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Towards the End of the Çatalhöyük East Settlement A Faunal Approach

Kamilla Pawłowska

An aurochs head along with bench decorated with the horns of bulls in its original position in Çatalhöyük building. Photograph by J. Quinlan.

The Çatalhöyük site produced material from the Neolithic occupation (7100 cal BCE–5900 cal BCE) through the Muslim period, including Bronze Age, Iron Age (Phrygian period), and Hellenistic periods. Twenty-five years of research have allowed us to study various ecofacts and artifacts, including animal and plant remains, human bones, pottery, stamp seals, and figurines. Faunal remains, which are the focus here, have been the subject of intense multidisciplinary research, particularly during the last decade. This has led to a greater understanding of Neolithic farmers' subsistence patterns in the Anatolian region; the domestication, health and disease in past animal populations; spread of livestock; daily practices of animal food-related activities and management of waste; and of the ecological conditions of the region in which this community operated. Animals were also involved in social practice (Russell, Martin, and Twiss 2009; Pawłowska 2020; Pawłowska and Marciszak 2018; *Der this issue*) and used as a source of raw material in manufacturing.

Material and Methods

The material consists of animal bones excavated between 1993 and 2018 within various excavation areas. More than one million animal remains have been studied by the international faunal team (Pawłowska in press a, in press b, 2018, 2020; Russell

and Martin 2005; Russell et al. 2013; Twiss et al. in press; Wolfhagen, Twiss et al. in press). These were recovered using dry sieve and flotation procedures. The scope of research included basic, isotopic, manufacturing, taphonomic, and social analysis. The results were considered by stratigraphic level (from South.G to T.P.R) and also by context (such as floor, fill, and midden). The recently introduced sequencing of the site into Early, Middle, Late, and Final phases also allows us to track any changes within a broader framework. This approach was adopted here.¹

Faunal Results and Discussion

The results of the research have revealed the major changes that took place between Middle and Late (6500 cal BCE) (Russell et al. 2013; Twiss et al. in press; Wolfhagen, Twiss et al. in press) and between Late and Final (6300 cal BCE) phases of the Neolithic sequence (Pawłowska in press a, 2020). Prior to 6500 cal BCE (the Early and Middle phases, with emphasis on the latter), the classic early Çatalhöyük pattern can be seen in the form of the elaborate symbolism in houses, installations of wild animals parts with an emphasis on bucrania, special animal feasting and deposits, and elaborate burials involving numerous objects being placed in graves (Hodder 2014). After this time, many lines of evidence point to changes in the size and construction of buildings, burial practices, installations, symbolism, feasting, and consumption.

The post-Neolithic study focused on contextual zooarcheology in order to elucidate the depositional pathways of the bone assemblages associated with various chronological contexts,



Figure 1. Example of Hellenistic animal bones, juvenile. Photograph by K. Pawłowska.



Figure 2. Cattle bucranium abutting a human skull in Neolithic context (Final phase). Photograph by J. Quinlan, modified by K. Pawłowska.

from the Bronze Age through the Iron Age and the Hellenistic period (fig. 1) to the Muslim period (Pawłowska in press b). The results revealed the complexity of the practice of waste disposal and the use of garbage as a fill material in archeological structures.

The faunal research mainly focused on the social and economic significance of animals, their domestication, and the effect of these variables on the life of the Neolithic community. Equally important were issues of waste utilization and management, as well as those related to public health, including odor emissions.

Domestication and Social Practices

The results of the faunal research show that sheep had a domestic status, and herding them was the main economic goal on the site. The results from the Late (Wolffhagen, Twiss et al. in press) and Final (Pawłowska in press a, 2020) phases show that goats began to gain importance in the social context in the selection of certain parts of their bodies, especially the heads and horns.

The initial concept that Çatalhöyük was a center of cattle domestication (Perkins 1969) was revisited (Russell, Martin, and Buitenhuis 2005) and more recently it has become clear that cattle only became domesticated towards the end of the Neolithic occupation (Pawłowska in press a, 2020; Russell et al. 2013). Cattle management was part of a long-term process of adaptation to the local aurochs population (Wolffhagen, Twiss et al. in press) which begin in the Middle phase (Twiss et al. in press). The Çatalhöyük site therefore provides an opportunity to study the health and disease of domesticated livestock from very early domestication onwards. The results showed that inflammatory diseases and dental anomalies were more frequent in relation to arthropathies, congenital anomalies, traumatic lesions, and diseases associated with the environment (Pawłowska 2018; see also Russell et al. 2013).

In the early Neolithic sequence at Çatalhöyük, aurochs remains were used in social contexts as part of installations and special deposits (that is, a set of selected artifacts or ecofacts inside a house; Russell 2016). It seems that the inhabitants were very involved in ritual and social practice, and this focus on aurochs can be seen as a reason for the late adoption of cattle here (Arbuckle 2013; Arbuckle et al. 2014). This inference draws upon the results of other Anatolian sites where morphologically domestic cattle have been noted much earlier, for example in Erbaba at ca. 6600–6500 cal BCE (Arbuckle and Makarewicz 2009, with references).

Further significant changes at Çatalhöyük took place in the Late and Final phases, as exemplified on the basis of the TP and GDN Areas. There is a juxtaposition of cattle and aurochs in the same acts of deposition (Pawłowska in press a, 2020). Also, in the Final phase, the significance of domesticated cattle was raised, combining them with the human skull as a kind of covering in graves as a part of a new social burial practice (Pawłowska in press a, 2020; fig. 2). Generally, at this time and especially in the Final phase, the results

show that the participation of aurochs decreases, as does the number of installations in which aurochs body parts were involved (Pawłowska in press a; Russell et al. 2013; Russell 2016). This can also be applied to deer, whose antlers were used in special deposits, but in the Late and Final phases these are only sporadic or even negligible (Pawłowska in press a; Russell and Martin 2005; Russell et al. 2013). In both cases, this may reflect a decrease in interest in hunting in favor of domesticated animals, especially cattle, or local environmental changes that led to a remodeling of the fauna. To conclude, the decreased attention paid by the inhabitants to wild game at this time, while production increased, was reflected in the social domain of ritual practices.

