

DNA reveals Neolithic farmers' near Eastern affinities

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During an international research project, scientists from the Institute of Anthropology at the Johannes Gutenberg University Mainz and the University of Adelaide worked with a number of additional partners to research the structure and dynamics of population genetic processes in central Germany during the Neolithic period (7,500-4,100 years ago).

No change in epoch has shaped the history of the human race like the Neolithic Revolution. The cultural transition from the gathering to the producing economy and the settling of communities took place around 11,000 years ago in the Near East, and reached central Europe around 7,500 years ago with the most significant Neolithic culture, the Linear Pottery Culture (LPC). In controversial hypotheses, there have long been speculations attempting to explain the spread of the farming lifestyle from the Fertile Crescent to Europe: via idea transfer and acculturation, or even through different forms of infiltration by foreign civilizations in central Europe.

As a "neolithic package", the immigrants didn't just import new species such as domestic cattle and cultivated plants such as einkorn. By mixing with the local population, they also left traces in the genetic pool of central Europe. These traces are still evident today in the form of allochthonous [DNA markers](#) (mtDNA and Y-chromosome lineages).

The present interdisciplinary study analyzed samples of old DNA (aDNA) from a burial ground at the Early Neolithic Derenburg-Meerestieg II site in the Middle Elbe-Saale region. The main finding of

the study is the first molecular genetic proof indicating that the [genetic profile](#) of the early neolithic settlers from Derenburg has strong similarity with populations currently living in the Near East. This means that, in this case as least, the first farmers immigrated to central Europe, instead of the hunter-gatherer populations previously prevalent in the region simply adopting a farming lifestyle. The genetic signatures also provide clues to the immigration route via South East Europe and the Carpathian Basin to Central Europe. Based on the information gained, it is now possible to reconstruct the settlement processes that have been so influential for early European history.

In addition to the actual historical findings, the conclusions drawn are also of major relevance to the current debate surrounding immigration: "Out of Africa" marks the beginning of the spread of the Homo species throughout the world over two million years ago. Humans are migrants by nature and it is clear that mobility and migration have been part of our behavior for all time. Increases in population density and the rise in hierarchy in society, a strongly regimented access to natural resources, human intervention in nature and war have gradually led to a rise in economic and social pressure within and between societies - with obvious results.

The emotionally charged discussion surrounding integration in Germany could be diffused if politicians used the tools available to demonstrate the joint roots shared by locals and immigrants. The task has surprisingly fallen to the discipline of archaeometry to make these connections clear. The most significant economic transformation in the history of the modern humans - the Neolithic Revolution - began in a region that is thought to be the birthplace of all Europeans, who spread outwards in waves of migration. These findings are not a completely unexpected development for traditional pre-history research. The scientific proof, however, has only just been found in a combined effort between archeology and anthropology.

More information: W. Haak, O., et al. The Genographic Consortium: "Ancient DNA from European Early Neolithic Farmers Reveals Their Near Eastern Affinities", in: *PLoS Biology* (2010) 8(11): 1-16.

Provided by Johannes Gutenberg University Mainz

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