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## Palaeoenvironment of the earliest hominins in western Europe: the Guadix-Baza Basin

**Hervé Bocherens**<sup>1,2</sup>, Hugues-Alexandre Blain<sup>3,4</sup>, Mikael Fortelius<sup>5</sup>, Juha Saarinen<sup>5</sup>, Christian Sanchez Bandera<sup>3,4</sup>, José Antonio García-Solano<sup>6</sup>, Deborah Barsky<sup>3,4</sup>, Carmen Luzón<sup>7</sup>, and Juan Manuel Jiménez Arenas<sup>7,8,9</sup>

<sup>1</sup>Universität Tübingen, Department of Geosciences, Biogeology, Tübingen, Germany ([herve.bocherens@uni-tuebingen.de](mailto:herve.bocherens@uni-tuebingen.de))

<sup>2</sup>Senckenberg Centre for Human Evolution and Palaeoenvironment, Tübingen, Germany

<sup>3</sup>IPHES, Institut Català de Paleoecologia i Evolució Social, Tarragona, Spain

<sup>4</sup>Universitat Rovira i Virgili, Area de Prehistoria, Tarragona, Spain

<sup>5</sup>University of Helsinki, Department of Geosciences and Geography, Helsinki, Finland

<sup>6</sup>Universidad de Sevilla, Departamento de Prehistoria y Arqueología, Sevilla, Spain

<sup>7</sup>Universidad de Granada, Departamento de Prehistoria y Arqueología, Granada, Spain

<sup>8</sup>Universidad de Granada, Instituto Universitario de la Paz y los Conflictos, Granada, Spain

<sup>9</sup>University of Zurich, Department of Anthropology, Zürich, Switzerland

The Guadix-Baza Basin (Granada Province, Southern Spain) is the richest area in Western Europe for the study of early hominin dispersal and evolution, having yielded the earliest localities with evidence of hominin occupation (a deciduous human molar, lithic industries and cutmarks) together with a rich large and small vertebrate assemblage dated to around 1.4 Ma. A key question is whether environmental changes were involved in the arrival of hominins in this region at this time. To answer this question, possible environmental differences between one older site lacking evidence for hominin occurrence (Venta Micena VM, ~1.6 Ma) and younger sites with undisputable evidence (Barranco León BL and Fuente Nueva-3 FN3, ~1.2-1.5 Ma) were investigated using various approaches, including carbon and oxygen isotopes in tooth enamel, tooth wear analysis, ecometrics and microvertebrates (amphibians, reptiles, mammals) as proxies for palaeoclimate.

Tooth enamel powders were collected from herbivorous mammal specimens from the three sites. For several specimens, enamel was sampled serially to document intra-annual dietary and/or habitat changes for the studied individuals. A large diversity of herbivorous taxa was sampled, including cervids, bovids, equids, rhinoceros, hippopotamus and mammoths. The analyses were conducted at the University of Tübingen (Senckenberg Centre for Human Evolution and Palaeoenvironment).

Carbon isotopic results from the three sites showed that the plants foraged by herbivores were essentially of C3 photosynthetic pathway (trees, shrubs and C3-grass adapted to mild growth season), which is consistent with the results of tooth wear analysis indicating browsing or mixed feeding with browsing preference for most taxa. The consumption of some C4 plants for some

herbivores has been detected only in Barranco León, which is consistent with the results of palaeoclimatic investigations based on ecometrics and microvertebrate fauna, indicating a particularly wet and warm climate for this site compared to both others and colder conditions in Venta Micena, the site devoid of hominins. Oxygen isotopic results seem to be essentially related to browsing (high values) versus grazing (lower values) and to different habitats (lowest oxygen isotopic values for semi-aquatic hippos). The differences in isotopic results among taxa are in agreement with those of dietary preferences from mesowear tooth analysis. In addition, in a context of still Mediterranean climate with 4-months aridity during summer, isotopic variations within teeth suggest in some cases significant changes in foraging through a year, which could be related to local seasonal changes or mobility across areas with different vegetation types.

The first results of this multidisciplinary research project financed by the Leakey Foundation and a General Research Project from the Andalusian Regional Government help us to refine the palaeoenvironmental reconstruction around the time of the earliest arrival of hominins in Southern Spain. In combination with the climatic data provided by ecometrics and microvertebrate investigations, it allows us to develop a more detailed framework for the interpretation of the carbon and oxygen isotopic data from tooth enamel in a Mediterranean climate context, which corresponds to the type of climatic conditions where the earliest hominins occur in Europe in the Early Pleistocene.