Subsistence Mode

Recent studies have shown that, apart from in the social sphere, major changes also occurred in subsistence between the Late and Final phases of occupation (Pawłowska 2014, in press a; Russell et al. 2013). The subsistence pattern of the inhabitants of Çatalhöyük in the Late Neolithic was based first on caprines, and then on cattle. Herding, primarily of sheep (the proportion of which increased over time), was thus the main method of procuring food other than hunting (Pawłowska in press a; Wolfhagen, Twiss et al. in press). The geographic expansion of pastoral activities farther from Çatalhöyük—possibly reflecting resource depletion—and the increasing diversity of the sheep's diet can be seen from the results of isotope studies as the large range of carbon and nitrogen values (Larsen et al. 2015; Pearson 2013; Pearson et al. 2015). The same tendency in the carbon and nitrogen isotopes for cattle has been linked with the introduction of the domestic form at the site (Pearson et al. 2015). Caprine culling patterns, determined using tooth wear and fusion data, indicate that individuals were slaughtered when they had the optimum amount of meat, at between years 2 and 3. However, in the Final phases of site occupation, seasonal management of flocks was practiced along with a distinctive pattern of herd management (TP Area; Pawłowska in press a). The size of herds and herd management tactics both altered: H herds become smaller, and a shift towards the slaughter of older animals (30–48 months old) began to manifest. These changes are supported by results of both oxygen isotope analysis of teeth and microtraces on their surfaces, which indicate deliberate intervention in the birth of lambs (Henton in press). The seasonal activities of late spring shifted forward to early spring, thus making it possible to avoid grazing the animals on the plain, but requiring them to be fed soft food, which had to be gathered earlier.

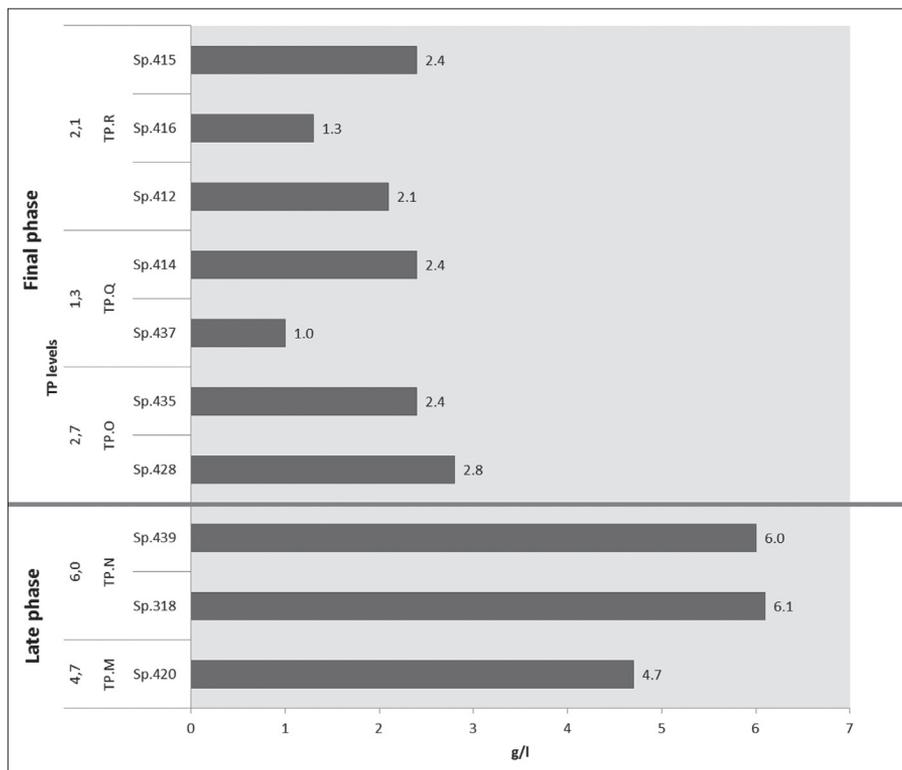


Figure 3. Çatalhöyük East. Daily deposit density through the TP Neolithic sequence (TP.M–TP.R), based on faunal assemblages. Data shown as gram per liter of soil. Sp.: Space.

Hunting of wild game, especially aurochs and deer, was still part of the seasonal activity of Çatalhöyük's inhabitants through the Neolithic (Pawłowska in press a; Russell and Martin 2005; Russell et al. 2013). Direct evidence of hunting and the tools used are provided by a fragment of aurochs scapula with obsidian inserted in it—though in this case, evidence of bone regeneration indicates that the animal survived (Pawłowska 2014). Aurochs were hunted in a C3 vegetative zone (meaning an area rich in C3 plants, which are distinguished by cycles of photosynthesis and their adaptation to cool and temperate climates), such as open woodland, in at least the Early phase, as shown by the isotope results for carbon and nitrogen (Pearson et al. 2015). The aim of the hunt was to acquire not only meat, but also raw material for working, or to use selected elements for special deposits. This can be seen in some abandonment deposits where the condition of scapulae indicates that they were deposited with soft parts (Barański et al. 2015), which in turn implies that offerings of food (rather than bone) were given before leaving home. The lack of evidence of cooking techniques for these scapulae suggests that these food offerings were raw. Equids, which are wild throughout the entire Çatalhöyük sequence, were hunted in C4-rich areas of grassland (with low levels of protein and high fiber and silica content), particularly in the Late phase, as has been shown by the combined faunal and isotope data (Pearson et al. 2015). However, Twiss et al. (in press) suggest that equids became less available or less desirable, leading to waning consumption of these animals which can be seen in the decline in equid numbers.

