Vol. 10, No. 25, Summer 2020
P. ISSN: 2345-5225 & E. ISSN: 2345-5500

Darvi Tepe Chehr, A Workshop Open Site from the Middle Palaeolithic Period in Harsin Region, Kermanshah Province

Mohammad Eghbal Chehri
Assistant Professor, Department of Archaeology, Islamic Azad Univerty, Central Tehran Branch, Tehran, Iran
eghbal1262@yahoo.com

Hamed Vahdati Nasab
Associate Professor, Department of Archaeology, Faculty of Humanities, Tarbiat Modares University, Tehran, Iran

DOI: 10.22084/nbsh.2020.17083.1795
Received: 2018/10/25 - Accepted: 2019/07/12

Abstract

The valleys and margins of the intermountain plains between Harsin and Bisetun are among the key geographical areas in the Zagros Palaeolithic studies. Recent archaeological research has shown that some of the Zagros Paleolithic sites are adjacent to radiolarian rocks of chert. Darvi Tepe as one of these important sites with a considerable number of stone artifacts is located on the near of Chehr village and 10 km south of Bisetoon mountain. The geographical position of the Darvi Tepe is such that it lies between the Middle Paleolithic sites in the Harsin Mountains and the Paleolithic sites of the Bistoon Mountains. In this article, research questions were included what kind of usage does the site have on a rocky bed of natural radiolarian outcrops? By studing and typology of surface findings, what is the time period of Darvi Tepe? The study of the technology making and typology of the pieces collected from the Darvi Tepe shows that the site was used as an open workshop for the production of stone artifacts. The Surface findings from the site indicate that the Darvi Tepe is belong to the Middle Paleolithic period. The research on the findinds is based on library- field survey method. Also the relatively high presence of the LevaLeva technique and retouch on the debitage of the site are noteworthy. The presence of a large number of retouch pieces in a workshop site on the high quality raw materials was indicated that the low availability of raw material resources does not lead to retouch and it is the main reason for the retouch creating efficient edges. While the relative abundance of the Levaleva technique in the Darvi Tepe is confirming studies based on

the presence of Levaleva in high Zagros, and this is another site that further substantiates the claim of Levalova in the High Zagros.
Keywords: Middle Palaeolithic, Levaleva Technique, Darvi Tepe, Workshop Site, Central Zagros.

Introduction

The valleys and margin of the inter-mountain plains between Harsin and Bisetun hillsides are of the most important areas in the Central Zagros, where numerous sites from different pre-historic periods have been obtained. Archaeological evidence from different parts of the region indicates that scattered human groups were present in the foothills and the intermountain areas during the late Pleistocene period. It seems that its environmental status has provided the necessary conditions for the survival of these groups. Despite the importance of this area in Paleolithic studies, it has not received much attention from archaeologists and most of the Paleolithic studies in recent decades have focused on caves in the slopes of Mount Biestun (Coon, 1951. Young & Smith, 1966; Jaubert et al, 2006; Biglari, 2001).

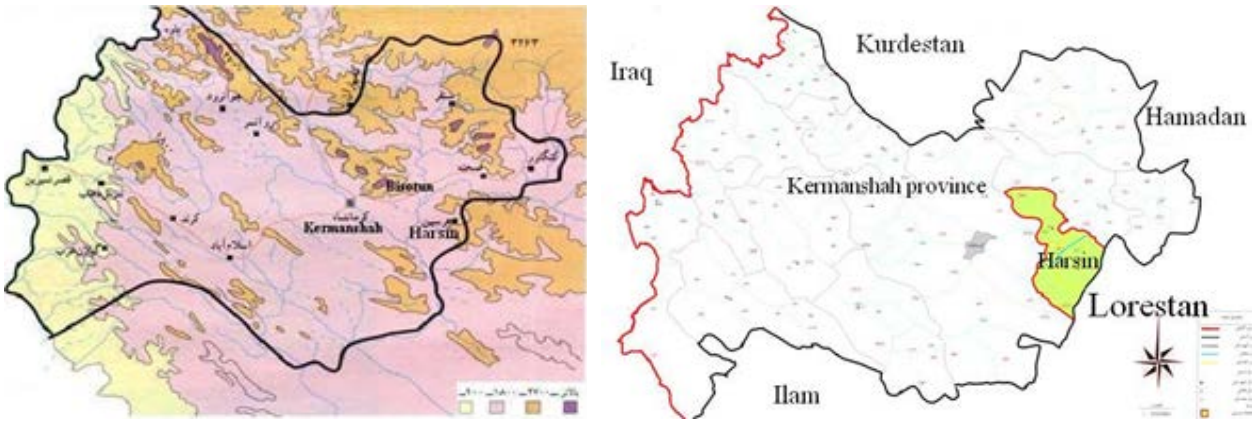
In this paper, the research questions are: 1) what is the application of open-air site of Darvi on a rocky bed of natural radiolarite outcrops? 2) What is the timeframe of the Darvi site according to the survey and typology of superficial findings?

The study of the manufacturing technology and typology of the fragments collected from the Darvi Hill showed that the site was used as an open workshop for the production of stone artifacts. Surface findings from the site indicate that Darvi Tepe is a single-period site in the Middle Paleolithic period. The research is based on the findings of the library-field survey. Despite the high importance of open-air sites in the area that are formed on chert rock resources, which have often been workshops for the production of artifacts, there has been little research to date on open-air sites and how to access raw material resources such as chert-bearing outcrops at the regional level. Therefore, recognition of these open-air sites, which have been workshops for producing stone tools or animal slaughter sites, can solve some of the problems posed about the Paleolithic of this area. It can also help to understand the Paleolithic of the area in terms of supplying the raw material on these sites.

The geographical location of the area

Harsin city with an area of 1007 Km2 with geographical coordinates of 47° 15′ to 47° 40′ E and 34° 05′ to 34° 25′ N, is located at an altitude

of 1582 m above sea level at the east of Kermanshah. The county is bounded to the north by Sahneh county and Dinavar district, to the east and south by Lorestan Province, and the west by Dorudfaraman in Kermanshah province. Harsin is 44 km from Kermanshah city (Fig. 1).



