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New Discovery of Paleolithic Evidence in Dargaz Plain, Northeastern Iran

Ali Sadraei¹ and Mahya Azar²

¹Ronin Institute. E-mail: ali.sadrayi@ronininstitute.org ²Master of Archeology, University of Neyshabur

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Abstract: Northeast of the Iranian plateau is one of the least known geographical areas in the field of Paleolithic studies, and despite numerous archaeological studies conducted in this part of the plateau, very little attention has been paid to studying the Pleistocene Age. The present research provides the results of an archaeological survey in the inter-mountain plain of Dargaz located in the northern slopes of the Kope Dagh mountain chains. Of the 35 registered sites, evidence of the Paleolithic period was identified in three points of the mentioned plain. Shamkhal collection in the westernmost point of Dargaz plain, the Artian site in the middle of the plain and the collection gathered from Zarrin Kouh, which is located near a canyon overlooking the vast plain of Atak and Lotfabad, are among the sites that can be attributed to the Pleistocene era. The presence of heavy-duty tools and scrapers, as well as thick flakes, along with a three-sided sample, reinforces the idea of attributing these collections to the Lower Paleolithic period. In the meantime, the study and investigation of these collections, which are mainly in form of open-air sites, have been accompanied by many complications and challenges, and the authors try to investigate and introduce these three collections in the first step, and then, if possible, provide solutions to identify and study such sites in northeast of the Iranian plateau, focusing specifically on Dargaz plain.

Keywords: Dargaz Plain, Lower Paleolithic Period, Northeast of the Iranian Plateau, Open-Air Sites.

Background of Paleolithic Studies in the East and Northeast of the Iranian Plateau

East and northeast region of the Iranian plateau that encompasses the modern provinces of South Khorasan, Khorasan Razavi, Northern Khorasan and parts of Golestan in terms of political geography, has a wide range of different climates and at the very beginning stages of the Paleolithic studied it was

considered by the experts of this period. These studies can be divided into two time periods: research beginning in the middle of the twentieth century that led to some surveys and excavations at several-year intervals which can be considered the first phase of Paleolithic studies in this part of Iran. And the second phase of these studies, the most important feature of which is the lack of a codified plan and its case-by-case performance, has been conducted by identifying and introducing some surface assemblages that cannot be considered a suitable basis for the analysis of knapping industries in this part of the Iranian plateau in the absence of purposeful strategies.

The studies performed by Carlton Stanley Coon, which began in western Iran and extended along a hypothetical line to northwestern, northern, eastern Iran and eventually to Afghanistan, are considered the starting point of Paleolithic studies in eastern Iran. The excavations conducted by Coon in western Iran have identified at least one case that resulted in the discovery of a piece of a human forearm (see: Terinkaus & Biglari, 2006). However, these studies in eastern Iran, despite finding evidence from the Paleolithic era, were only limited to identifying a collection of stone tools in dispersed layers of a rock shelter called Khunik (20 km from the modern city of Ghaen). According to reports published by this scholar, the sampled tools (N: 91) represent a range of Middle Paleolithic instrument industries that despite being similar to Bistoon and Tamtameh collections have their local characteristics; however, due to the dispersion of the layers, not possible to discuss the other features these tools with certainty (Coon, 1951).

Charles McBurney was another researcher who studied the Paleolithic period in the northeast of the Iranian plateau and excavated several caves (Biglari, 2015). However, it was only in the cave of Keyaram (I) that he could find tools from the Pleistocene era (N: 135). He compared the collection obtained from Keyaram to the Mousterian Zagros collections (McBurney, 1964). After these studies, with an interval of nearly a decade, the third and last study of the first phase in northeastern Iran was conducted (Ariai & Thibault, 1975). Unlike previous studies, which often focused on caves and rock shelters, these studies focused on Mashhad plain and the Kashafarood Riverbeds. These studies resulted in the identification of 7 collections of stone artefacts that were considered comparable to the ancient Paleolithic tool industries and attributed to the Middle Pleistocene era (Ibid). The importance of these findings on the one hand, as well as the relatively challenging chronology proposed by its researchers, posed some doubts and led to the beginning of the second phase of Paleolithic research by conducting surveys in these sites (Jami Al-Ahmadi, 2008). The survey and review of these collections confirmed parts of previous information, although there are still serious doubts about the proposed chronology. After these studies and since the beginning of the second decade of the 21st century, Paleolithic studies were followed only in a limited way and they have only been carried out in the form of a subsidiary program of general archaeological research. And it has been considered enough to identify surface assemblages from the extensive area of Khorasan (Barfi and Soroush, 2012; Barfi et al., 2014; Nikzad et al, 2015; Sadraei et al, 2017; Sadraei & Anani, 2018; Sadraei et al, 2019; Sadraei, 2019; Sadraei et al., 2021).