The evidence so far for Çatalhöyük East shows negligible acquisition of fish by its inhabitants in all time periods (Pawłowska, in press a, in press b; Pawłowska et al. 2017; Russell and Martin 2005; Russell et al. 2013). This is important in that it shows a steady trend during the

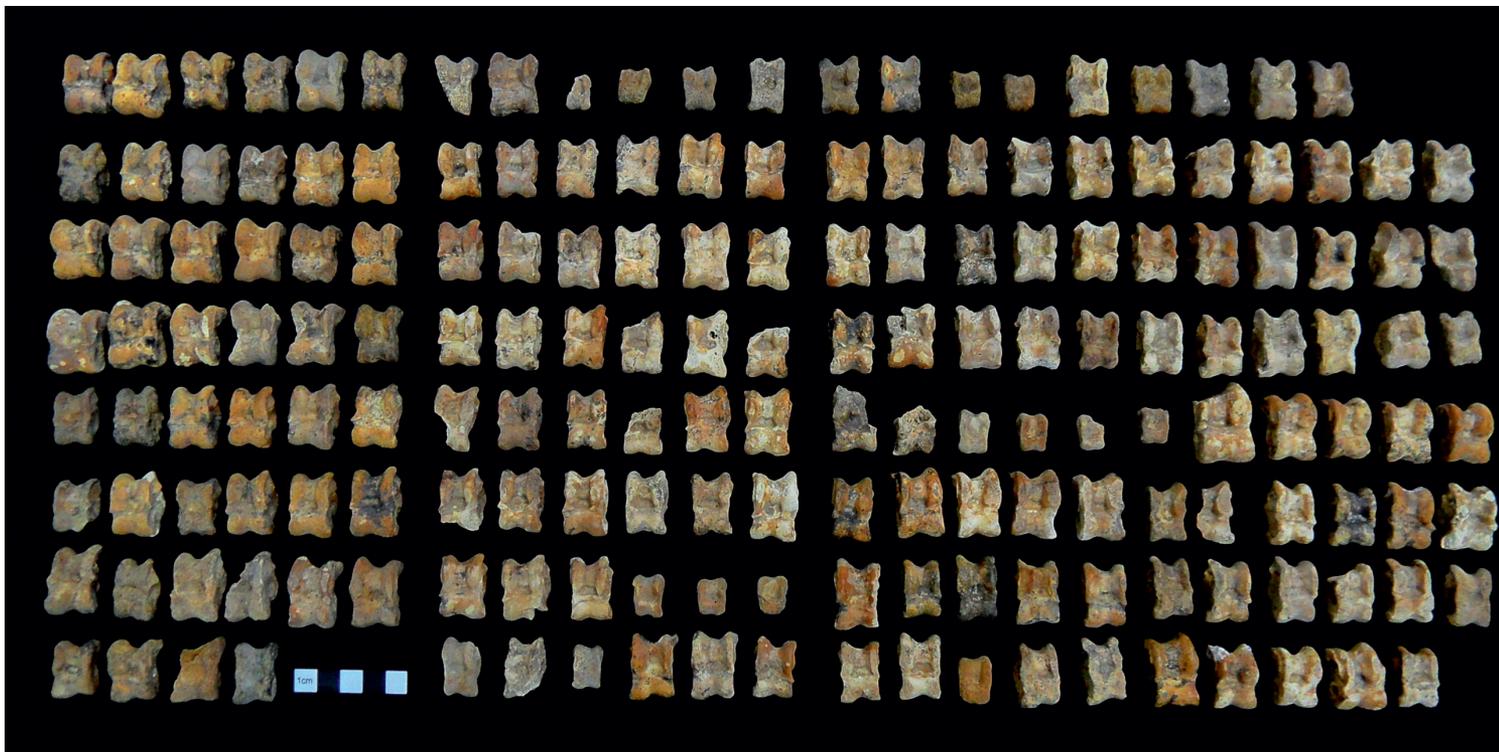


Figure 4. One of a set of astragali recovered from North, TPC and GDN Neolithic contexts. Photograph by K. Pawłowska.

Early–Middle (South and North Areas) to Late–Final (South, TP and GDN Areas) phases. The reason may lie in a lack of interest in this source of food—for example, because of taste values or due to environmental connotations, such as the shallowing out of habitat reservoirs. According to Van Neer et al. (2013), the fish were very small, and thus it is difficult to imagine that they could significantly contribute to the basic diet.

Birds had a negligible role in subsistence across nearly the entire ca. 1100-year sequence of the Neolithic East Mound; they did, however, possess a symbolic role, at least in the case of cranes, vultures, crows, and spoonbills. Other birds, as herons, were most likely the subjects of taboos. Generally throughout the sequence, water birds were targeted, most likely to obtain feathers, as indicated by predominant legs and wings and the underrepresentation of the meatier portions of the skeleton (Russell 2019a, 2019b). The role of birds in mediating between the human and spirit worlds—particularly in association with newborn human infants—has also been suggested (Russell 2019b).

Processing and Preparation of Animal-Related Food

Food processing includes several activities, which we mainly observe as butchery marks in the zooarchaeological record. However, not every incident leaves a mark on the bone; this depends on the size of the animal and thus on the thickness of the fat and meat. The record is also influenced by taphonomic processes, which make it difficult to base conclusions solely on butchery marks. Evidence from butchery marks is scarce across the Neolithic sequence (Russell and Martin 2005; Russell et al. 2013; Pawłowska in press a, in press b; Pawłowska et al. 2017). The

pattern of their occurrence on sheep-size and cattle-size bones differs: Sheep-size animals have more incidences of filleting than of dismemberment, unlike the cattle-size animals, where dismemberment predominates over filleting (Pawłowska in press a; Russell et al. 2013). These suggest that meat was removed from caprine bones, but remained on cattle bones during processing, implying a differentiation in the preparation of meat for consumption from these two groups of ungulates. Despite this conclusion, bones from both size classes were later affected by intense smashing as a part of the marrow and grease recovering process (Final phase).

