

## Canine Economies of the Ancient Near East and Eastern Mediterranean

Max Price<sup>a</sup>, Jacqueline Meier<sup>b</sup>, and Benjamin Arbuckle<sup>c</sup>

<sup>a</sup>Massachusetts Institute of Technology, Cambridge, MA, USA; <sup>b</sup>University of North Florida, Jacksonville, FL; <sup>c</sup>University of North Carolina, Chapel Hill, NC, USA

### ABSTRACT

Archaeological assemblages, texts, and iconography indicate a multifaceted, yet often ignored, canine economy in the ancient eastern Mediterranean and Near East. This economy included not only dogs' celebrated roles as hunting aids, guards, village scavengers, and companions, but also the regular processing, use, and consumption of dogs for foods, hides, and medicinal/ritual purposes. Drawing on ethnohistorical information and zooarchaeological data from three Chalcolithic/Bronze Age sites—Tell Surezha (Iraq), Mycenae (Greece), and Acemhöyük (Turkey)—we emphasize evidence for the processing of dog carcasses, which reflect a range of post-mortem treatments of dog bodies. We suggest the widespread use of primary products from dogs, features of an ancient canine economy that are rarely reported on in depth and often explained away as aberrations by modern scholars of the region. We speculate that this neglect stems in part from analysts' taboos on cynophagy (unconsciously) influencing archaeological reconstructions of dog use in the past.

### KEYWORDS

dogs; cynophagy; Mesopotamia; Anatolia; Aegean; zooarchaeology

### Introduction

The significance of canine remains excavated from archaeological sites in the Near East and Mediterranean has been under-appreciated. This conclusion, which we substantiate below, is curious given the cultural and economic significance of dogs in human societies today. Ethnographic studies reveal the presence of complex and variable canine economies, which we define as systems that exploit dogs or use them in the production/acquisition, consumption, and distribution of goods and services. These economies include the more familiar forms (to Western readers) of work-related human-canine interactions, such as the use of dogs as hunting companions and guard animals, but they also include raising and slaughtering dogs for meat, skins, or other primary products. Dog consumption (cynophagy) is common today in parts of East Asia and Sub-Saharan Africa. At the same time, many cultures harbor powerful taboos against eating dogs; these taboos articulate with culturally prescribed notions of cleanliness, status, and/or the perception of a special emotional relationship between humans and canines (Simoons 1961; Linseele 2003; Hadjikoumis 2016).

In fact, we posit that these taboos have influenced archaeological approaches to dogs in the ancient world. Archaeologists working in the Near East and Mediterranean region, who predominantly come from European, American, and Middle Eastern cultures (all of which harbor taboos on cynophagy and often the use of canine skins), have little difficulty imagining ancient living dogs inhabiting roles as pets, hunting companions, faithful guardians, or even semi-feral pariah animals. Although there has been considerable treatment of cases of dog sacrifice (e.g., Clutton-Brock 1989; Blau and Beech 1999; Lev-Tov et al. 2018), sometimes in ways that feed into existing Western narratives about the special emotional bond between humans and canines, there exists a tendency to downplay the ample faunal evidence that, in

death, canines and their primary products played important roles in ancient economies in the region.

In this paper, we explore canine economies at three sites dating to the Chalcolithic and Bronze Age (ca. 4500–1200 B.C.). Comparing our data to regional trends more broadly, we argue for a reconsideration of the widely held, if implicit, zooarchaeological assumptions about dog remains. We argue that dogs should be considered in discussions of animal economies often reserved for sheep, goats, cattle, pig, equids, and other traditional livestock, even if they typically make up only a small percentage of animals consumed at archaeological sites. We also recognize the multifaceted and often ritual roles played by dogs in the ancient world. However, rather than separating “ritual” and “mundane” uses of dogs, we consider dog sacrifice and other ceremonial uses of dog bodies to be part of the materialization of ritual (cf. DeMarrais, Castillo, and Earle 1996) and thus, from a substantivist perspective, important components of canine economies.

### The Roles of Dogs in the Ancient Near East and Mediterranean

Dogs and humans have had a long history together in the Near East and Mediterranean (Figure 1). As the oldest domesticated animal in the region, dogs are first identified in the Late Epipaleolithic (ca. 14,000 years ago) in the context of human burials associated with the Natufian culture of the southern Levant (Davis and Valla 1978). However, dog remains are relatively infrequent in faunal assemblages, which tend to be dominated by the remains of ungulates (for recent review, see Russell 2020). A recent survey of zooarchaeological work in the region spanning the Holocene up to ca. 5000 B.C. indicates that dogs typically represent less than 2% of faunal assemblages calculated by number of identified specimens (NISP); rarely do they compose more



**Figure 1.** Map of zoarchaeological assemblages containing evidence of butchery or burning of canine remains. Number in parentheses after site name indicates millennium B.C. of occupation (e.g., T. Surezha 5–4 indicates 5th and 4th millennium B.C.). For site list and references, see Supplemental Material 1.

than 5% (Russell 2020). Despite these low frequencies, they are a consistent and predictable component of faunal assemblages (dog remains are identified in 84% of 286 Near Eastern Bronze and Iron Age assemblages with a total NISP > 500; dataset in possession of author B. A.). Additionally, the near ubiquitous occurrence of gnaw marks on faunal remains also indicates the presence of canines as active agents of bone modification and residents in ancient settlements (e.g., Atici 2006; Yeomans, Martin, and Richter 2019).

Archaeological, textual, and ethnographic data indicate dogs played a variety of roles in the ancient world. Many studies of texts and iconographic evidence have emphasized the roles of living dogs and their unique abilities to work with humans. These include the uses of dogs in hunting (e.g., Englund 1995, 122) and warfare (e.g., Tsouparopoulou 2012). While the earliest images of dogs as hunting companions date to the 8th millennium B.C. or earlier (Rosenberg and Davis 1992; Guagnin, Perri, and Petraglia 2018), by the Uruk period (4th millennium B.C.), they were associated with high-status males engaging in royal hunts (Englund 1995). Thus, the elite male-hunt-dog triad celebrated in Classical works such as Xenophon's *Cynegeticus* (ca. 400 B.C.), was present at the very first urban complex societies in Mesopotamia.

In fact, texts from Mesopotamia reveal a long tradition of dog use by state institutions. At the Ur III (ca. 2100 B.C.) site of Drehem, ancient Puzrish-Dagan, texts document specialized kennels and kennel masters, as well as disbursements of livestock for feeding dogs (Jones and Snyder 1961, 127; Tsouparopoulou 2012). Dogs associated with the military were provisioned with carcass parts of cattle and equids, while those associated with the Temple of Gula/Ninisina, the patron deity of the city of Isin, were provided with sheep. This suggests ancient Mesopotamian elites set aside a sector of institutional economies for the raising and training of

dogs in the Bronze Age for warfare (although the details of these roles are unknown) and for religious rituals (Tsouparopoulou 2012).

Dogs were social agents whose associations with magic facilitated their uses in ritual. Textual sources indicate that dogs possessed powerful toxic/medicinal properties. For example, a variety of Babylonian incantations were recited to protect the performer from stray dogs, whose bites were considered toxic, like those of snakes (e.g., Veldhuis 1993; Veenhof 1996). These spells are perhaps an indication that rabies was endemic in the ancient world; incantations frequently describe dogs' aggressive or "furious" behavior (Veldhuis 1993, 161), and one appears to note the transmission of rabies through bites: "from his [the dog's] teeth / hangs his semen / wherever he bit, / his child / he left behind" (Whiting 1985, 182). On the other hand, by emphasizing the particular magical effects that dogs could have on human bodies, these texts also serve to underscore the connection ancient peoples drew between dogs and healing magic.

One important feature of the canine economy was the use of dogs in rituals designed to cure illness. Mesopotamian and Anatolian texts frequently associate dogs with healing. A prime example is the goddess Gula/Ninisina, whose main temple in the city of Isin was known as the *é-ur-gi-ra* or Dog Temple (Ornan 2004). Excavation of this temple revealed dog burials and dog figurines dating to the middle and end of the 2nd millennium B.C. (Ornan 2004). Apparent dog sacrifices and dog figurines in association with the cult of Gula have been found at other sites in Mesopotamia dating to the 2nd millennium B.C., such as Sakhariyah and Nippur (Twiss 2017). Dogs also served as substitutes for humans in healing rituals. The canine participant was used to absorb a human curse or sickness and then sacrificed to absolve an afflicted person (e.g., Moses 2020). Hurro-Hittite texts from Anatolia similarly link dogs to rituals related to healing. Collins (1990) has

argued that puppies were among the most common animals utilized in Hittite ritual. These frequently involved cutting puppies in half and sometimes included burning or using puppy flesh, bones, fat, and feces in healing rituals. Consumption of puppy flesh in this context is mentioned, although indirectly, in one Hittite ritual text (Collins 1990).

In the Near East, Mediterranean, and Africa, consuming dogs was (and, in some contexts, still is) connected to healing rituals. In Nigeria, where dog meat remains both a mundane form of meat that is produced and sold on the market and a powerful medium for magic (Ojoade 1990, 206–208; Blench 2000), eating dog flesh figures in a number of rituals, including those intended to improve fertility, protect against harmful magic, and ward off disease (Ojoade 1990, 207). Similarly, in the ancient Mediterranean world, dogs were often associated with healing deities, such as the Greek god Asklepios (Edrey 2008). This association offers parallels to the Mesopotamian goddess of healing, Gula, mentioned above. Sacrificing dogs in healing rituals was also at least sometimes accompanied by cynophagy (Collins 1990, 214). For example, according to Pliny, dog meat was reportedly used by the ancient Romans to treat victims of poisoning (Pliny, *Natural History* XXIX.14). The similarity to Mesopotamian magico-medicinal uses of canines is striking.

