

## Classification and typology of tools recovered from survey of middle paleolithic and epipaleolithic sites of sargachineh intermountain plain in Yasuj, Iran<sup>1</sup>

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### ABSTRACT

*Profile of prehistoric archaeology, especially Paleolithic period in Kohgiluyeh and Boyerahmad Province has been neglected and remained largely obscure due to lack of attention and recognition of researchers as well as concentration of a majority of research projects on neighboring provinces. Archaeological study of Sargachineh intermountain plain in highlands of Boyerahmad started with assumption of finding the seasonal settlements of Neolithic period, which were detected by examining older settlements related to Middle Paleolithic and Epipaleolithic. The study of this plain began with a compact survey of the main road towards the river and continued until the boundary of a dam under construction on the river. In total, in the studied area, eight sites from Middle Paleolithic and Epipaleolithic periods were discovered, and random samples were collected from the surface of sites. This paper attempts to classify, determine the typology and investigate technological diversity of lithics collected from the superficial surveys of Middle Paleolithic and Epipaleolithic periods in Sargachineh Plain. A total of 338 pieces of lithics from Middle Paleolithic and Epipaleolithic periods were found in Sargachineh Plain, including tools, debitage, debris, and cores. 337 pieces of lithics found in sites of Sargachineh Plain are chips. The presence of cores among the tools of some sites is indicative of construction of tools within the site, while the high percentage of tools shows a longer period of settlement in these sites. Chert in a range of red, carmine, brown and similar colors is the most common raw material used to make stone tools. Chert sources are probably located in the same region because chert fragments washed into the plain by river current are visible in the river*

*Keywords: Sargachineh Plain, Lithic, Middle Paleolithic, Epipaleolithic.*

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<sup>1</sup> This paper is derived from master thesis of Maryam Fatahipour entitled "Determination of the distribution patterns of Neolithic settlements in Gachineh Plain" at Art University of Isfahan.

## **Introduction**

For several reasons, archaeology of Iran embarked on research activities related to Paleolithic much later than other countries in the region. From early 1990, the first field studies were conducted, which increased our understanding of Iranian Paleolithic cultures, especially in Zagros region (Biglari, 2012: 13).

Lithics of Middle Paleolithic usually have sharp edges. These single facial tools are made only by knapping, which allows for sharper edges than the bifacial hammered Acheulean knapped stone (Debenath and Dibble, 1994: 569). The technique that can be attributed to the makers of Middle Paleolithic period has four steps: 1) The edges of a piece of stone are scraped, 2) The surface of the stone is whittled, 3) The surface to be knapped is created, 4) The blow is hit and the chip is separated from the core (Ghasemi, 1993: 85). Mousterian and Levallois industries emerged in this period, and this type of tool has been found in Europe, North Africa, Western and Central Asia, showing differences from various respects (Vahdati Nasab and Ariamanesh, 2015: 162). Levallois-based technology or flake technology is related to the critical period of 50,000-35,000 years ago. This stone industry permeated to Europe and Southwest Asia through a major shift (Shidrang, 2016: 28). The approach of Levallois industry as a more complex form of chipping involved careful choice of rubble and calculated blow of each hammer stroke (Patrishiade, 2004: 62).

The precise period and an industry distinguishing Epipaleolithic from Upper Paleolithic have not yet been distinguished, if Epipaleolithic is deemed to represent a distinct period. The main tools of this period include retouched and backed blades and bladelets, serrated blades and chips, and a variety of small scrapers such as nail scrapers. Geometric microtools like crescents and triangles were also found in the upper parts of ancient deposits of Zarzi Cave (Ghasidian, 2012: 68). Zarzi industry was discovered by Dorothy Garaud during excavations conducted in 1928 within cave of Zarzi in northern Iraq, the largest tool of which was 20 centimeters long. The tools were in the form of instrumental blades, blades, end toothed splitters, side scrapers, crescent or nail scraper, burins, hammers, and geometric tools (Ghasidian & Azadi, 2009: 126).

Similar to other Zagros sites, Paleolithic sites uncovered in Kohgiluyeh and Boyerahmad have led to the development of settlements for prehistoric people due to appropriate environmental conditions. Study of topography and lithics of Paleolithic period can present a model of past human life (Dadvar and oliyei, 2012: 32). The current ecological situation of Sargachineh Plain is such that today's settlements in it have taken a nomadic form due to cold weather and special environmental conditions. However, in spite of the environmental setting, prehistoric settlements have been found in this plain with pottery data of stone tools. The study of stoneware has a special place in archaeological studies since the rock is more stable than other archaeological remains, and is the first data maintaining the technology used in its construction (Inizan et al. 2010: 23). The study of this region started based on hypothesis of detecting seasonal settlements of Neolithic. Further survey detected lithics data in addition to pottery fragments, indicating older settlements related to Middle Paleolithic and Epipaleolithic. Therefore, in the present research, we deal with classification, typology, and description of artifacts found in sites of Sargachineh Plain.

## **Background of studies in the region**

Consideration of natural features and geographical frameworks for prehistoric research in Southern Zagros region as well as presentation of multiple maps has not been sufficient and persuasive to present an acceptable perspective on natural backgrounds and cultural ecosystems. In 2008, the first season of field studies was conducted in the form of a survey and identification of Boyerahmad County under supervision of Hossein Tofighian, Hossein Gholami, and Abbas Emaddadin in southern part of the county centered in Yasuj, which led to the detection of sites from the following periods: Paleolithic, Pre-Pottery and Pottery Neolithic, Iron Age, Sassanid, Parthian, and Islamic (Tofighian, 2008: 3). The second season of the study was performed in 2009 by Kouros Alamdari and Abbas Emadeddin (Alamdari, 2009: 265). As a result of archaeological surveys in different parts of Boyerahmad County, monuments of the entire county, including northern, southern, and central parts were investigated, identified and recorded, and only some northern and a few southern parts were not subject to further examination. This research,

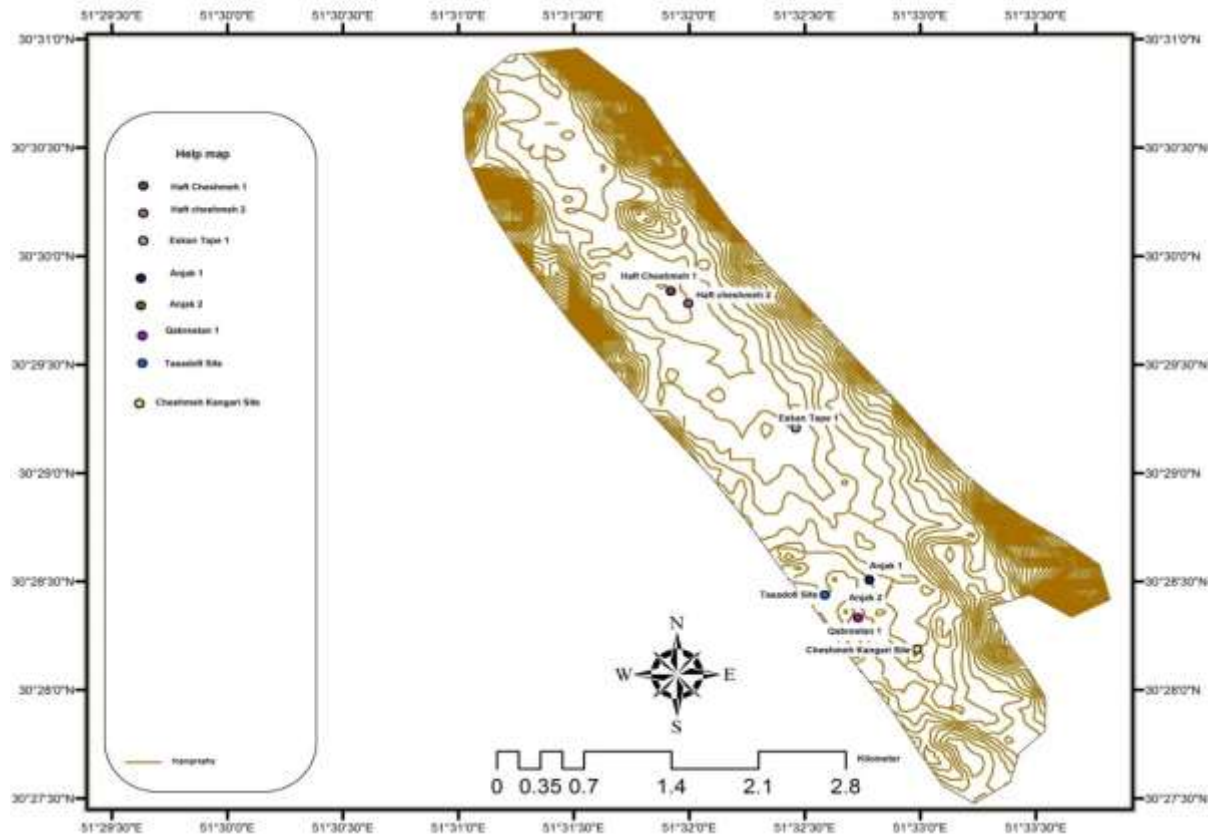
which is a follow-up study in Boyerahmad region, led to identification of sites from Middle Paleolithic, Epipaleolithic, Neolithic, Chalcolithic, and historical periods.

