

Early hominin cultural development in Central Asia constrained by high-precision U-series chronology

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Central Asia was likely to have been a gateway for hominin expansion. The region contains a number of sites that contain extensive paleolithic artifacts and in some cases hominin remains. Our understanding of early hominin evolution and the associated lithic industries has remained a challenge due to the scarcity of absolutely datable sites.

Some of the early hominin finds in Central Asia come from eastern Uzbekistan with the discovery of the Teshik-Tash child in 1938 and the discovery of the Obi Rakhmat juvenile hominin (OR-1) in 2003 in a rock shelter¹. The OR site excavated section consists of 10 meters of calcareous and clay-rich sediments interbedded with travertine.

The sequence is subdivided into 22 stratigraphic layers (L1-L22). The OR-1 remains, contained within layer 16 (L16), consist of 6 isolated permanent maxillary teeth and 121 cranial fragments of a child (OR-1) between 7-9 years old. Extensive dental morphometric analysis data on the OR-1 teeth suggest a Neanderthal lineage, although the data fall on the periphery of the distribution of primary European Neanderthal line. In contrast the cranial morphology is suggestive of modern human affinity. In addition to OR-1, the site contains a rich collection of Paleolithic artifacts, more than 60,000 in total, along with more than 3000 non-hominin bones.

A number of previous attempts at dating the site had resulted in variable and ambiguous ages. Given advances in uranium-series chronology, we undertook another dating effort. Our new precise uranium-series dates constrain the age of this deposit to 98 ky BP towards the top and 109 ky BP for the layer containing OR-1, pushing hominin expansion into Central Asia 109 ± 2 ky BP. Our results also show that there was a well-developed lithic industry in Central Asia prior to 98 ky BP. The period covering the deposition of the sediments containing the artifact and specimen OR-1 coincides with a warm and one of the most humid interval of the last interglacial and last glacial periods in the region, providing support for climate-driven hominin expansion.

1. Glantz, M. et al. *J Hum Evol* 55, 223-237 (2008).