Looking at all the Paleolithic findings identified to date in the east and northeast of the Iranian plateau (Figure 1) and comparing them with those of the central and western parts of the plateau, the thought-provoking silence of this part of the Iranian plateau in the Pleistocene is revealed, with eleven Lower Paleolithic open-air sites, 15 Middle Paleolithic sites, and only one Upper Paleolithic site. The lack of any evidence of the Epipaleolithicperiod in this part of Iran itself reveals the unclear situation of this extensive region. Moreover, some of the mentioned sites contain only a small number of stone

artefacts that are sometimes sampled based on personal tastes, and hence, the provided chronologies cannot be confirmed. The only stratigraphic excavation has been performed in a cave and a rock shelter many years ago, and no validation-review studies have been carried out on them, and the dating has been made solely based on artefact typology. However, extensive excavations in most parts of Iran have achieved reliable results that are beyond the scope of this study. The only way to get out of this complicated and ambiguous Paleolithic situation in eastern and northeastern Iran is to have a codified program and planning for systematic and specialized studies in this field, something that has been rarely considered to this date.



Figure 1: Distribution of Paleolithic collections in the east and northeast of the Iranian plateau (newly discovered sites of Dargaz plain have been marked in the box)

Geographical Location and Landscape of Dargaz Plain

The inter-mountain plain of Dargaz, with a length of about 60 and a width of 35 km, is located in the north of the Kopeh Dagh mountain ranges and overlooks the extensive plain of Qara Qoom. Two natural features of the Hezar Masjed-Kopeh Dagh mountain ranges in the south and west and the Qara Qoom desert in the north and northeast of the Dargaz plain, have put this plain in a unique situation. From

the geological point of view, the mentioned site is part of the Kopeh Dagh-Hezar Masjed sedimentary basin, the oldest sediments which date back to the second geological period. In addition, its oldest outcrop at the anticlinal core is Chehel Kaman sediments encompassing the northwestern heights on the border of the Republic of Turkmenistan (Nami, 2016).

Access to permanent water resources and altitude differences have been influential factors in the distribution pattern of human populations, which is also seen in Dargaz plain. Two main catchments of Danroungar and Zanglanlu supply the main permanent water resources of this plain. Daroungar River, which has the longest length, after leaving Shamkhal valley in the westernmost point of Dargaz plain flowing towards the central parts and then crossing two straits of Golkhandan and Zarrin Kouh before reaching the border town of Lotfabad, in the north of this plain flows in the inland areas of Turkmenistan. Zanglanlu River, on the other side of the plain, created through the confluence of Garni and Darbandi rivers, passing through the narrow inter-mountain valleys in the southern highlands of Dargaz, flows towards east, and like Daroungar River, eventually ends in the vast plains of Turkmenistan. By providing permanent water resources, these two rivers have had a profound effect on the distribution of active farming populations in this plain, so few sites from rural periods onwards can be found that are not located on the margins of these two rivers. On the other hand, the altitude difference seen in different parts of this plain has led to significant temperature differences in various parts of it. The westernmost point of this plain is about 1050 meters above sea level and has a temperate and somewhat cold climate, and it is mainly accompanied by rain and snow in the winter seasons. However, this altitude in its northernmost point, near the city of Lotfabad, reaches less than 230 meters and has a dry climate with the least amount of rainfall.