▲ **Fig. 1. Geographical location of Harsin County in Kermanshah Province (Authors, 2019).**

Harsin County is a part of the Zagros Highland or thrust Zone that tectonically contains radiolarites, limestones, ophiolitic remnants named Harsian-Sahneh ophiolites, Eocene volcanic rocks, and Flysch (Agard et al., 2005: 403). According to geological studies, the Harsin region and the southern valleys of Mount Behistun are some of the main radiolarite sources of the region. This area belongs to the radiolarite belt (The belt stretching from Boroujerd to Paveh) that extends 5–10 km north and northwest to the alluvial plain of the Ghareh Sou River and the northern slopes of Kuh-e-Sefid (Daveau et al., 2010). Thus, Kermanshah radiolarites, in a more or less regular band, cover a very large area parallel to the Bisetun limestone massif and its southern thrust from Harsin to Kouh-e-Sefid (Brood, 1989: 26). According to available data, the radiolarites of the Harsin basin have started at least from the Liassic (Lower Jurassic) period. In some parts, the radiolarian reentrant has been in the form of cortex (Daveau et al., 2010). Bisetun thick limestones with an altitude of 1500 to 3000 m are of the highest peaks in the region, with sediments ranging from the Upper Triassic to the Upper Cretaceous (Cenomanian). The main peaks of the Bisetun unit in the area are two tall massifs of Mount Bisetun in the north of Kermanshah and Shirez Mountain in the north of Harsin (Agard et al, 2005: 405).

Historic background of the archaeological studies of the area

Archaeological studies of the area began in 1949 with excavations by Carlton Stanley Coon from the University of Pennsylvania at Bisetun

Cave (Coon, 1951). Then in 1965, Young and Smith performed excavations at Bisetun Khar Cave (Young & Smith, 1966). But the systematic study of the Harsin region's intermountain valleys began in 1977, A joint delegation, under the supervision of Philip Smith and Pether Mortensen conducted a thorough investigation in the intermountain valleys of the Harsin region. They also reported two sites of the Palaeolithic period near the Ganj Dareh Hill (Mortensen and Smith, 2014: 4. Mortensen and Smith, 1977; Smith and Mortensen, 2009). One of these identified sites is the No. 16 open-air site on hilly lands of chert-bearing outcrops that may have been a stone mine and a workshop for stone artifacts. In this site, a variety of blade and flake cores with varied shapes, and cores prepared by Levallois technique, flakes with lateral retouching, Levallois and Mousterian points, were obtained. Besides, Smith reported a small number of chert-made tools such as the Mousterian lateral scrapers on a small rock shelter near Harsin (Mortensen and Smith, 2014: 4. Smith, 1986: 21).

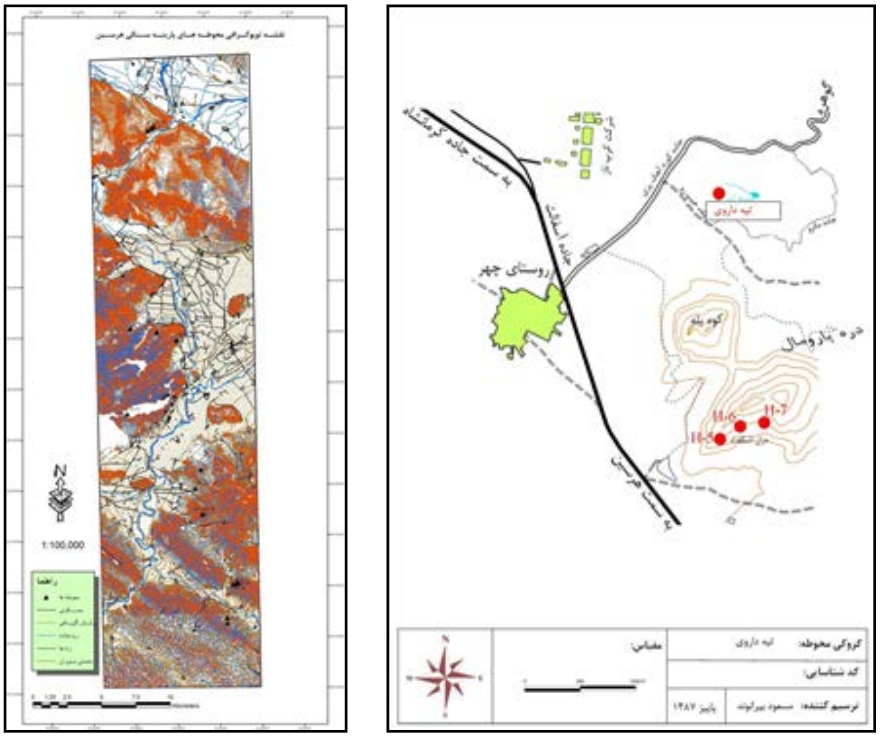
Within one of the experimental trench on the margin of Ganj Dareh Tepe, Smith obtained stone artifacts attributed to the Middle Palaeolithic. He attributes them to the river terrace sediments in a valley next to Ganj Dareh Tepe (Smith, 1975: 179). The most recent palaeolithic studies in the area have introduced Martarik, Mardodar, and Maraftab caves and excavations in the Martarik cave (Biglari, 2001: 50-60; Jaubert et al., 2006). Most of these archaeological studies have focused on Mount Bisotun and its hillsides. Therefore, an intensive and thorough study is required to find new Palaeolithic sites in the intermountain valleys leading to Harsin city. Besides, the investigation and identification of the county of Harsin by Abbas Motarjem and Ya'qub Mohammadifar (Motarjem and Mohammadifar, 2002) resulted in the registration of 126 sites from various periods, especially from the pre-historic periods of rural life (Pre-Pottery Neolithic) to the late Islamic period. Therefore, it was proposed to investigate and identify the area to register new sites on the agenda of Cultural Heritage, Handicrafts, and Tourism Organization of Kermanshah Province, with the permission of the Institute of Archaeology. As a result, archaeological survey of the area led to the identification of 96 new sites from different eras. 21 sites of them belonged to the Middle Paleolithic to the Epipaleolithic periods(Chehri, 2009).

Among these newly identified sites, the Middle Paleolithic to Epipaleolithic sites of Harsin county included: Divangah cave, Divangah rock shelter in Harsin, Qaysvand cave and rock shelters

(01-06) in the slope of Mount Booreh, Markhadad cave, Merel Eshkoft Rock Shelters (1, 2, 3), Darvey open-air site, Aveza Cave in Bisetun Town, Farhad Trash Wall Cave, Zardeh Yoochak Rock Shelter, Bazcharkhan Cave, Tangzin Cave, Hossein Abad Rock Shelters and Cave (1, 2, 3). Therefore, Darvi Tepe was the only open-air site identified, which was of particular importance in terms of its functionality. The site supplied the raw material of some of the above sites during the Middle Paleolithic period, such as Merel Eskoft (1-3), located 2 to 3 kilometers northeast of it(Chehri, 2012).