Canines were not only associated with healing, but also with the death-fertility dyad. Perhaps the most well-known example for Western readers is the dog Cerberus, who was said to guard the Underworld in Greek mythology, a concept that finds parallels throughout Indo-European traditions (De Grossi Mazzorin and Minniti 2006; Anthony and Brown 2017). Ancient Near Eastern and Mediterranean people mobilized these symbolic characteristics of dogs in the canine economies in a number of ways, but often through sacrifice. The recovery of 60 puppies and other animals at the bottom of an alleged *abi*, or channel to the underworld, in Hurrian religious traditions, at 3rd millennium B.C. Tell Mozan suggests ancient roots of the chthonic-dog connection and that it was widespread. On the other side of the death-fertility dyad, dogs were sacrificed to Genita Mana, a local Italian goddess associated with menstruation and fertility (De Grossi Mazzorin and Minniti 2006, 62–63). During the ancient Roman Lupercalia festival, young men (*luperci*, deriving from *lupus*, or “wolf”) sacrificed a dog and ran through the streets whipping young women to purify the city and ensure fertility (Plutarch, *The Roman Questions* 68).

Another metonymic attribute of dogs, sometimes mobilized in ritualized cynophagy, is their association with warfare. Anthony and Brown (2017) connect the consumption of dogs and wolves within a non-domestic structure at the 2nd millennium B.C. site of Krasnosamarskoe, located in southern Russia, to Indo-European traditions concerning young male warriors, who were often likened to canines (Anthony and Brown 2017, 135). They argue that wearing skins of and eating both dogs (symbolic of death and war) and wolves (symbolic of “anti-culture”) took place at initiation rituals in which “normal dietary behavior towards canids was suspended and inverted” in order to forge the liminal identity of young male warriors (Anthony and Brown 2017, 138). An interesting parallel to this ritual was found among 19th century A.D. Oglala and other Native American peoples of the Great Plains tribes. In this context, too, eating dog flesh signified the archetype of the wild, ferocious warrior (Comba 1991, 46–47).

In addition to being an element of ritual/magical activity, food is also one of the primary means by which social groups distinguish themselves from one another. The consumption of dogmeat may have served as a powerful signifier of group identity, through a mutually reinforcing dialectic between one group’s culturally significant cynophagy and a sense of disgust by the “other.” Such a dynamic may have existed in the Iron Age Levant between Philistine and Israelite/Canaanite peoples (Maher 2017). In modern times, Avieli (2011) has examined the intersection of identity and cynophagy in Vietnam. He argues that eating dog at semi-clandestine restaurants is associated with the performance of a distinct type of middle class masculinity, one that simultaneously highlights masculine carnivory, rejects Buddhism, and fashions a sense of a distinction and, thus, status. Similarly, cynophagy has emerged as a medium for self-fashioning identities in opposition to global or Westernized identities. In part, this is a response to Euro-American efforts to stamp out cynophagy, which have successfully influenced anti-cynophagy legislation in Taiwan, Hong Kong, and the Philippines (Oh and Jackson 2011). In South Korea, a nation where an estimated two million dogs are slaughtered annually for food, cynophagy has become emblematic of the tension between traditional culture and the globalized cosmopolitanism that has developed since the 1950s (Podberscek 2009).

While food is inherently social, often imbued with cultural and religious significance, we should be wary of sensationalizing cynophagy. Numerous examples document quotidian consumption of dog meat. In these cases, in North and Mesoamerica, western Sub-Saharan Africa, East Asia, and the Pacific Islands, dogs’ primary products offer no greater significance than other forms of meat (Simoons 1994; Callahan 1997; Valadez Azúa et al. 2013). That dogs may have been eaten simply because they represented a culturally acceptable source of meat and fat is a reality that researchers’ own biases may dissemble (Linseele 2003). This warning applies as equally to archaeology as it does to ethnography. In ethnography, cultural biases can even influence the ways in which informants themselves discuss their food. Cynophagists might feel pressure to explain their diet in terms of culture, religion, or medicine—rather than taste—because they perceive those to be more acceptable to their interviewer (Linseele 2003, 324).

While over-interpretation of dog consumption represents one pitfall, under-interpretation is perhaps of greater concern in archaeology. Zooarchaeologists work under the implicit assumption that, unless proven otherwise by unambiguous evidence (e.g., cutmarks), cynophagy was rare or non-existent in the ancient Near East and Mediterranean. Despite a growing awareness of past dog consumption, especially in the Aegean and Iron Age Levant (Snyder and Klippel 2003; Maher 2017; Lev-Tov et al. 2018)—and even though, as a general rule, zooarchaeologists are not surprised to find evidence of cynophagy or dog skinning—dog bones are typically not tallied among lists of livestock species in zooarchaeological reports. Even when zooarchaeologists find clear indications of dog butchery, dogs are generally excluded from synthetic treatments of ancient foodways and are often lumped together among “other” taxa in reports and regional summaries, a trend noted by Russell (2020). The result is a sort of cognitive dissonance, whereby researchers recognize the importance of dogs in special contexts but generally exclude dogs from general discussions of the animal economy.

## Approaching Dead Dogs: Between Taphonomy and Bias

To develop a better understanding of the significance of dead dogs, zooarchaeologists can combine their interpretations of taphonomic data, including skeletal part representation and anthropogenic marks, with the excavators' interpretations of archaeological contexts (e.g., midden deposits, associations with special buildings). Broadly speaking, one can distinguish two main types of canine deposits. Articulated dog remains, consisting of several elements found in anatomical association, can reflect intentional placement of dog carcasses by humans, often associated with funerary rituals (e.g., Safar, Mustafa, and Lloyd 1981, 121; Boessneck and von den Driesch 1984; Wapnish and Hesse 1993; Blau and Beech 1999; Edrey 2008; Çakırlar et al. 2013; Dixon 2018), or undisturbed remains of dogs that died of natural causes (e.g., Horwitz 2013). Disarticulated remains are those found isolated or mixed together with other animal bones and settlement debris. Skeletons become disarticulated through either human action (e.g., butchery, dismemberment, or postpositional disturbance) or non-anthropogenic taphonomic processes, the latter of which includes carcass ravaging by dogs.

While presenting a window into past human-canine relationships, articulated remains can reinforce researchers' prior beliefs about these relationships. This may seem paradoxical, but the ritual treatment of canines can strike a chord with Euro-American sentiments of dogs as animals with special emotional significance to humans. Article titles such as "Pampered Pooches" (Wapnish and Hesse 1993) or "One Woman and her Dog" (Blau and Beech 1999) can unintentionally feed into such narratives, as do the celebrations (and pathos-laden depictions) of archaeological finds of dog interments in the popular press (e.g., Friedman 1987; Fessenden 2019). Yet, cursory or uncritical readings of them can reinforce the notion that the Euro-American upper/middle class ideal of loving companionship between humans and dogs is timeless and ubiquitous. And even though it is widely recognized that dogs were sacrificed to accompany humans in burial or for use in chthonic and healing rituals, it is easy to appeal to an ostensibly universal emotional connection between humans and dogs as the defining feature that underwrites their sacred status. For example, Safar, Mustafa, and Lloyd described burial 185 at Ubaid period Eridu (6th–5th millennium B.C.), indexed as "a young man and his dog" (Safar, Mustafa, and Lloyd 1981, 121), in the following terms: "A dog was laid across [the human's] middle, a few centimeters above... Beside the [dog's] lower jaw lay a meat-bone which had no doubt been placed there intentionally at the time of burial. The inclusion in this way, of a favorite domestic animal's body was perhaps not an unusual procedure." Even in the context of funerary sacrifice, archaeologists can insert their own narratives about the emotional bond between humans and canines, universalizing the "dogs as pets" ideal. While archaeologists must admit that people killed dogs, they are still free to imagine that they did so only under exception and emotionally charged circumstances.

Disarticulated dog remains, however, can challenge archaeologists to consider the uses of dead dogs and their primary products. After all, these remains are analogous to those of livestock found in the same contexts. Yet, disarticulated dog remains are often ignored as dietary or economic

data. While zooarchaeologists working in Bronze and Iron Age contexts typically deploy the a priori assumption that the majority of disarticulated animal remains in anthropogenic contexts reflect past human butchery and carcass processing, they (and we admit our guilt as well) frequently exclude dogs from tallies of taxa contributing to the subsistence economy. Reflecting on our work and those of our colleagues, we suspect the root cause of this a priori rejection is zooarchaeologists' own cultural biases that mask the possibility of dogs being used as a source of food, hides, or other primary products—unless directly and unequivocally indicated by marks on bones.