Although fish were seldom eaten, those included in the diet were prepared in various way. The small size of the fish implies that they were dried, rather than processed by other methods; however, we cannot exclude the possibility that they were eaten raw. One more way of consuming fish was as a soup or stew, in which fish were mixed together with cereals and pulses, as indicated by recent evidence (González Carretero et al. in press).

Faunal data from the Late and Final phases of site occupation (TP and GDN Areas) indicate that meat was stewed rather than roasted, as exemplified by butchery marks, burning pattern, and bone breakage patterns (González Carretero et al. in press; Pawłowska in press a, in press b; Pawłowska et al. 2017). Particularly intense changes occurred around 6300 cal BCE, when bone processing became increasingly frequent, perhaps in response to environmental stress (Pawłowska in press a). The faunal results are supported by the relatively small size of pots for cooking, as described by Pyzel (in press), which points to the stewing of at least caprine meat as the major cooking technique at this time. In contrast, meat baking was preferred until the half of the

Middle phase of occupation as there is little sign of roasting (Russell and Martin 2005; Russell et al. 2013). Roasting is particularly visible in post-Neolithic contexts, as shown by Hellenistic samples (Pawłowska 2014; Pawłowska in press b).

Given the remnants of daily meals discarded in middens, it appears that the basis of household consumption was meat, marrow, and grease, mainly recovered from caprines. Communal eating in the form of feasting seems to be less common in the Late Neolithic, as less evidence of such events has been found. This does not mean, however, that there have been no changes in this respect. Evidence from TP deposits provides proof of some transformation of feasting, in which domesticated cattle were included, and which was not found before (Pawłowska 2020). Domestication of the cattle is indicated by both the evidence of malnutrition displayed on its bones and biometric data using the Logarithm Size Index (LSI) method and standard animals (Degerbøl and Fredskild 1970). The results thus indicate that feasting was linked to subsistence-level production. Equid remains from feasting also point to a new approach to feasting.

Each human activity related to food preparation is embedded in the context of its performance. Studies have shown that more outdoor activities took place in the Late and Final phases than earlier (González Carretero et al. in press); this is associated with architectural changes in the form of open spaces between buildings (Barański et al. 2015). However, some activities remained inside houses, as evidenced by filleting on the floors of some TP spaces (Spaces 323 and 434), revealed in contextual zooarcheological studies (Pawłowska in press a). Further implications in relation to this are provided by the archeological features of buildings. As these Late spaces did not always have fire installations, the stages of meat processing and consumption were probably separated and performed in different settings (Pawłowska in press a).

Seasonality

The “seasonality” of a particular event describes the time of year when it is most likely to occur (Monks 1981). Seasonality can also be understood as a temporal imbalance; for example, the main seasonal phenomena seen at Çatalhöyük from the faunal perspective are the use of wild animal resources and management tactics for herds, as shown above. When evaluated



Figure 5. Çatalhöyük East. Incised equid first phalanx (inverted, distal end upwards; GDN Area). Shown in dorsal and ventral (in the center) as well as side (left and right) views with a close-up of the coffee-bean shaped eyes. The scale is 2 cm long. Photograph by J. Quinlan.

as sources of protein, the most efficient use of seasonal resources was most likely for dietary supplementation. In other cases, they could be used as raw material for manufacturing and for items with application in the social sphere.

Multiple lines of evidence, in the form of body part distributions and demographic data, indicate that aurochs, deer, and equids were the most commonly hunted animal (Pawłowska in press a; Russell and Martin 2005; Russell et al. 2013). Zooarcheological evidence from Neolithic Çatalhöyük—and particularly the scarcity of wild game throughout the whole sequence—suggests hunting to have occurred on a rather periodic basis, rather than being part of a permanent taskscape (Wolfhagen, Veropoulidou et al. in press). Hunting was practiced in the winter, at least in the case of migratory species such as deer; these move to the lowland during winter and thus came within easy reach of the settlement’s inhabitants.

Important developments in seasonality occurred in the Late and Final phases, and are clearly marked as a distinctive pattern in herd management (described above). Seasonal management of flocks is a well-known practice today, as exemplified by the breeding cycle of Bozdağ wild sheep in Turkey, where the seasonality of their breeding and movement is synchronized with resource availability and need (Henton 2010). Another example is that of caprines in northern Iran where, due to climatic constraints, herds are moved for pasture on a seasonal cycle (Bocherens et al. 2001).

Herds are usually kept in penning areas, discerned by a combination of markers—such as microlaminated phytoliths, dung spherulites, and phosphate nodules (Shillito 2017). However, judging from the size of what are thought to be such spaces at Çatalhöyük (such as Spaces 470 and 620: South Area), only a few individuals could have been held there. Alternatively, these could be places for young lambs and their mothers which, according to Henton (2010), are commonly herded separately from older animals for a period of a few months. Evidence of cleaning and rebuilding the penning areas at Çatalhöyük (Barański et al. 2015) also sheds light on seasonal variation in the inhabitants’ tasks.

Integrating faunal data from all phases suggests that hunting and herding were regarded as coexisting strategies through time, though with a clear shift in emphasis from one to the other. This is especially evident in the differential use of bovids. In earlier phases, more emphasis was placed on aurochs; however, in the Late and Final phases, the focus was on cattle—coincident with their domestication—as indicated by the reduced participation of aurochs and their contribution

to the ritual sphere (Pawłowska 2020). Thus, this shows the relationship between seasonal activities, such as hunting, and the strengthening or weakening of rituals in which selected animal parts were involved. It is thus clear that changes in the seasonality model concerned both the subject and scope of activities. In the Late and Final phases, hunting seems to have been practiced when needed, or else in a seasonal mode.

