
The palaeoenvironment in the Ethiopian highland at ~1.6 Ma ago: evidence from stable isotope analysis at Garba IVD and Gombore IB (Melka Kunture, Upper Awash, Ethiopia)

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Résumé

Garba IV level D (Garba IVD) and Gombore I level B (Gombore IB) are archaeological levels which are part of the Melka Kunture (MK) cluster of prehistoric sites, located on the western edge of the Main Ethiopian Rift at ~2000 m a.s.l. Both have been dated at ~1.6 Ma and record a high-density distribution of lithic artifacts, pebbles, and faunal remains. At Gombore IB the left distal humerus of a *Homo erectus* was also discovered. Additionally, palynological studies document a landscape dominated by extended grassland at Garba IVD, while the mountain forest species were more abundant at Gombore IB.

Here, we present the measurements of ¹³C/¹²C and ¹⁸O/¹⁶O isotopic ratios of dental enamel carbonates on fossil teeth from the two archaeological layers. The analyzed *taxa* included hippopotamids, bovids, equids, suids, and crocodiles (collectively, 42 samples). Fossil teeth were sampled using bulk and intra-tooth serial techniques, then pretreated and analyzed following the internal lab protocol of the working group Biogeology (University of Tübingen, Germany) for the isotopic analyses of carbonates from tooth enamel. Isotopic results on bulk samples indicate that all the analyzed herbivores were mainly grazers, consuming C4 grass. Bulk and intra-tooth carbon isotopic ratios of crocodiles are the most depleted among the specimens. In this case, carbon-13 values suggest that Pleistocene crocodiles ate fishes and/or herbivores, and it may also reflect variations within the diets of herbivores that consumed C3 plants.

Our results seem to be in contrast with pollen data from Gombore IB, since isotopic evidence points to open spaces in the vegetation as C4 high-elevation grasslands. Nevertheless, the stable isotope results from mammal teeth reflect not only the strictly local vegetation available of the time, but also the feeding strategies and ecological behavior of each specimen, including feeding at a distance for the fossil site. Therefore, pollen and isotopic data provide complementary information about the Afromontane vegetation context present of MK since ~1.6 Ma: the landscape was marked by forests and bushy woodland as in Gombore IB with scattered open spaces probably near the river, while in other localities as Garba IVD the mountain grassland was more extensive.

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Mots-Clés: palaeoenvironment, Ethiopian highland, at ~ 1.6 Ma ago, stable isotope analysis