### Study area

The climatic variation of Iranian Plateau has led to seasonal settlement possibility in some areas with animal husbandry and nomadic livelihood, and the study of nomadic life can trace the process of social development and adaptation to the environment (Yousefi Zoshk and colleagues, 2012: 13-14). Natural factors have always been influential in human life, but humans interfere in the environment to control it. The quality of a zone depends on natural factors such as rainfall, soil, climate, and the ability of people to exploit them (Hool, 2004: 163). Geographically, Dasht-e Roum is an independent region surrounded by mountains (Sargachineh) adjacent to Rostam Mamsani from one direction and bordering to Sarrood from another, which forms the mainland of Upper Boyerahmad (Safi Nezhad, 1996: 258). Sargachineh is part of Dasht-e Roum rural district 35 km far from Yasuj city along the Yasuj to Babamaydan road (**Figures 1 and 2**). The sites found in Sargachineh Plain are located at an altitude of 2,100 meters, and most of lands in Sargachineh Plain are on dry farming of wheat. Relatively high altitude and mountainous weather are the most important environmental features of this area, which cause the inhabitants to live in it only during specific periods. The presence of springs and a semi-seasonal river creating small waterway branches supply water for inhabitants of the area, and the water from these springs is shed to the main river of Sargachineh. Most of the identified sites are located along branches of the river. Today, there is nomadic settlement on the slopes of hills in Sargachineh area. In the study area, the landscape of topography, seasons, and animal species have not been significantly different in past and present. While some technological and aspects have changed, the environment and dependence on nature are necessarily the same as the past.



Figure 1: Location of intermountain plain of Sargachineh near Yasuj (Authors)



**Figure 2: Distribution of sites in Sargachineh Plain (Authors)**

## **Methodology**

Compact archaeological survey of Sargachineh Plain began from the main road towards the river and continued until the boundary of a dam under construction on the river. Cultivated lands in the course of study area slowed down the work process, but continuation of study in other seasons revealed finds from agricultural lands. The sites were named based on geographic location or by native names, and the surface of sites was randomly sampled. Altogether, eight sites from Middle Paleolithic and Epipaleolithic were detected in the study area. This paper deals with classification, typology, and technological diversity of rocky artifacts collected from surface surveys of Middle Paleolithic and Epipaleolithic sites of Sargachineh intermountain plain in line with regional and comparative studies in order to present a brief overview of prehistory of the region.

## **Research results**

Archaeologists and anthropologists assigned the beginning of Middle Paleolithic in Eurasia as 250,000 years ago and its end as 40,000 years ago, and Epipaleolithic was assumed as encompassing 24,000-12,000 years ago (Shea, 2013:7). A number of sites dating back to Middle Paleolithic and Epipaleolithic have been found in Sargachineh Plain. Distribution of sites along or near Sargachineh River is the most important feature of the sites. The surface area, variety and distribution of tools are different in the sites, and Sargachineh River and the springs in the region are an important cause of this difference. In the studied area, six sites from Middle Paleolithic were found, including Eskan Tepe 1, Anjak 1, Anjak 2, Cheshmeh Kangari, Qabrestan 1, and Tasadofi were found, as well as Haft Cheshmeh 1 and 2 from Epipaleolithic. All the sites are located in the middle of Sargachineh Plain to southwest along a seasonal river called Sargachineh. Haft Cheshmeh 1 and 2 sites are located near the present settlements of nomadic tribes in the area near the main road of Nurabad to Yasuj, but the Middle Paleolithic settlements are

located along the track to Khol Valley or Sargachineh River on slopes of the plain. In the following, we will introduce the identified sites.

**Eskan Tepe 1:** Survey number 39 R 0551739 and UTM 3373326, 2132 m altitude, 0-7 slope in western direction. A short dirt road passes 100 meters south of the site. The surface area of this open-air site is 100×150 square meters along Sargachineh River southwest to Sargachineh Mountains. On the surface of site, stacked stone and open graves are observed, which have been destroyed over time with landslide and unauthorized excavations. Architectural structures of contemporary nomadic tribes with yards and tents are located 50 meters west of the site. Several pieces of lithics were found along with core pieces scattered over the surface of the site (**Figure 3a**).

**Anjak 1:** Survey number 39 R 0552472 and UTM 3371582, 2132 m altitude, 21-30 slope in northern-eastern direction. The surface area of the site is approximately 500×400 square meters and the river flows in its eastern part (**Fig. 3b**). Vegetation in the form of brushwood extends up to 500 meters in the same direction. The density of tools increases with advancing towards the south. The white color of soil was considered as an advantage because small stone tools were identifiable on the surface of the site. The lithics found by surface survey of the site include a number of flakes, debitage, and core fragments, and small chips accounted for a majority of tools. The site was probably a tool-making workshop.

**Anjak 2:** Survey number 39 R 0552549 and UTM 3371538, 2150 m altitude, 21-30 slope in northern-eastern direction. The approximate surface area of this site is 150×200, which is located south of Anjak 1 along the river (**Figure 3c**). This site can be a good landscape to describe the whole area. In eastern part, a track and the hills 15-20 m above the surface of track are visible, and the vegetation is not much different from Anjak 1 Site. On the surface of Anjak 2 Site, a number of lithics, including debitage and core fragments were found.

