

ABSTRACT

Water, vegetation, and human habitats are tightly coupled, and Olduvai Gorge, Tanzania is an exceptional locality for examining evolutionary events that associate with water availability and environmental stability or change. This project investigates interactions between and among paleo-hydrology, habitat type, and the human response to changing environmental settings. The objective is to interpret the climate and environmental context of the oldest Acheulean stone tool industry at Olduvai Gorge using plant leaf wax lipid marker molecules, or biomarkers, as a source for carbon and hydrogen isotopes. The emphasis is on a roughly 200,000-year period (1.83 to 1.66 Ma), a timeframe that includes a key transition in stone tool technology from the Oldowan to the Acheulean, and the widespread distribution of the genus *Homo*.

To investigate the human-environment interactions for Olduvai's earliest Acheulean, terrestrial sediments from Beds I and II were systematically sampled and processed for normal (*n*-) alkanes and *n*-alkanoic acids. The focus is on the Frida Leakey Korongo North (FLK-N) and West (FLK-W) archaeological sites, which contain Oldowan and Acheulean tools, respectively, the geologic feature known as the Castle, and multiple landscape geological samples. From a methodological perspective, the innovation lies in the detailed environmental analyses using leaf wax biomarkers as a proxy record for paleo- hydrology and vegetation, and for the assessment of changes in precipitation, temperature, atmospheric CO₂, aridity/humidity and plant type.

The results indicate that both Oldowan and Acheulean assemblages were predominantly used within woodland settings with abundant freshwater nearby. The archaeological sites were situated within a mosaic environment of open grassland, closed riparian and groundwater-fed woodlands, lacustrine habitats, and ecotones. Both technological types were most likely used to process plant material such as hard-shelled nuts and fruits, but the Acheulean was also utilized for exploiting underground tubers as well as meat obtained in open settings.