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Deeper Insights Into the Lithic Raw Materials on the Iranian Plateau: West-Central Zagros Mountains

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Abstract

Recent prehistoric research, which involved surveys and excavations in the Kermanshah Region, has focused on understanding the nature and timing of the Middle Palaeolithic to Upper Palaeolithic transition. This research, conducted as part of the Human Evolution in the Zagros Mountains (HEZM) project, specifically targets the Nawdarwan area. The Bawa Yawan Rockshelter was selected for further investigation. Over four excavation seasons (2016–2021), evidence of long-term occupation spanning from the Middle Palaeolithic to the Epipaleolithic (EPI) periods has been uncovered. These findings are embedded in five geological horizons, covering a time range from 83,000 years ago to 13,400 years ago. These excavations have yielded more than 11,000 lithic artifacts. As one of the primary goals of the HEZM project which is conducting comprehensive studies on lithic raw materials in the West-Central Zagros region, we have initiated a comprehensive research project centred on the Bawa Yawan site and around it. This short paper presents our preliminary observations on the variety and extension of stone raw resources used in this key location in Zagros.

Keywords: Paleolithic, West-Central Zagros, Lithic Raw Material, Radiolarite, Bawa Yawan Rockshelter.

Article Type: Short Article

Introduction

Fresh prehistoric research including surveys and excavations in the Kermanshah Region (Figure. 1) by concentrating on the nature and time of the Middle Palaeolithic (MP) to Upper Palaeolithic (UP) transition has opened new horizons in the history of human evolution for this part of the world (Ecker *et al*. 2023; Hariri 2022; Hariri *et al*. 2021; Heydari *et al*. 2024; Heydari-Guran *et al*. 2021a; 2021b; Heydari-Guran and Ghasidian 2020; 2017). The research project Human Evolution in the Zagros Mountains ("HEZM") has focused on the Nawdarwan (Figure. 2A), a 17 km long valley rich in Palaeolithic occupations around the Razawar River that connects the two fertile plains of Kermanshah and Kamyaran (Heydari-Guran *et al*. 2021b). We have selected the Bawa Yawan Rockshelter (Figure. 2B) for further research. So far, four excavation seasons (2016–2021) resulted in a long occupation from the MP to the Epipaleolithic (EPI) periods embedded in five geological horizons covering a time of 83ka to 13.400ka BP (Heydari-Guran *et al*. 2021b). More than 11000 lithic artfacts and a large number of faunal remains were achieved from excavations and more significantly, an in situ Neanderthal deciduous incisor was found in GH5. The MP artefacts of the Bawa Yawan Rockshelter comprise the Mousterian industry such as steeply retouched convergent scrapers, side scrapers, and Levallois recurrent cores. The cultural materials of the UP include the laminar industry including platform cores, tools on blades and bladelets, burin, and notched pieces. Finally, the EPI lithic artifacts mostly included

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geometric microliths and baked bladelets (Heydari-Guran *et al*. 2021b). One of the HEZM project goals (Heydari-Guran and Ghasidian 2017) was to conduct comprehensive lithic raw material studies in West-Central Zagros to understand behavioural changes based on lithic raw material varieties and procurements during the transitional stage from MP to UP and Epipaleolithoic. Recent studies on the lithic raw material economy in southern Zagros (Ghasidian and Heydari-Guran 2018) and in the Kermanshah Region (Biglari 2004; Heydari 2004; Heydari-Guran and Ghasidian 2020) have indicated the intensive use of local raw materials by different hominins (e.g. hand axe of Gakia; (Braidwood 1960), Neanderthals and anatomically modern humans (AMHs). Despite these researches have enlightened this topic, the study of the raw material economy in West-Central Zagros is at the opening stage. In line with this regard, our team has recently started a comprehensive research based on the Bawa Yawan Rockshelter site.