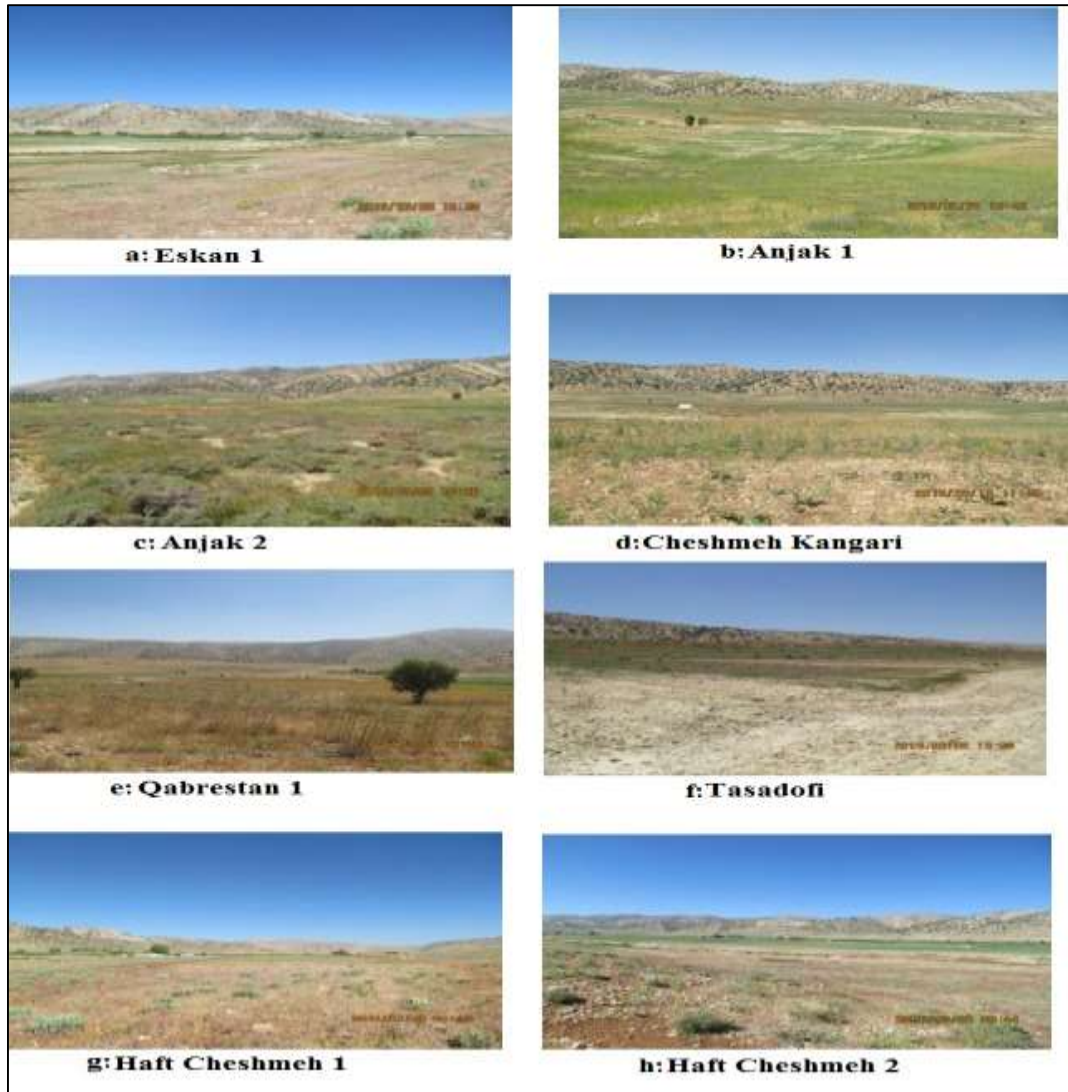
**Cheshmeh Kangari Site:** Survey number 39 R 0552761 and UTM 3370940, 2161 m altitude, 21-30 slope in northern direction. With an approximate surface area 200×200 square meters, this site is located on western side of the river. There are springs around the site where the water pours into Sargachineh River. The site is slightly higher than the surrounding area and harbors a nomadic family. In addition to various lithics, several pieces of pottery were found on the surface of site (**Figure 3d**). The lithics are limited to several debitage pieces and core fragments

**Qabrestan 1:** Survey number 39 R 0551625 and UTM 3372024, 2154 m altitude, 21-30 slope in northern direction. The approximate surface area of the site is 200×350 square meters, and it is not located along the river course in contrast to other sites. It is located approximately 200 meters northeast of Anjak Site near the hills. The surface of the site is not uniform and has moderate slope up to the edge of the road. There is more cultural data in Qabrestan 1 and the sites situated along it than other sites in the course of Sargachineh River (**Figure 3e**). On the surface of the site, rubble was arranged on a regular basis for the architectural structure. The lithics found in Qabrestan 1 Site include debitage, debris, and core fragments.

**Tasadofi 1 Site:** Survey number 39 R 0552342 and UTM 3371512, 2155 m altitude, 0-7 slope in northwest direction. The approximate surface area of the site is 150×300 square meters, and it is located in the same direction of Qabrestan 1 Site with a track on western wing. Nomadic architectural structures are also visible in this site (**Figure 3f**). The lithics found on the site include debitage, debris, as well as core fragments.

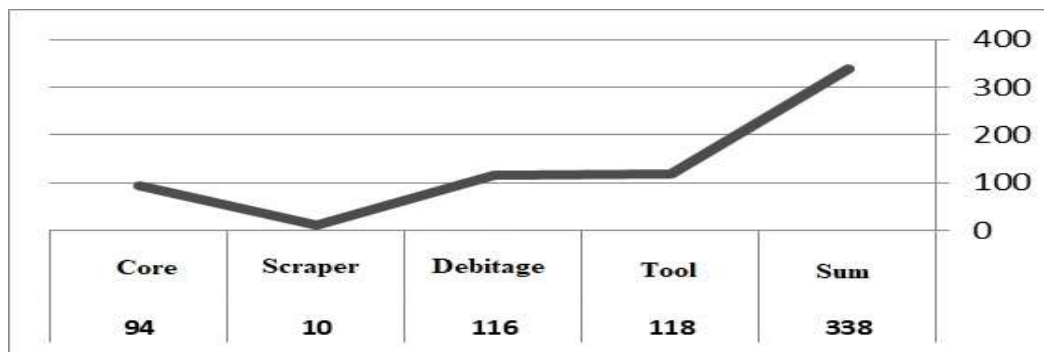
**Haft Cheshmeh 1:** Survey number 39 R 0551377 and UTM 3373692, 2128 m altitude located southwest to Sargachineh Mountains. It has a surface area of nearly 200×300 square meters with a southern-western slope. Sargachineh River passes 50 meters south to the site. In northeast of the site, farmland and tense orchards are visible. The lithics found on the surface of the site are debitage and chert cores red brown in color (**Figure 3g**).

**Haft Cheshmeh 2:** Survey number 39 R 0551571 and UTM 3373469, 2126 m altitude and estimated surface area of 200×300 square meters (**Figure 3h**). The scattered data found on the surface of the site includes tools, debitage, and cores. The tools are made of chert and gray opal. The lithics found are made of chert in red, brown and other colors.



**Figure 3. The Middle Paleolithic and Epipaleolithic sites of Sargachineh Plain**

A total of 338 pieces of stone artifacts were found from Middle Paleolithic and Epipaleolithic sites of Sargachineh Plain, including tools, debitage, debris and cores (**Diagram 1**).



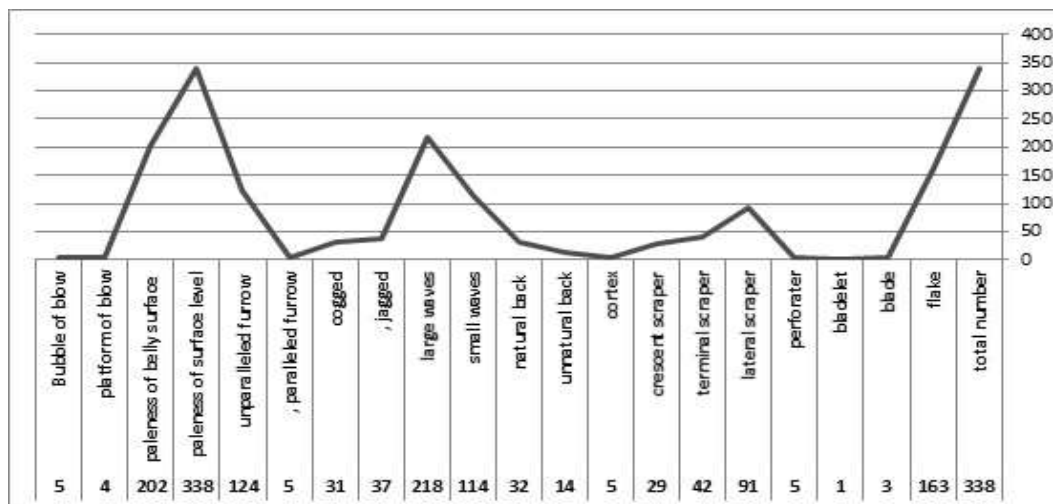
**Diagram 1: Knapped stone artifacts of Sargachineh Plain (authors)**

Two methods were used in this research to count the flakes:

1. NAS count: This method involves counting each and every flake and piece, regardless of whether they are intact or broken. The resulting figure includes the totality of flakes and pieces.