Darvi Tepe

Darvi Tepe is a natural promontory on the eastern margin of the intermountain valley in the south of Bisetun, 3 km southwest of Gamasiab and 2.5 km northeast of Chehr village. It is located in the dry farming area of this village (Fig.2). The geographical coordinates of Darvi Hill are as follows: E:47˚27 ’03.1” N:34 ˚19 ’ 55.2” and a height of 1349 meters above sea level. On this natural hill, interconnected by chains across other hilly lands, there were a large number of stone artifacts and tool-making raw materials, mainly of veined flint. Locals call the area “Darvi” because of the willow trees next to the spring near the hill. Darvi Hill is approximately 1.3 hectares (130 × 100 m) and its peak is 4.5 m above the surface of adjacent southern plains(Fig. 3). The site is situated on a natural

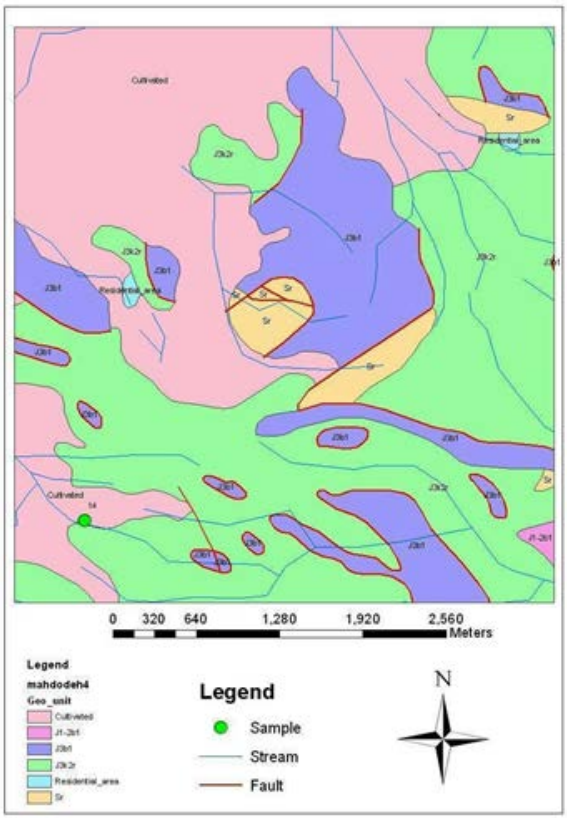


◄ **Fig. 2. Geographical location of the open-air Darvey in the area (Authors, 2019).**

Fig. 3. Pictures of different views (south, north and east) of the natural hill of the Darvi (Authors, 2019). ▶

oval-shaped hill and a rocky bed of flint with a relatively red soil that connects with the east-west longitudinal axis to the other hilly lands. The slope direction of the hill is north-south with an average slope of 15-20 degrees in the north and south. At the surface of the hill, radiolarite outcrops are seen as large circular fragments of flint. This open-air site is completely south facing and the whole surface of the hill is under dry farming. There is also a water spring at 300 meters to the east. The geological age of the range in which the natural hill of Darvi is located belongs to the Jurassic-Cretaceous period of Kermanshah radiolarites (j3k2r). The geological texture of the Darvi site is a combination of red radiolarite flint with limestone. Around the site, there are two other geological units (sr and J3b1) from the Jurassic-Cretaceous period that include limestone with flint bedrock (cherts) and serpentinites (Fig. 4).

Chert often occurs as nodules or bubbles in a parent rock such as limestone. It is believed that nodular chert is precipitated under conditions of low pH, where carbonate materials tend to dissolve. Limestone and dolomite formations are typical places where chert nodules tend to be found. Cherts are also found in massive beds or layers. It is possible that chert can also form as a result of precipitation directly within a sedimentary ooze at the bottom of oceans. Chert forms not only in a deep-sea environment, but also in shallow waters, and may also form as an indirect result of volcanic activity (Andrefsky, 2005: 54-56).



◄ **Fig. 4. Geological map of the open-air site of Darvi Tepe (Authors, 2019).**

Materials & Methods

As mentioned, the entire southern slope of the open-air site of Darvi was covered by chert bedrocks. The fieldwork method in this site was the use of systematic survey because the systematic survey is more accurate than other survey methods, and the chances of the samples being present are greater in this type of survey. Therefore, the hill topography map was prepared using the Total Station camera, and the hill surface was divided into equal squares (25 × 25 m). Then, by systematic sampling in 10% (5 squares of 48 squares) of the whole squares, the sampling of stone findings was done by a three-person team. Each of these 5 squares, 25 by 25 meters, which was selected as the sampling unit, was divided into small networks (5 by 5 meters) for higher accuracy, and sampling was performed on it. The result of the collection was a total of 194 stone findings from the open-air site of Darvi. For greater accuracy in recording the findings, they were divided into three workshops of A, B, and C (Fig. 5). The sampling results of the workshops were as follows: 93, 54, and 47 fragments were collected from units A, B, and C, respectively.

The various features of technology or manufacturing technology, the type of raw material, the typology, and the metric characteristics of all collected stone findings were recorded in the database designed

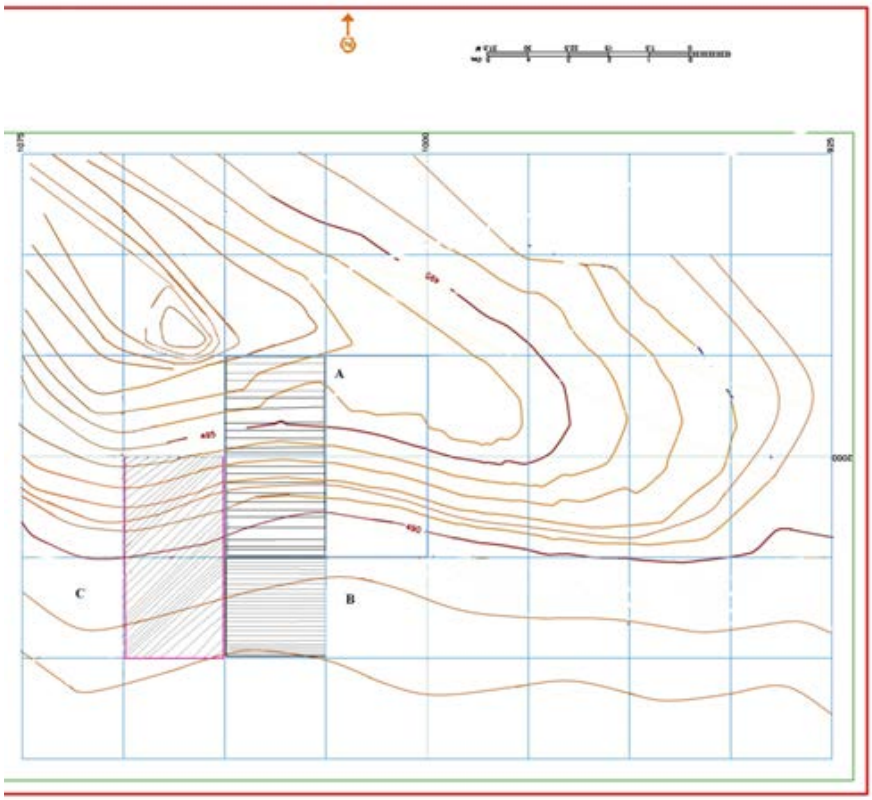


Fig. 5. Topographic map of Darvi Tepe with sampling units of A, B, and C (Authors, 2019). ▶

in Excel software. The following is based on the analysis of the data obtained from the same database.