Meanwhile, the middle parts of Dargaz plain have an intermediate situation, which has had a significant impact at least on the distribution of settlement patterns of the Late Holocene period; and according to the conducted studies, the highest concentration of settlements in Dargaz plain can be seen in this area. (See: Kowsari and Sarfaraz, 1966; Kohl & Heskel, 1980; Garajian, 1998; Yousefi Zashk and Baghizadeh, 2012; Nami, 2016). However, none of these studies has pointed to pre-Neolithic evidence. However, the limited studies of the authors indicate that in three different altitudinal positions of Dargaz plain (western high part, the middle part of the plain and the downstream northern part) evidence of this period can be identified (Figure 3).

Palaeolithic Sites of Dargaz Plain

Despite having passed more than seven decades since the first Paleolithic research in Khorasan (Coon, 1951) and the special importance of this part of the Iranian plateau in drawing possible patterns of hominids distribution to the interior parts of Asia (Bar-Yosef & Belfer-Cohen, 2001; Vahdati Nasab et al, 2013) no purposeful research has been performed on the region so far. This is also somewhat the case for Dargaz plain, in such a way that about fifty years of archaeological studies conducted in the form of six seasons of comprehensive surveys and several seasons of archaeological excavations in this plain have focused on the identification of dozens of sites from different periods after neolithic and subsequent periods, especially the glorious Parthian and Sassanid dynasties; and the heavy shadow of these discoveries has practically led to the complete forgetting of the Paleolithic research in this plain. Given the location of the Dargaz plain and its climatic potentials mentioned above, this issue emphasized the importance of pursuing specialized Paleolithic studies in the region.

The first evidence of the Paleolithic period of the Dargaz plain was sampled on the terraces of the Danroungar River and attributed to the Lower Paleolithic (Sadraei et al, 2018). Due to the nature of

the findings, which were situated in the secondary context, as well as the erosion of the artefacts, the authors decided to study the Paleolithic parts of the plain on a case-by-case basis during the project for registration of historical evidence of Dargaz plain. The results of this study, in addition to identifying 35 sites from the later period (Holocene onwards) led to the review of Artian site and the discovery of two other open-air sites in the Dargaz plain, including the Shamkhal site in the westernmost point of the plain and Zarrin Kouh site in the north of Dargaz plain. In addition to the introduction and typology of the mentioned findings, this research seeks to provide solutions for conducting this type of research in Dargaz plain.

From among the three collections sampled in Dargaz plain, the Shamkhal site has the highest frequency (N: 23) followed by Artian (N: 16) and the lowest number of samples were identified in the Zarrin Kouh site (N: 7). Looking at all three mentioned collections, it can be found that there is a similar pattern in the general composition of the two collections of Artian and Shamkhal. However sampling error, which was mainly conducted in a simple randomized way due to a shortage of time and the low number of findings, reminds the necessity of exercising great caution concerning the possible functions of each of them.



Table 1: General composition of stone artefacts in three collections of Shamkhal, Artian and Zarrin Kouh

Raw Stone Material

Availability of stone raw material is one of the most important factors in composing the type of lithic artefacts of Paleolithic sites (Shea, 2013), and studying the patterns of using stone raw material resources can provide valuable information regarding the adaptation strategies of hunter-gatherer groups (Andrefsky, 1994). In such a way that by studying the sources of raw materials used in different geographical areas, the mobility domain of Pleistocene populations can be traced (Inzian et al., 2010). On the other hand, the quality of local stones as well as their diversity can significantly affect the economic strategies of these groups (ibid.). Outcrops, river bed cobbles, and Chert Noduleshave been major resources of stone raw material for Knapping artefacts (Debénath & Dibble, 1994). In

the absence of any of these resources, alternative resources may have been used. However, during the Holocene and especially the Neolithic period, the high quality of obsidian stones, regardless of the availability of other local stone resources, led to the possible transfer and trade of these resources to remote areas (see, for example, Barge et al, 2018).



