**Reconstructing the landscape at the time of early hominin dispersal in northern Africa**

**The research, published in *Nature Communications*, has revealed for the first time the environmental context of this region during the Plio-Pleistocene transition.**

**The landscape was dominated by an arid environment but with diverse habitats. This diversity of environments and resources may have facilitated the occupation of this territory by mammals, including hominins.**

*Tarragona, October 4, 2024.* Archaeopaleontological work carried out by a multidisciplinary team at the Guefaït-4 site (Morocco) has allowed for reconstructing the ecological context of northern Africa 2.5 million years ago. Through multiple analyses, it has been confirmed that this region enjoyed a diversity of environments dominated by an arid ecological context but with forested areas, wetlands, and more open spaces. This palaeoecological information is essential for understanding the evolution of hominins in the Plio-Pleistocene of northern Africa and their adaptive capacities in the changing and increasingly open environments of this period in Africa.

This is the main conclusion of the study published in the prestigious journal *Nature Communications*, led by Iván Ramírez-Pedraza, a researcher at IPHES-CERCA (Institut Català de Paleoecologia Humana i Evolució Social) through the FI Agaur Grant, with contributions from researchers from Rovira i Virgili University (URV), Mohammed First University of Oujda (FSO, UMP), the National Institute of Archaeological and Heritage Sciences (INSAP), the Max Planck Institute for Geoanthropology (Jena, Germany), the Autonomous University of Barcelona (UAB), Bryant University (USA), the Spanish National Research Council (CSIC-Junta de Extremadura), the University of Iceland, the National Museum of Natural Sciences (MNCN), the University of the Philippines, the National Center for Research on Human Evolution (CENIEH), and the Histoire Naturelle de l’Homme Préhistorique (MNHN/CNRS/UPVD).

According to Iván Ramírez-Pedraza, the study's lead author, “these results provide the first known ecological framework for northern Africa, where, until now, robust data were lacking, unlike other parts of the continent such as eastern and southern Africa.”

These data were obtained through various analytical techniques that have proven complementary. The main methods used were stable isotope analysis and dental wear analysis of large vertebrate fauna remains recovered at the Guefaït-4.2 site. On the one hand, the isotopic study of dental enamel provides information related to the type of food ingested and the temperature of the water consumed. On the other hand, a dental microwear analysis was conducted, which involves quantifying a series of marks, such as scratches and pits, formed on the tooth's surface during food consumption.

In addition to these analyses, stable carbon isotope analysis from plant wax *n*-alkanes, analyses of small vertebrates, pollen, micro-crustaceans and algae have been conducted.

**Ecological diversity facilitated the expansion of hominins**

During the Plio-Pleistocene transition, the onset of glaciations in the northern hemisphere occurred, along with a global trend towards aridity. This newly published research shows that this aridity was also present locally but was part of a highly diverse ecosystem. This regional mosaic environment, combined with several Green Sahara Periods during the Plio-Pleistocene transition, may have facilitated the dispersal of mammal communities (including hominins) from central or eastern Africa to northern Africa, occupying ecosystems with resource availability similar to their original habitats.

In this sense, the data obtained from the multiproxy analysis are essential in defining the complexity of the ecological conditions in which the Plio-Pleistocene hominins lived in northern Africa.

The evidence of the first hominins in northern Africa dates back to around the Plio-Pleistocene transition (about 2.4 million years ago) at the Ain Boucherit site in Algeria. The ecological context of this first population is a key issue in understanding the dispersal of our ancestors and other mammals in these territories. “Considering the proximity of Guefaït to Ain Boucherit, understanding the ecology of such a vast territory can provide clues about some of the ecological resources that these early hominins might have had,” explains Dr. M. Gema Chacón, a researcher at IPHES-CERCA and co-director of the project, along with Dr. Robert Sala Ramos, a professor at URV, and Dr. Hassan Aouraghe, a professor at UMP, FSO in Oujda (Morocco).

“In Guefaït, multiple animal species of different origins coexisted, and Guefaït-4.2 is just a trench of a few meters within a fossiliferous layer that extends for kilometers. Given the richness of fossils at the site, it cannot be ruled out that future archaeological work in the region may yield fossils of the early hominins who occupied northern Africa” adds Dr. Hassan Aouraghe, co-director of the project.

**An international project of IPHES-CERCA**

Since 2006, the Ain Beni Mathar-Guefaït Basin has been the subject of a research project directed by Robert Sala Ramos and M. Gema Chacón from the Institut Català de Paleoecologia Humana i Evolució Social (IPHES-CERCA) in Tarragona, and Dr. Hassan Aouraghe from the Faculté de Sciences at Mohammed First University of Oujda (Morocco). The main objective of this project is to investigate the origins of human settlement in northern Africa.

The research project in Morocco is made possible thanks to the collaboration of the Jerada government, the local authorities of Ain Beni Mathar and Guefaït, Mohammed First University of Oujda (Faculté de Sciences), the Ministry of Youth, Culture, and Communication of the Kingdom of Morocco, and the National Institute of Archaeological and Heritage Sciences (INSAP), also from Morocco. The research has been funded by the State Research Agency (Ministry of Science, Innovation, and Universities), the CERCA program (Government of Catalonia), the Palarq Foundation, the Ministry of Culture and Sports, the Ministry of Science, Innovation, and Universities, the María de Maeztu program (CEX2019-000945-M), and supported by the activities of the Research Groups (SGR) of the Government of Catalonia, among others.

**Paper:**

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**Captions**

Photo 1: Excavation work at the Guefaït-4.2 site (Morocco). Credit: IPHES-CERCA

Photo 2: General view of the excavation work at the Guefaït-4.2 site. Credit: IPHES-CERCA

Photo 3: General view of the excavation work at the Guefaït-4.2 site. Credit: IPHES-CERCA

Photo 4: Iván Ramírez-Pedraza sampling teeth for isotope analysis in the biomarker laboratory at IPHES-CERCA. Credit: IPHES-CERCA