In this way, burning and cutmarks on dog bones provide the most robust challenge to the prevailing bias against the canine economy. They provide the most direct evidence for processing dog carcasses. It is important, however, to recognize a few limitations of these data. First, thermal alterations that change the color of bones are neither a necessary outcome of food preparation nor a clear indication of it. Many cooking practices do not leave burning marks on bones (Stiner et al. 1995), and non-cooking behaviors involving fire, such as waste disposal, accidental fires, or ritual immolation, can carbonize/calcine bones. Second, while cutmarks are clear indicators of human processing (especially butchery and skinning), only a small proportion of elements will bear evidence of these activities. This proportion varies depending on the butchery tools, skill, and desired products. In Binford's well-known experimental Nunamuit assemblages, for example, only 11% of the processed carcass elements bore cutmarks (Binford 1981, 97). In archaeological assemblages, frequencies of cutmarks are often obscured by weathering, gnawing, root etching, or calcium carbonate accretions. This fact has important implications for the three case studies examined below, which show direct evidence for cynophagy on only a handful of bones.

## Canine Economies in the Ancient Near East and Mediterranean: Three Examples

### *Tell Surezha (Iraq)*

The University of Chicago's excavations of Tell Surezha, directed by Gil Stein, Abbas Alizadeh, and Michael Fisher, have uncovered a multi-period site covering 22 ha about 20 km southwest of Erbil. Surezha is remarkable for its intact domestic and potentially ritual architecture dating to the Ubaid through Late Chalcolithic (LC) 2 (ca. 5500–3800 B.C.). This period corresponds to the development of social inequality in northern Mesopotamia (Stein 2012; Stein and Fisher 2019). Since 2016, the excavations have focused on the southern edge of the mound (Area B). This area included at least two houses, continuously occupied from the Ubaid through LC 1–2, along with an abutting courtyard containing pits and ovens. Household refuse in rooms, pits, and courtyard contexts included animal bones. Immediately to the west of these domestic structures, in Operations 9 and 10, excavators uncovered a large, free-standing, and apparently non-domestic building dating to the LC 1 period. The structure included several rooms, as well as a large enclosing wall. It contained animal bones and other debris, including stamp seals, seal impressions, a mortar and pestle, and an almost complete painted lenticular spouted vessel (Stein and Fisher 2019).

**Table 1.** *Canis* spp. NISP and proportion of bones modified over time from Tell Surezha and Acemhöyük. Proportion of caprine bones modified included for comparison. \*Much of the burning in Level III is not related to cooking practices.

Phase	NISP	%NISP	%Cutmarks (Canines)	%Burned (Canines)	%Cutmarks (Caprines)	%Burned (Caprines)
Surezha						
Ubaid	1	< 1%	0%	0%	0%	3%
LC 1	95	8%	4%	2%	2%	5%
LC 1–2	6	1%	0%	0%	2%	1%
LC 2	0	0%	NA	NA	0%	2%
Acemhöyük						
EBA	83	2%	14%	12%	8%	15%
MBA Level III	186	3%	7%	12%*	3%	30%*
MBA Level II	161	3%	17%	6%	5%	10%
Mycenae						
Mycenae LBA	918	8%	< 1%	< 1%	4%	2%

Faunal analysis of remains recovered from the 2013–2019 excavation seasons indicate that canine remains represent around 1% of the entire assemblage from Tell Surezha. However, canines represent 8% of the LC 1 deposits (Table 1), where biometric evidence indicates the presence of both dogs and wolves (Table 2). All canines appear to have been adults—no deciduous teeth were recovered, and all long bones exhibited fused epiphyses (Table 3). One mandible (identified as a wolf, based on size) had antemortem loss of a second molar, whose alveolar socket had ossified over, suggesting advanced age.

At least four individual canines were represented, most deriving from Operations 9 and 10 (Figure 2). The remains were not excavated in articulation, but rather were found mixed together with the bones of sheep, goats, cattle, and pigs. However, the recovery of elements from across the body, with limited evidence of post-depositional breakage, suggests entire dogs/wolves were butchered and consumed nearby and their remains deposited with other refuse. Evidence for canine consumption includes two burnt bones and cutmarks on four elements. While canine elements were, in general, more complete than those of other animals, the rates of bone modification (butchery and burning) on canines were similar to those of caprines (Figure 3; see Table 1). The placement of the cuts is consistent with marks produced during either the initial dismemberment or later fileting of the carcass (Binford 1981, 125–136).

The context of the finds at Surezha offers further clues about cynophagy at the LC 1 settlement. The finds derive from within and around the unusual, non-domestic structure

in Operations 9 and 10. The fauna from this part of the site also contained higher proportions of wild animals and cattle, potentially indicative of ritual feasts or other ceremonial activities. Tentatively, then, canine consumption may have played a symbolic role in these practices at LC 1 Surezha.

While the nature of these rituals remains opaque, the LC 1 period is thought to have witnessed the development of heritable inequality (Stein 2012). It is tempting, then, to explain the cynophagy in the special building at Tell Surezha as part of “diacritical feasting” (Dietler 1999, 145), in which kin groups or ambitious individuals sought new forms of prestige to distinguish themselves from other members of society and to reify their social positions (see also Brereton 2013). If so, the consumption of dogs and wolves may have helped facilitate this process of differentiation by drawing upon magical powers associated with canines, conferring them upon special members of the community, or employing them to address community-wide concerns such as healing, fertility, or mediating relationships with deities.

An alternative explanation borrows from Anthony and Brown (2017), who described a similar find (cynophagy of dogs and wolves in a non-domestic building) at the 2nd millennium B.C. site of Krasnosamarskoe in Russia. As mentioned above, the authors interpret the finds as evidence of young male warrior initiation rituals. Although the cultural and geographic context of Krasnosamarskoe is admittedly quite different from that of Tell Surezha, it is possible that in both contexts people associated dogs with warfare and that the unique buildings at each site were analogous to the “men’s houses” found historically in small-scale societies around the globe (e.g., Flannery and Marcus 2012). In fact, the Late Chalcolithic in northern Mesopotamia did see a rise in warfare, with notable examples including the violent destructions of Tepe Gawra XII (LC 1) and XI (LC 2) and Hamoukar (LC 3), not to mention the mass grave of young adults (males and females) at Tell Majnuna (LC 3) (Rothman 2009; McMahon, Soltysiak, and Weber 2011; McMahon in press). Canines and their primary products may have helped motivate and inspire Chalcolithic youth to take on new roles as members of raiding parties, engaging in “dog-like” acts of violence.

**Table 2.** *Canis* lower first molar measurements from Tell Surezha and Acemhöyük compared to a domestic dog recovered from Akkadian period levels (late 3rd millennium B.C.) at Tell Brak in northeastern Syria (Clutton-Brock 1989) and modern wolves from the Zagros region (Davis and Valla 1978). \*Indicates probable wolf, based on metrics.

Site	Op/Loc	Dog/Wolf	Length (mm)	Breadth (mm)
Surezha	2/144	dog	22.5	9.2
Surezha	9/14	dog	22.6	8.8
Surezha	10/218	dog	22.7	9.0
Surezha	10/225	wolf	27.1*	10.4*
Surezha	10/233	wolf?	–	10.5*
Acemhöyük	AC2010 EB48katIV	dog	21.3	
Acemhöyük	AC2010 EB48katIV	dog	19.5	
Acemhöyük	AC2008TA33katII	dog	20	
Acemhöyük	AC2009Tektas	dog	21.3	
	SondajKatIII			
Acemhöyük	AC2003SA35katIII	dog	21.4	7.8
Acemhöyük	AC2009DB49katV	dog	23.5	
Acemhöyük	AC2013YA50katII	dog	22.3	9.1
Acemhöyük	AC2012CB51kat XI	dog	22.5	8.9
Acemhöyük	AC2009TA38katIII	dog	21.5	8.1
Tell Brak	Akkadian	dog	22.5	–
Modern	Zagros Wolves (n = 6)	wolves	26.6 ± 1.7	–

**Table 3.** Simplified epiphyseal fusion data from Tell Surezha, Acemhöyük, and Mycenae. Elements included in fusion stages: Stage 1 (Pelvis, Scapula, Ph. 1 & 2); Stage 2 (Ds. Humerus, Px. Ulna, Metapodials); Stage 3 (Px. & Ds. Radius); Stage 4 (Px. Humerus, Calcaneus, Px. & Ds. Femur, Px. & Ds. Tibia). For raw data, see Supplemental Material 2.

