«Digital Archaeology Bern – Ancient West Asia», 6–8 October 2023
Paper submission

Modelling the range of wild plants and crop progenitors in the Late Epipalaeolithic–Early Neolithic Levant

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Abstract

Late Epipalaeolithic and Early Neolithic societies in the Levant were amongst the first in the world to begin cultivating wild plants and, eventually, domesticating crops. The transition is well-documented in the archaeobotanical record and other palaeoecological proxies from this period, however these give 'snapshots' of flora at particular times and places, usually significantly conditioned by human action and various taphonomic processes. We cannot fully understand the economic choices of the first farmers without considering the wider, natural (or at least less anthropogenic) ecologies which they inhabited. Ecological niche modelling (ENM), also known as species distribution modelling, is widely used by ecologists to predict the ranges of plants and animals in the future or in hypothetical scenarios. ENM models are typically 'trained' on observed occurrences of the species of interest in relation to a number of environmental variables, then used to predict the probability of occurrence in an altered environment described by the same variables. They have also been applied to archaeology and palaeoecology, where the altered environment is typically a reconstruction of past conditions, however until recently this has been limited by the difficulty of obtaining occurrence data and palaeoclimate reconstructions of sufficient coverage. This is been especially true of West Asia, where key datasets used for ENM in other regions have often been lacking.

Here I present an application of ecological niche modelling can be used to reconstruct the ranges of several key wild plants and crop progenitors in the Levant over the course of the Late Epipalaeolithic and Early Neolithic. Recently-published open data on occurrences and a variety of (palaeo)environmental indicators, as well as advances in statistical methodology and software, has made it much more feasible to apply ENM in the context of the archaeology of West Asia. I also explore the use of *archaeological* occurrence data—drawn from the archaeobotanical, zooarchaeology, and radiocarbon records—to assess the accuracy of model predictions. This is an important prerequisite to establishing ENM as a reliable method of reconstructing past ecologies, but remains hampered by the relatively slow progress of open data in archaeology compared to ecology and climate science.

Keywords

Prehistory; Levant; ecology