Raw material and technology-typology structure

The open-air site of Darvi is located on a radiolarite bed of predominantly red and partially veined chehrt. Therefore, the set of stone artifacts collected from this site is quite local in terms of raw material type. Geological studies of the area have shown that Kermanshah radiolarites are more or less as a regular band in this area. These radiolarites are relatively thick layers of fine chert outcrops that cover a very large area parallel to the Bisetun limestone massif and its southern overthrust from Harsin to Kooh-e Sefid (Brood, 1989: 26). The chert types include radiolarian one, typical of the Zagros mountain region. The colour ranges from reddish brown, brown, green, greyish chert, and grey to cream (Nishiaki, 2016: 90).

The similar shape and texture of the region's chert stones has also been proven based on the stone artefacts of the Darvi Tepe, so that of a total of 194 stone finds of chert, 67.01% (130 pieces) are homogeneous reddish- brown, 13.40% (26 pieces) veined reddish-brown, 11.34% (22 pieces) bicolored reddish- brown with cream spots, and 8.24% (16 pieces) brown. In addition to the abundance of

stone finds on the site and the relatively high quality of chert, which is mainly associated with reddish- brown, There are a large number of cores in the form of large stone blocks of approximately 20 to 30 cm in length, with traces of debitage on their surface (Figures. 6 and 7). The dimensions of some of these rocks are so large that they could not be collected because of their large size and weight. The number of cores among the collected samples accounted for 10.30% (20) of the total set. Most of the cores are flake core with one or more surfaces being debitage, and a limited number of them, are Levallois blade cores. It seems that this open site is used as a place to produce stone artifacts during the Middle palaeolithic period. Evidence of this claim includes the high volume of raw materials on the surface of the site, cores that has been cortex and one or more debitage effects, The high frequency of the initial flakes and even the retouching tools have not been used effect on the side edges and the surface cortex of them can be seen.

◄ **Fig. 6. View of the surface of the hill and the abundance of raw material of chert stone (Authors, 2019).**

◄ **Fig. 7. Images of the scattering of stone tools on the surface of the Darvi Tepe (Authors, 2019).**

▲ Fig. 8. Some stone artifacts of the open-air site of Darvi: primary cortical flake (No. 1 and 2), Levallois core rock (No. 3 to 5), (Authors, 2019).

Most of these debitages were in the form of initial flakes with cortex effects and there were some chips among them. Besides, the presence of a large number of raw debitages and initial flakes(68.04%) in the site indicates that the process of decortication has been carried out inside the site. Thus, the presence of cortex is visible in 132 numbers (68.04%) of all fragments and is nearly twice that of non-cortex fragments(31.95%) in 62 numbers (Fig. 8, Nos. 1 and 2). It is possible that the blanks with large relatively dimentions inside the site were separated from the large cores and the process of making tools was performed on them. The presence of retouched pieces (123 pieces) in compared to non retouching pieces has a relatively high frequency, and this indicates that retouching tools have the most applications among the stone finds in the site. Also, the presence of Lavallois technique is another feature of the artifacts of the site which accounts for approximately 47.93% (93 pieces) of the stone findings total of the site(Fig. 8, numbers 3 to 5, Fig. 10). This relatively high percentage of Levallois technique indicates that there is a direct relationship between the Lavallois technique and the abundance of raw material, which will be discussed further below.

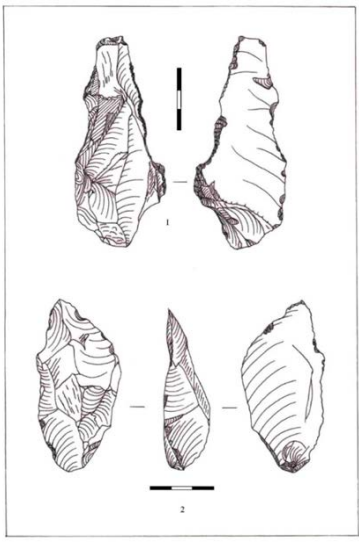
Technology for the production of stone tools in the Darvi Tepe

Regarding the number and debitage technology from cores (20 pieces), it can be said that flake cores have the highest amount, so that approximately 70% (14 pieces) of the total cores are the flake cores of one-sided and specially multi- faced(Figure 8, Nos. 3 to 5, Fig. 9). Another notable item is the Levalva blade cores with 20% of the cores total. The collection of stone tools in the site shows that during the Middle Palaeolithic period in this area, special emphasis was placed on the production of retouched flakes or tool flakes. Approximately large volumes of these tools have been produced using hard stone hammers or direct percussion techniques. The construction technique in most of the stone artifacts was in the form of a direct percussion technique with a large central percussion bulb. Most of the debitages were made with a plain platform. But in a limited number of tools, the Nahr Ebrahim technique is also observed (5.67% of the total or 11 number). The dihedral platform (6.18% of the total set or 12 number) and the cortical platform (4.63% of the total set or 9 number) are also found less frequently in the set. Although direct percussion technique and hard hammers have been used, a number of Crushed platform can be identified among the set.

▲ Fig. 9. Picture of different views of cortex cores of Darvi Tepe (Authors, 2019).

