

Zooarchaeology in Transitional Societies: Evidence from Anatolia, the Bridge between the Near East and Europe

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Abstract

This chapter summarizes the attempts to domesticate animals in Anatolia and traces the ways that people experimented with it. New evidence and recently published synthetic works have shown that animal husbandry was incorporated into Neolithic economies through highly variable paths and applications. The relationship of humans with animals encompassed hunting, managing and herding, and the species chosen differed amongst the settlements involved. Over the course of about a thousand years of advancing and retreating, domestication was finally completed and the dominant species were sheep and goat. South-west Asia holds a central place in these transformations as it was there that some of the earlier evidence of such innovations was found. Research in the Levant is abundant and well presented in literature. In contrast, the lands of Anatolia are less well known. Until recently, archaeological excavations that reached layers of this transitional phase of the Pre-Pottery Neolithic (PPN) were very few, and large parts of Anatolia were thought to lack this cultural horizon. It was thought that the 'Neolithic package' arrived there from the Levant fully developed and was then transmitted to Europe. Not long ago, fresh information and in some cases, totally unexpected discoveries moved the spotlight to this region, showing clearly that this part of the world played an important role in the development of domestic economies. Anatolia has now emerged as a major centre of animal domestication.

Introduction

About eighty years ago, Gordon Childe (1936) coined the term 'Neolithic Revolution' to describe the transition from hunter-gathers communities/economies to ones of farmers. Today it is firmly established that Neolithic was not a 'revolution' but rather an 'evolution' as it required a long time for the process to be completed. Nevertheless, it is

surely a 'revolution' for it altered radically the way we live. After millions of years of scavenging, hunting and gathering foodstuffs, we became food producers, thus creating the conditions for wealth to be accumulated.

Where, how and when this big step in the history of humankind was taken and what motivated our ancestors to abandon their old lifestyle for a new one are questions around which heated debates are still woven. Likewise, discussions about whether the 'Neolithic economy' was founded at once, at a single 'core' area from which it spread or if it was 'invented' many times at many localities seem endless.

Recent advances both in zooarchaeological methodology, as well as new archaeological discoveries have accumulated much new knowledge and have given rise to new interpretations. One cannot speak of domestication and Neolithic economies without referring to the seminal article by Bar-Yosef and Meadow (1995). The synthesis of what was known at that time showed that crop agriculture preceded animal husbandry and that the cradle of these developments was the southern Levant. Sixteen years later, Zeder (2011), in her article with the same title as Bar-Yosef and Meadow's, argued that the two processes were at action roughly at the same time and happened multiple times throughout the entire Fertile Crescent.

The conditions under which these early efforts to manipulate the natural environment began hold the key to understanding the why and how behind this fundamental economic change. The focus of this chapter is the period preceding fully developed agropastoral economies.

Defining Domestication in the Zooarchaeological Record

Amongst the major issues of tracing the when, where and how of domestication is what criteria we should

use to demonstrate it. At first, researchers in this field highlighted the smaller size that domestic animals exhibited in comparison to their wild ancestors. Morphological changes, such as in the shape of horns of caprines or the facial shortening in pigs, were also important indicators (Uerpmann, 1979; Meadow, 1989). Nevertheless, as our knowledge about ancient human – animal interactions increased, so did our doubts regarding our own methods. It has now become clear that morphological changes required a long time to become substantial enough to be visible in the zooarchaeological record (Vigne et al., 2000; Zeder and Hesse, 2000). Zeder (2011, p. 227) states that animal management started at least 1,000 years before such evidence can be detected in animal remains. What is more, when the wild progenitor was present in the area, interbreeding could not be safely excluded and continuous flow of 'wild' genes into the 'domestics' slowed down these processes (Zeder and Hesse, 2000, Hongo and Meadow, 1998). Additionally, reduction of body size does not always reflect domestication but often, sexual dimorphism when females are sought more than males (Zeder, 2001; 2011; Peters et al., 2005).

Demographic profiles are amongst the most powerful tools for recognizing human interference with animal populations. In these, the ratio of female to males slaughtered was an indicator on the grounds that surplus males should be first removed from herded flocks. Slaughtering schedules are also very informative with regards to the management of animals. This evidence together makes a stronger case and the focused killing of young males is considered a good marker for the existence of domestic or managed flocks. .

Advances in the field of palaeogenetics provided a new and very important line of evidence that helped unravel the entangled strands of the history of domestication by pointing out its likely timing and place (see for example, Luikart et al., 2006, Bruford and Townsend, 2006, Pedrosa et al., 2005; Bradley and Magee, 2006; Larson et al., 2005). The recently fine-tuned method of geometric morphometrics added a

new tool for measuring not only size, but also proportional change and appears to be more sensitive than traditional osteometric methods in recognizing domestic forms of animals (Evin et al., 2013).

Further help comes from the realm of chemistry. Analysis of the ratio of carbon and nitrogen isotopes has shed light on the diet of animals and used as an indicator of 'free-ranging' wild and fodder-fed domestic animals (Lösch et al., 2006). Another proxy indicator of domestication is the presence of dung within settlements, as this is a sign for 'stabling' animals within the site (Stiner et al., 2014). Phytolith concentrations representing potential fodder plants have also been used as another line of evidence (Stiner et al., 2014).

