

**Melka Kunture (Upper Awash, Ethiopian plateau):
the earliest human settlement of a high mountain system**

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Since the late Miocene, hominins evolved in East Africa as lowlanders. Paleoanthropological and archaeological sites are usually located at relatively low elevations where warm and dry climatic conditions prevail, most notably in the Rift Valley. Vice versa, there has been surprisingly little archaeological research on the plateau itself. In the Ethiopian highlands, Melka Kunture and Gadeb^{1,2} are the only two archaeological sites with long stratigraphic sequences from the Lower Pleistocene onwards, allowing to understand how hominins first developed the capacity of living at higher altitude. Unfortunately, after dam construction, the Gadeb site was flooded and became inaccessible. Detailed information is only available at Melka Kunture, at 2000m asl in the Upper Awash Valley. Many archaeological sites from the Oldowan to the Acheulean, from the Middle Stone Age to the Late Stone Age have been discovered there³. Here we report a recent paleoenvironmental reconstruction based on the palynological analysis of pollen samples collected in archaeostratigraphic units ranging from 1.7 to 0.2 Ma. Notwithstanding substantial fluctuations, pollen counts unambiguously and constantly point to the “Dry evergreen afro-montane forest and grassland complex” which nowadays still characterizes the vegetation of the Ethiopian mountains. There is simply no evidence whatsoever of the warmer and drier vegetation encountered in the Rift Valley today, and of any savanna tree species. Accordingly, the hominins experienced mountain ecological conditions, with cool nights and warmer daytime. These conditions persisted throughout the whole sequence from 1.7 Ma onwards. This high mountain system has distinctly different ecologies and characteristics when compared to the lowlands of the Rift Valley. Human adaptability to cool mountain environments has implication for the Out of Africa models, hypothesizing hominin expansions into Eurasia fostered by warmer climatic oscillations. The evidence from Melka Kunture also has a number of wider implications. The local fossil record points exclusively to genus *Homo*, i.e. to *Homo erectus sensu lato* during the Lower Pleistocene, and to later species of *Homo* during the Middle Pleistocene⁴⁻⁶. Australopithecines have not been discovered. This possibly suggests that *Homo erectus* was the first and only species of the time able to adapt to mountain environments. However, the Oldowan and early Acheulean technical structures of Melka Kunture do not differ from those of penecontemporaneous East African sites⁷⁻¹⁰. Accordingly, the assembled biological, cultural and paleoclimatic evidence allows 1) observing the technological changes between Oldowan and Acheulean without having to take into account the hominin species variability which is the rule elsewhere in East Africa; 2) assessing that similar lithic productions were successfully adopted in various contemporary environments.

Acknowledgments

We thank the Authority for Research & Conservation of Cultural Heritage of the Ministry of Culture & Tourism, the National Museum of Addis Ababa, and the Oromia Culture and Tourism Bureau for permits for fieldwork and access to the collections. The research is supported by grants of Università degli Studi di Roma Sapienza (Grandi scavi archeologici) and of Ministero degli Affari Esteri e della Cooperazione.

References

- ¹ Clark, J.D., Kurashina, H., 1979. Hominid occupation of the east-central Highlands of Ethiopia in the Plio-Pleistocene. *Nature* 282, 33-39.
- ² de la Torre, I., 2011. The Early Stone Age lithic assemblages of Gadeb (Ethiopia) and the developed Oldowan/early Acheulean in East Africa. *Journal of Human Evolution* 60, 768-812.
- ³ Chavaillon, J., Piperno, M. (Eds.), 2004. *Studies on the Early Paleolithic Site of Melka Kunture, Ethiopia. Origines*, Istituto Italiano di Preistoria e Protostoria, Firenze.
- ⁴ Coppins, Y., 2004. The hominids of Melka Kunture. Some general reflections. In: Chavaillon, J., Piperno, M. (Eds.), *Studies on the Early Paleolithic site of Melka Kunture, Ethiopia. Origines*, Istituto Italiano di Preistoria e Protostoria, Firenze, pp. 685-686.
- ⁵ Condemi, S., 2004. The Garba IV E mandible. In: Chavaillon, J., Piperno, M. (Eds.), *Studies on the Early Paleolithic site of Melka Kunture, Ethiopia. Origines*, Istituto Italiano di Preistoria e Protostoria, Firenze, pp. 687-701.
- ⁶ Di Vincenzo, F., Rodriguez, L., Carretero, J.M., Collina, C., Geraads, D., Piperno, M., Manzi, G., 2015. The massive fossil humerus from the Oldowan horizon of Gombore I, Melka Kunture (Ethiopia, >1.39 Ma). *Quaternary Science Review* 122, 207-221.
- ⁷ Piperno, M., Collina, C., Gallotti, R., Raynal, J.-P., Kieffer, G., Le Bourdonnec, F.-X., Poupeau, G., Geraads, D., 2009. Obsidian exploitation and utilization during the Oldowan at Melka Kunture (Ethiopia). In: Hovers, E., Braun, D.R. (Eds.), *Interdisciplinary Approaches to the Oldowan*. Springer, Dordrecht, pp. 111-128.
- ⁸ Gallotti, R., Collina, C., Raynal, J.-P., Kieffer, G., Geraads, D., Piperno, M., 2010. The Early Middle Pleistocene site of Gombore II (Melka Kunture, Upper Awash, Ethiopia) and the issue of Acheulean Bifacial Shaping Strategies. *African Archaeological Review* 27(4), 291-322.
- ⁹ Gallotti, R., 2013. An older origin for the Acheulean at Melka Kunture (Upper Awash, Ethiopia). Techno-economic behaviours at Garba IVD. *Journal of Human Evolution* 65, 594-620.
- ¹⁰ Gallotti, R., Raynal, J.-P., Geraads, D., Mussi, M., 2014. Garba XIII (Melka Kunture, Upper Awash, Ethiopia): A new Acheulean site of the late Lower Pleistocene. *Quaternary International* 343, 17-27.