

# Calcium isotope vertebrate ecology and Neanderthal ecosystem alteration in the Last Interglacial (Eemian) lakeland of Neumark-Nord (Germany)

THÉO TACAÏL<sup>1</sup>, LUTZ KINDLER<sup>2,3</sup>, SABINE  
GAUDZINSKI-WINDHEUSER<sup>2,3</sup>, WIL ROEBROEKS<sup>4</sup> AND  
THOMAS TÜTKEN<sup>5</sup>

<sup>1</sup>Johannes Gutenberg-Universität Mainz

<sup>2</sup>MONREPOS Archaeological Research Center and Museum for  
Human Behavioral Evolution

<sup>3</sup>Institute of Ancient Studies, Pre- and Protohistoric  
Archaeology, Johannes Gutenberg University of Mainz

<sup>4</sup>Faculty of Archaeology, Leiden University

<sup>5</sup>Universität Mainz, Department of Analytical Palaeontology

Presenting Author: [tuetken@uni-mainz.de](mailto:tuetken@uni-mainz.de)

The influence of Pleistocene hunter-gatherers on their ecosystems is a challenging aspect to reconstruct in past hominin ecology. Because of its remarkably rich palaeoenvironmental, archaeological and faunal archives over a continuous 11 kyr period, the Last Interglacial (Eemian, ≈125 ka BP) locality of Neumark-Nord (Saxony-Anhalt, Germany) offers a unique opportunity to explore the interactions between Neanderthals and the vegetal and vertebrate ecosystems. Archaeological, palynological and charcoal data notably allowed to demonstrate a clear ecological footprint of hominin activities, including fire use, resulting in a net opening of the Neumark-Nord vegetation landscape [1]. The widespread occurrence of butchery marks on faunal remains, including straight-tusked elephants (*Palaeoloxodon antiquus*, minimally 57 individuals over a period of more than 2 kyr), demonstrates the extensive and long-term exploitation of faunal resources by Neanderthals [2].

To assess the intensity and impact of Neanderthal hunting on herbivores and carnivores, we aim here at reconstructing the feeding ecology of large mammals and ecosystem trophic structure during the different Eemian substages by analysing the calcium isotopes (<sup>44</sup>Ca/<sup>42</sup>Ca ratios) of their tooth enamel. In this study, we systematically explored the Ca isotope ecology of the vertebrate faunal assemblage of Neumark-Nord 1 and 2 sites, representing two closely associated shallow palaeolake basins. We sampled and analysed the enamel of teeth that mineralized their crown post-weaning from over 100 individuals of 8 taxa, including herbivores (equidae, cervidae, bovidae, elephantidae, rhinocerotidae) as well as carnivores (canids, ursidae, felidae and hyaenidae).

Overall, we find tight species-specific distributions, in good agreement with previously reported values and diet-related inter-taxon differences observed for other Late Pleistocene vertebrate assemblages. Using this exceptional dataset, we discuss the changes of diets and alterations of the isotopic niches of the mammalian species in the different faunal assemblages from distinct time segments and environments of the Eemian. This

study notably intends to contribute new explanations for the observed impoverishment of the faunal community during the Eemian and for potential shifts in Neanderthal prey choice, which may have also had cascading effects on other sympatric predators.

[1] Roebroeks et al., 2021, Science Advances

[2] Gaudzinski-Windheuser et al., 2023, Science Advances