Lastly, the occurrence of animals outside their natural habitat is the most obvious marker for human managing and domestication. Nevertheless, it does not necessarily need to be done after a fully developed domestic economy is in place, as shown by the transportation of managed and wild animals from the mainland south-west Asia to Cyprus (Vigne et al., 2000, 2011).

The Archaeological Sites in Anatolia and their Dating

Excavated Aceramic sites are distributed unevenly in Turkey with clusters in regions where salvage excavations were necessary and around famous sites such as the Neolithic site of Çatalhöyük, inscribed on the World Heritage List in 2012, under criteria (iii) and (iv), and the Archaeological Site of Göbeklitepe, submitted to the World Heritage Tentative List in 2011 under criteria (i), (ii), (iii), (iv) and (vi). As a result, there are 'clusters' of Aceramic sites in east, southeast and central Anatolia. The terminology and periodization of the Aceramic or Early Neolithic or Pre-Pottery Neolithic in the south-west Asia is complicated. Largely, it still follows Kenyon's chronology (1956, 1960) with some subsequent refinements (see for example, Bar-Yosef, 1991, and Kuijt and Goring-Morris, 2002). This chronological scheme has the following divisions (cal. BP): Pre-pottery Neolithic A (PPNA) (10,500–9200), Pre-Pottery Neolithic B (PPNB) divided to Early Pre-pottery Neolithic B (EPPNB) (9200–8300) and Middle Pre-Pottery Neolithic (MPPNB) (8400–7500) and finally Late Pre Pottery Neolithic B- Pre Pottery Neolithic C/ Late Neolithic (PPNB–PPNC/LN) (7500–6000).

Rosenberg and Erim-Özdoğan (2011) discussed the discrepancies between local developments in south-