Fusion stage	Surezha %Fused	Acem. EBA %Fused	Acem. III %Fused	Acem. II %Fused	Mycenae %Fused
1 (6 mos.)	100	100	100	100	98
2 (10 mos.)	100	95.8	87.5	100	98.5
3 (12 mos.)	100	87.5	71.4	100	95.8
4 (18 mos.)	100	88.8	88.9	100	83.9

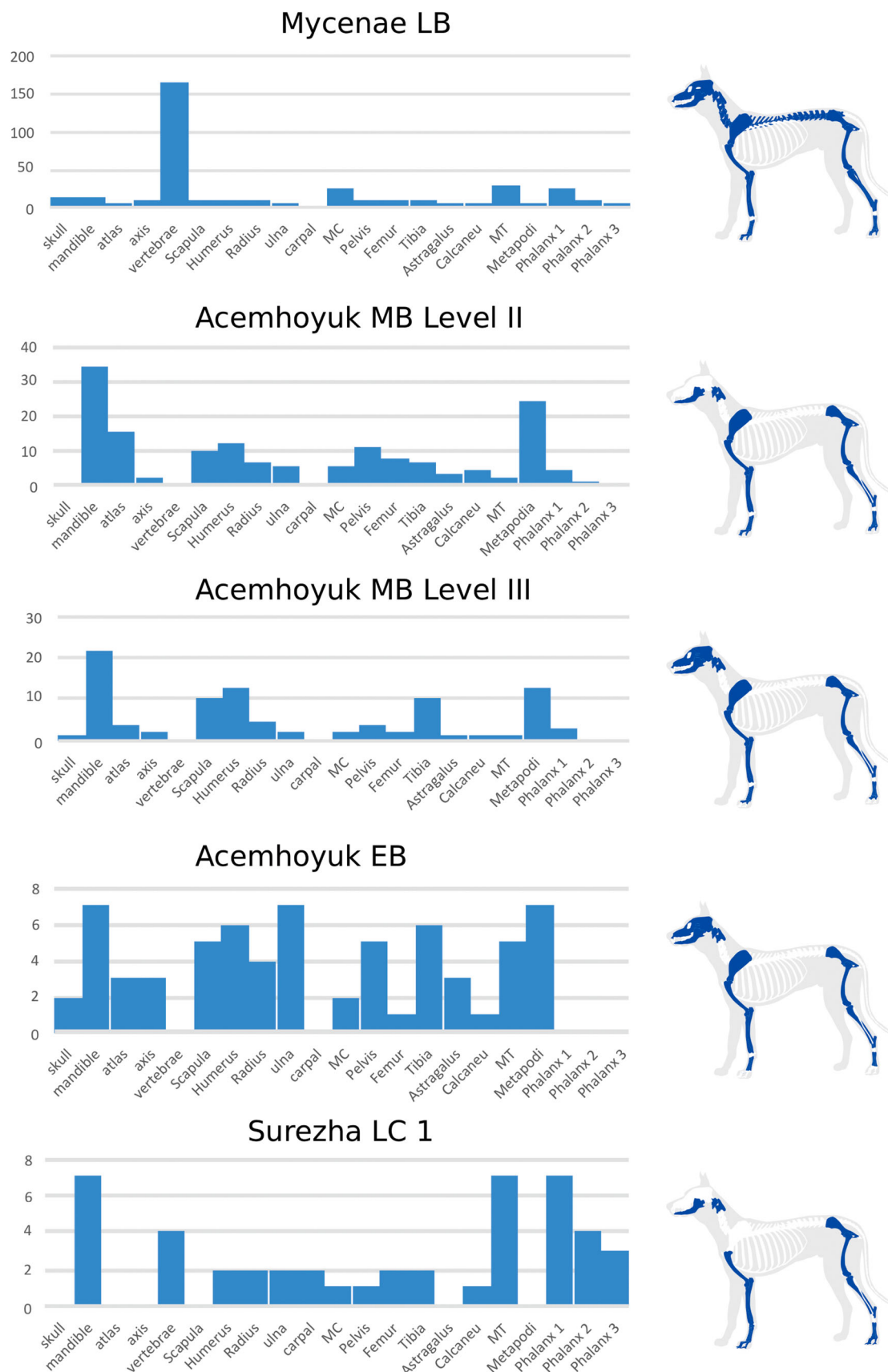
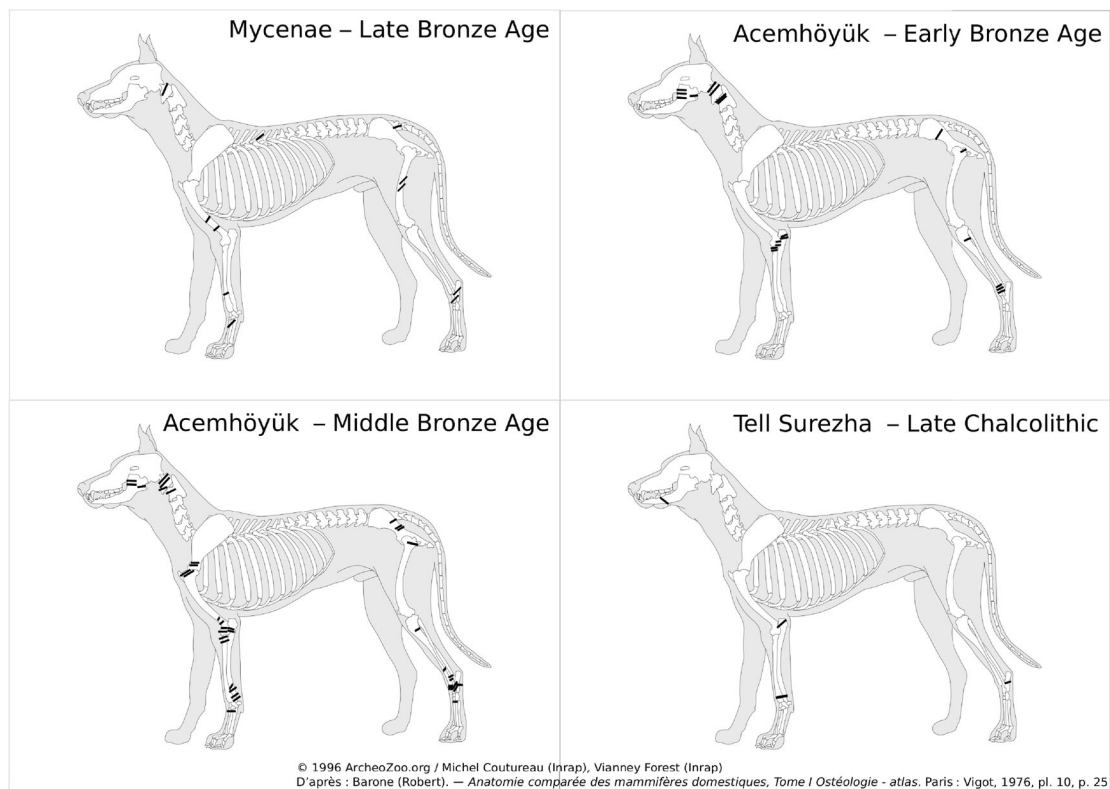


Figure 2. Minimum Number of Elements (MNE) at Tell Surezha, Acemhöyük, and Mycenae.

### Acemhöyük (Turkey)

Acemhöyük was a major Early and Middle Bronze Age urban center (ca. 2800–1700 B.C.) located on the Konya Plain in central Turkey. The Early Bronze Age settlement (EBA; 3rd millennium B.C.), which has been explored by Aliye

Öztan of Ankara University since 1989, included elite residential and administrative buildings surrounded by a monumental city wall (Öztan 1994). The better-explored Middle Bronze Age levels (III and II) dating to the early 2nd millennium B.C. include the remains of several palatial structures and administrative complexes, as well as an extensive lower



**Figure 3.** General locations of cutmarks on canine remains from Tell Surezha, Acemhöyük, and Mycenae.

town (Özgüç 1966; Öztan 1998). The monumental structures of the central mound, which belong to level III and contained sealings indicating communication with contemporary rulers in Mesopotamia and northern Syria, were destroyed in a massive fire in the 18th century B.C. (Özgüç 1980; Manning et al. 2016). A short reoccupation in level II consisted of smaller and poorly built structures directly on top of the destruction layer. There is no evidence for reuse of palatial structures, and the lower town appears to have been abandoned at this time (Özgüç 1966).

Most of the fauna derives from midden and fill deposits within administrative contexts in the city center. A total of 461 specimens identified as *Canis* sp., representing 2.8% of the total NISP from the site, were found, typically deposited within mixed midden deposits that also contained the remains of other butchered animals. *Canis* remains range from 0–3.2% of the NISP between the 11 stratigraphic levels dating to the Early and Middle Bronze Ages. Metrical data (see Table 2) suggest all of these animals were domestic dogs.

In the EBA (levels XII–IV), 83 *Canis* specimens were identified, accounting for 2.2% of the total EBA NISP. Contexts include areas around the city wall and trash pits. All *Canis* specimens represent disarticulated remains, with the exception of those from Area FB50–51, where two disturbed partial dog burials, including some articulated and paired elements, were uncovered. The vast majority of the dog remains from the EBA levels derive from adult animals exhibiting fully fused epiphyses and permanent dentition. Three unfused specimens indicate the presence of some juveniles (less than one year), including the tibia of a very young puppy. A relatively high frequency of the dog specimens exhibit cutmarks (14%) and evidence for burning (12%), the former higher than the proportion of cutmarked caprine bones (see Table 1, Figure 3).

The majority of dog remains derive from the Middle Bronze Age (levels III and II). In level III, 169 *Canis* specimens were recorded, with another 17 likely assigned to this level. This represents 3% of the total assemblage. Specimens were found disarticulated, and most derive from deposits associated with public architectural features in the city center. Additionally, several specimens were recovered from a sounding in the lower town, and two specimens (a mandible and third metacarpal) were found associated with a human burial in the Arıbas cemetery in the lower town. Most of the canines from level III represent adult dogs. One tibia reflects a very young puppy, while an unfused ulna and proximal radius also indicate juveniles (less than 10 months), as does a single mandible belonging to a puppy less than five months of age. About 7% of the dog specimens bear cutmarks (more than twice the rate for caprines), and 12% show evidence for burning, which is much lower than the rate for caprines, although much of the burning in Level III is not related to cooking practices (see Table 1).

