RECONSTRUCTION OF ANCESTRAL LANDSCAPES AND HUMAN DIETARY OPTIONS USING GEOCHEMICAL FOSSILS AT OLDUVAI GORGE, TANZANIA

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Throughout the last fifty years, many scientists have searched for direct connections among geology, (paleo)climate, and African ecosystem change as influential factors on human evolution and the emergence of our genus Homo (~2 million years ago [Ma]). Although such factors might have operated independent from one another, recent literature suggests vegetation serves as a conceptual thread bridging environmental influences on evolution. Indeed, vegetation is a crucial behavioural influence among primates, and humans in particular, because it directs resource availabilities (e.g., plant foods, shade), as well as space-time accessibility.

Olduvai Gorge is a world-famous archaeological heritage site situated in north Tanzania. The gorge itself is a river-incised valley triggered by regional tectonism that exposed large sedimentary deposits from the last ~2 Ma. Olduvai has yielded large numbers of hominin remains, stone tools, and large mammal bones since excavations started in the 1960s. However, the environmental factor(s) that drove differences in apparent behavioural development (i.e., evolution) between coeval hominin species remains a matter of debate.

This research focuses on novel biomarker-specific isotope analyses in order to resolve the importance of different foodstuffs (e.g., plant foods vs. meat) and freshwater resources among past hominin species. Initial biomarker (i.e., n-alkyl lipid biomarkers) analyses were conducted on an initial 40 sediment samples (e.g., paleo-soils and tuffs) excavated from at three important hominin archaeological sites at Olduvai Gorge (FLK Zinj [Figure 1], DS, and TK). Preliminary plant biomarker analyses suggest that the vegetation experienced brief, though dramatic, shifts from woodland to grassland, which highlight the conceptual importance of landscape change and food options variability on evolutionary patterns among hominins.

Future work will further explore the nature of hominin adaptative evolution amid dramatic environmental transitions using plant biomarkers specific to drought-tolerant foodstuffs (e.g., tubers) together with coupled biomarker δ¹³C–δD measurements as compared to archaeological distributions at Olduvai Gorge across space and through time.
Figure 1 Lithological section at FLK Zinj (Olduvai Gorge). A. Gas chromatography–flame ionization detector (GC-FID) trace of the apolar of typical tuffaceous (Tuff ID) samples. B, GC-FID trace of the apolar fraction in representative clay samples with extensive root fossils (rhizoliths).