



Press Release

Flexible Mr. Fox

Tübingen researchers show foxes started eating human garbage 40,000 years ago

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Even 40,000 years ago, foxes were adapting to the presence of humans - and changed their diet accordingly. This happened as anatomically modern humans entered what is now southwestern Germany and the caves of the Swabian Jura became subject to greater use. A team of researchers from the Senckenberg Center for Human Evolution and Palaeoenvironment at the University of Tübingen has been investigating the fox's main sources of food and relationship with humans in the period from 42,000 to 32,000 years ago. Team members Chris Baumann, Professor Hervé Bocherens, Dr. Dorothee Drucker and Professor Nicholas Conard carried out isotope analyses on fox bones from various sites in southwestern Germany, including several caves in the Swabian Jura. Some of the foxes lived near humans; but there were also animals which were independent of humans; they went hunting or scavenged off the kills of larger predators. The results have been published in *PlosONE*.

Humans began to influence their environment at an early stage. It's thought that human hunting in the late Pleistocene led to the extinction of large herbivores. "In this study, we were seeking to discover whether human hunting activity may have provided advantages for some animal species," says Chris Baumann. Originally, the main food source for the red fox and arctic fox (*Vulpes vulpes* and *Vulpes lagopus*) was small mammals, which the foxes hunted. "That was the case in the Middle Palaeolithic, more than 42,000 years ago," Baumann says. "In southwestern Germany that was the time of the Neanderthals and the Swabian Jura was only sparsely populated."

A new ecological niche

When modern humans moved into the region in the Upper Palaeolithic, a new ecological niche opened up for the foxes. In the cultural epochs of the Aurignacian (42,000 to 34,000 years before today) and Gravettian (34,000 to 30,000 years before today), the caves in the Swabian Jura were used more intensively. "The isotopic data from the fox bones

University of Tübingen
Public Relations Department

Dr. Karl Guido Rijkhoek
Director

Janna Eberhardt
Research reporter

Phone +49 7071 29-76788
+49 7071 29-77853
Fax +49 7071 29-5566
karl.rijkhoeck[at]uni-tuebingen.de
janna.eberhardt[at]uni-tuebingen.de

Senckenberg Nature Research
Society
Press Office

Dr. Sören Dürr
Director

Judith Jördens
Phone +49 69 7542 1434
judith.joerdens[at]senckenberg.de

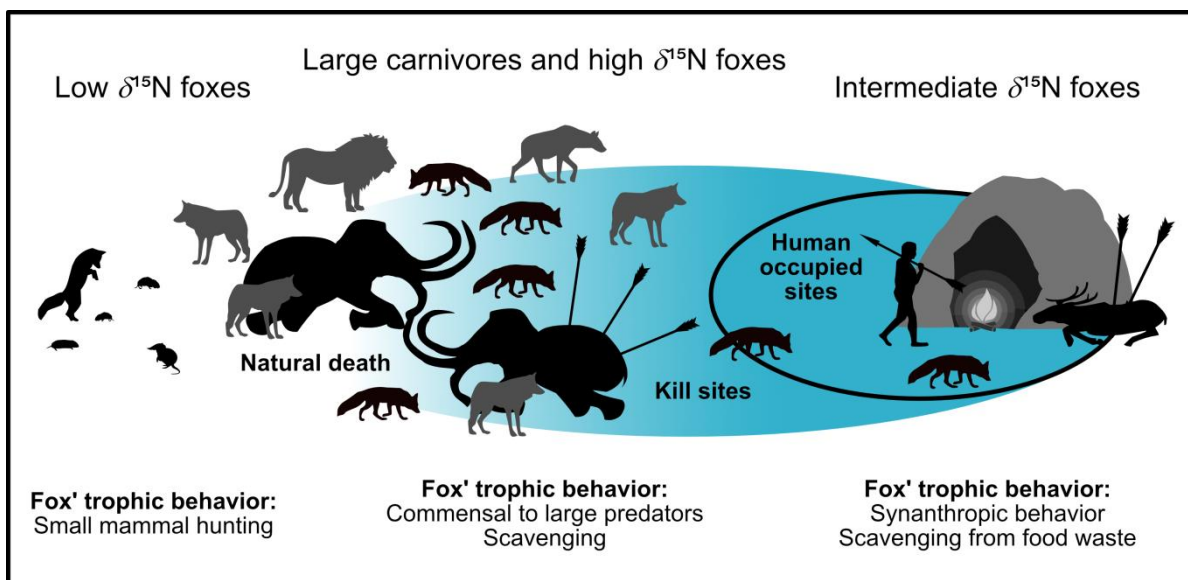
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indicate that the composition of several animals' diets changed. We assume that these foxes now lived mainly on meat waste left behind by humans, or perhaps were even fed by them," says Hervé Bocherens. The data showed the meat was from large animals that the foxes could not bring down – such as mammoth and reindeer.

"The humans dragged the whole reindeer into their caves. But the huge mammoths were butchered in the place they were killed," Baumann explains. The foxes probably used both as food sources. Foxes, he says, are very flexible and are quick to switch to the most easily available food. Baumann points out that even today, foxes can be observed scavenging rubbish near human settlements. But with the free food came danger – jawbones from the Vogelherd Cave in the Lone Valley revealed Upper Palaeolithic-era incisions, indicating that humans made use of the foxes' meat and fur.

Dog, fox and wolf

In an earlier publication, the team had studied the food spectrum of dogs, foxes and wolves in the period between 17,000 and 13,000 BP (the Magdalenian cultural period), from several sites in southwest Germany and Switzerland. "The wolves fed on a broad spectrum of prey, while dogs depended on humans for their food," Baumann summarizes. Most foxes occupied their own ecological niche and hunted small mammals. "However, there was one red fox with a similar food spectrum to that of the dogs. He lived near humans, like the foxes in modern-day cities."



The graphic shows the differing feeding strategies of foxes in southwestern Germany some 100,000 to 32,000 BP: Some hunted small prey, while others ate the larger animals killed by humans or larger predators. Illustration: Chris Baumann

Publications:

Chris Baumann, Hervé Bocherens, Dorothée G. Drucker, Nicholas J. Conard: Fox dietary ecology as a tracer of human impact on Pleistocene ecosystems. *PlosONE*, <https://doi.org/10.1371/journal.pone.0235692>

Chris Baumann, Britt M. Starkovich, Dorothée G. Drucker, Susanne C. Münzel, Nicholas J. Conard, Hervé Bocherens: Dietary niche partitioning among Magdalenian canids in southwestern Germany and Switzerland. *Quaternary Science Reviews*, Volume 227, 1. Januar 2020; <https://doi.org/10.1016/j.quascirev.2019.106032>

Contact:

Chris Baumann
University of Tübingen
Faculty of Science
Biogeology
chris.baumann[at]uni-tuebingen.de