2. Intact flake counting method: This method counts only intact flakes and eliminates broken pieces from records. The error rate of this method is high because in the same way as NAS count overestimates the number of flakes, this method underestimates their number (Jayez and Vahdati Nasab, 2015: 51).

Handmade chips were grouped as flakes, blades, bladelets, burins, and three types of scrapers (i.e. terminal, crescent, lateral). Some possess cortex, are natural and abnormal backed, have parallel and unparallel grooves, retouches surrounding the tools as dentate and serrated, and cracks on proximal and distal surface, some with bulb of percussion as well as small and large wavelets on tools (**Diagram 2**).



**Diagram 2: Typology of artifacts found in survey of Sargachineh Plain (authors)**

### Raw material

The availability of raw materials, their quantity and quality are among the factors affecting the technological aspects as well as production and application process of lithics. Understanding the type and distribution of raw materials provides important information about the stone cycle and thus people's use of their surrounding landscape (Andrefsky, 2008: 9). The most important goal of identifying the type of stones is to specify their source and initial formation site, which plays a role in determination of the mobility and displacement of stone group and the way it is used (surface collection, transport from elsewhere, and use of the source itself) as well as the relationship between man and environment. On the other hand, the use of raw materials from different sources affects the technology to shape the final form of tools (Andrefsky 1998: 147; Adams and Blades 2009: 26; Blades, 2001: 2). With respect to raw material, chert is the most commonly found stone in these sites with a range of colors like red, carmine, brown, etc. The source of chert is probably in the region itself, because fragments of chert can be seen in the river, which have been washed into the plain by river current. In addition to chert, opal and jasper are visible among these artifacts (Diagram 3). The tools found in the collection were classified based on their similarity to different geometric forms, including triangular (complete, truncated), rectangular, circular, elliptical, trapezoidal, and shell. A large number of artifacts lacking a regular shape were designated as unspecified.

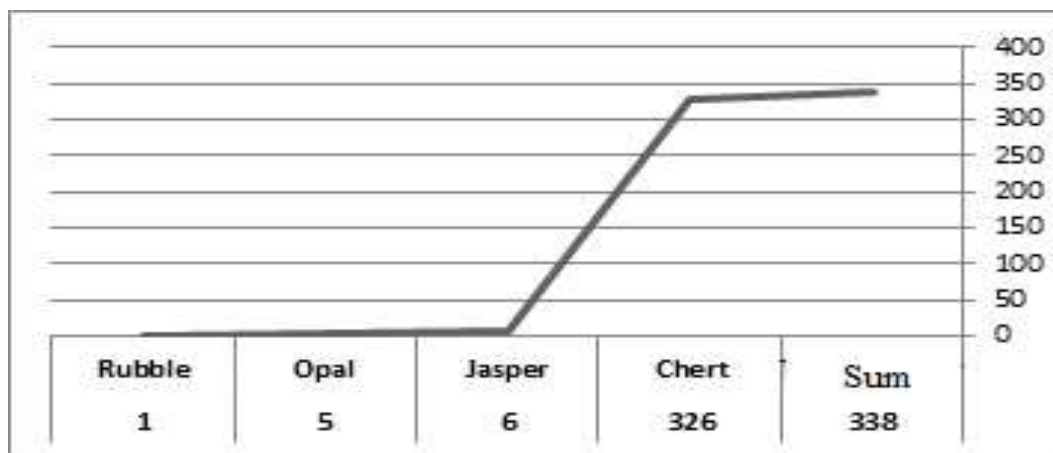


Diagram 3: Type of lithics discovered in sites of Sargachineh Plain (Authors)

### Discussion

Eskan Tepe 1 is among the sites in which data related to Middle Paleolithic were found, including a natural-backed side scraper in triangular with small retouches, which was slightly abraded due to natural factors (Figures 4a-5a). There is a crescent chip with retouched edge in dentate and serrated forms with cortex at ventral surface and a grayish color (Figures 4b-5b). Vestiges of parent rock's cortex remain on ventral surface, which has been largely removed (Figures 4c-5c). The largest and smallest tools found in this site are 40 mm and 16 mm in length, respectively. The totality of artifacts found on the site is probably of local chert since chert rubbles can be seen in river bed that have found their way into the plain from Sargachineh Mountains with river currents.

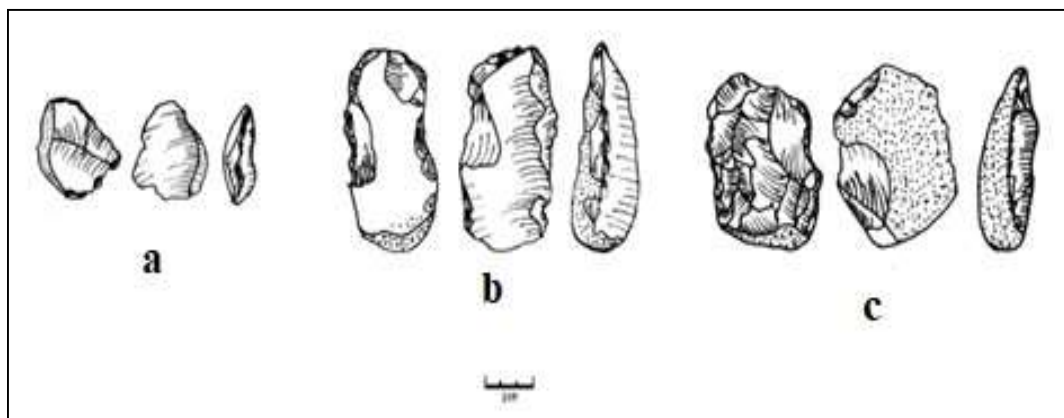


Figure 4: Lithics of Eskan Tepe 1 Site: a) Side scraper; b) Crescent scraper; c) Core with cortex (Authors).

Lithics of Anjak 1 Site were classified into three groups: tools, debitage, and cores. Side, End, and crescent shaped scrapers were found, including a natural-backed side scraper with dentate and serrated retouches that are pointed at tip and show bulb of percussion at end (Fig. 5d-6a). The core is natural backed with cortex and unparallel grooves on surface and irregular retouches at terminal end (Figures 5e-6b). Another triangular lateral scraper is surrounded by dentate and serrated retouches and has cracks on both sides (Figures 5g-6c). A crescent-shaped scraper has also toothed and serrated retouches all around it with wavelets and asymmetrical grooves (Figures 5h-6d). The bullet-shaped core has not been completely removed and probably belongs to later periods with some cortex appearing on the ventral surface (Fig. 6e-5f). Due to the large number of flakes found in this site, it has been probably a place for chipping industry.



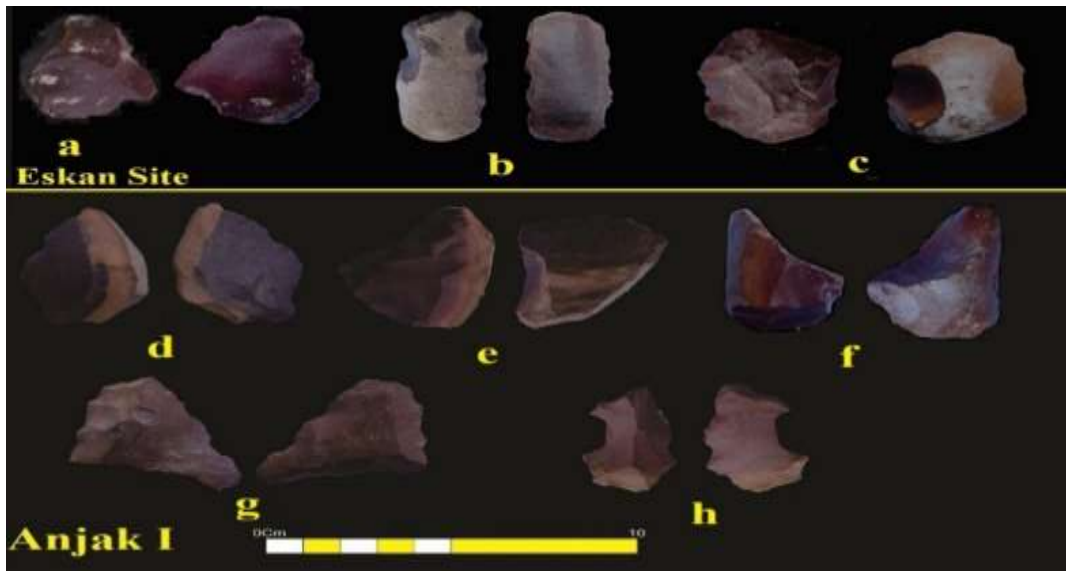


Figure 5: Selection of lithics from Eskan1 sites on top with tools of Anjak 1 Site below.