The composition of debitages in the stone collection of Darvi Tepe

The frequency and percentage of the collected stone artifacts were included: debitages %26.28 (51 pieces), tools %63.40 (123 pieces) and, as mentioned, cores 20 pieces (10.30%) (Table. 1). The image, obtained from all the stone artifacts collected from the site, showed that the site served as an open-air workshop for the production of stone artifacts. The high percentage of primary cortex flakes (Fig. 10, Nos. 1 and 2), large fragments of cores, and primary flakes from the process of decortication showed that the process of forming the core rock and producing the flakes took place within this site. The presence of the Levallois technique is also another feature of the artifacts of the site, which accounts for approximately 47.93% of the total stone findings of the site. There are includes Levaleva retouching flakes, levaleva blades and cores(Fig. 10). This relatively high percentage of Levallois technique (47.93%, 93number) indicated that Darvi Hill was one of the workshop centers for the production of Levallois artifacts in the region. Also, the high number of tools scattered across the site could indicate that not all of the stone artifacts produced were used within the site, but probably a large amount of these tools for other sites producted(where access to limited raw material resources is limited). It seems that flake debitages were produced in different forms, and more than 80% of these flakes can be introduced as retouching tools. Therefore, the preliminary study of this group of stone findings has shown that the use and efficiency of flakes is done in different ways and the percentage of flakes that have become retouched tools, much more in compared to non-retouched flakes. Besides, most of the blades consist of retouched Levallois blades (Fig. 11, Nos. 3 and 4; Fig. 12, Nos. 3, 8 and 11), which are made from the blade Levallois cores. This relatively high percentage of Levallois technique (47.93%) indicated that Darvi Tepe was one of the workshop centers for the production of Levallois artifacts in the region.



▲ **Fig. 10. An example of Levallois tools design in Darvi Hill (Authors, 2019).**

There are similarities between some of the Levallois artifacts in the excavated area of Martarik Cave in Bisetun with Darvi open-air site, especially in terms of raw material (such as the set of homogeneous reddish-brown cherts). However, so far, no laboratory methods for finding their provenance have been performed in this area, and currently, this is only an assumption. But it can be argued that at least some parts of the Levallois artifacts with the homogeneous reddish-brown chert raw material found in the caves and rocky shelters of Mount Bisetun, associated with the high production of

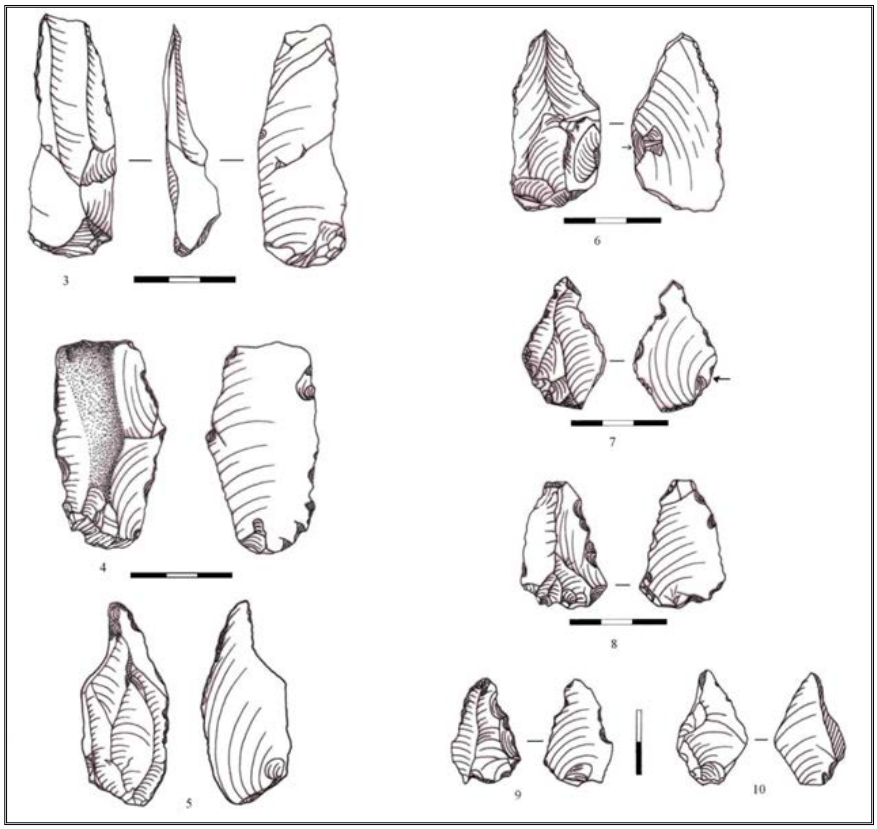


Fig. 11. An example of the design tools of Darvi Tepe: (3, 4) Levallois retouched blade (5) Levallois pointed flake (6) dejete retouched point (7) dejete Scraper (8) denticulate tool (9) notched tool (10) Pointed flake (Authors, 2019). ▶

Levallois artifacts in the site of Darvi Tepe. This is justified by the ten-kilometer distance of Darvi to Bisetun and the similarity of their raw material.

Jaubert et al. argue that the industry in Martarik likely resembles Tabun B, which is termed the Levant final Mousterian (70, 000 to 45, 000 years ago), the Neanderthal remnants in Kebara Cave (approximately 60, 000 years ago), and Amod. The only major difference between the Zagros Mousterian and the Levant final Mousterian is in the number of truncated artifacts, and the Levallois arrows of Mousterian generally dominate in the Martarik (Jaubert et al, 2009. Wahdati Nasab & Aryamesh, 2015: 195). This date also corresponds to Neanderthal human burials in layer D of Shanidar Cave dating from 65, 000 to 45, 000 years ago (Solecki, 1963). Therefore, based on this evidence and comparisons, it can be conjectured that the Middle Paleolithic period of the region was in this period.

Typology of tools and retouching pieces

As previously explained, the most prominent feature of the set of tools is the abundance of retouching pieces. This abundance of retouched

tools is found mainly in flake tool, poins, scrapers, denticulates / nutches, and blades (see Figure 11 and 12 for tool morphology). The stone tools of the Darvi Tepe nclude a variety of different types of retouched flake pieces, such as alternate retouching flake, bifacial retouching flake, transverse retouching flakes, and other types of retouched flakes. There are 123 tools (41.17%) including 32 Levallois points, 29 scrapers (13 single sided scrapers, 6 double-sided scrapers, 6 end scrapers, 2 transverse scrapers, and 2 dejete and stemmed scrapers, respectively), 24 notched tools, 18 denticulate tools, 9 Levallois blades, 4 borers 3 naturally backed knife and 1 burins (Table.2). Notches have been created with one percussion (clactonian technique) on one or more edges of the flakes. Sometimes notches are single, or sometimes we take more than one notches at a distance on one or two different edges, which can be accompanied by bifacial, tansverse, or alternate retouching. Notches are often built on large flakes and are rarely seen on blades. In addition to

◄ **Fig. 12. Pictures of the stone artifacts of the open-air site of Darvi; (Nos.1, 5, and 6) notched flake, (No. 10)denticulated flake, (Nos. 2 and 9) Levallois pointed flake, (Nos. 3 and 8) Levallois blade, (No. 4) blade, (No. 14) Levallois end scraper, (No. 7) Levallois plain flake, (No. 11) Levallois sharp-tip blade, (No. 12) single straight scraper, (No. 15) Levallois flake, (No. 13) Levallois dejete/denticulate scraper (Authors, 2019).**

▲ Fig. 13. Photos of how to retouching on retouched tools on the Darvi Tepe (Authors, 2019).

the end notched flakes in some pieces, a notch has been created on their platform. Denticulates are often made with a heavy and stepped retouch on the flakes. Interestingly, there are a large number of different types of retouched flakes, points, scrapers, and notch / denticulates compared to a very small number of perforators / drills and burins on the Darvi Tepe.