The dog remains from level II comprise 161 specimens, representing 3.2% of the assemblage. These remains derive from residential areas hastily rebuilt on top of the destroyed city center. One complete dog burial—an adult male, based on the presence of a baculum—was recorded, but all other remains are disarticulated. As with the earlier occupations, the vast majority of the dog remains represent adult individuals. One unfused distal metapodial indicates a juvenile less than eight months old, while two puppy mandibles, probably from the same individual, were also recorded. Burning is evident on 6% of the dog remains in level II, the lowest at the site, whereas the frequency of cutmarks increased dramatically to 17% of the dog assemblage from this period, more than three times the rate observed on caprines (see Table 1).

Location of cutmarks and the skeletal parts are similar in all periods (see Figure 3). Specimens with cuts across the

ventral portion of the atlas suggest removal of the head, as well as, perhaps, cutting of the throat. Cuts on the metapodials and tarsals likely reflect skinning, whereas cuts across the distal trochlea of the humerus and the head of the femur likely reflect dismemberment. Thus, multiple stages of the butchery process are reflected in the cutmarks on the dog assemblage.

Overall, the dog assemblage at Acemhöyük does not fit the iconographic or textual evidence (reviewed above) for an assemblage resulting from the special ritual use of dogs: it is not dominated by complete or partially complete skeletons that are often indicative of dog burials or sacrifices. Contextual data and the general lack of puppies, the common victims of Anatolian dog sacrifices reported in texts (e.g., Collins 1990), also argue against ritual use. Meanwhile, the high prevalence of cut marks and burning does not fit expectations for ad hoc disposal of the carcasses of semi-feral or free-ranging dogs.

The dogs at Acemhöyük instead match expectations for a tradition of cynophagy. Dog consumption appears to have taken place across the urban center and in the lower town and occurred irrespective of social status both as a prosaic practice within the walls of the city, as well as associated with at least some funerary contexts. Dog bodies were regularly skinned, butchered, and cooked within the EBA and MBA settlement, and these behaviors continued and perhaps increased in the less opulent occupation (level II) following the destruction of the administrative center. The consumption of dogs at Acemhöyük focused primarily on adults, although in the EBA and level III periods, 11% of the population were culled as juveniles (see Table 3). While skinning, butchery, and consumption are indicated by the high frequencies of cutmarks and burnt bones, as at Tell Surezha, dog skeletal elements were relatively more complete than those of sheep, goats, cattle, and pigs. This suggests dog carcasses were subject to lesser degrees of processing for marrow and grease than those of ruminant and suid livestock. While it is unclear exactly what social significance dog primary products held, the canine economy at Acemhöyük was a persistent characteristic of local foodways for a millennium. The Acemhöyük data thus reveal that dog consumption was a long lasting and widespread aspect of everyday life in this Bronze Age community, taking place in a wide variety of social contexts, including public and private, sacred and profane.

### ***Mycenae (Greece)***

Our final case study features dog remains recovered from the site of Mycenae, Greece. Dog carcass parts were recovered from Petsas House—a domestic-industrial complex involved in wider local and regional systems of craft production (ceramics) and the provisioning of diverse resources, including animals, during the Late Helladic IIA2 period (1375–1300 B.C.) (Shelton 2010; Price, Krigbaum, and Shelton 2017; Kvapil et al. 2019). Petsas House was recently excavated by the Archaeological Society of Athens and the University of California Berkeley under the field direction of Kim Shelton (Shelton 2010, 2015). In Room II of the structure, dog specimens were found with a diverse assemblage of well-preserved faunal remains and other debris packed into a ca. 12 m deep well. Subsequent analysis has detected several ceramic joins between, on the one hand, sherds deriving from the rooms

of the building and, on the other, fragments found in the well deposit. This suggests waste from the rooms, and perhaps other parts of the site, were deposited in the well, probably following a destructive event (Shelton 2009, 2015; Price, Krigbaum, and Shelton 2017; Kvapil et al. 2019). Thus, the dog remains were likely deposited in the well by several cleaning events that occurred shortly before and after the destruction of the house.

The dog remains within Room II appear to derive from both disarticulated and more complete skeletal parts. Analysis of a vertical sample of faunal remains from the northwestern quadrant of the well revealed a high proportion of dogs ( $n = 918$ , 8.1% of NISP) (Meier, Price, and Shelton *forthcoming*). In the deepest layers of the well, dog abundance was higher, and many elements were found in anatomical association, suggesting the deposition of more complete animals. More isolated, disarticulated elements were mixed throughout the upper layers.

Taken as a whole, body-part representation is diverse throughout the vertical sample (see Figure 2). Elements included many vertebral bones, as well as the bacula of three male individuals (Meier and Price *forthcoming*). Although a majority of the dog remains represent adults, 16% of the individuals died prior to epiphyseal closure, and both puppies and juveniles were represented in the assemblage (see Table 3).

Cutmarks were found on 14 specimens throughout the well deposit; four from the intensively studied vertical sample (0.4% of canine NISP), and an additional ten specimens were observed in an ongoing study of the other parts of the well deposit (see Figure 3). Cutmarks consistent with skinning are present on elements of the autopodia, while disarticulation marks were detected on the articular ends of long bones and vertebra. One cut atlas bone was present that may reflect butchery to remove the head or kill the animal. In addition, calcined fragments of a distal scapula and ulna were found (0.3% NISP). This exposure of dog limb parts to high temperatures may reflect roasting or disposal of dog carcass parts in or near hearths.

Taphonomic assessment of fauna from the well in Room II reveals that dog bodies were subject to different treatments. In the lower layers, whole or partially complete skeletal parts were deposited, suggesting minimal carcass processing and, perhaps, the use of the feature as a convenient or socially meaningful location to inter the remains of canines in the early stages of filling the well. The disarticulated remains in the upper layers more closely match expectations for household consumption refuse, which was deposited into the well during the post-destruction cleaning activities. These butchered dog remains were also deposited with other types of debris, including faunal and ceramic waste from household meal preparation and consumption.

While the upper layers clearly indicate that dogs were periodically included in household meals, the recovery of whole or partially complete skeletons in the lower layers of the well reflects more primary deposition. The treatment of these remains offers parallels to other finds, such as the numerous examples of articulated dogs found within human burials in prehistoric Greek contexts (Hamilakis 1996). The evidence of rapid deposition and butchery, perhaps reflecting sacrificial activities, also resonates with deposits in the Near East (e.g., Schwartz 2013) and in later periods of the Aegean (e.g., Liston et al. 2018). Additional



parallels come from Eretria in Greece, where there is potential evidence for dog consumption and symbolic activities during the Helladic–Hellenistic periods (Chenal-Velarde 2006).

### Discussion: The Value of Dogs and Their Products in the Past

The cases we have explored highlight three different uses of dead dogs and, presumably, cynophagic activity. The results indicate that Acemhöyük has more cut and burned dog remains than Tell Surezha and Mycenae. Interestingly, some of the assemblages from Acemhöyük and Tell Surezha contain higher percentages of cut-marked remains of dogs than of caprines. While there are only adult dogs and wolves at Surezha, Acemhöyük and Mycenae have some younger dog remains, and no specimens that fall within the size range of wolves. All have some evidence of processing for consumption and, potentially, skinning. There does not appear to be any temporal patterning in the results, but rather they reflect dog use that is specific to each context.

The LC 1 deposits at Tell Surezha are perhaps the most cryptic, in that there are few comparative cases at nearby sites. Combining the faunal data and contextual evidence, the deposits might indicate ritual uses of dog and wolf flesh and possibly skins during the prehistoric period, rituals potentially connected to incipient inequality, or the organization of war bands. Data from Early and Middle Bronze Age Acemhöyük, on the other hand, indicate a long-term (over a millennium) tradition of quotidian consumption of dogs. This tradition does not appear ritual in nature, nor does it appear to have been associated with a particular status group, but instead reflects a conservative aspect of the local urban economy involving the regular use of dog flesh and skins. Meanwhile, the data from Mycenae reflect a case that does not fit neatly within such a sacred/profane dichotomy. Rather, it likely represents a combination of symbolic and quotidian activities reflecting different uses of dogs in relation to the local norms of refuse management and household responses to a natural disaster. The deposition of whole or partially complete dogs at the bottom of the well of Room II may fit models of offerings or convenient disposals. Later deposits of more disarticulated remains in the well likely reflect more mundane consumption within an industrial household setting.

The examples from Surezha, Acemhöyük, and Mycenae join dozens of other cases of cynophagy reported by zooarchaeologists. We have compiled a selection of these examples in Figure 1. As with the case studies taken from our own datasets, canine economies were generally a small component of animal exploitation systems, never making up more than about 5–10% of archaeofaunal assemblages. Nevertheless, the recurring evidence for cutmarks and burning on dog remains indicate that dogs were consumed in a variety of contexts in many Near Eastern and Mediterranean societies.

Figure 1 indicates that, in certain spatiotemporal contexts, dead dogs played more prominent roles in animal economies—especially the Neolithic and Bronze Age in the Gulf, the Neolithic–Classical Aegean, and the Iron Age Levant. Indeed, various researchers have commented on these canine economies. The tradition of cynophagy at sites dating to the Neolithic and Bronze Age in the Persian Gulf region has been interpreted within a broad spectrum animal economy

dominated by fish, marine mammals, and sheep/goats (Uerpmann and Uerpmann 1994; Maini and Curci 2013). People consumed dogs, a small percentage of the total NISP, in domestic settings as a part of mundane meals. Maini and Curci (2013) suggest that dogs were raised as a convenient cost-effective alternative to caprines and to supplement the diet during seasonal lulls in fishing.