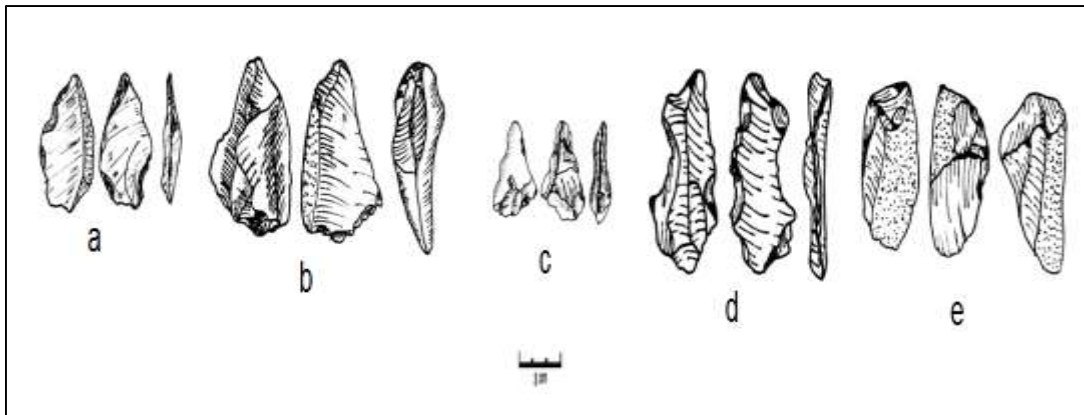


Figure 6: Schematic view of lithics from Anjak 1 Site: a-c) side scraper, b) Backed core, d) Crescent scraper, e) Removed bullet-shaped core (Authors).

A total of 38 pieces of lithics were found in Anjik 2 Site, including the flake core with cortex in ventral surface and a surface hinged having unparallel grooves (**Figures 7 a-b, 8-a-b**). From the total artifacts of this site, there was only one sample of jasper and the rest were of chert. Most tools are scraper and retouched, which have been scratched from one or both sides in a crescent form. A triangular scraper featuring a bulb of percussion as well as fine dentate retouches encompassing all parts of the tool except for its terminal end (**Figures 7c-8c**).

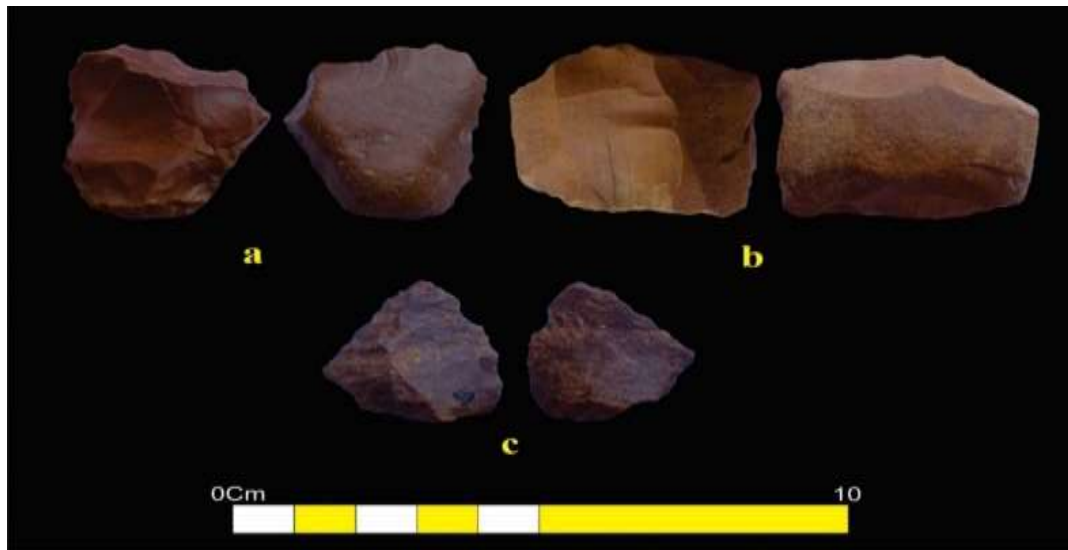


Figure 7: Selection lithics of Anjak 2 Site

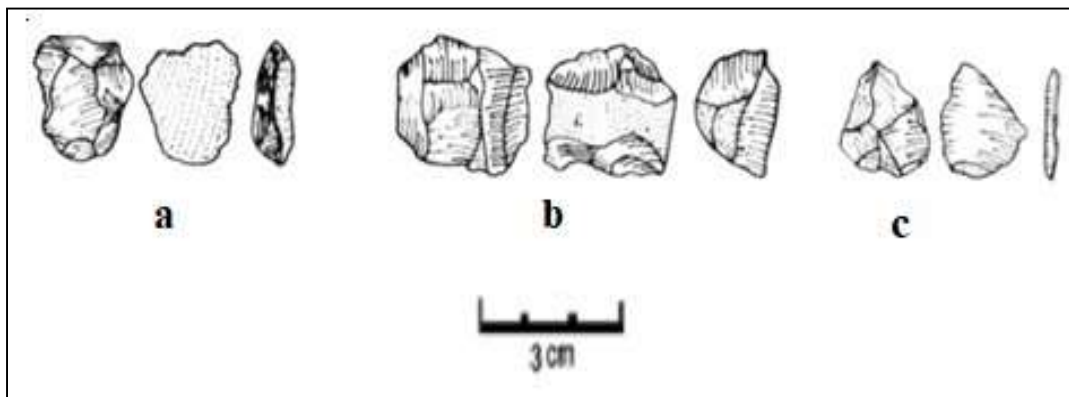


Figure 8: Sketch of lithics from Anjik 2 Site: a-b) Flake core c) Triangular scraper (Authors)

From Cheshmeh Kangari Site, 13 pieces of artifacts from chert, jasper, opal and sand were found, including a core from sand showing vestiges of cortex in lower end and retouches on two surfaces (**Figures 9a-10a**). The triangular jasper flake has bulb of percussion in terminal end and serrated retouches on its surface (**Figures 9b-10b**). A core with cortex is cone-shaped and irregularly removed (**Figures 9c-10c**). Among all scrapers, an opal side scraper has natural back and small retouches on the other side, and only part of it has remained due to environmental damage (**Figures 9d-10d**). Another side scraper scratches from one side, has a bulb of percussion in terminal end and cortex on surface (**Figures 9e-10e**). A triangular scraper is surrounded by fine retouches (**Figures 9f-10f**).