As mentioned above, the number of retouching tools obtained from the site is very large compared to non-retouching tools (Fig. 13). This large number of retouching tools compared to non-retouching tools in a stone tool workshop suggests that despite the abundance of raw materials, there are other practical reasons for creating retouching on hand tools. Therefore, the retouching of hand tools on the Darvi Tepe has nothing to do with simple or hard access to raw material resources, but the retouching of artifacts may have been more due to their use and the creation of efficient edges. In this regard, it should be noted that the open site of the Darvi Tepe is located on a natural bed of radiolarite outcrops, which can be seen on the surface of large and small pieces of chert, and it is used as a workshop site for the tools production. Therefore, the abundance of retouching on stone artefacts cannot be interpreted in any other way than creating efficient edges. Regarding the amount of retouching (continuous or non-continuous) on the retouched fragments, it was found that light, moderate, and heavy retouches were applied on 51.47%, 36.09%, and 12.42% of the total retouched fragments, respectively. Therefore, light and heavy retouches had the highest and lowest presence among the retouched fragments of the site, respectively. The different types of retouching performed on these retouched fragments consisted of standard, alternate, transverse, and bifacial retouches.

Metric analysis

In the metric analysis of the stone artifacts of the site, the criterion is the axis of the debitage or the separation of a fragment from the core rock based on the axis of the percussion platform. The largest length and width are also considered to measure the dimensions of each fragment. In this category, there are some cases of stone

Table 1. Percentage and frequency of classification of stone artifacts (Authors, 2019). ▶

Number	Percentage	Classification of stone artifacts
20	%10.30	cores
123	%63.40	tools
51	%26.28	debitages
194		total

artifacts in which a longitudinal axis of the debitage is opposed to the longitudinal axis of the fragment and therefore, in this category of artifacts, the longitudinal axis of the debitage is considered.

According to the axis of the debitage, the largest length of the artifacts of the site was 116.43 mm, and their smallest length was 18.89 mm. However, the means of the largest and smallest lengths are 74.73 mm and 34.52 mm, respectively. Therefore, the site artifacts follow a specific metric pattern and are always made on the debitages with the mean length ranging from 74 to 34 mm. Thus, the number of artifacts with dimensions out of this range is not large. In the metric analysis, the width of the artifacts was similar to the length, as the largest and smallest width of stone artifacts were 85.41 mm and 14.72 mm, respectively. By examining the dimensions of the site artifacts, it was found that in 19.58% (38 fragments) of the artifacts the longitudinal axis of the flake is opposite of its longitudinal axis. This feature is particularly noticeable in points, scrapers, and denticulate tools. Other features of some of the stone artifacts in the area are the relatively large dimensioned percussion platform with the largest and smallest length of percussion platform being 63.65 mm and 4.20 mm, respectively. Examining the dimensions of the site's artifacts, it was found that in 19.58% (38 pieces) of the hand tools, the longitudinal axis of the piece is the opposite of the longitudinal axis of the flake, which is more noticeable, especially in points, scrapers and notches. Also, a study of the metric dimensions of hand tools indicated that there was a standardization of size for making hand tools in this site, and in terms of their manufacturer, the average length size between 74 and 34 mm was the best possible mode for their efficiency and use.

Table.2 Frequency of tools typology in Darvi Tepe (Authors, 2019). ▼

Number	Tools Typology
32	points
29	scrapers
24	notchs
18	denticulates
12	Levaleva blades
4	borers
3	naturally backed knife
1	burin
123	total

Discussion

As noted earlier, the stone artifact collection of Darvi Tepe mostly represents the use of the site as a workshop in the Middle Paleolithic period. Since the site is located on radiolarite outcrops with homogeneous chert, most of the site artifacts are constituted of the reddish-brown flint with little variation in texture or color. Thus the Darvi Tepe complex represents a completely local assemblage that, to a large extent, was as independent as the site 16 of the Hersin area (Smith, 1986: 21) in producing stone artifacts. The feature of such complexes is the abundance of flakes that comprise the bulk of the findings. The main focus in Harsin was on denticulate, notched, and side-retouched flakes, and a few end scraper on the blades, a few Mousterian-like arrows, backed flakes, and the Levallois arrow.

Based on a large number of cores and debitages and the presence of reddish-brown outcrops, researchers have suggested that the site was a workshop for making stone artifacts (Vahdati Nasab & Aria Manesh, 2015: 196 Mortensen and Smith, 1977). It seems that almost all of the sequential operations involved in the manufacture of the artifacts and the stages of their production, including the initial preparation and decortication, took place in Darvi. Therefore, a significant number of the site artifacts comprise the coated initial flakes (68.04%), large pieces of core stone, and retouched flakes. The presence of retouches on about 50% of the fragments is a notable issue in this site. Despite the abundance of flint raw material at the area, some of the stone findings are retouching tools (continuous or non-continuous retouching). The amount of retouching and access to the raw material has always been one of the issues discussed by researchers in Paleolithic Archaeology. Herold Dibble in the mid-1980s, by studying the artifacts of the Bisetun area, introduced the Scraper Reduction Model (Dibble, 1984). He attributed the high rate of retouching in the high Zagros to the lack of access of dwellers of this site to raw material resources in the Middle Paleolithic period (see also Dibble, 1995). The idea has always been opposed since its introduction by Dibble. Opponents of the idea suggested that retouching in the Middle Paleolithic was not necessarily influenced by the lack of access to the raw material, but rather it was used for the creation of cutting edges and deformation of the raw flake (Mellars, 1996: 335-341). Recent research on locating raw material resources near Mount Bisetun (Joubert et al, 2006: 66), as well as studies on the relationship of retouch rate with raw material availability and presence of river pebbles as one of the main sources of decortication for the dwellers in rocky shelters and caves of Bisetun region during the Middle Paleolithic period (VahdatiNasab and Vahidi, 2011), all suggest that the Dibble Scraper Reduction Model could not have been considered as an inclusive model - at least in the high Zagros. The data obtained from this study, which indicates the presence of retouch on several artifacts located adjacent to the raw material, are also in full support of the opponents of the Dibble's hypothesis. Therefore, it can be concluded that the retouching of the artifacts in Darvi Tepe is not related to the availability or unavailability of the raw material sources, but rather to the application of the artifacts and the creation of more efficient and cutting edges.