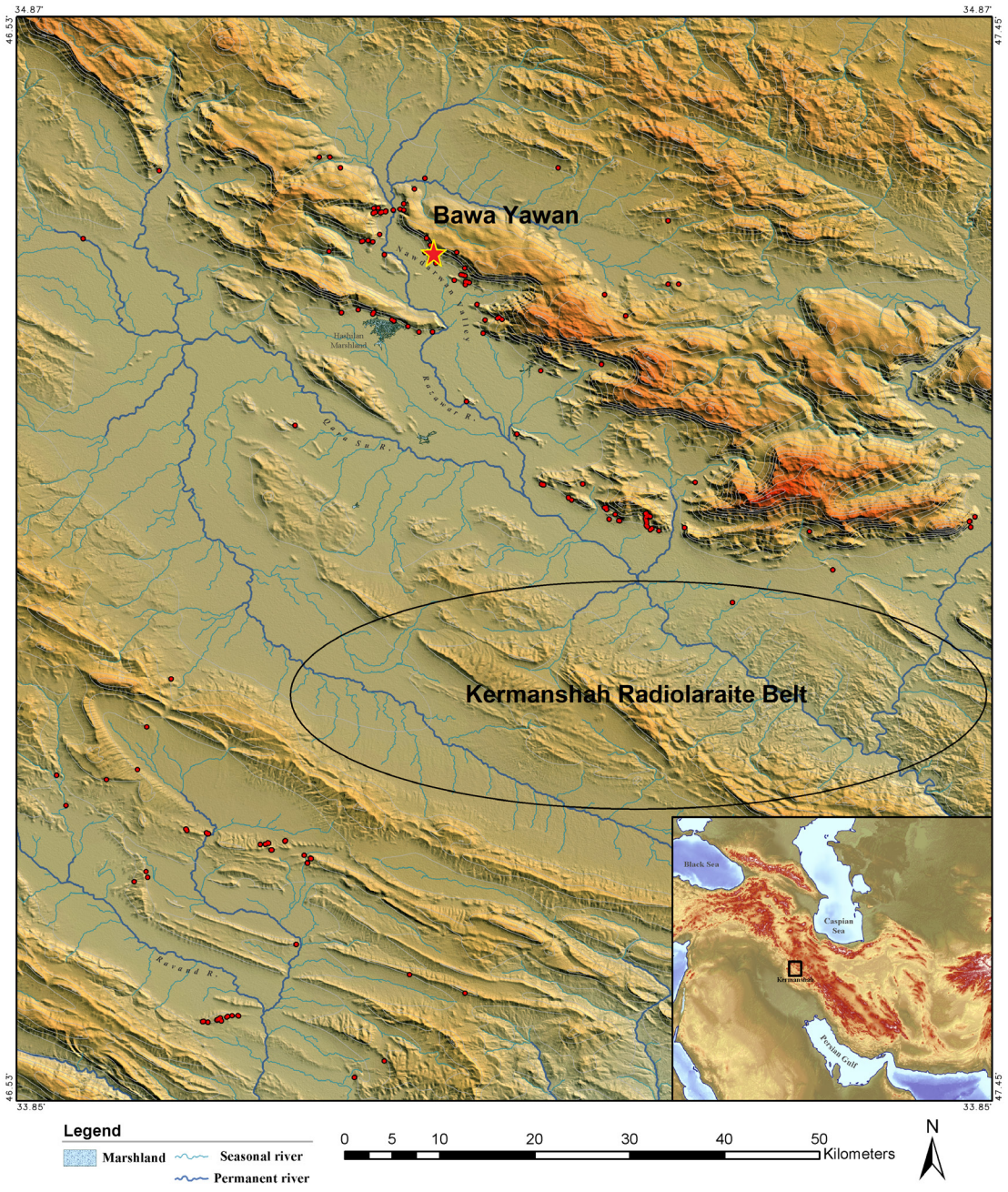


Figure. 1: *The map shows the topography and hydrography of the Kermanshah region. Red dashed line indicates approximately Radiolarite belt, and stars indicate several key Paleolithic sites including the Bawa Yawan rockshelter of the Kermanshah region (Map by S. Asiabani and S. Heydari-Guran).*