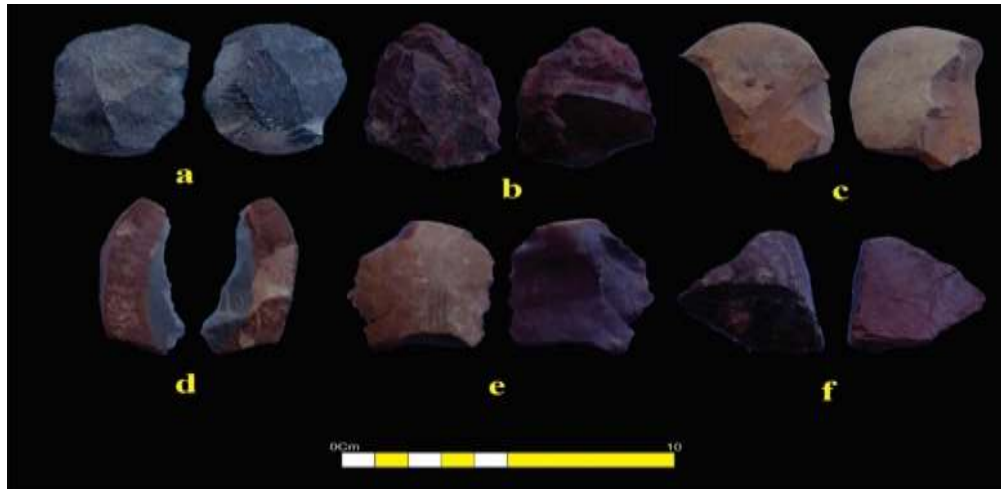


Figure 9: Selection lithics of Cheshmeh Kangari

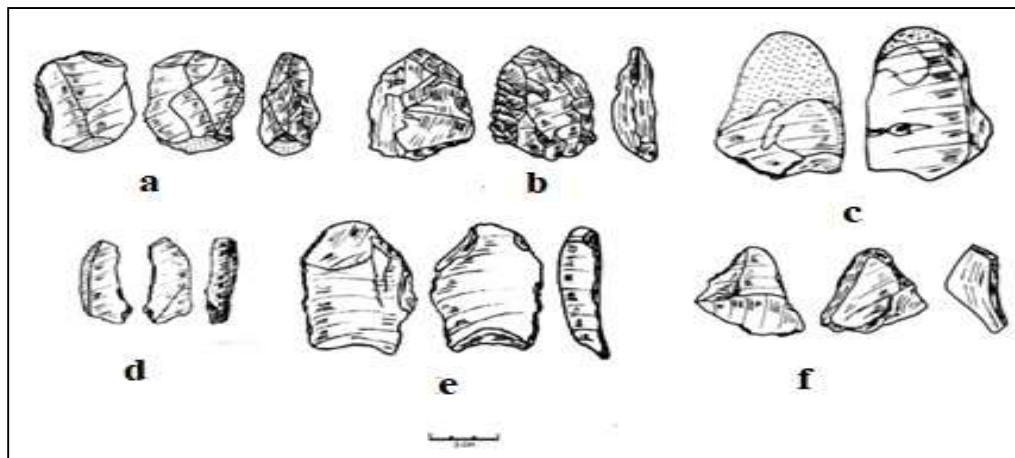
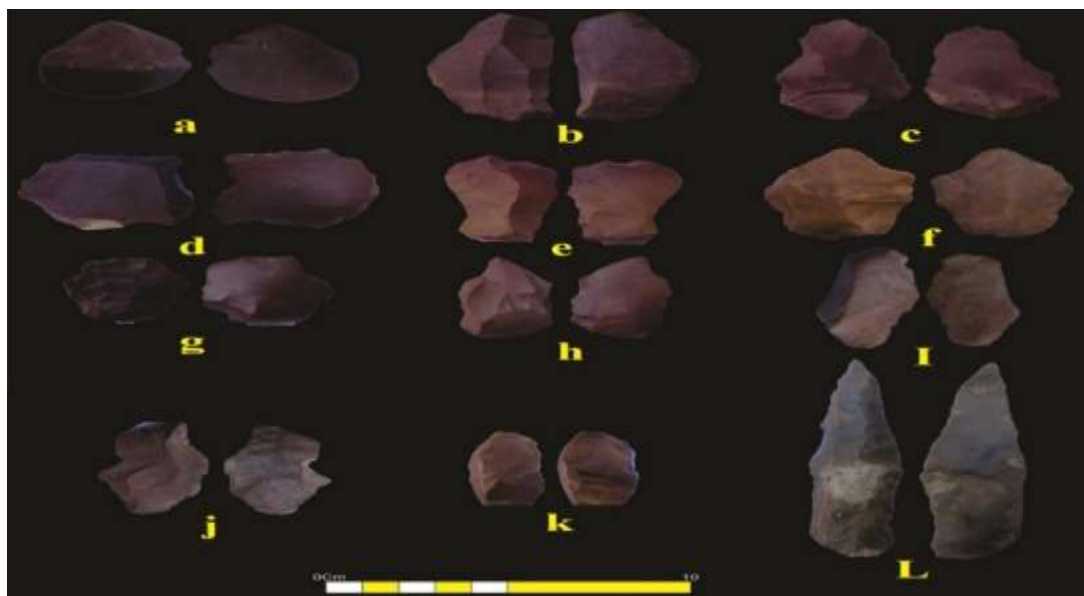
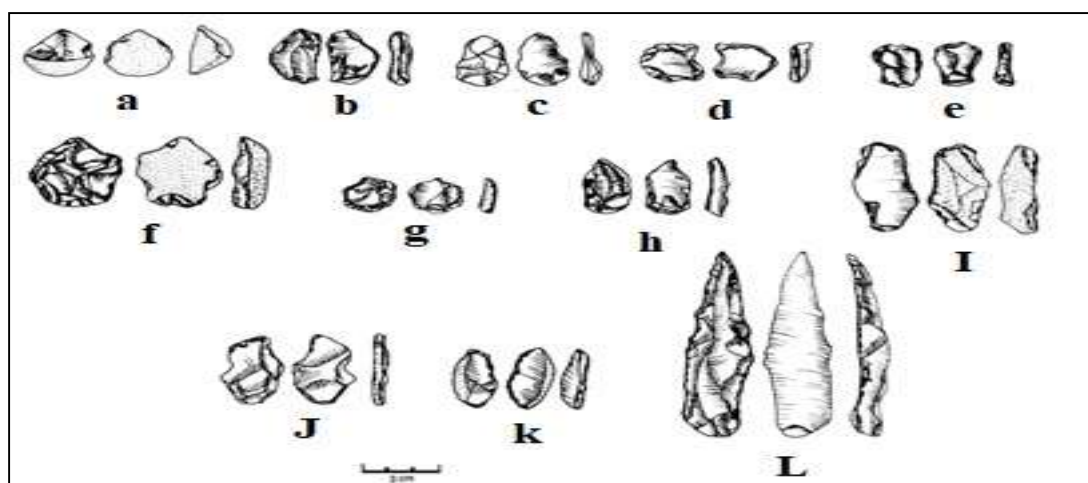


Figure 10: Sketch of lithics from Cheshmeh Kangari Site: a) core from sand, b) Jasper triangular flake; c) Cone-shaped core with cortex d) Opal side scraper; e) side scraper; f) Triangular scraper (Authors)

A majority of lithics found in Sargachineh Plain was discovered from Qabrestan 1 Site, including 112 lithics. The lithics of this site and those of Tasadofi Site are typical of Middle Paleolithic in Sargachineh Plain. Unlike other sites, the mentioned two sites are not situated in the course of Sargachineh River and both are on the same path beyond the dirt road, and a homogenous chert core with cortex at the bottom that is pointed at the top through hinges (**Figures 11a-12a**). A chert side scraper with unparallel grooves on upper surface, cortex at bottom and pointed at upper end scratches from both sides (**Figures 11b-12b**). A crescent scraper with platform at bottom as well as bulb of percussion with toothed retouches (**Figures 11c-12c**). Flake is in the form of a nail scraper with toothed retouches (**Figures 11d-12d**). A lateral scraper with unparallel grooves on its surface (**Figures 11e-12e**) and a discoid-shaped core with cortex at ventral surface (**Figures 11f-12f**). A crescent-shaped scraper with retouches around it with bulb of percussion (**Figures 11g-12g**). Side scrapers (**Figures 11 h-I-J, 12h-I-J**). Side scraper with natural back and fine retouches that can scratch (**Figures 11K-12K**). There is a point-shaped tool of Middle Paleolithic in this collection, which is 105 mm long with retouches in right and left and is backed in the middle, the upper end of which is pointed and in the bottom has bulb of percussion (**Figures 11L-12L**).



