Faunal remains from TPC Area, 2014

Julie Daujat

Introduction

This season saw the continuation of the analysis of Neolithic faunal remains from the TPC Area from past excavation seasons, supplemented by Neolithic material excavated this year. In addition, tooth and bone samples were selected for stable isotope analyses (oxygen, carbon and nitrogen) carried out by Dr Jessica Pearson (University of Liverpool). A substantial amount of time was spent tracking and extracting the required material, and locating suitable teeth and bones. Stable isotope analyses will provide substantial insight into diet of both humans and animals at the site, as well as elucidate their regional origins and movements.

This year's report for the TPC Area faunal remains presents an assessment of which of the targeted units from stratigraphically secure Neolithic contexts have been studied before, an overview of the material studied to date, and the objectives and protocol for the next season for the TPC Area.

TPC	*Total*
NISP	4,044
DZ	387.5

Table 6.8. *TPC faunal material recorded to date (DZ = diagnostic zone).*

The TPC Neolithic fauna

So far, a total of 4,044 animal bones (Table 6.8) have been recorded from Neolithic contexts in the TPC Area (see Archive report 2013).

A summary of the faunal material recorded from an infill deposit and cluster of animal bones in Sp.494, between the walls of B.110 and B.111 and the oven (F.3924) is presented in Table 6.9.

TPC Area 2012	*% NISP*	*% DZ*
Capra	12.9	19.7
Ovis	42.4	63.7
Ovis/Capra	30.9	14.6
Sheep-size	8.4	0
Bos sp.	1.1	0
Cow-size	0.3	0
Small-medium equid	0.6	1.0
Large cervid	0.3	0
Capreolus capreolus	0.66	0.5
Sus scrofa	0.3	0.5
Lepus	0.6	0
Vulpes vulpes	0.3	0
Large bird	0.3	0
Bird	0.8	0
Homo sapiens	0.3	0

Table 6.9. Relative proportions of taxa in Sp.494.

Clearly, caprines are the dominant animals representing 86.2% of NISP, with more sheep identified than goats. *Bos* – probably domestic--is very poorly represented, as are wild taxa. This seems to indicate that an economy mainly based on sheep and goat husbandry, but it is too early in the study to characterize systems of exploitation.

An interesting unit was excavated in 2012: it consisted of a cluster of animal bones (20255), including 199 caprine astragali (See Faunal Archive reports of 2012 and 2013; analysis by K. Pawlowska). These astragali represent a minimum of 96 individuals ranging from fetus to adult in age. It is noteworthy that 30% of them were modified from their natural state into 'knucklebones', through the smoothing of the medial and lateral surfaces.

In 2013, in addition to the remaining bones from Sp.494, three units ((30216), (30221), (30241)), as well as a deer antler (30779.x1) from Sp.514 in B.121, were recorded by K. Pawlowska (See Archive report 2013). There is no table with the relative proportions of taxa available in the report from 2013, though caprines are again dominant over other taxa.

A full and detailed quantitative assessment of analyzed bones and relative proportions of species will be given next year.

Assessment

For many of the targeted units, the material was scattered in different crates. The first task consisted of: i) re-grouping material from the same unit; ii) regrouping all the targeted units into new crates, and iii) necessitating revision of entries the 'Finds' database. This reorganization was necessary in order to facilitate access for next year season.

Secondly, an assessment of the targeted units needed to be done, in terms of which had been studied in previous years. Of 58 units selected by A. Marciniak for their archaeological significance, eight did not provide any faunal remains, one was not found in the 'Finds' database, and as mentioned above, for three units the material is lost. Of 46 units from 2012-2013 Neolithic contexts, four ((20255), (30216), (30221), (30241)) were completely recorded – 'Tier1 Recording' system, two ((20124), (30757)) were assessed – 'A4' and 'A3' assessment (only diagnostic bones recorded). Finally, 10 units ((20232), (30264), (30293), (30298), (30705), (30716), (30737), (30773), (30774), (30842)) were briefly scanned either for ^{14}C dating samples and/or stable isotopes samples and/or worked bones; these units will need to be fully studied. There are also 40 variably sized units of unstudied material– a few units contain relatively large quantities of material, though most units are quite small.

Thirdly, as mentioned earlier, it was hoped that *c.* 50 tooth and bone samples from caprines (sheep and goats), cattle, equids, and carnivores could be pulled for stable isotope analysis from a list of secure Neolithic contexts. Unfortunately, only two of these units ((20255) and (30774)) proved to contain useful material for such analyses. Therefore, it was decided to pull out material from other, not securely dated units, to achieve the needed *c.* 50 samples. Ultimately, 63 samples were prepared for export – scanned or photographed before sampling; most were sampled on site. For most samples, a small piece of cortical bone – between 0.5g and 2.5g – was taken using a diamond powder-coated cutting wheel. Teeth require a different sampling method – serial sampling of the enamel, for which it is necessary to have a proper laboratory environment and/or equipment. It was not possible to do it this year and this material was therefore not suitable for export.

