РЕЗУЛЬТАТЫ ИЗУЧЕНИЯ МАТЕРИАЛОВ АРХЕОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ

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A TYPO-TECHNOLOGICAL ANALYSIS OF THE CHIPPED STONE ASSEMBLAGE FROM THE MULTILAYER SITE DAM-DAM-CHESHME-1, EASTERN CASPIAN (THE ARCHIVE OF THE MOSCOW STATE UNIVERSITY)

Saltanat Alisher kyzy

Institute of Archaeology and Ethnography SB RAS, Novosibirsk, Russia;
saltanat.alisher.kyzy@gmail.com, https://orcid.org/0000-0003-3138-0942

Abstract. This article presents a typo-technological analysis of the lithic assemblage from the excavation of multilayered site of Dam-Dam-Cheshme-1 (east of the Caspian Sea). The site was excavated by A.P. Okladnikov in 1950's, G.E. Markov in 1970's.The archaeological materials from the excavations were divided between the Institute of Archaeology and Ethnography of the Siberian Branch of the Russian Academy of Sciences (materials from 1950's) and Moscow State University (materials from 1970's). This research is based on the chipped stones stored in the Moscow State University. The analyzed assemblage characterized by bladelet industry, and toolkit consisting end, side-scrapers, perforetors, notch/denticulate tools and single lunates, points and backed tools. Presents characteristics allow us to attribute lower layer to Mesolithic and upper layer to Neolithic periods of Eastern Caspian culture. The closest analogies are observed with the materials of the grotto of Dam-Dam-Cheshme-2 and Oiukly located in the Eastern Caspian Sea.

Keywords: Mesolithic, Neolithic, Eastern Caspian, lithic industry, techno-typology

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ТЕХНИКО-ТИПОЛОГИЧЕСКИЙ АНАЛИЗ КАМЕННОЙ КОЛЛЕКЦИИ ИЗ МНОГОСЛОЙНОГО ПАМЯТНИКА ДАМ-ДАМ-ЧЕШМЕ-1 (МАТЕРИАЛЫ ИЗ АРХИВА МОСКОВСКОГО ГОСУДАРСТВЕННОГО УНИВЕРСИТЕТА)

Салтанат Алишер кызы

Институт археологии и этнографии СО РАН, Новосибирск, Россия;
saltanat.alisher.kyzy@gmail.com, https://orcid.org/0000-0003-3138-0942

Резюме. Статья посвящена технико-типологическому анализу каменной коллекции из многослойного памятника Дам-Дам-Чешме-1 (Восточный Прикаспий). Памятник был открыт и изучен в 1950-х гг. А.П. Окладниковым, позже, в 1970-х гг., изучение памятника было продолжено Г.Е. Марковым. Материалы, полученные в результате данных работ, были разделены между Институтом археологии и этнографии СО РАН (материалы 1950-х гг.) и Московским государственным университетом (материалы 1970-х гг.). Данная статья основана на анализе каменных коллекций, которые хранятся в фондах кафедры этнологии Московского государственного университета. Результаты технико-типологического анализа каменной коллекции свидетельствуют о том, что в первичном расщеплении использовалась в основном ударная техника с применением мягкого отбойника для получения мелкопластинчатых заготовок, реже наблюдаются свидетельства использования техники отжима. В орудийном наборе типологически выраженные изделия представлены боковыми и концевыми скребками. Специфической чертой являются скребки на нуклеусах, как боковые, так и концевые, острия, перфораторы и пластинки с притупленным краем представлены единичными экземплярами. Выделяются выемчатые орудия на пластинчатых сколах, единичными экземплярами представлены ножи и боковые резцы на пластинчатых сколах. В результате анализа материалы верхних слоев (слой 2–3) были отнесены к периоду неолита, а самый нижний слой (слой 4) — к финальному этапу мезолита, переходному к неолиту. Ближайшие аналоги к комплексу слоя 4 зафиксированы в материалах слоя 4 грота Дам-Дам-Чешме-2, а слоев 2 и 3 — в неолитических комплексах оюклинской культуры.

Ключевые слова: мезолит, неолит, Восточный Прикаспий, технико-типологический анализ

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Introduction

The territory of the southeastern Caspian region is of key importance in studying the interaction of the ancient cultures of the Middle East and Central Asia, since the region is a kind of buffer zone between them. For the earliest stages of interaction between the regions, they were traced on the basis of the technical and typological features of the stone industries. In the last decade, the closest attention of researchers has been focused on the study of the Late Pleis-

tocene and Early Holocene complexes of the southeastern coast of the Caspian (fig. 1) (Jayez and Nasab-Vahdati, 2016; Nasab-Vahdati et al., 2020; Alisher kyzy et al., 2020; Shnaider et al., 2018; Shnaider et al., 2021). The emergence of new materials about the region (Nasab-Vahdati et al., 2020) and old materials revision opened a new perspective on the previously proposed cultural and chronological interpretations. In particular, the revision of the final Pleistocene materials of the Dam-Dam-Cheshme-2 key site confirmed the earlier hypothesis of Iranian colleagues, according to which these materials have many similarities with such sites as Komishan and Hotu (Jayez, Nasab Vahdati, 2016; Nasab-Vahdati et al., 2020; Alisher kyzy et al., 2020). In this regard, a review of other key complexes in this region has become more relevant, since it will help clarify and supplement the available data in order to reconstruct a complete picture historical process. Thus, the purpose of this study is to analyze the lithic industry from the Dam-Dam-Cheshme-1 site (DDC-1), obtained during the course of work of Okladnikov in the 1950s.