**Figure 11: Selected lithics of Qabrestan 1 Site**



**Figure 12: Sketch of lithics from Qabrestan 1 Site: a) Homogeneous core, K-J-I-h-e, b) Side scraper, c-g) Crescent scraper, d) Nail Scraper, f) Discoid core L) Point-shaped tool from Middle Paleolithic (Authors)**

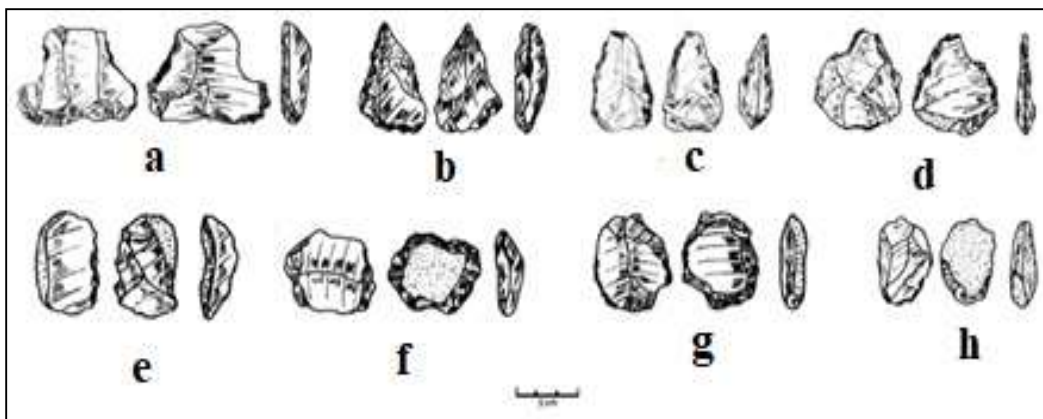
After Qabrestan 1, the highest number of artifacts was found in Tasadofi Site. A total of 86 pieces of lithics have been recovered from Tasadofi Site, including tools, debitage, debris, and cores. There are 63 pieces of chips, 46 of which are intact and 17 pieces are simple and broken chips. In total, from these side, end, and crescent scrapers, there are 12 pieces of natural-backed tools as well as a perforating piece. Retouches are observed on both upper and ventral surfaces. 10 pieces of tools are serrated and 13 are toothed. From the stone artifacts of this site, 56 pieces have long waves and 29 short waves, and some have cracks on upper and ventral surfaces. There is a bulb of percussion in a tool. The length, width, and thickness of largest and smallest tools in this site are 33 and 11 mm; 33 and 8 mm; 15 and 3 mm, respectively. Out of 86 stone artifacts found on this site, only one piece is made of opal and others of chert in a variety of colors. The shape of these artifacts is complete and truncated triangular, rectangular, circular, elliptical, trapezoidal, and uncertain.

Typical tools of this site include a scraper scratching from both sides having breaks on both upper and ventral surfaces as well as hinges (**Figures 13a-14a**). A triangular side scraper in the form of a perforator

at top (**Figures 13b-14b**), another triangular scraper with crescent retouches around it with break at its upper end (**Figures 13c-14c**). Nail scraper with fine retouches (**Figures 13d-14d**) and a side scraper with natural back that is a non-typical tool (**Figures 13e-14e**). The flake core is disc-shaped (**Figures 13f-14f**) and a core prepared with bulb of percussion (**Figures 13g-14g**), and the flake core (**Figures 13h-14h**). These artifacts are typical of Middle Paleolithic.



**Figure 13: Selected lithics of Tasadofi Site**



**Figure 14: Sketch of lithics from Tasadofi Site: a) Bilateral scraper, b, e) Side scraper, c) Triangular scraper, d) Nail Scraper, f) Discoid core g) Core prepared with bulb of percussion, h) Flake core (Authors)**

Haft Cheshmeh 1 and 2 sites are related to Epipaleolithic and have a different orientation from Paleolithic sites. The two sites are adjacent and located near Sargachineh village. The artifacts of Haft Cheshmeh 1 are triangular scrapers of chert with regular grooves scratching in all directions, which have a pointed tip at the upper part (**Figures 15a-16a**). An truncated triangular scraper also scratches in all directions (**Figures 15b-16b**) and the side scraper was found as a fine chip (**Figures 15c-16c**). A core with cortex at the ventral surface that is taken from the upper surface and has small rectangles on one side (**Figures 15d-16d**). Core with cortex at ventral surface removed from the upper surface having fine retouches in one side (**Figures 15d-16d**).



Figure 15: Selected lithics of Haft Cheshmeh 1 Site

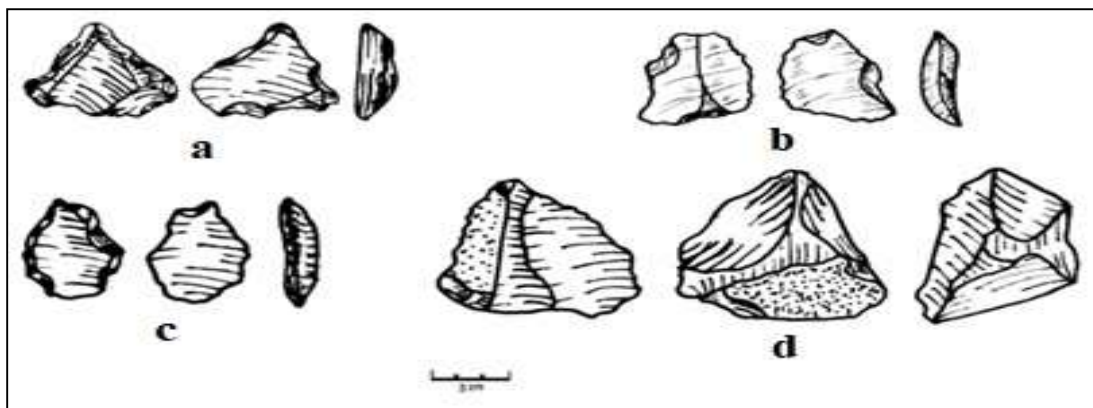


Figure 16: Sketch of lithics of Haft Cheshmeh 1 Site: a) Triangular scraper, b) Truncated triangle scraper c) Side scraper; d) Core with cortex (Authors).

Haft Cheshmeh 2 Site is located along Haft Cheshmeh 1. A chert side scraper with natural back of reddish color with a length of 30 mm, which is the largest tool of the site (Figures 17a-18a). The side scraper with thumbhole scratching from the other side (Figures 17b-18b). A side scraper with fine opal retouches (Figures 17c-18c).

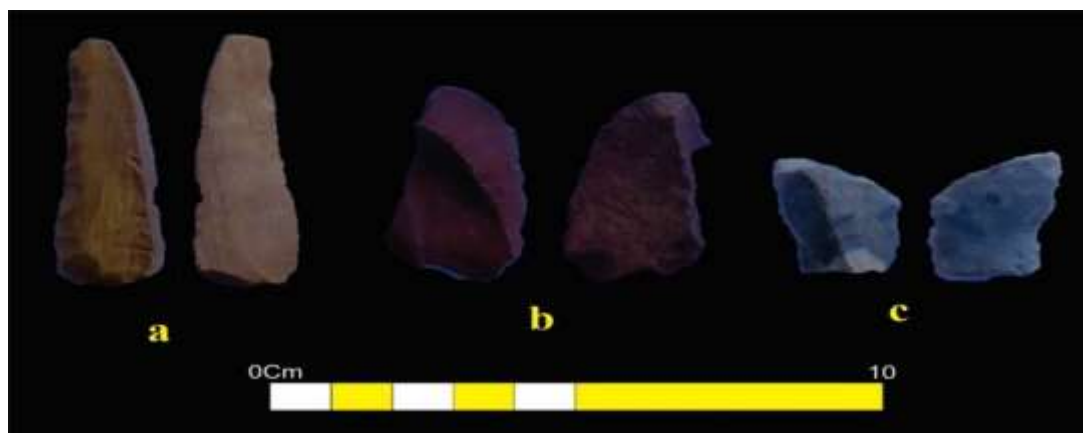
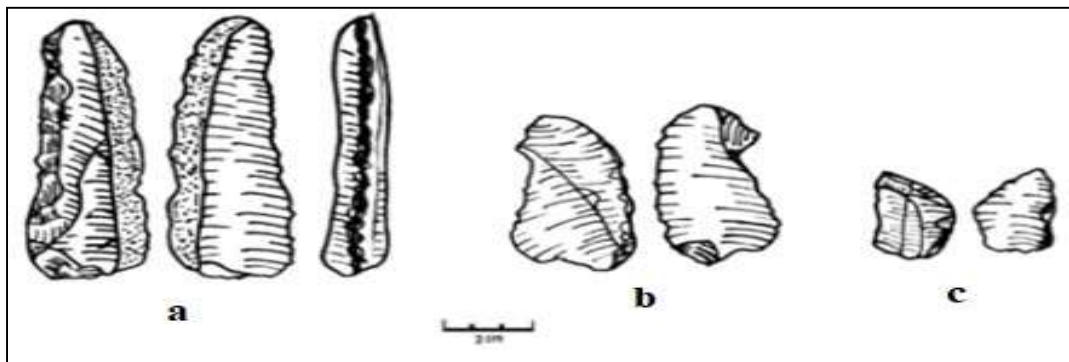