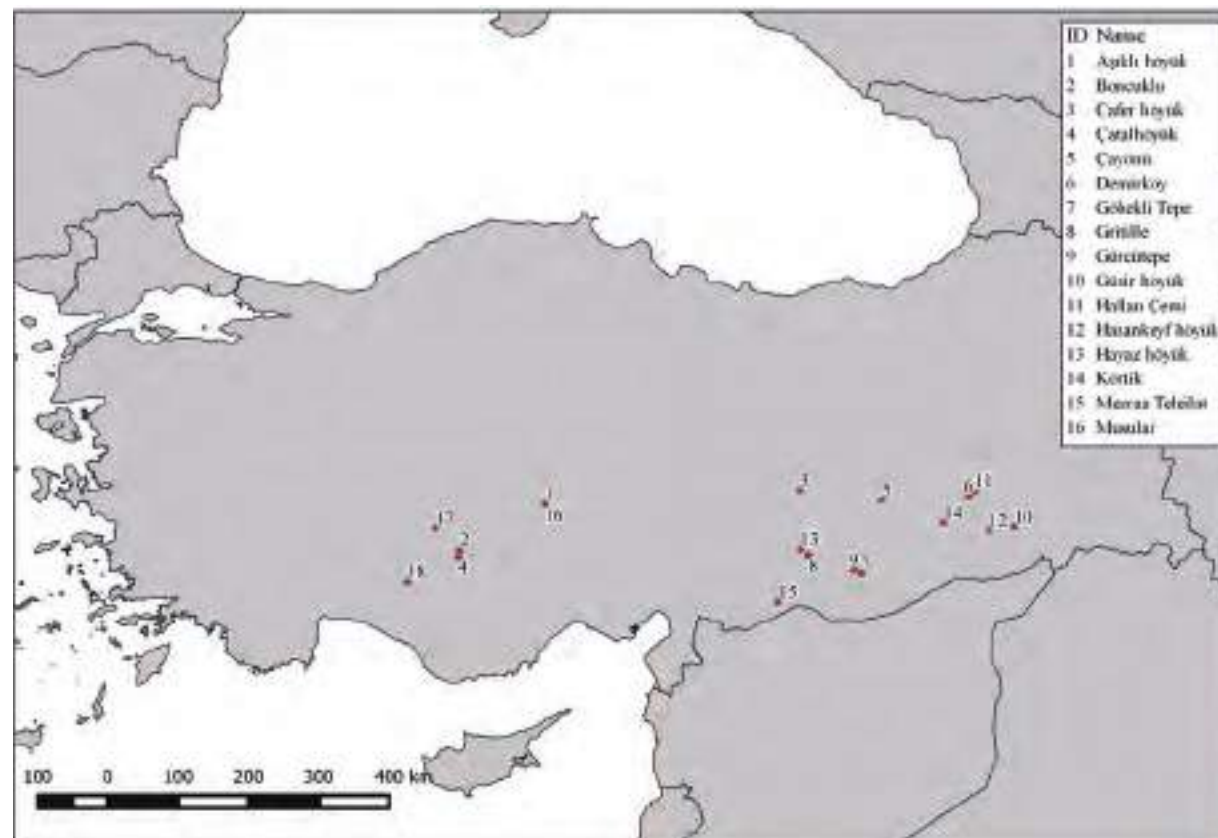


Figure 1: Location of sites mentioned in the text. © Evangelia Pişkin

east Anatolia and the Levant, and proposed another chronological scheme that departs from Kenyon's. The first phase, called EA (Early Aceramic Neolithic, subdivided into EA I and EA II) denotes the cultural horizon characterized by round house architecture, and starts roughly in the last centuries of the eleventh millennium BP (Rosenberg and Erim-Özdoğan, 2011). It includes the sites of Hallan Çemi, Demirköy, Körük, Biris Mezarlığı, Soğut Tarlası, Hasankeyf höyük and Gursin, as well as the first phases of Çayönü and Göbekli Tepe. The Early Aceramic (EA) may be preceded by a phase called 'Proto-Neolithic': Hallan Çemi may be considered as transitional from this early and poorly known phase to the EA, and is currently the earliest published settlement in the region. The lowest levels of Çayönü and Göbekli are seen as transitional from EA to MA (Mature Aceramic Neolithic), which represents the second phase of the Aceramic Neolithic tradition (subdivided into MA I, MA II and MA III) and is characterized by rectilinear architecture. Göbekli IIA, most of the phases of Çayönü, all of Nevalı Çori and Gürcütepe and the lower phases of Akarçay, Mezraa Teleilat, Yeni Mahalle – Balıklıgöl, Hayaz and Gritille, belong

here. The two Aceramic periods of the Early and Mature Aceramic Neolithic are followed by the Pottery Neolithic phase and include the last layers of Çayönü, Akarçay and Mezraa Teleilat, as well as several other sites that are excluded here because they lack aceramic layers.

Özbaşaran and Buitenhuis (2002) have expressed similar reservations as to whether the Pre-pottery Neolithic (PPN) model that was designed for archaeological sites in the Levant is applicable to central Anatolia. Their response was to propose a new system called 'Early Central Anatolia' (ECA). This chapter will address two phases of this system (dates in cal. BC):

ECA I, including the time period from the Younger Dryas to c. 9000 cal. BC. This covers the Epipalaeolithic and PPNA/PPNB. Included in this time frame is the site of Pınarbaşı rock-shelter (area B, the Epipalaeolithic phase).

ECA II from 9000 to the late eighth millennium cal. BC corresponding to the Levantine Early/Middle PPNB to Late

PPNB. The sites of Pınarbaşı A (8540–8230), Aşıklı Höyük (8210–7480), Musular (7480–7080), Boncuklu (8400–7800) and partly Can Hasan III (7600–6650), Suberde (7460–6770) and Çatalhöyük East (7400–6200) belong to this time bracket.

The South-East Anatolian Sites

The Euphrates Region

Göbekli Tepe is a unique site in that all the architecture excavated until now has demonstrated a public character. Its faunal assemblage is dated to the Late PPNA/Early PPNB (Peters et al., 2005; von den Driesch and Peters, 1999). The food provisioning relied on hunting a large variety of wild animals, of which the dominant species were gazelle and aurochs. Deer and pig were also hunted, as well as a surprisingly large number of foxes. Sheep had a minor role and goats were absent.

Nevalı Çori is situated in a more hilly terrain, relatively close to Göbekli Tepe. The majority of the bones analysed belong to the Early/Middle PPNB layers. The main species hunted was again gazelle. According to Peters et al. (2005), sheep in the mid-late ninth millennium were intensively managed, smaller than their wild counterpart and hence more likely domestic but it constituted only a small component of the assemblage. Goats were wild and minor contributors. Peters et al., (2005) report a trend through time for *Bos*, *Sus* and *Ovis/Capra* that became more important at the expense of gazelle. They also argue that at Nevalı Çori there is some of the earliest evidence for pig management, at around 7500 cal. bc. The work of Lösch et al., (2006) on isotopes showed that all smaller sized but morphologically wild individuals amongst sheep, goat and pig had been foddered with legumes and were thus under human control. Nevalı Çori is now under the waters of Atatürk dam.

Gürcütepe II is one of four low mounds located just 12 km away from Göbekli Tepe. The materials studied belong to the Late/Final PPNB (Peters et al., 2005; von den Driesch and Peters, 1999). The species composition from Gürcütepe differs greatly from the earlier Göbekli Tepe. Especially important is the existence of domestic goat at Gürcütepe. The absence of wild goats at Göbekli Tepe was considered as evidence that this region was not within the natural habitat of this species, and therefore, goats were introduced into the area after their domestication as a founder stock.



Figure 2 : Aşıklı Höyük, step trenches at the west side of the settlement showing the sequence of layers. Picture printed with kind permission of Prof. Mihriban Özbaşaran.



Figure 3: Aşıklı Höyük, view of the 8th millennium settlement. Picture printed with kind permission of Prof. Mihriban Özbaşaran.



Figure 4: Aşıklı Höyük, mid-ninth millennium activity area. Picture printed with kind permission of Prof. Mihriban Özbaşaran.



Figure 5: Aşıklı Höyük, in situ scapulae on the floor of 8th millennium building. Picture printed with kind permission of Prof. Mihriban Özbaşaran.

Domestic sheep were abundant at the site by 7500 cal. bc and there was also evidence for some domestic cattle and pig. Gürcütepe appears to have a fully grown agropastoral economy. The area where the four mounds of Gürcütepe stand is now invaded by modern buildings.

