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The Neolithic tell as a multi-species monument: Human, animal, and plant relationships through a micro-contextual study of animal dung remains at Koutroulou Magoula, central Greece

Georgia Koromila[a,*], Panagiotis Karkanas[b], Yannis Hamilakis[c], Nina Kyparissi-Apostolika[d], Georgia Kotzamani[e], Kerry Harris[f]

[a] School of Archaeology, Geography and Environmental Sciences, University of Reading, Whiteknights, Reading RG6 6AB, UK
[b] Malcolm H. Wiener Laboratory for Archaeological Science, American School of Classical Studies, Souidias 54, Athens 10676, Greece
[c] Joukowsky Institute for Archaeology and the Ancient World, Brown University, Box 1837, 60 George Street, Providence, RI 02912, USA
[d] Ephorate of Palaeoanthropology and Speleology Greek Ministry of Culture, Ardittou 34b, 11636 Athens, Greece
[e] Hellenic Ministry of Culture and Sports, Ephorate of Antiquity of Athens, Makriyianni 2-4, Athens 11742, Greece
[f] School of Humanities, University of Southampton, Southampton SO17 1BJ, UK

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ABSTRACT

Neolithic tells are traditionally considered synonymous to prolonged and persistent human activity. In this paper, micro-contextual examination of dung-related evidence at the Neolithic tell of Koutroulou Magoula, central Greece challenges this anthropocentric view. Thin section analysis demonstrates the abundance of dung indicators – including faecal spherulites, phytoliths, phosphatic impregnative features, and microlaminated fabrics – within a range of deposits and contexts across the site; such evidence was observed in built and unbuilt spaces, and enabled identification of possible penning areas and documentation of the use of dung as fuel source. Targeted archaeobotanical and phytolith analyses of dung-rich deposits point to diverse animal feeding practices and joint human-animal engagement with a range of ecological resources. Based on this integrated evidence which illustrates the significance of animals in co-creating and sharing living environments with humans at Koutroulou Magoula, we argue for the value of a multi-species perspective in Neolithic research.

1. Introduction

The archaeological significance of animal dung is widely recognised, as it comprises an important resource for pre-industrial societies, e.g. used as fertiliser, fuel, and construction material, and can provide direct evidence on animal diet and husbandry practices (e.g. Anderson and Ertug-Yaras, 1998; Jones, 2012; Shahack-Gross, 2011). In particular, dung has become a key subject of investigation in current Neolithic research. Recent decades have seen a proliferation of dung-related studies that cover a range of methodological approaches and analytical perspectives, and have greatly contributed to our understanding of Neolithic life. Some studies have highlighted the use of manure in crop cultivation, evidenced through isotopic signatures of plant remains, with implications for the inferred extent and intensity of agricultural practices (e.g. Bogaard, 2012; Vaiglova et al., 2014). Ethnoarchaeological and experimental research has explored the potential of dung as fuel resource, including its firing properties, the range of activities associated with dung fuel, the seasonality of its use, and the different types of its preparation and storage (e.g. Anderson and Ertug-Yaras, 1998; Gur-Arieh et al., 2014, 2013). Other ethnoarchaeological investigations have provided insights into recent agro-pastoral practices and their spatial configurations, and highlighted issues of preservation and taphonomy of dung remains (e.g. Elliott et al., 2015; Shahack-Gross et al., 2004, 2003). Biomolecular analyses of faecal remains have provided evidence on dung provenience, distinguishing between herbivore and omnivore species in order to build a clearer picture of animal presence and on patterns of dung distribution in archaeological sites (e.g. Shillito et al., 2011). Finally, integrated plant and microstratigraphic approaches have examined dung remains as evidence of animal management and feeding/herding practices through the analysis of ingested plant material, providing insights into animal diet, ecology, and resource strategies (e.g. Portillo et al., 2012; Portillo and Albert, 2011; Portillo et al., 2009; Shillito et al., 2013).

This paper examines dung evidence at the Neolithic tell settlement of Koutroulou Magoula, central Greece, where thin section analysis identified dung as a major constituent of the sediments comprising the

* Corresponding author.
E-mail address: georgia.koromila@reading.ac.uk (G. Koromila).