Figure 2: Resources of stone raw material in Dargaz plain, A, B Flint and quartz cobble identified in geological sections, C. Flint and lime cobble has seen in the proximity of Daroungar River

Regarding the composition of stone raw material used in Paleolithic sites in Dargaz plain, the greatest use of stone cobble has taken place (Figure 2, Table 2) and no evidence of Chert and flint outcrops has been identified by the authors. Looking at the type of stone raw material of these collections, it can be seen that each of these three collections is more focused on one type of raw material, which is one of the characteristics of application patterns of stone raw material in ancient Paleolithic collections. (See, for example, Dennell et al, 1988; Ranov et al, 1995; Goren-Inber et al, 2000). Limestone in the Shamkhal collection (91.30%), Flint in Artian collection (75%) and sandstone in Zarrin Kouh (85%) had the highest frequency of use in the knapping process (Table 2). Taking into account the above-mentioned compositions, on the one hand, and considering factors such as the high amount of cortex on artefacts, the low number of formal tools, the low number of negative removals and the low ratio of flakes to cores, supports the idea of easy access to raw stone material. This is consistent with the results of surface surveys conducted in surrounding areas of the mentioned sites. The existence of flint and quartz cobble in the geological sections adjacent to the mentioned sites (Figure 2, A, B) on the one hand and cobble of Daroungar River (Figure 2, C) on the other hand can be considered the most probable sources of raw material available to producers of the above-said artefacts. However, to provide more convincing evidence, it is necessary to conduct laboratory studies and achieve desirable results in this area.

Shamkhal Open-air Site

The open-air site of Shamkhal was identified at the northernmost point of Dargaz plain, at the confluence of Daroungar and Shamkhal valleys and on eroded layers whose western edge is cut by Dargaz-Quchan



Table 2: An abundance of stone raw material in the Paleolithic sites of Dargaz plain

road (Figure 3). This site is about 1050 meters above sea level and overlooks Daroungar River, which flows westwards and at a distance of approximately 500 meters. The artefact collection obtained from this site represents a chopper industry, in which about half of the artefacts are made of cores and their related fragments (43.47%). Different types of tested single-side and double-side cores as well as multi-side cores are classified in this category. Cortical, longitudinal and broken flakes, make up the flakes of this collection, and heavy-duty and side scrapers, denticulate pieces, and retouched parts are another category found in the Shamkhal site (Table 3).

The high amount of cortex on the cores (75%), the low number of negative removals on them (4 removals per core) along with the low number of flakes and the dominant presence of retouched fragments indicate that the Knapping process in the mentioned collection has been done only to meet the immediate needs. Given the relatively appropriate access to stone raw materials, this is consistent with the models proposed by some researchers who consider easy access to stone raw materials as one of the main reasons for not producing formal tools (Andrefsky, 1994).

Artian Open-air Site

The open-air site of Artian is located in the middle of Dargaz plain at an altitude of 500 meters above sea level and on the terraces of the eastern edge of the Daroungar River. The mentioned site had previously been identified, and preliminary studies had been performed on it (Sadraei et al, 2018). However, the low number of artefacts in the initial visits and also the necessity to study the artefacts more carefully led to a review of the collection. According to the secondary context of the artefacts, a large part of the findings suffers from erosion by water. In some cases, the high degree of abrasion of the negative removals and the lines between the removals cause the identification and typology of pieces to be a difficult task.

The collection obtained, which is also the result of recent reviews (N: 16), includes 10 types of tools. Single-side and double-side chopper-cores, polyhedrons, tested cores and fragments of cores can be seen among the category of cores of the collection. Crude flakes, notches, heavy scrapers and

retouched pieces are other artefacts in this collection. Meanwhile, the existence of a sub-triangular biface tool in the collection doubles the importance of these findings. The dimensions of the sub-triangular biface are 8.5×3.5 cm, which in some parts, in addition to abrasion, has suffered from some fractures too.