The Mezraa Teleilat assemblage was studied by Ilgezdi (2008). Domestic sheep and goats appear from the earliest levels of MPPNB (Middle Pre-Pottery Neolithic B). Ilgezdi

argued that they may represent imported stock. In contrast, cattle and pig show a gradual decrease in size and the faunal materials include both large and small individuals. Small, presumably domestic forms of all four species make up the most of the bone assemblage in the LPPNB (Late Pre-Pottery Neolithic B).

The published data on Akarçay refers to the later phases of the site, dating to around 6480 to 6080 cal. bc (Saña

and Tornero, 2008). Dominant species were sheep and goat, with sheep being more numerous. Second in importance, were cattle and then pig. There was also minor hunting of cervids, equids and gazelle.

The Aceramic phase of Gritille spans the LPPNB. There is evidence for cattle herding whilst auroch hunting continued. About 80% of the bones come from domestic caprines amongst which sheep was the more numerous than goat.



Figure 6: Çayönü, general view. The rolling hills of the "Fertile Crescent" in the background. Picture printed with kind permission of Prof. Mehmet Özdoğan.



Figure 7: Çayönü, aerial view. Picture printed with kind permission of Prof. Mehmet Özdoğan.



Figure 8: Çayönü, detail of the Grill phase. Picture printed with kind permission of Prof. Mehmet Özdoğan.



Figure 9: Musular, general view. Picture printed with kind permission of Prof. Mihriban Özbaşaran.

Most sheep (60%) were killed before reaching two years of age. The next most important species was the pig, followed by cattle. The pig is referred to as wild or at very early stage of domestication (Stein, 1986). The site was flooded by the waters of the Atatürk dam.

At Hayaz Höyük, there were domestic sheep and goat, by the mid-eighth millennium cal. bc, but the status of cattle and pig was uncertain. There were aurochs, boars and some smaller individuals but their domestic status has not been

determined (Buitenhuis, 1985). Hayaz was also flooded by the Atatürk dam.

In his later publication of the faunal assemblage from Cafer höyük, Helmer (2008) proposed that sheep were hunted in most of the ninth to eighth millennium bc but were managed intensively in the late eighth millennium cal. bc. Goats were dominant in the bone assemblage, and were both hunted and herded in the late ninth and early eighth millennium cal. bc. At the same time, when we find indications for goat

herding we also have the earliest evidence of cattle herding. Pigs were wild but managed intensively from the middle of the eighth millennium. Cafer höyük is now under the waters of Karakaya dam.

The Upper Tigris

Çayönü is perhaps the most important site for understanding early animal husbandry, domestication and the development of village communities in this region, because it is the only site with occupation layers covering the whole time span of the period in question. Habitation starts from the Early Neolithic II (which corresponds to the end of PPNA in Kenyon's chronology) through the first phases of the Ceramic Neolithic (Pottery Neolithic) (Rosenberg and Erim-Özdoğan, 2011), with only one possible hiatus in part of the earliest phase (9300–8700 cal. BP). The phasing of the site has been established according to the architectural forms and has the following dates reported as 'absolute BP' (Erim-Özdoğan, 2007): Round Building phase (EA II or PPNA, 10200–9400 BP), Grill Building Phase early (EA II or PPNA, 9400–9200 BP), Grill Building Phase late (MA I or early PPNB, 9200–9100? BP), Channelled Building phase (early MA I or PPNB, 9100–9000 BP), Cobble paved Building phase (MA II or Middle PPNB, 9000–8600?), Cell plan Building phase (MA II or Late PPNB, 8600–8300 BP), Large Room phase (MA III or PPNB, 8200–8000? BP).

At Çayönü, the pig was the most heavily exploited species (Hongo et al. 2004). It was heavily hunted from the beginning of the settlement of the site and the first evidence for 'management' begins in the late ninth to the early eighth millennium cal. BP. In the mid-late eighth millennium cal. BP, pig management is clearly shown by evidence for size reduction, age and sex selection (Hongo and Meadow, 1998, 2000; Ervynck et al., 2002; Hongo et al., 2002). According to the same authors, the decrease in the size of pigs started during the Grill phase but because the hunting of wild boar continued, the bones of both large boar and small domestic pig are present. Evidence for Linear Enamel Hypoplasia is also recorded, but nevertheless, it is more abundant in the early/middle PPNB than in later phases (Ervynck et al., 2002). It appears that the pigs at Çayönü were something between wild and domestic, and they may have been domesticated in LPPNB Gürcütepe at a time earlier than in Çayönü (Ervynck et al., 2002; Peters et al., 2005).

Cattle were heavily hunted during the Round Building phase of the settlement. Isotope work on cattle and red deer bones suggest that the diet of cattle changed in the Channelled phase and this together, with some decrease in size and changes in the slaughtering schedule, may indicate foddered domestic cattle or, better, intervention with the aurochs populations that eventually led to the domestication of cattle (Hongo et al., 2009). The shift towards slightly smaller and younger culled cattle has been observed even

earlier, during the preceding Grill phase, but it is clearer in the following Channelled building phase (Hongo et al., 2009). Based on this evidence, the authors argue that there were domestic cattle in the Middle PPNB, and perhaps slightly earlier.