Figure. 2: *A: A view of Nawdarwan Valley showing the location of the Bawa Yawan rockshelter (view from the west, photo by A. Babaei), B: Detailed view of the Bawa Yawan rockshelter (view from the south, the red arrow indicates the main front of the shelter, photo by N. Hariri).*

Kermanshah Region: Geology and Raw Material Sources

Kermanshah region is one of the richest Prehistoric areas on the Iranian Plateau associated with human occupations from the Lower Palaeolithic to Neolithic periods. It has been believed that most of these occupations are related to the Kermanshah Radiolarite, as a main raw material source in Kermanshah.

Kermanshah Intermountain is located in the western Zagros Mountains. These mountains stretch across several countries, including Iran, Iraq, and Turkey. The region's geological history involves complex tectonic activities, including the collision of the Arabian and Eurasian tectonic plates, which has resulted in the formation of folded and faulted sedimentary rocks (Bisetun-Shaho Block) during the Cretaceous and Tertiary periods of the Earth's history (Ghobadi *et al*. 2015).

The Kermanshah Radiolarite is a well-known geological formation for the Zagros Region (Broud 1987). These rocks primarily consist of the silica skeletons of radiolarians, which are marine microorganisms. The Kermanshah radiolarite outcrops are limited by the Bisetun Fault to the north and the Kuh-e-Sefid Fault to the south. This formation is exposed in a 35 km wide region that lies between the Bisetun limestone in the north and the in situ Zagros deposits in the south (Abdi *et al*. 2022).

Methodology

The previous cultural studies of the transitional stage of the Bawa Yawan Rockshelter from MP to UP (in GH 3 and 2) have resulted in the idea of simultaneous use by Neanderthals and AMHs (Heydari-Guran *et al*. 2021b). To examine this hypothesis, we are applying multidisciplinary approaches and have a fine look at raw material changes among them for this site including different macroscopic observations (Delage 2007; Suga *et al*. 2022). The macroscopic method does not require petrographic and geochemical analysis for identifying lithic raw materials. The purpose is to quantify textural grades (e.g., amorphous, very fine grain, fine grain, medium grain, coarse-grained), luster (e.g., vitreous, resinous, waxy, dull), translucency (e.g., opaque, slightly translucent, moderately translucent, highly translucent), colour categories, patination, and perform high-resolution extraction of lithic artifacts. These observations for the 11000 pieces in 16 m2 Bawa Yawan Rockshelter not only make it possible to identify the differences from MP to UP and Epi techno-typologies and provide a concept for understanding stone raw materials used between Bawa Yawan Rockshelter inhabitants, during occupational seasons. In addition to this, we have considered the distribution of lithological deviations by 50 km in diametre based on the available geological maps (Figure. 1).

Preliminary Results

Our preliminary results from studied lithic arteafcts show that the raw material types in the Bawa Yawan Rockshelter have indicated 99 percent, comprised of sedimentary rocks including the local varieties of non-detrital crypto-microcrystalline rocks (such as chert, radiolarite, chert to opal, opal and flint), carbonate rocks (such as red pelagic limestone, Slightly/Moderately/Highly Silicified Limestone), clastic rock (such as sandstone, siltstones, mudstones, tuff, and marl). The remaining percent include metamorphic (phyllite) and igneous (basalt) (Figure. 3).