Quotidian cynophagy was a long-standing tradition, lasting from the Neolithic–Hellenistic period, in Greece, Italy, and western Anatolia, as well as in Greek colonies throughout the Mediterranean (Peters 1993; Snyder and Klippel 2003; De Grossi Mazzorin and Minniti 2006; Gündem 2010; Hadjikoymis 2016). Justin’s *Historiae Philippicae* (3rd century A.D.) and Pliny’s *Naturalis Historia* (1st century A.D.) suggest that cynophagy was also present in the Classical and perhaps Persian periods in North Africa (Simoons 1981). While a source of everyday meat, the significance of dog flesh went beyond that of calories in these contexts. Classical period texts provide some passing references to quotidian dog consumption in Greece, but they more frequently reference the use of dog and puppy flesh in magico-medical rituals and other ceremonies (Simoons 1961). In Italy, Pliny the Elder (ca. A.D. 23–79) opined that his Roman ancestors “considered the flesh of sucking whelps to be so pure a meat, that they were in the habit of using them as victims even in their expiatory sacrifices. A young whelp, too, is sacrificed to Genita Mana; and, at the repasts celebrated in honour of the gods, it is still the usage to set whelps’ flesh on table” (*Natural History* XXIX.14, trans. by Bostock and Riley 1855). Pliny’s description vaguely parallels archaeological finds at 6th century B.C. Sardis. There, excavators recovered, within domestic contexts, over two dozen intentionally buried meals consisting of puppy skeletons, clusters of pots, and iron knives—food intended for deities in order to bless and protect houses (Robertson 1982). Both examples remind us that butchered canines may not be exclusively for human consumption.

In northern Mesopotamia and Anatolia, there is occasional zooarchaeological evidence for the use of dog primary products, although detailed taphonomic data are often not reported. Cutmarks on distal tibiae were also recorded in LC 1–2 phases at Tell Hamoukar in northern Syria (J. Doe, personal communication 2010). The canine remains were found within Hamoukar’s southern extension (Khirbat al-Fakhar), a part of the site associated with craft production and domestic refuse (Al Quntar, Khalidi, and Ur 2011). Cutmarks were also observed on dog skeletal remains at Çadır Höyük in occupation levels dating from the Late Chalcolithic to the Byzantine period (Arbuckle 2009). Cutmarks found on a single distal tibia at Tell Shiukh Fawqani (Chantier E) led Vila (2005) to speculate about the use of dog skins; she also cites unpublished evidence for skinning/butchery at Tell Sheikh Hassan, Tell Chuera, and Gindaris (Vila 2005). The Acemhöyük data presented above corroborate a long tradition of quotidian use of dog primary products in northern Mesopotamia and central Anatolia, two regions strongly connected by trade and diplomacy in the Bronze Age (Özgülç 1966).

A burgeoning body of literature has recently focused on cynophagy in the Levant and its significance for understanding social identity in the Iron Age (e.g., Maher 2017; Lev-Tov et al. 2018). Cynophagy, the argument goes, was not an indigenous practice in the region, but was introduced by

Philistines and other “Sea Peoples” from the Aegean/Cyprus region. Supporting this argument are diachronic trends in NISP data from the southern Levant. Cutmarked canine bones are rare in the prehistoric period; they include a single element from Pre-Pottery Neolithic Tell es-Sultan (Jericho) (Clutton-Brock 1979) and a nasal bone at the Pre-Pottery Neolithic C and Pottery Neolithic site of Tell Hreiz (Horwitz, Lernau, and Galili 2006). However, in the Iron Age, cutmarks have been found repeatedly, though in small numbers, at Philistine-related settlements (Maher 2017; Lev-Tov et al. 2018). Some (e.g., Maher 2017) have suggested that, in the context of emerging and competitive ethnic groups in the Iron Age Levant, eating dogs may have developed into a tradition that reinforced group belonging and affirmed an identity as separate from (and against) ones’ neighbors. This situation perhaps finds some parallels in the nationalist rhetoric that surrounds the dialogue about cynophagy in South Korea today (Podberscek 2009).

Zooarchaeological data thus sheds light on cynophagy in multiple locations and time periods in the Near East and Eastern Mediterranean region. This information derives from cutmarks on bones, unambiguous evidence of carcass processing, in addition to more ambiguous cases of burnt canine bones. Some of the cutmark evidence might indicate skinning for dog hides, an activity that may be part of the process of butchery for meat. However, the location of cutmarks at most of the sites considered here indicates butchery for food, although the consumers of canine flesh may have included supernatural beings in addition to, or instead of, humans. Added to these direct data are the countless disarticulated dog bones found at archaeological sites across the region on which cutmarks were not initially identified or recorded. The true extent of cynophagy is thus likely greater than Figure 1 suggests. Yet, as this article has pointed out, these aspects of the canine economy have generally been left out of reconstructions of the ancient Near East and Mediterranean.

## Conclusion

Archaeologists have long recognized that dogs were a ubiquitous feature of life in the ancient Near East and eastern Mediterranean, functioning as companion animals, hunting aids, village pariahs, and even sacrificial victims. The recovery and occasional publication of articulated dog remains, often highly celebrated, can feed into narratives that canine economies of the ancient past were similar to those observed today, or, at the very least, that a special and near-universal emotional bond exists between humans and canines. But the uses of dead dogs for their primary products, while recognized in a number of zooarchaeological reports, have been less frequently discussed. When dog-skinning or cynophagy are discussed, there is a tendency to sensationalize these discoveries and treat them as aberrations from “normal” human behavior in the ancient Near East and Mediterranean. As a result, dogs have generally been left out of discussions of subsistence economies.

We hypothesize that the neglect of these aspects of canine economies stems from an implicit bias against the use of dogs for meat and skins, one derived from modern taboos against cynophagy in contemporary Euro-American and Middle Eastern cultures. We suggest reintegrating dogs into zooarchaeological discussions of ancient economy and

social life more broadly. By applying methods generally associated with describing the production, processing, and consumption of livestock to dogs, we predict that evidence for a wide range of practices constituting ancient canine economies will become evident and that a part of the ancient world, previously hidden, will begin to emerge.

We have used the examples from Late Chalcolithic Tell Surezha, Early and Middle Bronze Age Acemhöyük, and Late Bronze Age Mycenae to highlight the varied uses of dead dogs. These examples represent the tip of the iceberg, suggesting to us that many communities in the ancient world deployed practices that regularly involved the killing, skinning, processing, cooking, and consumption of dogs. Consideration of all aspects of the canine economy, and its social and cultural significance, will provide a rich topic for zooarchaeology to engage with. It will lead to a productive reimagining of life in the ancient world and the history of our species’ relationship with dogs.

## Acknowledgments

This article greatly benefited from the helpful suggestions and constructive comments by Kim Shelton, as well as three anonymous reviewers. We wish to thank the excavators of Acemhöyük, Tell Surezha, and Mycenae—Aliye Öztan, Gil Stein, Abbas Alizadeh, Mike Fisher, and Kim Shelton. We also extend our thanks to the local museum and state representatives for facilitating research on these sites. Thanks to Kate Grossman for sharing her unpublished data from Hamoukar. Financial support for zooarchaeological work at Acemhöyük was provided to author B. A. by the National Science Foundation (BCS-0530699; BCS-1311551), National Geographic Society, the American Research Institute in Turkey, the University of North Carolina-Chapel Hill, and Baylor University. Zooarchaeological work at Tell Surezha by author M. P. was supported by the National Geographic Society (YEG 9352-13), the National Science Foundation (DDIG #1405344), and the Oriental Institute of the University of Chicago. Permission to study the fauna from Petsas House at Mycenae was granted to author J. M. by Kim Shelton, director of the excavations. The excavation and study were made possible by the Archaeological Society of Athens and the Division of Research Implementation of the Ministry of Culture and Tourism General Directorship of Antiquities and Cultural Heritage of Greece. This research was supported by grants from the Institute for Aegean Prehistory, the Witherill Foundation, and the University of California Berkeley. Travel for the faunal study was made possible through support from an American School of Classical Studies at Athens Wiener Lab Short-Term Research Grant and University of Connecticut Department of Anthropology Fellowships to author J. M.

## Notes on Contributors

**Max Price** (Ph.D. 2016, Harvard University) is currently a Lecturer in Archaeology in the Department of Materials Science and Engineering at MIT. He is a zooarchaeologist who studies the roles of animals in the development of complex societies in the ancient Near East.

**Jacqueline Meier** (Ph.D. 2017, University of Connecticut) is Assistant Professor in the Department of Sociology, Anthropology and Social Work at the University of North Florida. She is a zooarchaeologist who studies human-animal relations in prehistoric and ancient societies in the Mediterranean.

**Benjamin Arbuckle** (Ph.D. 2006, Harvard University) is Associate Professor in the Department of Anthropology at the University of North Carolina-Chapel Hill. He is a zooarchaeologist whose research focuses on human-animal interactions in ancient Anatolia.

## References

- Al Quntar, S., L. Khalidi, and J. A. Ur. 2011. “Proto-Urbanism in the Late 5th Millennium BC: Survey and Excavations at Khirbat al-Fakhar/Hamoukar, Northeast Syria.” *Paléorient* 37: 151–175.