The use of resources in social contexts is one of the possible causes of seasonality of human activity, apart from the use of resources as a raw material. The second cause of seasonality may be more natural, related to the influence of climate and the potential disorder arising from it. The impact of the 8.2 ka event, when the climate became cooler, may be visible in the intensification of bone processing, as suggested by the faunal results from the TP Area (Pawłowska in press a) extended by isotope studies (Roffet-Salque et al. 2018). The results show that the consequences of cooler temperatures in winter include an increase in livestock nutritional requirements and thus the need to provide foddering, which could be the case in the later phases of Çatalhöyük's occupation. In the food procurement system, dietary supplementation by hunting, as discussed above, is also within the scope of natural causes of seasonality.

Overall, the data suggest that Çatalhöyük's later Neolithic system appears to have been scheduled according to the seasonal availability of resources and rhythms associated with management tactics for herds. The relative size of seasonal variation suggests that the seasonal organization of activities at Çatalhöyük was important and determined the rhythm of life.

Health and Demography

Waste and certain social practices—such as the burning of houses as part of the abandonment process—must have constituted health hazards at Neolithic Çatalhöyük. Additionally, various activities associated with keeping animals in pens, butchery, and processing and preparing food could have produced bad smells and disease risks on the local scale and on the scale of the settlement (Pawłowska 2014). Health conditions were also affected by the construction of houses, where animal and human feces were inclusions in the microstructure of floors, walls, and burial (Matthews 2005; Shillito et al. 2013). Further evidence of an extended interval between death and burial at Çatalhöyük—where soft tissue mass was reduced or removed from some bodies by manual defleshing, desiccation, or exposure of bodies to vulture scavenging (Pilloud et al. 2016; Haddow and Knüsel 2017)—sheds light on the potential epidemiological threat, level of sensitivity, and tolerance to odors of the decomposition process. The latter must have been particularly strong when disturbances occurred early in the process of decomposition.

Çatalhöyük was most densely populated in the Middle phase of the Neolithic sequence (3,500–8,000 individuals), as a consequence of increased fertility and birthrate (Larsen et al. 2015); this led to elevated levels of stress, conflict, and interpersonal violence in the Çatalhöyük community, especially regarding females, as has been shown by bioarchaeological records (Larsen et al. 2019). The crowded living conditions affected health by

increasing the chance of localized tissue infections deriving from cuts and abrasions of the skin, promoting the transmission of pathogens (Larsen et al. 2019). Although the role of sheep as hosts for parasites prior to human infestation has been suggested as a major public health problem (Larsen et al. 2019), the evidence so far has only established one parasite, the geohelminth whipworm, which spread from one human to another via the contamination of food or water with human feces, thus indicating that living conditions with middens containing human excrement located directly adjacent to houses played a role in their transmission (Ledger et al. 2019). Simultaneously, the diversity of parasitic infection turned out to be low compared to what was expected in such living conditions and by analogy with other Neolithic sites. This may be associated with general lifestyle and the shift from reliance on wild animals as animal herding was developed (Ledger et al. 2019).

As discussed, the people of the Middle phase were involved in elaborate rituals, symbolism, installations, and burials. The study of burials has revealed that individuals interred in houses were not necessarily biologically related, meaning that house affiliation was based on practical kin: That is, groups of people cohabitated for various social or cultural reasons motivated by the adoption of domesticated plants and animals. This is one explanation for their different carbon and nitrogen isotope signals, which indicate that they had different diets from one another (Pearson et al. 2015). These components of the spiritual sphere changed over time as the intensity of production increased (Hodder 2014). Yet later on, from the Late and Final phases onwards, production, and thus waste, was gradually limited, as shown by the gradual but significant decline of faunal densities in daily deposits, which Pawłowska (in press a) links to decreased population (fig. 3). The changes previously described in subsistence, herding, and processing strategy, which entailed social behaviors, took place at this time, and many were related to a potential food crisis and environmental changes at the end of the settlement at Çatalhöyük East (Pawłowska in press a). Environmental changes occurred in the form of a more arid climate and a rise in the groundwater level, as evidenced by the effect of water on bones and the formation of gypsum in the TP deposits, especially in the Final phase.

Manufacturing

As was the case at most sites in Anatolia, animals at Çatalhöyük served as sources of raw material for manufacturing. The raw materials were stored in the house, allowing for the use of various objects in daily practice (Russell and Griffiths 2013; Russell et al. 2013). Most bone tools were made using raw materials from caprines, cattle, and cervids. These were classified by function and form as points, needles, picks, chisels/gouges, scrapers, burnishers, pottery polishers, plaster tools, spoons, spatulas, bowls/cups, handles, hafts, knucklebones (some from a set of caprine astragali; fig. 4), ornaments, pendants, beads, rings, belt hooks, collars, fishhooks, harpoon, pressure flakers, hammers/mallets, and punches (Russell and Griffiths 2013). A major breakthrough here was the discovery of the first bone figurine from the site to be made from an equid phalanx with incision marks

shaped like eyes (fig. 5), as is well documented in Near Eastern contexts, and widely known as ‘idols’ (GDN Area; Pawłowska and Barański 2020). This raw material was acquired through hunting, since we do not have any evidence of horse domestication on site, and zooarchaeological evidence indicates the presence of hemionus (*Equus hemionus hydruntinus*) and wild horses (*Equus ferus*) (Pawłowska, in press a; Russell et al. 2013). A detailed examination of the contextual setting of all the modified equid phalanges from Çatalhöyük showed that they are associated with food storage, or with human activity that took place in spaces where the food was stored, rather than as objects of worship.

A kind of standardization can be seen in the Late phase (GDN Area) in the collection of caprine premaxilla bones. This selective pattern is most likely a result of intentional choice, in order to use them as raw material, as shown by the worked premaxilla pieces (García Díaz, personal communication) in the assemblage.

