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Press release

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Neanderthals Ran "Fat Factories" 125,000 Years Ago

Groundbreaking discovery in Germany reveals large-scale fat processing by Neanderthals

Fat is a very valuable food, packed with calories, especially important when other resources might be scarce. Our earliest ancestors in Africa already cracked open bones to extract the fatty marrow from bone cavities. But now a groundbreaking archaeological study led by archaeologists from MONREPOS (a research department of the Leibniz Zentrum für Archäologie, LEIZA, Germany) and Leiden University (The Netherlands), in cooperation with the State Office for Heritage Management and Archaeology Saxony-Anhalt (Germany), and published in *Science Advances* demonstrates that our distant cousins, the Neanderthals, pushed fat extraction from bones quite a bit further.

The evidence comes from the Neumark-Nord 2 site in central Germany, dating back 125,000 years to an interglacial period when temperatures were similar to those of today. The site was situated in a lake landscape. At this location, researchers found that Neanderthals not only broke bones to extract marrow but also crushed large mammal bones into tens of thousands of fragments to render calorie-rich bone grease through heating them in water. This discovery substantially shifts our understanding of Neanderthal food strategies, pushing the timeline for this kind of complex, labour-intensive resource management back in time tens of thousands of years.

Systematic bone processing 125,000 years ago

The findings indicate that Neanderthals operated what can be described as a prehistoric "fat factory," carefully selecting a lakeside location to systematically process bones from at least 172 large mammals, including deer, horses and aurochs. These activities, previously believed to be limited to later human groups,

now appear to have been part of Neanderthal behavior as early as 125,000 years ago.

"This was intensive, organized, and strategic," says Dr. Lutz Kindler, the study's lead archaeologist. "Neanderthals were clearly managing resources with precision—planning hunts, transporting carcasses, and rendering fat in a task-specific area. They understood both the nutritional value of fat and how to access it efficiently - most likely involving caching carcass parts at places in the landscape for later transport to and use at the grease rendering site". "Indeed, bone grease production requires a certain volume of bones to make this labour-intensive processing worthwhile and hence the more bones assembled, the more profitable it becomes", adds co-author Prof. Sabine Gaudzinski-Windheuser, Head of MONREPOS and Professor at Johannes Gutenberg University Mainz.

Strategic Planning and Caching

The archaeological finds are extraordinarily well-preserved, with over 120,000 small bone fragments and more than 16,000 flint tools and other artifacts, most of these recovered from a tightly clustered 50-square-meter area. These were found alongside signs of fire use, indicating a sophisticated and purposeful operation that requires careful planning of activities and resources.

The authors write that over the course of the year Neanderthals repeatedly hunted in the Neumark-Nord region, and whenever they succeeded in killing animals beyond their immediate food needs, they may have cached the surplus, including lipid-rich bones. Subsequently, over a comparatively brief period at some undetermined time of year, the caches were emptied and stored carcass parts were brought to the Neumark-Nord 2 location for marrow and grease processing. Caching is an essential component of the hunting way of life, universal among ethnohistorically documented mid- to northern latitude foragers, who in fact could not survive without stored foods.

Large site provides unique access to the Neanderthals' way of life

This discovery builds on decades of research at the ca. 30 ha large Neumark-Nord site complex already discovered in the 1980s by Jena archaeologist Dietrich Mania. In 2023, the team published evidence that Neanderthals [hunted and butchered straight-tusked elephants](#)—up to 13-ton animals that could provide over 2,000 adult daily food portions. The use of fire to [manage landscape](#) vegetation and the diversity of processed species at different locations reveal a level of planning and ecological engagement previously underestimated in Neanderthals.

"What makes Neumark-Nord so exceptional is the preservation of an entire landscape, not just a single site," said co-author Prof. Wil Roebroeks, Professor at Leiden University. "We see Neanderthals hunting and [minimally butchering deer](#) in one area, processing elephants intensively in another, and—as this study shows—rendering fat from hundreds of mammal skeletons in a centralized location. There's even some evidence of plant use, which is rarely preserved. This broad range of behaviors in the same landscape gives us a much richer picture of their culture."

The Neumark-Nord discoveries are continuing to reshape our view of Neanderthal adaptability and survival strategies. They show that Neanderthals could plan ahead, process food efficiently, and make sophisticated use of their environment.

"The sheer size and extraordinary preservation of the Neumark-Nord site complex gives us a unique chance to study how Neanderthals impacted their environment,

both animal and plant life," said Dr. Fulco Scherjon, data manager and computer scientist on the project. "That's incredibly rare for a site this old—and it opens exciting new possibilities for future research."

Publication

Kindler et al.; Large-scale processing of within-bone nutrients by Neanderthals, 125,000 years ago, *Science Advances* 11, 2. Juli 2025.

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Images and further information available upon request.

About MONREPOS – The Archaeological Research Center and Museum for Human Behavioral Evolution, Leibniz Zentrum für Archäologie

MONREPOS is an internationally recognized research center dedicated to studying the evolution of human behavior. Based in Neuwied, Germany, it conducts cutting-edge research into the archaeology of early humans, with a focus on understanding the behavioural and social evolution of our ancestors through fieldwork, experimental archaeology, and interdisciplinary studies. MONREPOS is a department of the Leibniz-Zentrum für Archäologie (LEIZA), a Leibniz-Association research centre, based in Mainz, Mayen, Neuwied and Schleswig.

About the Faculty of Archaeology, Leiden University

Leiden University is one of Europe's leading centers for archaeological research and education. The Faculty of Archaeology conducts fieldwork and research projects around the world, advancing our understanding of the human past through innovative and interdisciplinary approaches.

About the State Office for Heritage Management and Archaeology Saxony-Anhalt

The State Office for Heritage Management and Archaeology Saxony-Anhalt – State Museum of Prehistory Halle (Saale) is a subordinate authority to the State Chancellery and Ministry of Culture of Saxony-Anhalt. It is the state's expert authority on heritage, its tasks including the scientific recording, research and documentation of cultural monuments in Saxony-Anhalt. Finds from Neumark-Nord are on display in the permanent exhibition at the State Museum of Prehistory in Halle (Saale). They are also featured on the museum's YouTube channel, *Museum exklusiv*, with English subtitles.

- Die Funde aus dem Tagebau Neumark-Nord | Museum exklusiv:
<https://youtu.be/gThLypWPbtg?feature=shared>
- Die Megafauna von Neumark-Nord: Der Waldelefant | Museum exklusiv:
<https://youtu.be/RPOvRt7SThQ?feature=shared>
- Die Megafauna von Neumark-Nord: Auerochse und Raubkatze | Museum exklusiv:
https://youtu.be/Aovl3a7_gIU?feature=shared