Zarrin Kouh Open-air Site

The northernmost mountain ranges overlooking Atak plain have created Zarrin Kouh heights, which are formed in a northwest-southeast direction along the southern part of Lotfabad city. In the middle of this area, near a strait with the same name, 1 km southwest of it, an assemblage of stone artefacts was identified (Figure 3, C). This site is 290 meters above sea level, which is lower than other sites of Dargaz plain. The collection of artefacts obtained from this site is very limited (N: 8). However, the amount of patina and the type of techniques used in the knapping process indicate their attribution to the early Paleolithic period.



Figure 3: Satellite image (A) and landscape of the three Paleolithic sites (B). Shamkhal, (C). Zarrin Kouh and Artian (D)

Three pieces of single-side chopper cores, a piece of tested single-side core, a piece of the polyhedron, a piece of broken core, a heavy scraper and a piece of early Levallois flake constitute the collection of Zarrin Kouh. Among them, the Levallois flakes of the Zarrin Kouh collection can be considered as a part of the early Levallois flakes that were common in the Lower Paleolithic era. Among the technical features of these removals, in addition to their larger dimensions, the non-preparation of the striking platform can be mentioned (Sharon, 2009). This can be seen in the example of the Zarrin Kouh collection.



Table 3: Frequency of the stone artefacts in three collections of Shamkhal, Aryian, and Zarrin Kouh

By looking at the three collections of Shamkhal, Artian and Zarrin Kouh, one can identify a relatively homogeneous composition that generally presents a chopper industry (Figures 4 and 5), which is comparable to the early Paleolithic industries. However, the presence of an early Levallois flake and a sub-triangular biface sample in Artian collection indicates the possible familiarity of



Figure 4: A selection of Paleolithic artefacts of Dargaz plain, 1. Double-side chopper-core, 2-3. Single-side chopper-cores, 4. Sub triangular biface tool, 5. Heavy scraper, 6. A Notch, 7. Longitudinal flake, 8-9. Retouched flake

hunter-gatherers in Dargaz plain with other early Paleolithic knapping techniques. On the other hand, the remarkable existence of chopper cores, crude flakes, and flat and cortical platforms strengthens the idea of using hard stone hammers as the dominant technique in the knapping process of stone artefacts of the collections in Dargaz plain. However, unlike other Lower Paleolithic collections of Central Asia (Ranov et al, 1995), Kashafarud plain (Bigleri, 2015) and Neyshabour plain (Sadraei et al in Press), in which the use of anvil techniques is also observed, no evidence of this type of technique was identified in any of the sites of Dargaz plain.



Figure 5: Paleolithic artefacts of Dargaz plain (Drawing: Ali Sadraei)

Challenges

As mentioned earlier, despite the extensive research conducted in Dargaz plain, no mention has been made so far to the existence of Pleistocene populations that were active in this plain, as if the plain has only witnessed the presence of human populations with the beginning of the Neolithic era. However, the geographical location of Dargaz plain, as one of the inter-mountain valleys leading to the extensive plain of Qarah Qom on the one hand, and the existence of reliable water resources and stone raw material on the other hand, have significant capacities to attract hunter-gatherer groups of Paleolithic age. This can be proved by identifying three Paleolithic sites (Figure 6). However, the most important challenge in identifying such sites is the high potential of plains such as Dargaz to receive a great number of depositions, which is increasingly followed by displacement and aggregation of sediments in the middle parts and even parts of the marginal sections of the plain due to high rate of flooding of permanent rivers on the one hand and deposits resulting from erosion on the other hand. Evidence for this claim is the open-air site of Artian, which was identified among the sediments that were most likely transferred to this point by water currents of Daroungar River from the higher parts of the plain and evidence of which can be seen in the considerable degree of erosion taken place in the lithic artefacts of this collection and their location in the terraces of Daroungar River. On the other hand, in

the absence of caves and rock shelters, the identification of Paleolithic open-air sites requires intensive surveys and, consequently, a relatively great amount of time and cost, which in practice causes the implementation of such research to be faced with serious problems. Therefore, only those parts of the plains can be studied, in which the least rate of sedimentation and changes of the late period (Holocene) has occurred.



