

Early agriculture left traces in animal bones

March 23 2009

Unraveling the origins of agriculture in different regions around the globe has been a challenge for archeologists. Now researchers writing in the *Proceedings of the National Academy of Sciences* report finding evidence of early human experiments with grain cultivation in East Asia. They gathered this information from an unlikely source—dog and pig bones.

The dog and [pig bones](#), as well as bones of other animals analyzed in the study, come from an archaeological site in a region of northwest [China](#) considered to be a possible early center of East Asian [agriculture](#). Chemical traces within the dog bones suggest a diet high in millet, a grain that wild dogs are unlikely to eat in large quantities, but that was a staple of early agricultural societies in northwest China. "If the dogs were consuming that much millet, their human masters were likely doing the same," says Seth Newsome, a coauthor on the study and a post-doctoral associate at the Carnegie Institution's Geophysical Laboratory, where the chemical analysis was performed.

The bones come from a Neolithic site known as Dadiwan, in China's western Loess Plateau, excavated first by a Chinese team in the late 70s and early 80s, and in 2006 by a team from the University of California, Davis, and Lanzhou University in China. Humans occupied the site during two main phases, from 7,900 to 7,200 years ago (Phase 1) and from 6,500 to 4,900 years (Phase 2). Though some fossil remains of millet plants have been found in both of these deposits, the fossils don't directly reveal how much millet contributed to the local diet.

To address this question, the researchers turned to a technique known as stable isotope analysis. Atoms of elements such as carbon come in different forms (isotopes) which are chemically similar, but can be distinguished in the laboratory by minute differences in their mass. Certain kinds of plants known as C4 plants tend to concentrate heavier carbon isotopes as they grow, compared to other plants known as C3 plants. Animals with diets high in C4 plants also tend to concentrate heavier isotopes in their bones. As it turns out, millet is one of the few C4 plants that grow in arid northwest China, making the carbon isotopes in [bone](#) a good indicator of a millet-rich diet.

The researchers found that the most of the dog bones from the Phase 1 deposits bore the isotopic signature of a high millet diet. This suggests that these dogs were domesticated and fed by humans who harvested millet. Bones of pigs from the site tell a slightly different story. In the Phase 1 deposits, the pig bones don't show signs of millet in the diet, so they were probably wild pigs hunted and eaten by people. But pig bones from Phase 2 do have the isotopic signature of millet, so they were probably domesticated by this time.

"Our results help fill in the picture of how agriculture arose in this part of the world," says Newsome. "There has been speculation that agriculture spread north from southern rice-farming areas, but the Phase 1 people were likely experimenting with agriculture by cultivating local grains. This simple system was later replaced by people in Phase 2 who had a much more developed agricultural system."

More information: Loukas Bartona, Seth D. Newsome, Fa-Hu Chen, Hui Wang, Thomas P. Guilderson, and Robert L. Bettinger. Agricultural origins and the isotopic identity of domestication in northern China, [Proceedings of the National Academy of Sciences](#) Online Early Edition, March 23-27, 2009

Source: Carnegie Institution

Citation: Early agriculture left traces in animal bones (2009, March 23) retrieved 25 April 2024 from <https://phys.org/news/2009-03-early-agriculture-left-animal-bones.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.