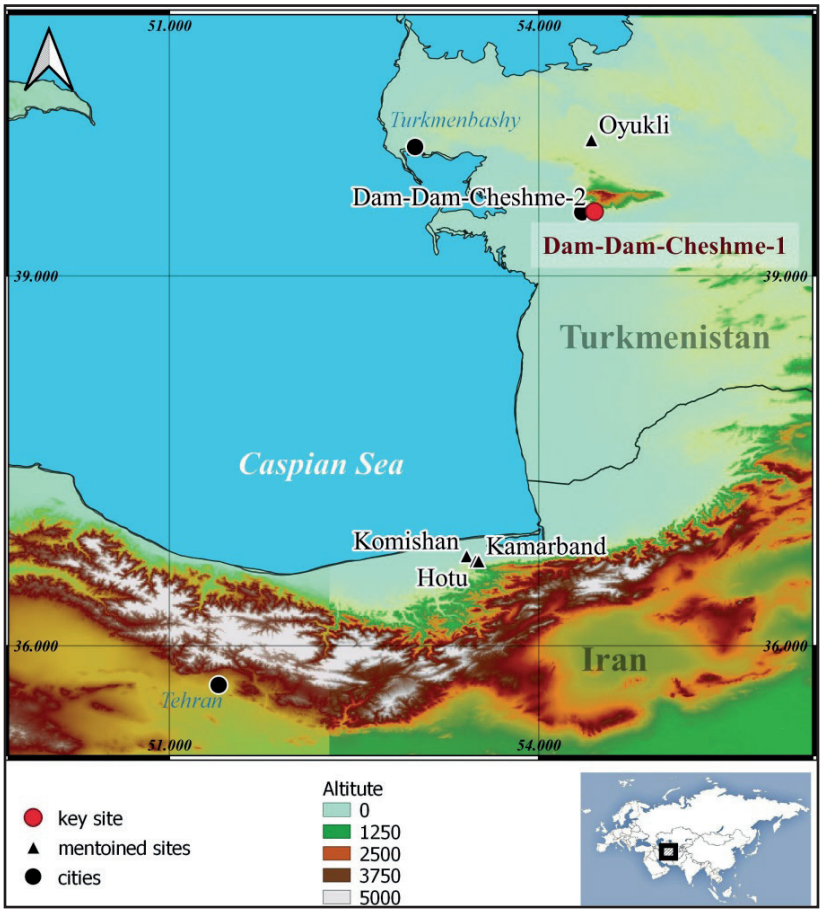

Fig. 1. The location of archaeological sites mentioned in the article

Рис. 1. Расположение археологических памятников, упоминающихся в тексте

Material

The Rockshelter DDC-1 was discovered by the geologist Shumov in 1947, and excavated by A.P. Okladnikov in 1947–1952 (Okladnikov, 1951; 1953), and in 1971 the excavations were continued by G.E. Markov. A.P. Okladnikov made two trenches in the central part with the result that five cultural layers were unearthed. In eastern part of the rockshelter, only one cultural layer was found (Okladnikov, 1951). Subsequently, G.E. Markov excavated a much larger area in the cave and found only five layers in its central part. The site has been attributed to the Mesolithic and Neolithic eras based on the analysis of archaeological material, mainly lithics. The archaeological materials obtained during these excavations were divided between Institute of Archaeology and Ethnography, Novosibirsk (materials from Okladnikov's excavation) and Moscow State University (materials from Markov's excavation). A.P. Okladnikov presented a brief introduction to the archeological material in his short paper and reports (Okladnikov, 1951, p. 67–71; Okladnikov, 1953). He described materials from the lower layers (layers 5–4) in the central part of the cave and materials from the eastern part, characterizing them as a Mesolithic assemblage. This assemblage includes such artifacts as notched flakes and blades, end scrapers. On the other hand, the researcher did not provide a description of technological characteristics of the complex, and the drawings were published in a small number (Okladnikov, 1953, p. 400–406). The assemblage of upper layers (layer 3 and 2) in the central part was attributed to the Neolithic, based on the presence of ceramics in the excavated materials. The authors of this paper re-analyzed the above materials and proposed a new cultural and chronological attribution of this site (Alisher kyzy, Shnaider, 2021).

