

## **Environmental Archaeologies of Neolithisation: Old World case studies**

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The origins and spread of Neolithic life-ways represent a pivotal change in human ecology and society. Communities transformed their relationships with the world around them, shifting away from reliance upon hunted and collected wild resources, to the management and domestication of plants and animals, alongside a pattern of increasing sedentism. These processes were played out at differing temporal and spatial scales; from the life-cycle of a single organism of a population on the path to domestication, to the dissemination of 'new' farming economies around the world. The varied fields within environmental archaeology are providing an increasingly detailed understanding of the agencies, processes and pathways in these transformations. These include work in the established fields of geoarchaeology, zooarchaeology and archaeobotany (Bendrey et al. 2013). In recent decades advances in archaeological science have opened up exciting and fruitful new avenues of research. Techniques such as stable isotope analysis, for example, are allowing understanding of life histories of individual animals and their interactions with their environments (Balasse et al. 2012). On a broader scale, genetic studies and geometric morphometrics give greater understanding of changes at the population level and can inform on the diffusion of farming economies (Larson et al. 2007; Ottoni et al. 2012). It is the inter-disciplinary applications of environmental archaeology that are significantly contributing to our understanding of processes of Neolithisation.

The papers brought together in this volume were presented at the Association for Environmental Archaeology, Autumn Conference 2012, held at the University of Reading, UK. This meeting brought together a rich and diverse set of papers on the applications of environmental archaeology to the study of the origins and development of Neolithic life-ways, from the core areas of the origins of the Neolithic in the Near East out to more distant parts of the Old World where the transition to the first farmers happened millennia later. The papers are being published in two volumes. The first considers a regional sequence which in a global view is relatively well understood: the dissemination of farming economies across Europe (Bendrey et al. 2014). These papers explore detailed case studies along this trajectory, starting from south-east Europe around 6000 BC and finishing in north-west Europe some three millennia later, and together significantly add to the narrative of the Neolithisation of Europe (Tresset and Vigne 2011; Hadjikoimis et al. 2011). It is also the case that inter-regional variability is increasingly being recognised in the early stages of the transition to farming (e.g. Gangal et al 2014; Linstädter 2008) and we must therefore move away from 'one size fits all' models, to each region being discussed on its own terms. This volume, the second from the conference, contributes to this aim by presenting a series of diverse case studies from across the Old World that contribute to regional narratives, allow for comparative inter-regional studies and widen the scope for understanding these transitions.

Şevketoglu and Hanson (2015) present the results of rescue excavations at the site of Akanthou-*Arkosykos* on the north coast of Cyprus. Radiocarbon dates for possibly the earliest olive stone on the island and carbonised pistachio have established that occupation was contemporary with that at the site of Shillourokambos, in the late ninth to early eighth millennium BC. The permanent settlement has yielded evidence for a combination of both hunting and herding practices, and the highest concentration of obsidian finds seen at any site on the island, indicative of prolonged contact with the Anatolian mainland.

Moving eastwards to Iraqi Kurdistan and the hilly flanks of the Zagros mountains, Iversen presents a microarchaeological study of edible land mollusc exploitation at the Early Neolithic settlement of Bestansur. At this site, dating to the earlier 8<sup>th</sup> millennium BC, Iversen examines the activities of

collection, preparation, consumption and disposal through a spatial study of large numbers of *Helix salomonica* shells at the site. Molluscs are a visible part of the archaeological record of Early Holocene sites in the eastern Fertile Crescent, but have been relatively under researched and Iversen's microarchaeological quantitative analysis of molluscs in Neolithic settlement archaeology contributes to rectifying this situation.

Zhuang's (2015) reviews the Early Neolithic of North China and presents geoarchaeological and landscape perspectives from the Chinese Loess Plateau and the Lower Yellow River. Micromorphological analysis of the archaeological soils is used to investigate evidence for early farming, repeated occupation and abandonment of archaeological sites. The evidence from northern China suggests a gradual and regionalised Neolithisation based on evidence for ecological diversity in early farming and diversified land use patterns.

Lebreton et al. (2015) provide an important contribution for environmental archaeological research in North Africa. This paper documents the vegetation history based on the results of pollen analyses from the semi-arid area of Central Tunisia. Analyses are conducted from 2.5 metres of a core retrieved from the centre of the sebkha-lagoon, Halk el Menjel. This analysis provides important new information to address the expansion of *Olea* at the Middle-Late Holocene transmission. The results provide evidence for *Olea* expansion dated to  $4946 \pm 108$  cal BP, suggesting possible early cultivation in the eastern Maghreb by Neolithic populations.