Sheep and goat in the late PPNA and early PPNB were wild. In the later, channelled building phase, Hongo et al., (2005) reported some mild phenotype changes and argued for the management of small herds. In the Large Room phase, many more small caprines are found but Hongo et al. (2005) believe that this size reduction is not the result of domestication but due to the increase of females in the sample. In addition, caprines have higher survival rates in the later phases in contrast to pigs and cattle, which were progressively killed at a younger age.

The most important change is the increase in caprine percentages in the sample accompanied by a marked decrease in hunted taxa variety and proportions. Parallel with this is the reduction in the importance of pig, which was the most intensively exploited species during the first phases of the settlement. This shift is first observed in MPPNB whilst a second and clearer shift is documented in the Late/Final PPNB (Hongo et al., 2005, 2009). Caprine dung is also found at this phase in the site. Together this evidence shows a dramatic change in the economy.

It is argued that evidence for the domestication of all four animals appear at about the same time (end of early PPNB and the beginning of the middle PPNB) at Çayönü, but it is uncertain whether or not we are dealing with local domestication or stock imported from other regions (Hongo et al., 2009). Wild (maybe domestic too) pulses were preferred to cereals at this site, and the exploitation of nuts and fruits was also intensive (van Zeist and de Roller, 1992).

Hallan Çemi has the earliest deposits of all excavated sites in south-east Anatolia, dating to the end of 11th millennium BC (Rosenberg et al. 1998). The inhabitants were sedentary foragers who did not collect cereals but rather pulses, nuts and fruits (Savard et al., 2006) and hunted wild animals. The species mostly hunted is the sheep. Sheep mortality profiles show some emphasis on culling young animals between one to three years old (Redding, 2005). Wild goats were a minor component of the diet. Pig remains show some management trends escalating through time (such as a slight reduction in size, increases in the percentages of pig, some over-representation of males and young individuals, and a few foetal remains) that may indicate 'incipient

domestication' (Rosenberg et al., 1995, 1998; Redding, 2005).

Interestingly, no aurochs remains have been identified apart from three bones (Starkovich and Stiner, 2009) and an aurochs skull, which was likely hanging on the walls of one of the public buildings (Rosenberg, 1999). Evidence of feasting has been found in the central area, comprising a large number of animal bones and burned cracked stones (cooking stones) (Peasnell et al., 1998; Rosenberg and Redding, 1998). In this context, the bones of young caprines, many of them still in an articulated position, are most abundant. Other species include red deer, pig and many carnivores like fox, bear, wild cat and marten, and many tortoises. Deer and sheep skeletal representation is heavily biased towards meat bearing bones whilst lacking bones with less meat. In contrast, pig skeletal representation documents complete carcasses. These observations gave rise to an argument for the presence of 'managed' pig on the site as opposed to sheep and deer that were hunted and butchered some distance away (hence the lack of some skeletal elements). It should be noted that the proportion of sheep to goat in the assemblage from the central area differs significantly from that in other parts of the settlement. In the central area, the ratio of sheep/goat = 18:1 whilst in the peripheral areas the ratio decreases to half (sheep/goat = 9:1). Starkovic and Stiner (2009) argue that the hunting practices resemble more the earlier Palaeolithic ones than similar practices of the same period in the Levant. Nevertheless, Peasnell et al. (1998) call it a 'second autochthonous centre of Neolithization' (second to that of the Levant). Hallan Çemi is now under the waters of the Batman dam.

Demirköy (Demircitepe) is located around 40 km south of Hallan Çemi and it is slightly younger. The animals consumed were all wild. There is no evidence for the type of pig husbandry evidenced at Hallan Çemi, but rather a shift to caprines is mentioned (Rosenberg and Erim-Özdoğan, 2011). The plant gathering is similar to Hallan Çemi in that cereal exploitation is again missing and the focus is on pulses, nuts and fruits (Savard et al., 2006).

Körtik Tepe. Arbuckle and Özkaya (2006) published a detailed report of a small bone assemblage from this site dating to the tenth millennium. A variety of wild animals were hunted but there is some evidence of the possible management of sheep, some of which may occasionally have been kept in captivity. Sheep is the most abundant species and its culling shows a concentration on animals between one and three years old, although metrical data

do not show any reduction in size or sex selection. Heavy hunting of aurochs is attested with a focus on very young animals, less than one year in age, whilst wild goats make up a small component of the bone assemblage. Pigs are few, wild, and both young and old were targeted for consumption. Benz et al. (2013) have recently reported Epipalaeolithic layers at this site, and mentioned that this site is the core of a locally developed tradition. Nevertheless, results are preliminary and detailed analysis is pending.

Hasankeyf höyük. Work at this site is recent and in progress. The first excavated layers belong to the second half of tenth millennium cal. bc. The first results showed that in the PPNA layers there were no cereals and no domestic animals. Sheep was the dominant species and no wild cattle has yet been found (Miyake et al., 2012).

Gusir höyük. There is no detailed publication of animal bones yet, but it has been reported that no evidence of plant cultivation and no domestic animals have been found at this site that dates to roughly the second half of the tenth millennium cal. bc (Karul, 2011).