Conclusion

The faunal research conducted over the last two decades at Çatalhöyük has dealt with a broad range of animal-related issues, ranging from food provisioning, production, consumption, and manufacturing, through the role of animals in social practices, to the context of deposition. As a consequence, issues of animal domestication, social practices, subsistence mode, food processing and preparation, seasonality tasks, health hazards, demography, and bone tool manufacture could be addressed.

The results show that subsistence was based mainly on caprines, with contributions from cattle in the later phases, indicating a pastoral economy. The domestication of cattle was a complex process, as it usually is when wild animals begin to be managed by humans. This brought further changes in the form of a decrease in interest in aurochs, which altered the social organization of labor by leading to the limitation of communal hunting in favor of agriculture. At the end of the settlement in the East Mound, the status of cattle had increased to such an extent that, for the first time, cattle bucrania were found juxtaposed with a human skull. These are part of multifaceted changes revealed over more than one thousand years of occupation at Çatalhöyük. Other changes affected caprine herd management, butchery techniques, food processing, and population density. Cooking techniques also changed from baking of meat to stewing, with little roasting seen until the Hellenistic period. All of these are indicative of transformations that took place between the Middle and Late (6500 cal BCE), and between the Late and Final (6300 cal BCE), phases of the Neolithic sequence. As environmental changes occurred in the form of a more arid climate and a rise in the groundwater level, food crises had significant impact on the transformation between the Late and Final phases.

Penning, butchering, processing and preparing food, waste utilization and management, and certain burial and social practices have been linked with public health, showing a range of odor emissions, disease risks, and pathways of parasite transmission. Aspects of these health hazards must have shifted as the populations changed, with its highest value in the Middle phase and a great decrease in the Final phase. Comfort thresholds for

crowding in Middle phase were low, as indicated by bioarchaeological records in the form of interpersonal violence and the increased chance of tissue infections, favoring the transmission of pathogens.

The results all clearly point to the economic significance of animals, the skills of Çatalhöyük’s inhabitants in herding and resource management, the increased independence in provisioning, production, and consumption, and food preferences, as the population decreased in the Final phase. Animals were an integrated part of the daily life of the inhabitants of this Neolithic community and also fulfilled a role in the social domain as evidenced by the elaborate symbolism, the multiplicity of human–animal relations, and the distinctive placement and display of selected animal remains in the social context.

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Note

1. See the June 2020 issue of *NEA* (vol. 83.2) for terminology and chronology.

References

- Arbuckle, Benjamin S. 2013. The Late Adoption of Cattle and Pig Husbandry in Neolithic Central Turkey. *Journal of Archaeological Science* 40.4: 1805–15.
- Arbuckle, Benjamin S., Sarah W. Kansa, Eric Kansa, David Orton, Canan Çakırlar, Lionel Gourichon, Levent Atici, Alfred Galik, Arkadiusz Marciniak, Jacqui Mulville, Hylke Buitenhuis, Denise Carruthers, Bea de Cupere, Arzu Demirergi, Sheelagh Frame, Daniel Helmer, Louise Martin, Joris Peters, Nadja Pöllath, Kamilla Pawłowska, Nerissa Russell, Kathryn Twiss, and Doris Würtenberger. 2014. Data Sharing Reveals Complexity in the Westward Spread of Domestic Animals across Neolithic Turkey. *PLoS ONE* 9 (6), e99845, DOI:10.1371/journal.pone.0099845
- Arbuckle, Benjamin S., and Cheryl A. Makarewicz. 2009. The Early Management of Cattle (*Bos taurus*) in Neolithic Central Anatolia. *Antiquity* 83(321): 669–86.
- Barański Marek Z., Aroa García-Suárez, Arkadiusz Klimowicz, Serena Love, and Kamilla Pawłowska. 2015. The Architecture of Neolithic Çatalhöyük as a Process: Complexity in Apparent Simplicity. Pp. 111–26 in *Assembling Çatalhöyük*, ed. Ian Hodder and Arkadiusz Marciniak. Themes in Contemporary Archaeology 1. London: Routledge.
- Bocherens, Hervé, Marjan Mashkour, Daniel Billiou, Eric Pellé, and André Mariotti. 2001. A New Approach for Studying Prehistoric Herd Management in Arid Areas: Intra-Tooth Isotopic Analyses of Archaeological Caprine from Iran. *Comptes Rendus de l’Académie des Sciences-Series IIA-Earth and Planetary Science* 332: 67–74.