A multi-proxy approach utilising charcoal, seeds/fruits and phytoliths analyses is adopted by Salavert et al. (2015) to understand the Neolithic exploitation of vegetal resources and surrounding palaeoenvironment in the southern Crimean Mountains. These mountain ridges link Ukraine and the western Caucasus. This paper provides an important contribution to the understanding of Neolithic socio-economic frameworks. The layers within this rock-shelter, Buran-Kaya IV, date to 5800-5300 cal BC and the results from these analyses indicate a hunter-gather society based on wild food and animals rather than crop based agriculture and domesticated animals.

The final contribution is that of Elliott et al. (2015), who conduct an ethnoarchaeological study of animal husbandry in the modern village of Bestansur, which is situated some 700 metres from the Early Neolithic site of Bestansur (see Iversen 2015). The location of Bestansur is within a region of the ancient Near East with early evidence for the emergence of goat husbandry (Zeder 2011). The study of Elliott et al. (2015) is aimed at providing the groundwork for archaeological investigations of past animal husbandry practices in the local landscape on the basis that modern behaviours and identifiable ecological constraints and affordances can suggest testable patterns for past practices within the same functional and ecological domains. This paper explores how modern families use and manage their livestock within the local landscape and identifies traces of this use through archaeologically-detectable methods. The latter are significant in providing modern reference material for comparative archaeological purposes.

Processes of Neolithisation involved fundamental economic and social transformations that unfolded over multiple and diverse pathways, being both locally and historically contingent (Barker 2006). The contributions presented in this volume highlight the ways in which environmental archaeological studies are returning perspectives on these processes in various regions of the Old World. The application of diverse methodologies is identifying continuity and change in the plant and animal economies and wider environments of sites (Lebreton et al 2015; Salavert et al. 2015) and the long-term interaction between landscape change and cultural evolution (Zhuang 2015). The continued construction and improvement of region-specific modern reference datasets as control data for archaeological studies is also an important part of such research (Elliott et al. 2015). As Elliott et al. also discuss, ethnoarchaeological research can provide useful analogy for archaeological

research through providing examples of possible behaviours, strategies and processes within defined contexts.

The studies emphasise different dimensions of social interaction. Iversen's study stresses the local and contextual formation of the archaeological record – with mollusc processing and consumption probably occurring in repetitive communal contexts at the periphery of the settlement at Bestansur. As Iversen discusses, the mollusc consumption probably had relatively greater social significance than nutritional significance. Such events may be viewed within a context of communal food consumption helping to mediate social relationships during the radical economic and social transformations underway in the Early Neolithic (Asouti and Fuller 2013). Şevketoğlu and Hanson's paper, on the other hand, emphasizes more extensive social networks, connecting communities through the exchange of materials. Obsidian networks traversed land and sea, drawing together and mediating between scattered settlements. These networks facilitated the circulation of ideas, innovations and technologies, as people increasingly engaged with, and became entangled by, the material world, searching for solutions to new problems (Hodder 2013).

These diverse studies further underscore the local responses and narratives of Neolithisation. For example, in northern China Zhuang (2015) identifies a gradual and regional indigenous Neolithisation process, whereas elsewhere we clearly see the introduction of farming from other regions. In the Crimean peninsula we see elements of Neolithic cultural transition, such as pottery production, but no indications for a food producing economy at Buran Kaya IV (Salavert et al. 2015). Hunter-gatherer pottery production has been identified in the Far East and Siberia from 15,000 BC, and spread westwards, converging with early agriculture in the Near East (Gibbs and Jordan 2013). Diverse lifeways from across Eurasia influenced the development of regional, disparate Neolithisations.

The papers presented here, and in the first volume from the conference (Bendrey et al. 2014), demonstrate the diversity and vitality of environmental archaeological work. Together these provide a significant contribution to understanding contexts for the origins of the Neolithic in different regions of the Old World. Moreover, independent of any specific region, these papers underline the central role of environmental archaeology in elucidating the complex and integrated economic, social and environmental processes of Neolithisation. The volumes represent not just a review of how far we have come in our understanding of these regional perspectives, but the exciting potential for future avenues of research.

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