Figure 6: Altitude and geographical position of Paleolithic sites in Dargaz plain: A. Shamkhal site, B. Artian site, C. Zarrin Kouh site

According to the geomorphological nature of Dargaz plain, the authors limited the study of the mentioned plain to at least two points. In the western part and the mound-like heights overlooking Daroungar River, the greatest capacity to preserve stone tools can be seen. On the other hand, access to water resources and stone raw material of the riverbed (with a distance of less than 500 meters) along with hunting sources that can be easily traced from these heights could have played a significant role in attracting hominids to this point of the plain. In the meantime, due to the passage of Dargaz-Quchan road the downstream of these heights, which in most cases has led to the cutting of geological layers, a suitable opportunity to study geological layers and identify possible evidence from this period is provided. It should be mentioned that the Paleolithic site of Shamkhal was also identified using this approach (Figure 7).

The northern part of the Dargaz plain is another point that was visited. Features such as the unique geographical location, which is considered a gateway to the vast plains of Qarah Qom and access to



Figure 7: Geological section of Shamkhal Paleolithic site which is located along the Dargaz-Quchan road

permanent and seasonal water resources (Daroungar River and Shurkal seasonal river) as well as the geomorphology of the mentioned area that is mainly in the form of Low-altitude mounds with the least rate of sedimentation and a high potential to preserve stone tools, motivated the authors to make a case-by-case visit to this point of the plain and consider this part of the plain as one of the target areas in future purposeful research. Zarrin Kouh's open-air site can be regarded as the first evidence of the Paleolithic era in this part of Dargaz plain and we can hope to identify more evidence from this period in this part of Dargaz plain by conducting further systematic research.

Terraces and river sections are other places that have a good potential to trace the evidence of the Pleistocene era, which have already been used in parts of the Iranian plateau (Berillon et al, 2007). Although this issue is much less important concerning Dargaz plain than other parts of it, if possible, it may contain evidence from this period. The open-air site of Artian in Dargaz plain on the banks of the Daroungar River is one of these findings. However, the lack of in situ findings and the limited number of stone artifacts imply the possible challenges that may be encountered in the analysis and interpretation of such data, as well as their position in river sections and terraces.

Conclusion

Our knowledge of instrument industries, livelihood patterns, and other living aspects of hominids in the east and northeast of the Iranian plateau is so limited that it is not possible to provide a clear picture of any of these characteristics. This adds to the ambiguity of the situation due to the absence of an absolute chronology and solely relying on the typology of the lithic artefact. This is even though the Khorasan region has been one of the target areas in the first stages of Paleolithic research on the Iranian plateau, and after a promising start, Paleolithic research has unfortunately been neglected. Meanwhile, Dargaz plain has a much worse situation. The result of several decades of archaeological studies in this fertile plain is the identification and registration of ancient sites and mounds, which are relics of the glorious era of this part of the Iranian plateau in historical periods. The only prehistoric symbol of the plain is the huge mound of Yarim, the longevity of which can hardly be attributed to the Neolithic period, and no evidence of Pleistocene hunter-gatherer groups has been reported in this plain. During the project of National Registration of Historical Monuments of Dargaz city, the authors had some field visits from some places. The authors carried out a field visit in some places during the project of National Registration of historical monuments of Dargaz city. Revisit of Artian open-air site in the middle of Dargaz plain, the mounds extending near Zarrin Kouh strait in the north and the westernmost part of Dargaz plain and parallel to the entrance of Shamkhal valley on the other side of the plain were among the areas that had been limitedly surveyed that resulted in the identification of three open-air Paleolithic sites, which according to the type and technique of knapping in the mentioned collections, as well as the amount of patina and in some cases, the high abrasion of some artefacts (Artian site) strengthen the idea of attributing the mentioned collections to the lower Paleolithic.

Despite the limited scale of these visits, which were mostly done on a case-by-case basis, the evidence supports the notion that, at least in parts of Dargaz plain, evidence of Pleistocene huntergatherer groups can be found. The northern and western parts of Dargaz plain are two geographical areas, in which reliable evidence of this period can be identified through Paleolithic research and hence many ambiguities and questions that have not been addressed to date could be responded.

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