- Degerbøl, Magnus, and Bent Fredskild. 1970. The Urus (*Bos primigenius* Bojanus) and Neolithic Domesticated Cattle (*Bos taurus domesticus* Linné) in Denmark. *Det Kongelige Danske Videnskaberne Selskab Biologiske Skrifter* 17.1: 234.
- González Carretero, Lara, Lucy E. Bennison-Chapman, Arzu Demiregi, Dorian Q. Fuller, Sheena Ketchum, Marco Madella, Kamilla Pawłowska, Carlos Santiago-Marrero, Christina Tsoraki, Katheryn C. Twiss, and Rena Veropoulidou. In press. Disentangling Neolithic Cuisine: Archaeological Evidence for 9,000-Year-Old Food Preparation Practices and Cooking Techniques at Çatalhöyük East. In *Communities at Work: The Making of Çatalhöyük*, ed. Ian Hodder and Christina Tsoraki. British Institute at Ankara Monograph. Monumenta Archaeologica. Los Angeles: Cotsen Institute of Archaeology Press.
- Haddow, Scott D., and Christopher J. Knüsel. 2017. Skull Retrieval and Secondary Burial Practices in the Neolithic Near East: Recent Insights from Çatalhöyük, Turkey. *Bioarchaeology International* 1: 52–71.
- Henton, Elizabeth M. 2010. Herd Management and the Social Role of Herding at Neolithic Çatalhöyük: An Investigation Using Oxygen Isotope and Dental Microwear Evidence in Sheep. PhD diss., University College London.
- . In press. Domestic Herd Management in the Closing 200 Years of Çatalhöyük East, Elucidated through the Combined Use of Oxygen Isotopes and Microwear in Sheep Teeth. In *Late Neolithic at Çatalhöyük East: Excavations of Upper Levels in the Team Poznan Area*, ed. Lech Czerniak and Arkadiusz Marciniak. Los Angeles: Cotsen Institute of Archaeology Press.
- Hodder, Ian, ed. 2014. *Religion at Work in a Neolithic Society: Vital Matters*. Cambridge: Cambridge University Press.
- Larsen, Clark S., Simon W. Hillson, Başak Boz, Marin A. Pilloud, Joshua W. Sadvari, Sabrina C. Agarwal, Bonnie Glencross, Patrick Beauchesne, Jessica Pearson, Christopher B. Ruff, Evan M. Garofalo, Lori D. Hager, Scott D. Haddow, and Christopher J. Knüsel, 2015. Bioarchaeology of Neolithic Çatalhöyük: Lives and Lifestyles of an Early Farming Society in Transition. *Journal of World Prehistory* 28: 27–68.
- Larsen, Clark S., Christopher J. Knüsel, Scott D. Haddow, Marin A. Pilloud, Marco Milella, Joshua W. Sadvari, Jessica Pearson, Christopher B. Ruff, Evan M. Garofalo, Emmy Bocaege, Barbara J. Betz, Irene Dori, and Bonnie Glencross. 2019. Bioarchaeology of Neolithic Çatalhöyük Reveals Fundamental Transitions in Health, Mobility, and Lifestyle in Early Farmers. *Proceedings of the National Academy of Sciences* 116.26: 12615–23.
- Ledger, Marissa L., Evilena Anastasiou, Lisa-Marie Shillito, Helen Mackay, Ian D. Bull, Scott D. Haddow, Christopher Knüsel, and Piers D. Mitchell. 2019. Parasite Infection at the Early Farming Community of Çatalhöyük. *Antiquity* 93(369): 573–87.
- Matthews, Wendy. 2005. Micromorphological and Microstratigraphic Traces of Uses and Concept of Space. Pp. 355–98 in *Inhabiting Çatalhöyük: Reports from the 1995–99 Seasons*, ed. Ian Hodder. British Institute of Archaeology at Ankara Monograph 38. Cambridge: McDonald Institute for Archaeological Research.
- Monks, Gregory G. 1981. Seasonality Studies. Pp. 177–240 in *Advances in Archaeological Method and Theory*. New York: Academic Press.
- Pawłowska, Kamilla. 2014. The Smells of Neolithic Çatalhöyük, Turkey: Time and Space of Human Activity. *Journal of Anthropological Archaeology* 36: 1–11.
- . 2018. Animal Diseases in Neolithic Societies: Çatalhöyük (Turkey) in the Spotlight. Pp. 5–23 in *Care or Neglect? Evidence of Animal Disease in Archaeology*, ed. László Bartosiewicz and Erica Gál. Proceedings of the Sixth ICAZ Animal Paleopathology Working Group Conference. Oxford: Oxbow.
- . 2020. Time of Change: Cattle in the Social Practices of Late Neolithic Çatalhöyük. *Archaeological and Anthropological Sciences* 12:39. DOI: 10.1007/s12520-019-00961-x.
- . In press a. Animals at Late Neolithic Çatalhöyük: Subsistence, Food Processing and Depositional Practices. In *Late Neolithic at Çatalhöyük East: excavations of upper levels in the Team Poznan Area*, ed. Lech Czerniak and Arkadiusz Marciniak. Los Angeles: Cotsen Institute of Archaeology Press.
- . In press b. Contextual Zooarcheology: Depositional Pathways in Post-Neolithic Çatalhöyük. In *The Other Çatalhöyük. Proto-historic Settlements and Historic Cemeteries*, ed. Lech Czerniak and Arkadiusz Marciniak. Los Angeles: Cotsen Institute of Archaeology Press.
- Pawłowska, Kamilla, and Marek Z. Barański. 2020. Conceptualization of the Neolithic World in Incised Equid Phalanges: Anthropomorphic Figurine from Çatalhöyük (GDN Area). *Archaeological and Anthropological Sciences* 12:18. DOI: 10.1007/s12520-019-01006-z.
- Pawłowska, Kamilla and Adrian Marciszak. 2018. Small Carnivores from a Late Neolithic Burial Chamber at Çatalhöyük, Turkey: Pelts, rituals, and rodents. *Archaeological and Anthropological Sciences* 10: 1225–43.
- Pawłowska, Kamilla, Jesse Wolfhagen, and Virginia García-Díaz. 2017. Faunal Remains from the GDN Area, 2017. Pp. 151–58 in *Çatalhöyük Archive Report 2017*, http://www.catalhoyuk.com/archive_reports/2017.
- Pearson, Jessica A. 2013. Human and Animal Diet as Evidenced by Stable Carbon and Nitrogen Isotope Analysis. Pp. 271–98 in *Humans and Landscapes of Çatalhöyük: Reports from the 2000–2008 Seasons*, ed. Ian Hodder. British Institute at Ankara Monograph 47. Monumenta Archaeologica 30. Los Angeles: Cotsen Institute of Archaeology Press.
- Pearson, Jessica A., Amy Bogaard, Michael Charles, Simon W. Hillson, Clark S. Larsen, Nerissa Russell, and Katheryn C. Twiss. 2015. Stable Carbon and Nitrogen Isotope Analysis at Neolithic Çatalhöyük: Evidence for Human and Animal Diet and Their Relationship to Households. *Journal of Archaeological Science* 57: 69–79.
- Perkins, Dexter Jr. 1969. Fauna of Çatal Hüyük: Evidence for Early Cattle Domestication in Anatolia. *Science* 164: 177–79.
- Pilloud, Marin A., Scott D. Haddow, Christopher J. Knüsel, and Clark Spencer Larsen. 2016. A Bioarchaeological and Forensic Re-assessment of Vulture Defleshing and Mortuary Practices at Neolithic Çatalhöyük. *Journal of Archaeological Science: Reports* 10: 735–43.

