

Paper review: Hristov, P., Spassov, M., Iliev, N. Radoslavov, G. 2015: An independent event of Neolithic cattle domestication on the South-eastern Balkans: evidence from prehistoric aurochs and cattle populations. *Mitochondrial DNA*, <http://dx.doi.org/10.3109/19401736.2015.1127361>

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Domestication was a technical innovation of crucial importance in the history of humankind as it created a buffer in food provisioning unavailable to hunter-gatherers: livestock and crops. The occurrence of sheep and goat in Europe was a clear sign of diffusion (at least that of domestic animals) from Southwest Asia, as no wild caprines lived in Europe that could have been the ancestors of these Neolithic domestic animals. The situation was very different for pig and cattle, whose local wild forms were widely available for domestication across Europe. Ancient DNA research into pigs has revealed several waves of mutual introgression into both European and Asiatic pigs (Ottoni et al. 2013). The situation seems even more complex in cattle whose wild ancestor became extinct in the 17th century, and the paper under discussion here is an important contribution to the discussion.

Over forty years ago, the late Sándor Bökönyi (1974) hypothesised that a “cattle domestication fever” had swept through the Carpathian Basin during the Late Neolithic. He based his theory on the evidence of massive bovine bone deposits at several Late Neolithic tell sites in Hungary. These settlements provided not only evidence for large bones from aurochs and small bones from domestic cattle – a practical distinction *ab ovo* based on circular reasoning in the absence of genetic information. They also yielded numerous bovine bones from individuals of transitional sizes, putative crosses between the large wild and small domestic forms. “Appearances”, that is phenotype, was the only way to approach the problem in those days. Inherited size and the effects of environment on the animals’ size could not be distinguished, as ancient DNA research began only almost a decade later. When its results first began indicating an Early Neolithic link to Near Eastern aurochs in Southeast Europe, attention was focused on the possibility that some domestic cattle were introduced to Europe (Edwards et al. 2007) together with sheep and goat. The basic dilemma thus has included:

- independent local cattle domestication in Neolithic Southeast Europe and/or
- a single event of domestication in the Middle East and the subsequent dissemination of domestic cattle across Europe.

Since then, however, a far more complex picture seems to be emerging and the study by Hristov et al. adds valuable detail to our current knowledge, as they present results of ancient DNA analyses concerning aurochs in the Balkans for the first time, as well as their relation to domestic cattle during the Neolithic. In the specific case of aurochs, i.e. origins of domestic cattle, the influx of Near Eastern alleles remains a good basic disposition, but it is hard to follow how, when and where introgressions by local aurochs have taken place. These latest results are all the more interesting given the key importance of the Balkan region in the neolithisation of Europe. The analysis of 17 bone samples from a variety of archaeological sites by D-loop control region showed no difference between the genetic profiles for wild and domestic bovines included in this regional study. On the basis of their results, the possibility of independent local domestication cannot be ruled out. These events may have been combined with subsequent waves of parallel dissemination of cattle herds via the Mediterranean route of neolithisation.

Personally, these scientific developments remind me of the emergence of radiocarbon dating in archaeology. Both techniques may have methodological problems (e.g. of contamination) and margins of error, but at least they reveal the complexity of archaeological situations. Radiocarbon dating upset traditional typochronologies. Artefact types in the preceding scenario may be seen as analogous to the phenotypes of animals: appearances without a “background”: 19th scholarly tradition relied on the precise categorisation of visible types, trying to establish relationships between them. Both radiocarbon dating and ancient DNA studies give new depths to these valuable efforts in research history. Another similarity is that after more than seven decades, radiocarbon dating is still being refined. As it becomes more widely available (smaller, less destructive samples, lower costs) a host of previous methodological questions can be successfully addressed using statistically reliable series of dates. The same trend is visible in archaeogenetic research. While it is true of ancient DNA studies that they expose spatial and chronological distributions of many traits that remain physically invisible (i.e. not manifested in the phenotype), the quantitative accumulation of such patterns tends to reveal qualitatively new information.

As ancient DNA results show, nothing is as simple as we used to think. But complementing traditional archaeozoological work based on osteomorphology, now we can start seeing some of the underlying processes.

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