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# Technological divergence at the crossroads? Middle Paleolithic technology in the Armenian volcanic highlands and Central Anatolia, implications for hominin population dynamics

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## Résumé

A prominent question in Paleolithic research is how to trace and explain regionally distinct material cultural evolutionary trajectories among synchronous and geographically separated hominin populations. Here, we present a comparative case study that suggests broadly contemporaneous Middle Paleolithic (MP) technological divergence in two neighboring areas at the geographic nexus of Africa and Eurasia. The Armenian volcanic highlands and the Central Anatolian volcanic province (CAVP) are similar in geomorphology, but are separated by topography and ~ 800 km. MP artifacts in both areas were produced almost exclusively on obsidian raw materials. The influence of raw material properties on core reduction techniques is absent in our comparison, therefore any patterns in reduction techniques highlight variation in learned and transmitted technical behaviors.

We compared data on core reduction strategies from the site of Barozh 12 in Armenia, and numerous surface artifact assemblages in the G'oll'u Dağ area of the CAVP [1]. We also conducted raw material sourcing using pXRF on a sample of artifacts from Barozh 12 to assess the potential extent of MP hominin mobility in the Armenian volcanic highlands.

At Barozh 12, surface and excavated alluvial deposits yielded exceptionally high artifact densities. Age estimates indicate a range of ~ 61 – 32 ka BP OSL for the excavated sequence. Other MP sites in Armenia with chronometric ages date to ~ 104 – 30 [2]. At G'oll'u Dağ, tephrochronology from the sites of K'orkuyu and Kaletepe Deresi 3 suggests a

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maximum age range for MP surface material in the CAVP of  $\sim 160 - \sim 70 - 20$  ka [3]. These dates provide overlapping age ranges for the assemblages we studied in the two areas, and both samples are representative of other MP assemblages in each region. This chronological framework serves as a starting point for assessing long-term technological trends.

Results of our analysis demonstrate significant differences in core reduction strategies between the study areas. At Barozh 12, unidirectional-convergent Levallois core reduction for the production of points dominates, as it does in much of the documented MP in Armenia. In the CAVP, preferential, unidirectional, and centripetal Levallois reduction strategies are pervasive, but the production of points utilizing systematic unidirectional-convergent Levallois core reduction is essentially absent. Obsidian artifact transports to Barozh 12 overlap with those observed at other MP sites in the Armenian volcanic highlands, and as a whole describe a confined area of diachronic hominin mobility that extends into eastern Anatolia.

Taken together, our results suggest long-term technological divergence based on a Levallois 'platform', and long standing artifact manufacture techniques among geographically separate hominin populations. Regionalized technological divergence may signify a cultural evolutionary outcome of sub-population isolation, an important aspect of metapopulation models of MP hominin population structure and dynamics [e.g. 4]. Hominin population dynamics in our study area were complex and may have involved long periods of demographic and behavioral continuity in relatively small and confined geographic areas. In order to test this scenario, future research in this part of southwest Asia needs to refine archaeological chronologies and paleo-environmental records.

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