reveal important information about past ecological circumstances. Recent research conducted by Ruusila and Pesonen (2004) found greater success among Finnish hunting groups that used dogs as opposed to those that did not use dogs to hunt moose (*Alces alces*). The benefits of using dogs on hunts were most marked when moose densities declined, making the prey harder to find and smaller-sized human hunting groups needed. These results may point to the ecological circumstances under which early dogs became useful partners in cooperative hunts.

Increased ethnoarchaeological emphasis on how dogs work and are used by hunters in different contexts may help clarify the impact of early dogs and proto-dogs on human populations. Ultimately, additional ethnoarchaeological studies targeting dog–human interactions may help us better understand why domesticated dogs spread so widely and rapidly among prehistoric human populations and endure as companions to this day.

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