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site's stratigraphy. This observation is similar to other tell sites where micromorphology has been used for micro-stratigraphic investigation; the best-known example is the Neolithic tell of Çatalhöyük, Turkey, where Matthews (2005) and Shillito (2011) identified ample evidence of different types of herbivore and omnivore dung, e.g. in middens and in primary penning contexts. Later tell sites have also been shown to comprise high concentrations of dung-derived deposits, such as the Late Bronze Age and Iron Age urban layers of Tel Dor, Israel (Albert et al., 2008). Within this research context, in this article we take the opportunity to examine the abundant and well-preserved dung remains at Koutroulou Magoula with the aim of providing insights into the role of animals within the community and, more broadly, exploring the multiple human-animal interactions. In particular, we explore the following interlinked questions:

- What evidence can we provide on animal diet by examining plant-derived dung content? Based on this evidence what can we learn about the availability and use of ecological resources, and the patterns of animal (and human) mobility through the landscape?
- Was dung perceived and employed as a resource by the inhabitants of Koutroulou Magoula? What uses of dung can be documented in examining the histories of deposition and preservation of dung deposits, in their contextual associations? Can we discern any patterns of use and final deposition that may be linked to seasonal or environmental factors?
- What are the implications of dung evidence for the human-animal day-to-day experience in the settlement? What could be inferred on the nature of human-animal relationships that would have been built and maintained through routine practice, cohabitation and close physical interaction? How can the study of dung remains contribute to current theoretical debates on the co-constitution of human/animal worlds, in archaeology as well as in animal studies?
- What are the implications of these findings for the Greek Neolithic, and the study of the Neolithic more broadly?

2. The site

Koutroulou Magoula is a mound located at the south-east edge of the Thessalian plain, central Greece (Fig. 1), where it rises c. 6.6 m above the modern surface and constitutes a prominent landscape feature. The main archaeological phase is the Middle Neolithic when a large and thriving village was established. AMS radiocarbon dating places the Neolithic occupation of the site within the first two centuries of the 6th millennium B.C.E. (Hamilakis et al., 2017). The site was also used as a burial ground in the Late Bronze Age (c. 1200 BCE), and the Medieval times (12 c. CE). Archaeological work on the mound started in 2001 by the 14thEphorate of Prehistoric and Classical Antiquities (now Ephorate of Antiquities of Phthiotida and Evrytania), directed by Dr. N. Kyparissi-Apostolika (Kyparissi-Apostolika, 2003). Since 2009 (formally since 2010) the investigation of the site became part of the Koutroulou Magoula Archaeology and Archaeological Ethnography Project, a collaboration between the Greek Archaeological Service and the University of Southampton under the auspices of the British School at Athens (Hamilakis and Kyparissi-Apostolika, 2012; Hamilakis et al., 2017; Morgan, 2011, 2012, 2013). In 2017, and following the move of one of the two co-directors to Brown University, a new collaboration framework was established, involving the Ephorate of Phthiotida and Evrytania, the Brown University, and the Universities of Liverpool (for the 2017 season), and University College London (2018–).

Fig. 1. Map of Greece indicating the location of Koutroulou Magoula.

The location of Koutroulou Magoula at the edge of the alluvial plain of the Trikala Basin and near the foot of mountainous formations to the south-east indicates proximity and access to diverse geomorphological and ecological niches, including lower and higher altitude vegetational zones, such as mixed woodland, semi-open grasslands, and patches of wetland, that would have provided a range of options and potential resource strategies for the Neolithic community (Bottema, 1979, 1982; Koromila et al., 2017; Van Andel and Runnels, 1995).

The anthropogenic character of the investigated deposits indicates that the formation of the mound was the result of spatially focused human activity and accumulation, and more specifically the successive building and rebuilding activity on the same spot. The excavation thus far has exposed stratigraphic sequences down to 2.5 m from the surface of the tell, without any evidence of hiatus.

The built environment of the settlement seems to have been characterised by free-standing rectilinear buildings. Two well preserved examples have been fully excavated to date, as remains of stone wall foundations and cobbled under-floor layers on top of which clay floors seemed to have been laid; a number of other, partially preserved rectilinear buildings have been also unearthed. In one of the two fully excavated buildings, two or three earlier building phases, of the same position and orientation, have been revealed. This evidence is corroborated by the geophysical surveys, which suggest the presence of more similar features throughout the settlement. The outdoor spaces between buildings were places of intensive accumulation and activity, as indicated by finely stratified midden-like deposits, and charred and ash residues; by the presence of spatial features such as fire installations, stake holes and paved surfaces; and by densely deposited anthropogenic remains, including high amounts of pottery, animal bones, ground stones, lithics, and clay figurines (Hamilakis and Kyparissi-Apostolika, 2012; Hamilakis et al., 2017; Kyparissi-Apostolika and Hamilakis, 2012).

The geophysical and topographical surveys have also shown the existence of terracing, most probably to facilitate building activity, and the presence of con-centric curvilinear features surrounding the occupation area; these features have been interpreted as ditches defining the habitational area, which may have also served other purposes (Hamilakis and Kyparissi-Apostolika, 2012; Hamilakis et al., 2017; Kyparissi-Apostolika and Hamilakis, 2012).

3. Methodology

In our research approach we integrate data produced by thin section analysis of sedimentary sequences with bioarchaeological data, namely phytoliths, plant macroremains, and animal bones. This interdisciplinary approach enables us to piece together a dataset with broad