Figure 17: Selected lithics of Haft Cheshmeh 2 Site



**Figure 18: Sketch of lithics from Haft Cheshmeh 2 Site: a-c) Side scraper (authors).**

### Conclusion

338 lithic pieces were discovered from eight sites surveyed in Sargachineh Plain, which are divided into four categories: tools, debitage, debris, and cores. Tool fragments are the largest collection of data, accounting for 17% of finds. Debitages and cores are in the second and third ranks, each accounting for 14% of pieces. Debris is less frequently found and includes 3% percent of the collection. 163 pieces of lithics found in Sargachineh Plain are chips. Although chips are the most abundant pieces in the stone collections, they are not typical because of their production by stone knocking, and most of them have not been used as tools. There are a few bladelets, blades, and burins in this collection, and a large number of artifacts are lateral scrapers. There are different methods for counting handmade stone tools.

There are a few bladelets, blades, and burins in this collection, accounting for only 11% of pieces. A large number of artifacts are side, crescent, and end scrapers, and side scrapers form a majority of samples. Crescent and end scrapers are in the second and third places in this collection, respectively. Production of scrapers does not follow a standard or specific pattern at all. The scrapers were made based on immediate needs, not with anticipation and premeditation. Most scrapers are made on large and wide debitage. A majority of scrapers are made on chips; nevertheless, blade has been used in some examples to make scrapers. Among the artifacts, scrapers have been created with continuous and direct retouch, but reverse, discontinuous, and fully scattered samples are also found among them. In addition to retouch, the impact of toothed and serrated knocks can be seen on these artifacts. Among the scrapers, there are retouched, toothed, and serrated tools. Retouches are short or long and many of them are unilateral scrapers. Most scrapers have retouches with steep slopes used to cut soft materials. Scrapers are a typical tool of Epipaleolithic period. The waves on these artifacts are those easily detectable on the surface of tools or waves that need careful attention to be observed. Cracks on these artifacts are observed either on upper or bottom surface. The grooves visible on these artifacts are either parallel or unparallel. Bulb of percussion are only observed on some of the artifacts. The retouches are either observed on ventral or upper surface, and sometimes can also be seen on the tip of the tool. Retouches are not the only factor of cutting property of these artifacts, and there is tooth or dentate on a large number of tools in this collection, which is most commonly found on nail or semicircular crescent shaped scrapers.

On some artifacts, including cores, the cortex that is not separated from core can be observed. The presence of cores among the tools of some sites indicates that the tools have been produced within the sites, and at the same time, the high percentage of tools reveals the longer settlement periods in these sites. However, a notable issue in this regard is that the cores of the studied sites are often irregular flake cores, which is indicative of production in response to momentary needs and does not show systematic production.

### Acknowledgment

Finally, I appreciate Dr. Zabiullah Masoudinia who helped us with survey as well as Dr. Ahmad Azadi and Dr. Fereydoun Biglari who dated the stone artifacts.

## References

- [1] Adams, B. and Blades, B.S. 2009. *Lithic Material and Paleolithic Societies*. Blackwell Publishing Ltd.
- [2] Alamdari, Cyrus, Glam, Hossein, et al. 2009. Report of archaeological surveys of Boyerahmad County. Volume II, Organization of cultural heritage, arts and tourism of Kohgiluyeh and Boyerahmad Province.
- [3] Andrefsky, W.J. (1998). *Lithics: Macroscopic Approaches to Analysis*, Cambridge Manuals in Archaeology. Cambridge University Press, Cambridge.
- [4] Andrefsky, W.J. 2008. *Lithic Technology: Measures of Production, Use and Curation*. Cambridge University Press, Cambridge.
- [5] Blades, B.S. 2001. *Aurignacian Lithic Economy Ecological perspectives from Southwestern France*, Kluwer Academic Publishers, New York, Boston, Dordrecht, London, Moscow.
- [6] Biglari, F. 2012. Iranian archaeological research from the beginning to the end of seventies, Proceedings of 80 years of archaeology of Iran (Volume II), Tehran, Parineh publication in collaboration with the National Museum of Iran. pp. 4-7.
- [7] Dadvar, A, and Oliyei. 2012. Aesthetics of Paleolithic stone tools, Promotional biennial of Jelveh-y Honar, No. 7: 31-40.
- [8] Debenath, A., and Dibble, H. L. 1994. *Handbook of Palaeolithic Typology: Lower and Middle Palaeolithic of Europe*. University of Pennsylvania Museum, Philadelphia.
- [9] HOOL, F. 2004. *Archaeology of Western Iran*. translated by Zahra Basti, Organization for Study and Compilation of Humanities Books of Universities (SAMT).
- [10] Ghasidian, E. 2012. Upper Paleolithic period of Iran and its position in Southwest Asia. Tehran, Iran Negar.
- [11] Ghasidian, E., Azadi A., Heydari-Guran, S., Conard, N.J. 2006. Late Paleolithic Cultural Traditions in the Basht Region of the Southern Zagros of Iran. *Iran Palaeolithic Le Paléolithique d'Iran* Edited by Marcel Otte Ferreidoun Biglari Jacques Jaubert Proceedings of the XV World Congress of the International Union for Prehistoric and Protohistoric Sciences Actes du XV Congrès Mondial de l'Union Internationale des Sciences Préhistoriques et Protohistoriques 125-140.
- [12] Ghasemi, G. H. 1993. Iranian Prehistoric tools. Master's thesis in archeology, Tarbiat Modarres University.
- [13] Inizan, M-L, et al. 2010. *Technology and Terminology of Knapped Stone*. Translated by E. Qasidian. Tehran: Samira Press.
- [14] Yousef Zoshk, R., Miri, J., and Baghizadeh, S. 2012. A Historical perspective of Iranian lifestyle: The Structure of Nomadic Society of Iran from Ancient times to Contemporary Period. *Biennial of Life Style Studies*, Vol. 1, No. 2: 9-34.
- [15] Patrishiade, N. 2004. *The Stone Age*, Translated by Asker Bahrami, Qoqnus Publishing, Tehran.
- [16] Safi Nezhad, J. 1996. *Nomadic tribes of Central Iran*. Amir Kabir Publishing House, Tehran.
- [17] Shea, J. 2013. *Stone Tools in the Paleolithic and Neolithic Near East a Guide*. Cambridge University.
- [18] Shidrang, S. 2016. *Continuity and Change in the Late Pleistocene Lithic Industries of the Central Zagros: A Typo-technological Analysis of Lithic Assemblages*. Tübingen, Tübingen 72070, Germany.
- [19] Tofighian, H. 2008. Report on the survey and identification of archeology of Boyerahmad County. Cultural Heritage, Arts and Crafts Organization, Institute of Archeology.
- [20] Vahdati Nasab, H and Ariamanesh, Sh. 2015. Paleolithic archeology of Iran from the beginning to the dawn of rural settlement. Tehran, Cultural Heritage and Tourism Institute.