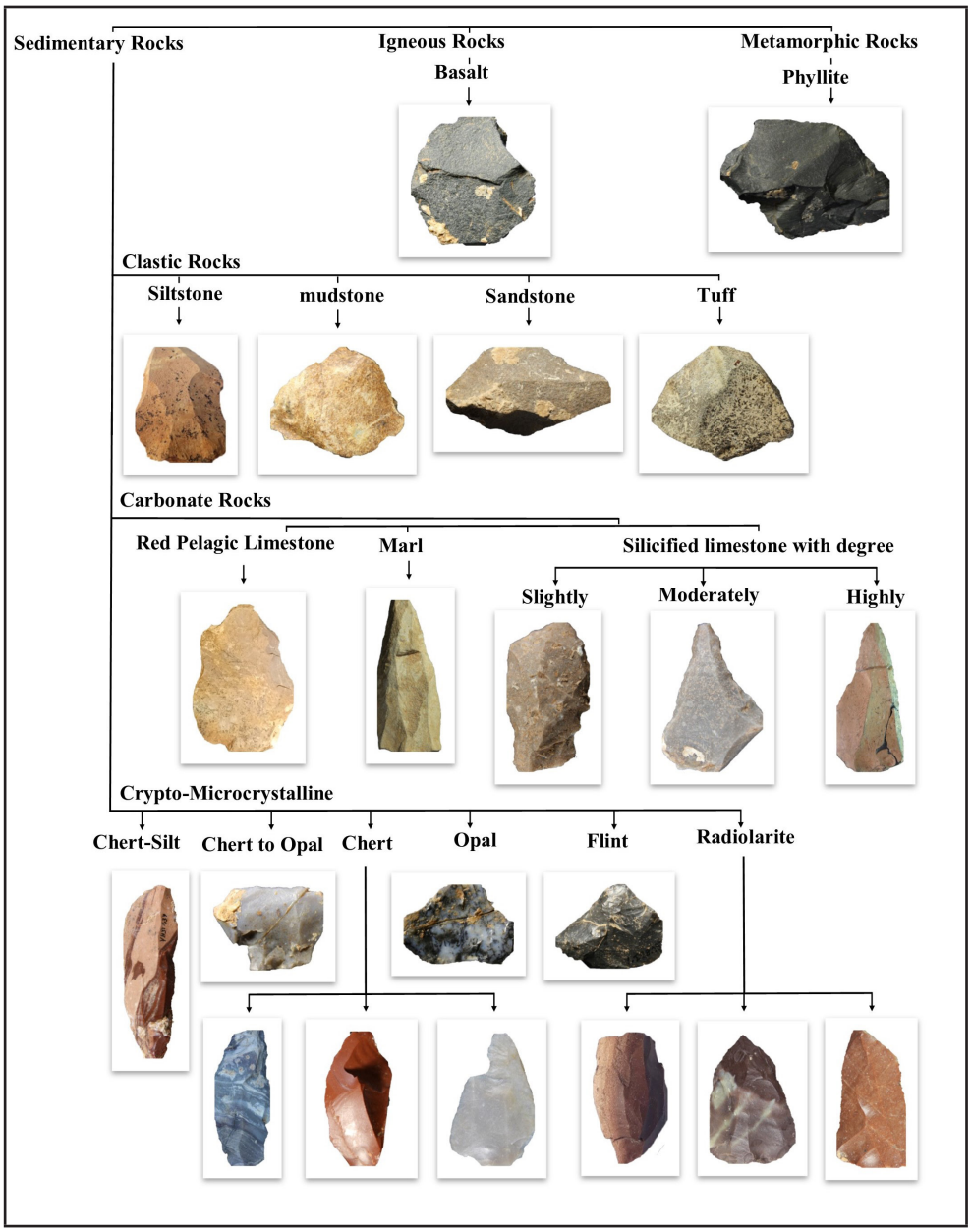


Figure. 3: *A macroscopic classification of lithic raw material from Bawa Yawan Rockshelter (photo by N. Hariri).*

Conclusion

In Conclusion, this research shows that during the MP periods, the procurement of sources was mainly based on local and non-local with larger varieties, and during UP and EPI were associated with limited diversity, but much higher quality. This indicates that MP groups have extracted available and closer sources around the site and UP and EPI peoples have focused on larger territory, from high-quality Kermanshah radiolarite almost exclusively (up to 50 km, Figure. 1).

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