These assessments enabled estimation of what could be expected for the analysis of the targeted units in terms of timescale. Considering the objectives (see below) and therefore the protocol that will be used to record the material, hopefully it will be possible to complete study of these units next season. If time remains, the faunal material that will be excavated next year could be briefly scanned to assess the quantity of work needed for the following season.

2015 objectives

Considering the nature and the short time of occupation in TPC Area, the aim is to understand and investigate the changes that occurred in the late levels of occupation at Çatalhöyük and led to the emergence of individual households. The analysis of animal bones will therefore focus on spatiality and specialization of domestic activities in different buildings and spaces. Are there any differences in production or supply of animal products between different households? Are there any differences in the way people prepared, cooked and consumed meat and secondary products from animals? Are there any differences in the way people disposed of their waste? Are there differences in the preparation and disposal layout between households?

These questions mainly deal with diachronic differences, though differences through time will be also considered. One major aim will be to understand the taphonomic history of TPC faunal assemblages. This will entail thorough recording of pre- (cut marks, breakage on fresh bones, and burning marks) and post- (carnivore gnawing, digestion, rodent and root etching, weathering, breakage of dry bones, etc.) depositional bone modifications. The relatively small quantity of material, contrary to the huge amount of animal bones from the South Area, will enable more use of the very detailed 'Tier1 Recording' system; TPC faunal recording will be as exhaustive as possible, especially in terms of quantitative data (counting everything, including scrap, perhaps even fragment size, and weight by taxon or size-category, counting all the taphonomic marks). This will enable good statistical comparisons between different assemblages, providing that there is sufficient data. In the Faunal database's 'Basic Fauna Table' several of these fields are present (e.g. burnt bone, gnawing, digestion, fragment

length; the 'Modification Table' allows recording of cut marks and chop marks. However, some post-depositional traces (e.g. weathering, root etching) cannot be recorded precisely using the current database. Such data can be entered in the 'Notes' field, and once the data are extracted, it should not be too difficult to add specific columns, in order to use the data for quantitative analyses. Species and anatomical representation will also be quantitatively analyzed and statistically compared whenever possible. Ageing and biometric data will be analyzed and compared in order to detect differences in the supply and/or choice of animals between households.

Research involvements

Introduction of domestic cattle: process and impact

Jessie Wolfhagen and Katheryn Twiss

Doctoral dissertation research being undertaken by Jesse Wolfhagen focuses on re-examining the process and social/environmental impact of the appearance of domestic cattle at the site. This will entail using: (a) standardized *Bos* measurements to create a change-point model to estimate when domestic cattle arrived at the site, and (b) stable and radiogenic isotopic analyses to compare aspects of wild and domestic cattle diet. Isotopic sampling will be undertaken in the next two seasons; this report focuses on describing the mathematical model for the appearance of domestic cattle.

Cattle are sexually dimorphic, and domestic cattle are generally smaller than both sexes of aurochsen, though domestic males and wild females overlap (Degerbol 1970; Russell *et al.* 2005). This complicates discrimination of wild vs. domestic cattle based on size alone as there are no threshold values that point towards domesticity; nor can one use evidence for two size groups to infer a mixed population (cf. Rowley-Conwy *et al.* 2012). Wolfhagen will resolve this issue by fitting mixture models to *Bos* limb bone measurements from the South Area. Mixture models fit data that can be interpreted as coming from multiple sources that would have different average sizes (e.g. wild male, wild female, and domestic males and females) (Helmer *et al.* 2005). Prior to the appearance of domestic cattle at Çatalhöyük, *Bos* measurement assemblages should be two-member mixtures (wild males and wild females). Since wild cattle are known to have been exploited throughout the occupation of Çatalhöyük, after the appearance of domestic cattle, *Bos* assemblages should be either three- or four-member mixtures (the two possibilities are due to the overlapping size of wild females and domestic males).

To determine when the shift from a two-member to a three+ -member mixture occurred a change-point model with Bayesian inference will be employed. This model states that initial levels of Çatalhöyük should contain two-member mixtures up to a certain stratigraphic level, when all of the following levels contain three-member mixtures. Bayesian inference on this model will allow identification of the 'change-point' by estimating parameter values and determining the likelihood (or how well the data 'fit' those parameter values). Possible values will be drawn from prior distributions: i.e. contextual information will be used to determine whether or not certain values are possible/likely before evaluating the data. By iteratively estimating sets of parameter values and using the likelihood of each set as a filter (i.e. sets of parameter values with higher likelihood are more likely than those with a low likelihood), this model will provide posterior distributions of parameter values for (1) the sizes of the different sub-populations of *Bos* (wild male, wild female, domestic), (2) at what stratigraphic level domestic cattle first appeared, and (3) the probability of each measured bone being in any of the three sub-populations. The third set of posterior estimates will be used to help structure stable and radiogenic isotopic analyses to directly compare wild and domestic cattle

Equid speciation and ecology

Katheryn Twiss, Jacqui Mulville, Jessie Wolfhagen, G. Arzu Demirergi and Richard Madgwick

Equids were important prey species across much of Pleistocene and early Holocene Eurasia, providing meat, hides, bones, teeth, and presumably hair. Both large (horse-sized) and smaller (ass or donkey-sized) equids were