- Anthony, D. W., and D. R. Brown. 2017. "The Dogs of War: A Bronze Age Initiation Ritual in the Russian Steppes." *Journal of Anthropological Archaeology* 48: 134–148.
- Arbuckle, B. S. 2009. "Chalcolithic Caprines, Dark Age Dairy, and Byzantine Beef: A First Look at Animal Exploitation at Middle and Late Holocene Çadır Höyük, North Central Turkey." *Anatolica* 35: 180–224.
- Atici, L. 2006. "Who Let the Dogs Out? Bone Destruction and Its Broader Implications in Interpreting the Bronze Age Pastoral Economies at Kaman-Kalehöyük." *Anatolian Archaeological Studies* 15: 121–131.
- Avieli, N. 2011. "Dog Meat Politics in a Vietnamese Town." *Ethnology* 50: 59–78.
- Binford, L. 1981. *Bones: Ancient Men and Modern Myths*. New York: Academic Press.
- Blau, S., and M. Beech. 1999. "One Woman and Her Dog: An Umm an-Nar Example from the United Arab Emirates." *Arabian Archaeological and Epigraphy* 10: 34–42.
- Blench, R. M. 2000. "African Minor Livestock Species." In *The Origins and Development of African Livestock: Archaeology, Genetics, Linguistics, and Ethnology*, edited by R. M. Blench and K. C. MacDonald, 314–338. London: UCL Press.
- Boessneck, J., and A. von den Driesch. 1984. "Die Zoologische Dokumentation der Reste von Vier Pferden und Einem Hund aus Einem Mykenischen Schachtgrab in Kokla Bei Argos (Peloponnes)." *Spixiana* 7: 327–333.
- Bostock, J., and H. T. Riley. 1855. *The Natural History of Pliny*. London: Henry Bohn.
- Brereton, G. 2013. "Cultures of Infancy and Capital Accumulation in Pre-Urban Mesopotamia." *World Archaeology* 45: 232–251.
- Callahan, R. 1997. "Domestication of Dogs and Their Use on the Great Plains." *Nebraska Anthropologist* 14: 1–11.
- Chenal-Velarde, I. 2006. "Food, Rituals? The Exploitation of Dog from Eretria (Greece) During Helladic and Hellenistic Periods." In *Dogs and People in Social, Working, Economic or Symbolic Interaction*, edited by L. M. Snyder, and E. A. Moore, 24–31. Oxford: Oxbow Books.
- Clutton-Brock, J. 1979. "The Mammalian Remains for the Jericho Tell." *Proceedings of the Prehistoric Society* 45: 135–157.
- Clutton-Brock, J. 1989. "A Dog and a Donkey Excavated at Tell Brak." *Iraq* 51: 217–224.
- Collins, B. J. 1990. "The Puppy in Hittite Ritual." *Journal of Cuneiform Studies* 42: 211–226.
- Comba, E. 1991. "Wolf Warriors and Dog Feasts: Animal Metaphors in Plains Military Societies." *European Review of Native American Studies* 5: 41–48.
- Çakırlar, C., V. Amer, J. Kamlah, and H. Sader. 2013. "Persian Period Dog Burials in the Levant: New Evidence from Tell el-Burak (Lebanon) and a Reconsideration of the Phenomenon." In *Archaeozoology of the Near East X*, edited by B. D. Cupere, V. Linseele, and S. Hamilton-Dyer, 243–264. Leuven: Ancient Near Eastern Studies Supplement 44. Peeters.
- Davis, S. J. M., and F. F. Valla. 1978. "Evidence for Domestication of the Dog 12,000 Years Ago in the Natufian of Israel." *Nature* 276: 608–610.
- De Grossi Mazzorin, J., and C. Minniti. 2006. "Dog Sacrifice in the Ancient World: A Ritual Passage?" In *Dogs and People in Social, Working, Economic or Symbolic Interaction*, edited by L. M. Snyder and E. A. Moore, 62–66. Oxbow: Oxbow Books.
- DeMarrais, E., L. J. Castillo, and T. Earle. 1996. "Ideology, Materialization, and Power Strategies." *Current Anthropology* 37: 15–31.
- Dietler, M. 1999. "Rituals of Commensality and the Politics of State Formation in the "Princely" Societies of Early Iron Age Europe." In *Les Princes de la Protohistoire et L'Émergence de L'État. Publications de L'École Française de Rome*, edited by P. Ruby, 135–152. Rome: École Française de Rome.
- Dixon, H. 2018. "Late 1st-Millennium B.C.E. Levantine Dog Burials as an Extension of Human Mortuary Behavior." *Bulletin of the American Schools of Oriental Research* 379: 19–41.
- Edrey, M. 2008. "The Dog Burials at Achaemenid Ashkelon Revisited." *Tel Aviv* 35: 267–282.
- Englund, R. K. 1995. "Late Uruk Pigs and Other Herded Animals." In *Beiträge zur Kulturgeschichte Vorderasiens*, edited by U. Finkbeiner, R. Dittmann, and H. Hauptmann, 121–133. Philipp von Zabern: Mainz.
- Fessenden, M. 2019. "New Study Looks at Why Neolithic Humans Buried Their Dogs With Them 4,000 Years Ago." *Smithsonian Magazine* 14 February.
- Flannery, K. V., and J. Marcus. 2012. *The Creation of Inequality: How Our Prehistoric Ancestors Set the Stage for Monarchy, Slavery, and Empire*. Cambridge: Harvard University Press.
- Friedman, T. 1987. "Ashkelon Journal; When Dogs Become an Archeologist's Best Find." *The New York Times*. New York. 14 August.
- Guagnin, M., A. R. Perri, and M. D. Petraglia. 2018. "Pre-Neolithic Evidence for Dog-Assisted Hunting Strategies in Arabia." *Journal of Anthropological Archaeology* 49: 225–236.
- Gündem, C. 2010. "Animal Based Subsistence Economy of Emar During the Bronze Age." In *Emar After the Closure of the Tabqa Dam. The Syrian-German Excavations 1996-2002*, edited by U. Finkbeiner and F. Sakal, 125–176. Turnhout: Brepols.
- Hadjikoumis, A. 2016. "Every Dog Has Its Day: Cynophagy, Identity and Emerging Complexity in Early Bronze Age Attica, Greece." In *Bones and Identity*, edited by N. Marom, R. Yeshurun, L. Weissbrod, and G. Bar-Oz, 225–245. Oxford: Oxbow Books.
- Hamilakis, Y. 1996. "A Footnote on the Archaeology of Power: Animal Bones from a Mycenaean Chamber Tomb at Galatas, NE Peloponnese." *The Annual of the British School at Athens* 91: 153–166.
- Horwitz, L. 2013. "The Faunal Remains." In *Excavations at Tel Zahara (2006–2009): Final Report, The Hellenistic and Roman Strata*, edited by S. L. Cohen, 75–96. Oxford: British Archaeological Reports International Series 2554.
- Horwitz, L. K., O. Lernau, and E. Galili. 2006. "Fauna from the Submerged Pottery Neolithic Site of Neve Yam, Northern Israel." *Journal of the Israel Prehistoric Society* 36: 139–171.
- Jones, T. B., and J. W. Snyder. 1961. *Sumerian Economic Texts from the Third Ur Dynasty*. Minneapolis: University of Minnesota Press.
- Kvapil, L. A., J. Meier, G. C. Price, and K. S. Shelton. 2019. "Beyond City and Country at Mycenae: Urban and Rural Practices in a Subsistence Landscape." In *Country in the City. Agricultural Functions in Protohistoric Urban Settlements (Aegean and Western Mediterranean)*, edited by D. Garcia, R. I. Orgeolet, M. Pomadère, and J. Zurbach. Oxford: Archaeopress.
- Lev-Tov, J., A. Killebrew, H. Greenfield, and A. Brown. 2018. "Puppy Sacrifice and Cynophagy from Early Philistine Tel Miqne-Ekron Contextualized." *Journal of Eastern Mediterranean Archaeology & Heritage Studies* 6: 1–30.
- Linseele, V. 2003. "Cultural Identity and the Consumption of Dogs in Western Africa." In *Behaviour Behind Bones: The Zooarchaeology of Ritual, Religion, Status and Identity*, edited by S. J. O'Day, W. Van Neer, and A. Eryvncck, 318–326. Oxford: Oxbow.
- Liston, M. A., S. I. Rotroff, L. M. Snyder, and A. Stewart. 2018. "The Agora Bone Well." *Hesperia Supplements* 50: iii–186.
- Maher, E. 2017. "Flair of the Dog: The Philistine Consumption of Canines." In *The Wide Lens in Archaeology: Honoring Brian Hesse's Contributions to Anthropological Archaeology*, edited by J. Lev-Tov, P. Hesse, and A. Gilbert, 117–148. Atlanta: Lockwood Press.
- Maini, E., and A. Curci. 2013. "New Evidence for Dog Butchering from Prehistoric Coastal Sites in the Sultanate of Oman." In *Archaeozoology of the Near East X*, edited by B. De Cupere, V. Linseele, and S. Hamilton-Dyer, 403–417. Leuven: Peeters.
- Manning, S. W., C. B. Griggs, B. Lorentzen, G. Barjamovic, C. B. Ramsey, B. Kromer, and E. M. Wild. 2016. "Integrated Tree-Ring-Radiocarbon High-Resolution Timeframe to Resolve Earlier Second Millennium BCE Mesopotamian Chronology." *PLoS ONE* 11: e0157144.
- McMahon, A. In Press. "Early Urbanism in Northern Mesopotamia." *Journal of Archaeological Research*.
- McMahon, A., A. Soltysiak, and J. Weber. 2011. "Late Chalcolithic Mass Graves at Tell Brak, Syria, and Violent Conflict During the Growth of Early City-States." *Journal of Field Archaeology* 36 (3): 201–220.
- Meier, J. S., and G. C. Price. Forthcoming. "The Animal Remains from the Room II Well." In *Petsas House, Mycenae. The Excavation of a 14<sup>th</sup> Century BCE Residential and Industrial Complex*. Athens: Archaeological Society of Athens (in progress).
- Meier, J. S., G. C. Price, and K. Shelton. Forthcoming. "Distinguishing Palatial from Autonomous Subsistence Provisioning With Zooarchaeological and Isotopic Analyses at Petsas House, Mycenae (Late Helladic IIIA2)." In *Food Provisioning in Complex Societies*, edited by L. Atici and B. S. Arbuckle. Denver: University of Colorado Press.