The Central Anatolian Sites

The Cappadocian Sites

Aşıklı höyük is the key site for the Aceramic period in central Anatolia with a long sequence (c. 900 years, 8400–7300 cal. bc) of occupation, extensive excavation and a large body of published data. It stands out for the intensive focus on sheep exploitation (Buitenhuis, 1997; Stiner et al., 2014). Even though morphologically sheep were wild from the beginning till the end of the sequence, multiple lines of evidence prove that sheep populations were managed.

In the earliest layers, several species of animals were hunted, but within a few centuries, sheep comprised c. 74% of the faunal assemblage in the first half of the eighth millennium cal. bc. Evidence from mortality profiles, dietary change (isotopes), neonatal bones, and dung deposits that indicate penning/keeping at the site appears to indicate small scale herding combined with hunting (Stiner et al., 2014).

Sheep and also aurochs were killed at a very young age. There is a heavy sex bias: for sheep 58% males and only 11% of females died before 6 months (Stiner et al., 2014). The site has also produced an exceptionally high number of bones from neonatal and foetal animals, mostly of

caprines but also a few aurochs and equids (Buitenhuis, 1997). The inhabitants of the site were maybe poaching the newborns or heavily pregnant females and confining them till they were fattened enough for slaughter (Stiner et al., 2014). These records have given rise to arguments for the local evolution of sheep husbandry. Comparisons of measurements of sheep from this site and the wild sheep from Göbekli Tepe showed that the Aşıklı sheep were smaller overall and led Peters et al. (2013) to argue for the possibility of domestic individuals in the assemblage during the mid-eighth millennium. At the same time as the intensification of sheep exploitation we have the first evidence for domestic wheat even though wild wheat is also present.

Musular is located just 400 m from Aşıklı höyük across the Melendiz River and dates to the mid-eighth–seventh millennium cal. bc. Özbaşaran (2011) suggests that the site is a satellite of Aşıklı and had no residential function but was instead used for feasting or ritual involving cattle since the vast majority of bones recovered are from aurochs.

The Konya Plain Sites

Boncuklu is one of the early earliest sites in the Konya plain, and dates to 8400 to 7800 cal bc. (Baird, 2007). It is contemporary with Aşıklı Höyük layer 4 where caprine herding was attested (Stiner et al. 2014) but here, at Boncuklu, such a practise is not chosen, instead meat is secured through hunting of wild animals. Wild sheep were a minor component of the bone assemblage compared with wild pig and aurochs. It is the only site in the region in which wild pig is not a minor component of the faunal assemblage (Baird, 2012, 2007; Arbuckle et al., 2014). Domestic cereals appear around 8300 cal. bc (Baird, 2012).

The Pınarbaşı locality comprises of an Epipalaeolithic rock-shelter and a low mound with later occupation. The economy of the Epipalaeolithic phase is characterized by hunting a variety of wild animals and gathering plants, mostly nuts but not cereals or pulses (Baird, 2012). In the later phases, sheep was a minor component of the economy and were wild during the ninth millennium cal. bc (Baird, 2012). In the Late Neolithic (6500–6000 cal. bc) hunted animals (such as aurochs, equids and deer) and domestic sheep are found together in unusually large numbers and their skeletal element proportions indicate that complete carcasses were butchered at the site and then transported to feed other villages in the vicinity (Carruthers, 2003).

Can Hasan III is one of the few Aceramic sites in the region and is important in that it overlaps with the last layers of Aşıklı and the earlier layers of Çatalhöyük. Detailed information about the animal bones recovered at the site is not yet available. It seems that hunting of wild animals, domestic and wild cereals and pulses are the main components of economy at Can Hasan III. In a preliminary report Payne (1972) argued that in mid–eighth millennium cal. bc, the cattle were domestic. In later deposits of the late seventh millennium fully domestic crops and animals appear (Payne, 1972; Martin et al., 2002).

Çatalhöyük. During the early phases of Çatalhöyük (around 7400 cal. bc) neither cattle nor pig was yet domesticated. Nevertheless, domestic sheep and goat are present from the beginning of the settlement (Martin et al., 2002, Russell et al., 2005). Goats were not important at this time in central Anatolia but they appear as domestics at Çatalhöyük from the earliest phases of the site (Russell and Martin, 2005). It is also interesting that the assemblage from the off-site KOPAL area differs from the one at the main mound of Çatalhöyük in that cattle dominates whilst at the rest of the site caprines are more abundant. Domestic cattle appear in the mid-seventh millennium cal. bc. Pig finds are surprisingly few since the environment around the site should have been favourable for this species (Russell and Martin, 2005).

The Lake District Sites

Suberde was famously named ‘a hunters’ village’ by Perkins and Daly (1968; see also Perkins, 1973). The site dates from the second half of the 8th to first half of seventh millennium. They reported a subsistence based on the hunting of wild sheep, goat and boar even though domestic sheep and goat were already known at Çatalhöyük. Nevertheless, Arbuckle (2008) re-examined a portion of the assemblage and argued that caprines may have been managed.