Based on the manufacturing technology of the stone artifacts, the presence and abundance of the Levallois technique is one of the most important elements and indicators for the detection of the

Middle Paleolithic period (Monnier, 2006). Thus, the description of Böeda can be considered the most comprehensive definition of this technique. According to this definition, two basic steps for the preparation and shaping of the Levallois core rock are identified: 1) preparing the sequential percussion platform along the edges of the core rock, often accompanied by direct and vertical hammer blows 2) systematically shaping the core rock by introducing blows to the percussion platform that first appeared around the core rock (Böeda, 1988). This process results to design the shape of the flake before separating it from the core rock by introducing blows. Detecting the effects of the preparation process of the core rock on the percussion platform and back surface of the produced flake in the Levallois technique is important. In 1949, Carlton Stanley Coon, after excavating the Bisetun rock shelter, stated that the Zagros Mousterian lacked the Levallois technique (Coon, 1951). His comment was due to the lack of attention to the effects of the preparation on the percussion platform, the lack of attention to the effects of the previous flakes on the back surface of the debitages, only focusing on the Levallois core rock, and the lack of precise and comprehensive definition of this technique. Following Coon, Skinner studied some of the Middle Paleolithic collections in Zagros in his doctoral dissertation. Due to the lack of access to all the materials explored in the sites, he noted that the characteristic of the Middle Paleolithic artifacts in Zagros is the absence of the Levallois technique (Skinner, 1965). In fact, because of this key point in identifying the Levallois debitages, Hole and Flannery repeated the mistake of Coon and Skinner in Bisetun regarding the absence of Levallois in the high Zagros in the Middle Paleolithic period for Khorramabad region (Hole and Flannery, 1967). Harold Dibble is one of the first scholars who has pointed to the presence of the Levallois technique in the Middle Paleolithic period in Zagros in the Bisetun, Shanidar, and Konji caves. He suggested that Coon and Skinner made an error about the absence of the Levallois technique in the Middle Paleolithic sites in Zagros (Dibble, 1984. Vahdati Nasab, 2010). The results of studies in the excavations of the 40s, 50s, and 60s all confirm Dibble's view about the presence of this technique in Zagros (Baumler and Speth, 1993; Dibble and Holdaway, 1993). These studies about the presence of the Levallois technique in Darvi Tepe (47.93%) along with field research conducted in Zagros during the past decade (Biglari and Abdi, 1999; Jaubert et al, 2006 and 2009; Roustaei, 2010; Alibeigi et al. al, 2011) all support that the absence of Levallois should not be reported as a feature of the middle Paleolithic period in Zagros.

The geographical position of Darvi Tepe is such that it lies between the middle Paleolithic sites in the Harsin intermountain valleys and the areas in the slope of Mount Bisetun (between 7 and 10 kilometers). The location of the open-air site of Darvi Hill in the center of the Paleolithic sites of the area indicates the use of the site as one of the main raw material workshops in the area during the Middle Paleolithic period. It seems that the site has supplied some of the stone artifacts of the area. Also, regarding the typology of the stone tools found in Darvi Hill, different types of retouched flakes, points, scrapers, and denticulate/notched tools are obtained. But in comparison, very few borers/drills and chisels have been obtained. Therefore, the production of stone artifacts in the area should be more related to hunting activities. This pattern of tool-making is also seen in other Middle Paleolithic sites of the region. Therefore, it can be said that during the Middle Paleolithic period in the region, the main emphasis was on the manufacture of hunting tools.

Conclusion

The Natural Darvi Tepe, such as Harsin No.16 one of the open-air sites for the manufacture of stone artifacts in the Middle Paleolithic period, was formed on a radiolarian bed of mostly homogeneous and partially veined reddish-brown chert rocks. Considering the large volume of rock artifacts at this site, it can be said that one of the important sources of raw material in the region, for the production of stone artifacts in the Middle Paleolithic period, was supplied from the open-air site of Darvi. On the site, the abundance of raw material with effect of flake removal, cores and cortex debitages with retouched tools without the effect of use can be seen on the side edges. The presence of cortex in 132 pieces (68.04%) of the whole set of hand tools has been collected. Also, at least some of the Levallois artifacts used in the caves and rock shelters in the slopes of Mount Bisetun, such as Martarik cave, were supplied from the open-air site of Darvi. This is associated with the high production of Levallois artifacts at this site. This view is justified by the ten-kilometer distance of Darvi from Mount Bisetun.

Acknowledgments

The authors thank the cooperation and efforts of Mr. Ayoub Cheri, Mr. Massoud Biranvand, Mr. Aref Biglori, and Mr. Ali Ali-Weissi. The authors would like to thank Ms. Niloufar Yazdanpanah, who contributed to the translation of the English text of the article. We are also grateful for the valuable and constructive suggestions of the judges of the article.

References

- Agard P, Omrani J, Jolivet L, Mouthereau O., 2005. Convergence history across Zagros (Iran): constraints from collisional and earlier deformation. Int J Earth Sci Geol Rundsch 94.pp. 401-419.

- Alibaigi S, Niknami K. A, Heydari M, Nikzad M, Zainivand M, Manhobi S, Mohammadi Qasrian S, Khalili M & Islami. 2011. Palaeolithic open-air sites revealed in the Kuran Buzan Valley, Central Zagros, Iran. Antiquity 85(329). Project Gallory.

- Andrefsky, W. 2005. Lithics: Macroscopic Approaches to Analysis, CambridgeUniversity Press.

- Baumler, M. F & J. D. Speth. 1993. A Middle Paleolithic Assemblage from Kunji Cave, Iran. In: The Paleolithic Prehistory of the Zagros-Taurus, edited by Deborah I. Olszewski and Harold L. Dibble, pp. 1-73. University Museum Monograph 83, University Museum Symposium Series 5. Philadelphia, PA: University of Pennsylvania.

- Biglari, F. & K. Abdi. 1999. Paleolithic Artifacts from Cham-e Souran, the Islamabad Plain, Central Western Zagros Mountains, Iran: in ArchaölogischeMitteilungenaus Iran undTaurus31:1–8.