- Moses, V. 2020. "Powerful Pups: A Case Study for Dog Sacrifice in Archaic Rome from the Area Sacra di Sant'Omobono." In *Dogs: Archaeology Beyond Domestication*, edited by B. Bethke and A. Burt, 232–252. Tallahassee: University Press of Florida.
- Oh, M., and J. Jackson. 2011. "Animal Rights vs. Cultural Rights: Exploring the Dog Meat Debate in South Korea from a World Polity Perspective." *Journal of Intercultural Studies* 32: 31–56.
- Ojoade, J. O. 1990. "Nigerian Cultural Attitudes to the Dog." In *Signifying Animals: Human Meaning in the Natural World*, edited by R. Willis, 204–210. London: Unwin Hyman.
- Ornan, T. 2004. "The Goddess Gula and Her Dog." *Israel Museum Studies in Archaeology*: 13–30.
- Özgülç, N. 1966. "Acemhöyük Kazıları. Excavations at Acemhöyük." *Anadolu* 10: 29–52.
- Özgülç, N. 1980. "Seal Impressions from the Palaces at Acemhöyük." In *Ancient Art in Seals*, edited by E. Porada, 61–99. Princeton: Princeton University Press.
- Öztan, A. 1994. "1992 Yılı Acemhöyük Kazıları." *Kazı Sonuçları Toplantısı* 15: 245–255.
- Öztan, A. 1998. "Preliminary Report on the Aribas Cemetary at Acemhöyük." In *Essays on Ancient Anatolia in the Second Millennium BC*, edited by T. Mikasa, 167–175. Wiesbaden: Harrassowitz.
- Peters, J. 1993. "Archaic Millet: Daily Life and Religious Customs from an Archaeozoological Perspective." In *Archaeozoology of the Near East*, edited by H. Buitenhuis and A. T. Clason, 88–96. Universal Book Services: Leiden.
- Podberscek, A. L. 2009. "Good to Pet and Eat: The Keeping and Consuming of Dogs and Cats in South Korea." *Journal of Social Issues* 65: 615–632.
- Price, G. C., J. Krigbaum, and K. Shelton. 2017. "Stable Isotopes and Discriminating Tastes: Faunal Management Practices at the Late Bronze Age Settlement of Mycenae, Greece." *Journal of Archaeological Science: Reports* 14: 116–126.
- Robertson, N. 1982. "Hittite Ritual at Sardis." *Classical Antiquity* 1: 122–140.
- Rosenberg, M., and M. Davis. 1992. "Hallan Cemi Tepesi, an Early Aceramic Neolithic Site in Eastern Anatolia: Some Preliminary Observations Concerning Material Culture." *Anatolica* 18: 1–18.
- Rothman, M. S. 2009. "Religion, Function, and Social Networks: Tepe Gawra in the Late Fifth and Early Fourth Millennia BC." In *A Propos de Tepe Gawra, Le Monde Proto-Urbain de Mésopotamie*, edited by P. Butterlin, 15–39. Turnhout: Brepols (Subartu XXIII).
- Russell, N. 2020. "Scavenger and Sentry: The Roles of Dogs at Çatalhöyük, Turkey, in the Context of the Near Eastern Neolithic." In *Dogs: Archaeology Beyond Domestication*, edited by B. Bethke, and A. Burt, 132–162. Gainesville: University Press of Florida.
- Safar, F., M. A. Mustafa, and S. Lloyd. 1981. *Eridu*. Baghdad, Republic of Iraq, Ministry of Culture and Information, State Organization of Antiquities and Heritage.
- Schwartz, G. 2013. "Memory and Its Demolition: Ancestors, Animals and Sacrifice at Umm el-Marra, Syria." *Cambridge Archaeological Journal* 23: 495–522.
- Shelton, K. 2009. "Bringing Down the House: Changing Construction Techniques in LH IIIA2 and IIIB Mycenae." In *Δώρον. Τιμητικός Τόμος για τον καθηγητή Σπύρο Ιακωβίδη*, edited by D. Danielidou, 635–646. Athens: Academy of Athens.
- Shelton, K. 2010. "Citadel and Settlement: A Developing Economy at Mycenae, the Case of Petsas House." In *Political Economies of the Aegean Bronze Age*, edited by D. J. Pullen, 184–204. Oxford: Oxbow.
- Shelton, K. 2015. "Pottery and Petsas House: Recent Research on LH IIIA 2 Mycenae." In *Mycenaeans up to Date: The Archaeology of the NE Peloponnese – Current Concepts and New Directions*, edited by A.-L. Schallin and I. Tournavitou, 27–36. Stockholm: Acta of the Swedish Institute at Athens.
- Simoons, F. J. 1961. *Eat Not This Flesh: Food Avoidances in the Old World*. Madison (WI: University of Wisconsin Press.
- Simoons, F. J. 1981. "Dogs as Human Food in Northwest Africa." *Appetite: Journal for Intake Research* 2: 253–266.
- Simoons, F. J. 1994. *Eat Not This Flesh: Food Avoidances in the Old World, Second Edition*. Madison (WI: University of Wisconsin Press.
- Snyder, L. M., and W. E. Klippel. 2003. "From Lerna to Kastro: Further Thoughts on Dogs as Food in Ancient Greece: Perceptions, Prejudices and Reinvestigations." In *Zooarchaeology in Greece: Recent Advances*, edited by E. Kotjabopoulou, Y. Hamilakis, P. Halstead, C. Gamble, and P. Elefanti, 221–231. Athens: The British School at Athens.
- Stein, G. J. 2012. "The Development of Indigenous Social Complexity in Late Chalcolithic Upper Mesopotamia in the 5th-4th Millennia BC – An Initial Assessment." *Origini* 34: 125–151.
- Stein, G. J., and M. T. Fisher. 2019. "Surezha Excavations: Erbil Plain, Kurdistan Region, Iraq." *Oriental Institute 2018-19 Annual Report*: 125–138.
- Stiner, M. C., S. L. Kuhn, S. Weiner, and O. Bar-Yosef. 1995. "Differential Burning, Recrystallization, and Fragmentation of Archaeological Bone." *Journal of Archaeological Science* 22: 223–237.
- Tsouparopoulou, C. 2012. "The 'K-9 Corps' of the Third Dynasty of Ur: The Dog Handlers at Drehem and the Army." *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 102: 1–16.
- Twiss, K. C. 2017. "Animals of the Sealands: Ceremonial Activities in the Southern Mesopotamian 'Dark Age'." *Iraq* 79: 257–267.
- Uerpmann, H.-P., and M. Uerpmann. 1994. "Animal Bone Finds from Excavation 520 at Qala'at al-Bahrain. Volume I: The Northern City Wall and the Islamic Fortress." In *Qala'at al-Bahrain*, edited by F. Højlund, H. H. Hellmuth, and O. Callot, 417–444. Moesgaard: Aarhus (Jutland Archaeological Society Publications XXV, 1).
- Valadez Azúa, R., A. Blanco Padilla, B. Rodríguez Galicia, and G. Pérez Roldán. 2013. "The Dog in the Mexican Archaeozoological Record." In *The Archaeology of Mesoamerican Animals*, edited by C. M. Götz, and K. F. Emery, 557–582. Atlanta: Lockwood Press.
- Veenhof, K. R. 1996. "An Old Assyrian Incantation Against a Black Dog (kt a/k 611)." *Wiener Zeitschrift für die Kunde des Morgenlandes* 86: 425–433.
- Veldhuis, N. 1993. "An Ur III Incantation Against the Bite of a Snake, a Scorpion, Or a Dog." *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 83: 161–169.
- Vila, E. 2005. "Analyse Archéozoologique de la Faune de Tell Shiukh Fawqani." In *Tell Shiukh Fawqani: 1994-1998, Vol. II*, edited by L. Bachelot and F. M. Fales, 1081–1108. Padova: S.A.R.G.O.N. Editrice e Libreria.
- Wapnish, P., and B. Hesse. 1993. "Pampered Pooches or Plain Pariahs? The Ashkelon Dog Burials." *Biblical Archaeologist* 56: 55–80.
- Whiting, R. M. 1985. "An Old Babylonian Incantation from Tell Asmar." *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 75: 179–187.
- Yeomans, L., L. Martin, and T. Richter. 2019. "Close Companions: Early Evidence for Dogs in Northeast Jordan and The Potential Impact of New Hunting Methods." *Journal of Anthropological Archaeology* 53: 161–173.