Animal Domestication: The ‘Long and Winding Road’

Evin et al. (2013) and Peters et al. (2013) called the process of domestication a ‘long and winding road’ to signify the difficulties in identifying the first morphologically domestic animals and in pinpointing the time, place and conditions under which these changes occurred. Proxies, like age at slaughter or sex ratios, have been found very useful for

recognizing 'management' before domestication but the results of such investigations often have more than one interpretation. For example, the focus on killing young caprines at Körtik, Cafer and Halan Çemi is interpreted by Arbuckle and Özkaya (2006) as intensive selective hunting but by Peters et al. (2005) as 'management'. In Aşıklı höyük the intensive management of wild sheep has been called 'proto-domestication' by Buitenhuis (1997). In that context, Arbuckle et al. (2009) feel surprised that after c. 400 years of management, including penning in the site (which may imply some degree of isolation from the wild population), there was still no morphological changes in the animals.

Even with these doubts, decades of research have accumulated a large body of data and a good number of lessons have been learned about the grounds on which we now can more confidently draw inferences. It is apparent that the processes that led to the adoption of animal husbandry were complicated and varied, involving both cultural and biological parameters. Long periods of experimentation with 'management' of wild animals at first and later the reproductive isolation of these managed herds from wild ancestors (for what reasons the last occurred remains elusive) gave rise to the morphologically changed animals that we call domesticates. These processes more likely began in the tenth millennium cal. bc and resulted in the first domestic animals in the mid- to late-ninth millennium in the Northern Fertile Crescent, that is the geographical area between south-east Turkey, north Syria, and north-west Iraq (Peters et al., 2005, Vigne, 2011, Zeder, 2008).

Preceding this stage was the intensification of the exploitation of a single species, often a different species at different sites. Nevertheless, it is not always this intensively hunted species that became the future domesticate. In the Levant, animal exploitation strategies seems similar from the Natufian period up to the middle PPNB but during the latter period, the hunting of *Capra* replaced in some areas the hunting of *Gazella* (Peters et al., 2005). This shift towards *Capra* is what probably led to the domestication of goat in the Zagros area (Zeder and Hesse, 2000; Zeder, 2001). In contrast, sheep in Syria were a minor component of the hunting regime but in the mid-eighth millennium cal. bc domestic sheep appear suddenly at Abu Hureyra and Halula (Peters et al., 2005). Similarly, at Çayönü there was a long period with a heavy reliance on pig and even evidence for their 'management' (Ervynck et al., 2002) but in the last phases, surprisingly, this habit of the past (and



Figure 10: Musular, possible butchery area. Picture printed with kind permission of Prof. Mihriban Özbaşaran.

the knowledge gained with it) is abandoned and domestic caprines dominate the economy (Hongo et al., 2009).

In southeast Anatolia, the management of animals before their domestication has been reported as intensive for pigs at Çayönü as well as possibly for cattle and caprines, for sheep at Nevali Çori and Körtik, for pig and maybe sheep at Cafer höyük and possibly for pig at Hallan Çemi. In central Anatolia, management of sheep is very clear at Aşıklı höyük and possibly at Suberde.

Caprines were arguably domesticated in the Northern Fertile Crescent and sheep more likely in south-east Anatolia sometime in the ninth millennium cal. bc. Peters et al. (2005) explain the earlier appearance of morphologically domestic sheep in areas farther south than Anatolia, arguing that it was the removal of managed sheep from their natural habitat and to the south that caused those sheep flocks to be cut off from the wild populations. This accelerated the process of transformation of wild sheep to morphologically domestic ones in sites such as Tell Halula

and Abu Hureyra (north Syria) in the MPPNB (Peters et al., 1999). Nevertheless, according to Peters et al. (1999) it is interesting to note that within the region of domestication (Nevali Çori) and the earliest diffusion (Abu Hureyra and Tell Halula) in the MPPNB the percentage of domesticates is small (generalizing, under 30%, the rest of subsistence relied still on hunting) which is interpreted by the same authors as pointing to domestication being led by sociocultural rather than environmental reasons.

Cattle seems to have been under control and domesticated in north Syria. Helmer et al. (2005) report that cattle are already domestic in the early PPNB in D'jade, Syria. They were also imported into Cyprus at the end of the ninth millennium (Vigne et al., 2000, 2011). It is argued that cattle were under control from the Middle PPNB at Çayönü (Hongo et al., 2009) but the clearest evidence of domestic cattle in Anatolia comes from Gürcütepe in the Late/Final PPNB (Peters et al., 2005).

Efforts to control pigs started in the Anti-Taurus area early in the PPNB but the existence in the same area of wild populations which were heavily hunted and obviously interbred with the managed species caused pigs to continue to resemble wild variants of their species throughout most of the PPNB in Çayonu and Cafer (Ervyck et al., 2002 Helmer, 2008). In the Early and Middle PPNB in Nevalı Çori, pigs are significantly smaller and their frequencies increase gradually (Peters et al., 2005). It appears that definite human interference with wild pig populations began in the Middle PPNB, and in the Late/Final PPNB in various localities in the Anti-Taurus, pigs acquired the typical domestication traits of a decrease in size and facial shortening.