- Biglari, Fereydoon, 2001; Reports of new Paleolithic sites in Bisetun; Journal of Archaeology and History, Volume 2, Issue 28, spring and summer 2000. pp. 50-60.(in Persian)

- Biglari, F and S. Shidrang. 2006. The Lower Paleolithic Occupation of Iran.Archaeology 69: 3-4. Pp: 160- 168.

- Böeda, E. 1988. Le concept laminaire: rupture et filiation avec le concept Levallois. In Ĺ Homme de Néandertal, vol. 8: La Mutation, ed. M. Otte. Liege: Etudes et Recherches Archeologiques de Ĺ Universite de Liege, pp. 41-59.

- Broad, Jan. 1368. Geological Map of Kermanshah, Translated by Ali Agha Nabati, Tehran: Geological organization of Iran.(in Persian)

- Chehri, M E, 2009, Identification and documentation of ancient sites of Harsin County, Kermanshah Cultural Heritage Archive. (unpublished). (in persian)

- Chehri, M E, 2012, Paleolithic settlement patterns in Harsin county and the role of ecological factors in the distribution of the site, Ph.D dissertation, Islamic Azad university, Science and Research Branch, Tehran. (unpublished). (in persian)

- Coon C.S., 1951.Cave Exploration in Iran1949. Philadelphia:The University Museum Monographs, University Of Pensylvania press, Philadelphia.

- Daveau J. W, Ringenbach, J. Tavakoli, S. Ruiz, .M.H, Lamotte,

D., 2010. Evidence for mantle exhumation along the Arabian margin in the Zagros (Kermanshah area, Iran).Arab journal Geosciences 2010, springer, pp. 1-15.

- Dibble, H. L. 1984. The Mousterian Industry from Bisitun Cave (Iran), Paléorient10/2:23-34.Dibble, H. L. 1995.Middle Paleolithic Scraper Reduction: Background, Clarification, and Review of the Evidence to Date. J.Arch.Method and Theory 2, 299-368.

- Dibble, H. L. & S. J. Holdaway. 1993. The Middle Paleolithic Industries of Warwasi: in D.I. Olszewski and H.L. Dibble (ed.), The Paleolithic Prehistory of the Zagros-Taurus, pp.75-99. Philadelphia: University Museum Symposium Series, Volume 5, University of Pennsylvania.

- Hole, F, and K. V. Flannery. 1967. The Prehistory of Southwestern Iran: A Preliminary Report. Proceedings of the Prehistoric Society 33: 147-206.

- Jaubert J, Biglari F, Bordes J-G, Bruxelles L, Mourre V, Shidrang S, Naderi R, Alipour S., 2006. New Research on Paleolithic of Iran: Preliminary Report of 2004 Iranian- French Joint Mission, Iranian center for Archaeological Research, Tehran.

- Jaubert J, Biglari F, Bordes J-G, Bruxelles L, Mourre V, Shidrang S, Naderi R, Mashkour.M, Maureille.B, Mallye. B, Quinif, Y, Rendu, W, Laroulandie. V., 2009. The middle Paleolithic occupation of Mar Tarik, a new Zagros Mousterian site In Bisotun massif (Kermansha, Iran), Proceedings of the XV World Congress (Lisbon, 4-9 September 2006): 7-28.

- Mellars, P. 1996. The Neanderthal Legacy. Princeton: Princeton University Press.

-Monnier, G. F. 2006. The Lower/Middle Paleolithic Periodzation in Western Europe.CurrentAnthropology, Volume 47, number 5, pages: 709-744.

- Mortensen, P. 1993. Paleolithic and Epipaleolithic Sites in the Hulailan Valley, Northern Luristan. In The Paleolithic Prehistory of the Zagros-Taurus, edited by D. Olszewski, and H. L. Dibble. University of Pennsylvania Museum, Pp: 159-187.

- Mortensen, P and Smith, P.F.L, 2014, A Survey of Prehistoric Sites in the Harsin Region, 1977, Modares Archaeological Research, Vols. 5& 6. Nos. 10-11, Pp: 1-10.

- Motarjem, Abbas and Yaghoub Mohammadi Far, 2002, Investigation, identification, documentation and survey of the historical sites of Harsin County, Archive of Kermanshah Cultural Heritage and Tourism Organization (unpublished). (in Persian)

- Nishiaki, Y, 2016. Techno-Typological Observations on the

Flaked Stone Industry of the Early Neolithic Settlement of Ganj Dareh, West Iran (the Tehran Collection), in the Neolithic of the Iranian plateau recent research, edited by Kourosh Roustaei and Marjan Mashkour, Berlin, Pp:189-208.

- Roustaei, K. 2010. Discovery of Middle Palaeolithic occupation at high altitude in the Zagros Mountains, Iran, Antiquity, Issue 325, Volume 84, Project gallery.

- Roustaei, K, H. VahdatiNasab, F. Biglari, S. Heydari, G. A. Clark, and J. M. Lindly. 2004. Recent Paleolithic surveys in Luristan. Current Anthropology. 45, pages: 692-707.

- Skinner, J- 1965.The Flake Industry of Southwest Asia: A Typological Study. Unpublished Ph. D. dissertation, Columbia University, New York.

- Smith, P.E. L. 1975.GanjdarehTepe, Iran VOL.XIII. Pp: 178-180.

- Smith, P.E. L. 1986. Paleolithic Archaeology in Iran.University of pennsyvania Philadelphia.

- Smith, Philip and Pether Mortensen, 2009, Introducing three old Neolithic sites in western Iran, translated by Fereydoon Biglari, Bastan-pazhooh Quarterly, Volume 12, winter 2009, University of Tehran, pp. 79-83.(in Persian)

- SOLECKI, R.S. 1963. Prehistory in Shanidar Valley, northern Iraq. Science 139: 179–193.

- VahdatiNasab, H. 2010. Reassessment of the Prehistory of Southwestern Iran Report (Hole and Flannery 1967), International Journal of Humanities. Volume 17, Number 2, Pp: 1-12.

- VahdatiNasab, H and M. Vahidi. 2011. Reevaluation of Scrapers Reduction Model Using Geometric Index of Reduction (Mar-Tarik Middle Paleolithic Assemblages), IranianJournal of Archaeological Studies, Volume 1, pages: 26-34.

- Vahdati Nasab, H. & Aria-Manesh, Sh, 2015, Paleolithic Archaeology of Iran (From the Beginning to the dawn of Rural Life), Tehran: Institute of Cultural Heritage, Handicrafts and Tourism. (in Persian)

- Young C. T, Smith P.E.L., 1966. Reaserch in the Prehistory of Central Western Iran. Science, 153: 386-91.