- Pyzel, Joanna. In press. Pottery. In *Late Neolithic at Çatalhöyük East: Excavations of Upper Levels in the Team Poznan Area*, ed. Lech Czerniak and Arkadiusz Marciniak. Los Angeles: Cotsen Institute of Archaeology Press.
- Roffet-Salque, Mélanie, Arkadiusz Marciniak, Paul J. Valdes, Kamilla Pawłowska, Joanna Pyzel, Lech Czerniak, Marta Krüger, C. Neil Roberts, Sharmini Pitter, and Richard P. Evershed. 2018. Evidence for the Impact of the 8.2 kyr BP Climate Event on Near Eastern Early Farmers. *Proceedings of the National Academy of Sciences of the United States of America*, 2018 115 (35) 8705–9, DOI.org/10.1073/pnas.1803607115 .
- Russell, Nerissa. 2016. Neolithic Human-Animal Relations. *Groniek* 48.206/7: 21–32.
- . 2019a. Feathers and Talons: Birds at Neolithic Çatalhöyük, Turkey. *Archaeological and Anthropological Sciences* 11.12: 6393–410.
- . 2019b. Spirit Birds at Neolithic Çatalhöyük. *Environmental Archaeology* 24: 377–86, DOI: 10.1080/14614103.2017.1422685.
- Russell, Nerissa, and Janet L. Griffiths. 2013. Çatalhöyük Worked Bone: South and 4040 Areas. Pp. 277–306 in *Substantive Technologies at Çatalhöyük: Reports from the 2000–2008 Seasons*, ed. Ian Hodder. British Institute at Ankara Monograph 48. Monumenta Archaeologica 31. Los Angeles: Cotsen Institute of Archaeology Press.
- Russell, Nerissa, and Louise Martin. 2005. The Çatalhöyük Mammal Remains. Pp. 355–98 in *Inhabiting Çatalhöyük: Reports from the 1995–99 Seasons*, ed. Ian Hodder. British Institute of Archaeology at Ankara Monograph 38. Cambridge: McDonald Institute for Archaeological Research.
- Russell, Nerissa, Louise Martin, and Hylke Buitenhuis. 2005. Cattle Domestication at Çatalhöyük Revisited. *Current Anthropology* 46 (S5): S101–S108.
- Russell, Nerissa, Louise Martin, and Katheryn C. Twiss, 2009. Building Memories: Commemorative Deposits at Çatalhöyük. *Anthropozoologica* 44: 103–25.
- Russell, Nerissa, Katheryn C. Twiss, David C. Orton, and G. Arzu Demirergi. 2013. More on the Çatalhöyük Mammal Remains. Pp. 213–58 in *Humans and Landscapes of Çatalhöyük: Reports from the 2000–2008 Seasons*, ed. Ian Hodder. British Institute at Ankara Monograph 47. Monumenta Archaeologica 30. Los Angeles: Cotsen Institute of Archaeology Press.
- Shillito, Lisa-Marie. 2017. Multivocality and Multiproxy Approaches to the Use of Space: Lessons From 25 Years of Research at Çatalhöyük. *World Archaeology* 49: 237–59.
- Shillito, Lisa-Marie, Ian D. Bull, Wendy Matthews, Matthew J. Almond, and Richard Evershed. 2013. Integrated Geochemical and Microscopic Analysis of Human Coprolites, Animal Dung and Organic Remains in Burials. Pp. 77–91 in *Humans and Landscapes of Çatalhöyük: Reports from the 2000–2008 Seasons*, ed. Ian Hodder. British Institute at Ankara Monograph 47. Monumenta Archaeologica 30. Los Angeles: Cotsen Institute of Archaeology Press.
- Twiss, Katheryn C., Jesse Wolfhagen, G. Arzu Demirergi, and Jacqui Mulville. In press. Macromammals of Çatalhöyük: New Practices and Durable Traditions. In *Communities at Work: The Making of Çatalhöyük*, ed. Ian Hodder and Christina Tsoraki. British Institute at Ankara Monograph. Monumenta Archaeologica. Los Angeles: Cotsen Institute of Archaeology Press.
- Van Neer, Wim, Ronald Gravendeel, Wim Wouters, and Nerissa Russell. 2013. The Exploitation of Fish at Çatalhöyük. Pp. 317–27 in *Humans and Landscapes of Çatalhöyük: Reports from the 2000–2008 Seasons*, ed. Ian Hodder. British Institute at Ankara Monograph 47. Monumenta Archaeologica 30. Los Angeles: Cotsen Institute of Archaeology Press.
- Wolfhagen, Jesse, Katheryn C. Twiss, Jacqui Mulville, and G. Arzu Demirergi. 2020. Examining Caprine Management and Cattle Domestication through Biometric Analyses at Çatalhöyük East (North and South Areas). In *Communities at Work: The Making of Çatalhöyük*, ed. Ian Hodder and Christina Tsoraki. British Institute at Ankara Monograph. Monumenta Archaeologica. Los Angeles: Cotsen Institute of Archaeology Press.
- Wolfhagen, Jesse, Rena Veropoulidou, Gianna Ayala, Dragana Filipović, Carla Lancelotti, Marco Madella, Ceren Kabukcu, Kamilla Pawłowska, Carlos Santiago-Marrero, and John Wainwright. 2020. The Seasonality of Using Wetland and Riparian Environments at Çatalhöyük. In *Communities at Work: The Making of Çatalhöyük*, ed. Ian Hodder and Christina Tsoraki. British Institute at Ankara Monograph. Monumenta Archaeologica. Los Angeles: Cotsen Institute of Archaeology Press.



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