In central-western Turkey domestic animals first appear in the eighth and seventh millennia cal. bc (Peters et al., 2013; Arbuckle, 2013; Arbuckle et al., 2014; Çakırlar, 2012) with the earliest substantial evidence being that of the caprines from Çatalhöyük in the mid-eighth millennium (Martin et al., 2002; Russell and Martin, 2005). Nevertheless, experiments are in place as is the case with Aşıklı. What happened between the 'proto-domestication' at Aşıklı (Buitenhuis, 1997; Stiner et al., 2014) and the appearance of the first domestic sheep in Çatalhöyük is not clearly understood. Domestic cattle appear about 1000 years later than domestic caprines at around the mid-seventh millennium (Arbuckle and Makarewicz, 2009; Arbuckle et al., 2014; Russell et al., 2005). Pig was not incorporated properly into the central Anatolian domestic economy but wild boar was exploited (Arbuckle, 2013; Arbuckle et al., 2014). All four domesticates (including pig) are attested in west Anatolia for the first time at Ulucak höyük in the early seventh millennium (Arbuckle et al., 2014; Çakırlar, 2012). Due to the lack of information from excavated Aceramic sites in western Anatolia not much can be said about the state of the economy before domestication. It has been argued that domesticates arrived there through, at least, two waves of 'diffusion' (Arbuckle et al., 2014): one represented by the cultures of south-east Anatolia with a distinctive lack of pig that spread to central Anatolia and from there to the Marmara region of Turkey, and a second wave that followed a coastal route to spread to the Aegean side. Still, the question of the possible autochthonous development of sheep domestication in central Anatolia or, at the very least, experimentation with developing a 'domestic relationship' may be considered not fully answered, keeping in mind the long tradition of sheep exploitation and to some extent sheep 'keeping' at Aşıklı höyük (Peters et al., 2013).

Why Domesticate? A Short Note and Conclusions

It is argued that prolonged sedentism will bring the need for modification of subsistence strategies, in particular the intensification of resource exploitation (Bar-Yosef, 2000). The need to secure a predictable supply of animals is also highlighted for these sedentary societies on the grounds that within the radius of permanent settlements wild animals will become gradually less and less abundant (Tchernov, 1993). Losch et al. (2006) have argued that the availability of fodder in early agricultural societies may have encouraged the process of animal domestication. Indeed, agricultural waste products such as straw or stems of plants that are not used for human consumption could have facilitated this process, as it would avoid competition for food resources between humans and animals. Small numbers of animals could have been captured and kept alive for some time to be slaughtered when needed, meanwhile being fed on the straw. This could have served well the need for securing a little of a 'walking larder' at the low percentages we see during the first stages of domestication.

Another reason to bring the animals alive in the settlement instead of killing them during the hunt might have been an intention to fatten them up, as is hinted by Stiner et al., (2014). Indeed to fatten up weak animals could have been an important reason for what has been observed at Aşıklı höyük. Speth and Spielmann (1983) described in depth the inadequacy and unhealthiness of a diet based on hunted animals that are in poor condition as is the case for all wild animals at the end of the winter and beginning of spring. This is actually the time when pregnant mothers or newborns could have been caught, as suggested for Aşıklı. The (probably limited) availability of straw made it possible for only a small number of animals to be kept in the site for a short time every year. This could be the reason that caprines at Aşıklı were culled so young (under 6 months) and never became morphologically 'domestics'. The same plant by-products may have initially attracted pigs at the waste grounds of Çayönü, only in this case these would have been legumes.

The practice of keeping alive animals readily available may have had other motives too. Reliefs in Göbekli Tepe have been interpreted as showing sheep hunted with nets (Schmidt, 2007). If this is so, no doubt they represent the decision not to just catch the sheep but to get it alive and keep it alive, till wanted. The need to find at once adequate 'fresh meat' supplies to feed the crowds congregated at the 'shrines' of Göbekli Tepe may be the reason for keeping

alive sheep by the site and a tell-tale sign to the role 'rituals' may have played in the appropriation of animals.

Research in Anatolia has afforded us tantalizing glimpses in a dynamic world of people in transition, experimenting with various adaptations fuelled by both, their natural and social environment. One of the key concepts, I believe, is that at this point of the history of humankind, people decided to stay within their 'territories'. Once more Çayönü arises as a prime example of the determination of its inhabitants to stay on the same land for almost 1300 years before actually having fully developed that 'economic basis' necessary to counteract the consequences of sedentism to nature. Staying on the same land surely must have caused a serious strain in resources and a need to re-secure them with a different way of food provisioning. But at the same time, clearly social processes were stronger than the environmental pressure. The 'glue' that kept together this world is perhaps the same that keeps us together today. And this might reasonably be considered to have its roots in the 'Behavioural Modernity' achieved during the Palaeolithic by the 'Anatomically Modern Humans': the ability to *live together* in large groups, create long distance barter and exchange *networks*, adapt to changing and challenging environments *rapidly* (McBrearty and Brooks, 2000), and *keep* these achievements alive by 'memory' and 'ritual' (Rossano, 2009; Wynn and Coolidge, 2003). These elements gave birth to what could be described as Neolithic 'territorialism' and its consequence and necessary fuel is the Neolithic 'agro-pastoral economy'.

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