G.E. Markov based on the typology of the stone tools and ceramics, concluded that the cultural coverage of this site is within the boundaries from the Upper Palaeolithic (UP) to the early Bronze Age. The layer 5 materials belongs to the final UP and early Mesolithic, the layer 4 presents transition from the Mesolithic to the Neolithic, layers 3 and 2 are the Neolithic, and the layer 2 was attributed to the Bronze age (Markov, 1981). According to the Markov's article, in which he presented materials from the Dam-Dam-Chashme-1 site, in total, the finds include 3 200 lithic artifacts, several hundred bone fragments, 604 ceramic fragments and a considerable number of perforated shells (Markov, 1981). This study presents in details a part of the same assemblage, stored in the archive of the Department of Ethnology of Moscow State University. Unfortunately, due to several relocations of the Department to different buildings of the University, a part of the collection has been lost (information received from the Head of the Department, Dr. O.E. Kazmina). At the moment, this collection consists of 2 493 lithic artifacts, 261 ceramic fragments and 324 bone fragments. Comparison of the surviving collection with its description in the G.E. Markov's publication reveals the fact that the current version of the collection lacks the described cores and stone tools. Perhaps the missing items were transferred to some museums in Turkmenistan for display at exhibitions.

Results

The lithic assemblages from DDC-1 is a blade(let) industry. The percentages of blade(lets) and tool blanks in debitage are 46,4% (486/1047) and 60% (117/195), respectively.

Total number of cores in the DDC-1 collection is extremely small. Therefore technological analysis mainly based only on the available cores (4 spc. from the layer 4), bladelete and core blanks. The cores can be subdivided on the basis of the differences in flaking techniques

(i.e., pressure and percussion) and the shapes of the main blank removal scars (i.e., blade/let and flake). The use of the pressure technique used for bladelet blanks removal was discribed in this study using the criteria listed by Inizan et al. (1999), Pelegrin (2012) and Inizan (2012). This technique is characterized by highly straight parallel edges, thin cross section, a smaller width of the striking platform of blade/lets relative to its maximum width, equal thickness of through all length, a straight or very slightly curved lateral profile, a cleavage angles close to straight, trace of ventral lips reduction.

Tab. 1

Typological categories of lithic assemblage from Dam-Dam-Cheshme-1 rockshelter

Таблица 1

Типологический состав каменной индустрии грота Дам-Дам-Чешме-1

Chipped Stone assemblage	Layer 1	%	Layer 2	%	Layer 3	%	Layer 4	%	Layer 5	%	Total	%
Cores	2	*12,5*	1	*0,34*	11	*2,84*	13	*4,17*	2	*5,71*	29	*2,8*
Core trimming elements	3	*18,75*	43	*14,48*	31	*8,01*	26	*8,33*	6	*17,14*	109	*10,4*
Flakes	5	*31,25*	101	*34,01*	175	*45,22*	123	*39,42*	19	*54,29*	423	*40,4*
Blades	2	*12,5*	42	*14,14*	36	*9,30*	39	*12,50*	3	*8,57*	122	*11,7*
Bladelets	4	*25*	92	*30,98*	94	*24,29*	78	*25,00*	4	*11,43*	272	*26,0*
Microblades		*0*	18	*6,06*	40	*10,34*	33	*10,58*	1	*2,86*	92	*8,8*
Total, without debris*	16	*84,21*	297	*60,24*	387	*27,68*	312	*61,90*	35	*44,30*	1047	*42,0*
Debris (chunks, chips, flakes less than 20 mm)	3	*15,79*	196	*39,76*	1011	*72,32*	192	*38,10*	44	*55,70*	1446	*58,0*
Total**	19	*100,00*	493	*100,00*	1398	*100,00*	504	*100,00*	79	*100,00*	2493	*100*

*Percentage of the total number of artifacts from layers without debris.

**Percentage of the total number of artifacts in the layer.

1. Layer 4 lithic assemblages

The cores from the layer 4 indicate the use of prismatic (fig. 2.-*22, 23*) and conical reduction for bladelet and microblade blanks removal (fig. 2.-*21*). The conical core present very regular scars, almost straight angle of striking platform (85°), more than 10 negatives of microblade blanks, and traces of ventral lips reduction on a striking platform, which might indicate the use of pressure techniques. Prismatic cores have a less regular shape compared to the conical core, the striking platforms are sloping (75°), which corresponds to a percussion technique. The core trimming blanks in the analyzed assemblages are not variable, they include lateral debordant blades (fig. 2.-*17*), core trimming flakes, crested blades, and rejuvenation core tablets.

The morphometric features of the flakes are not standard; they are characterized by angular shapes, longitudinal or transversal flaking scars on the dorsal face, polyhedral cross-sections, and planar and linear striking platforms. These features, together with the absence of flake cores, suggests that most flakes in this assemblage were not the target of lithic reduction, but were by-products of the core preparation process.

Tab. 2

Core type list from Dam-Dam-Cheshme-1 rockshelter

Таблица 2

Типологический перечень нуклеарного набора каменной индустрии грота Дам-Дам-Чешме-1

Types if cores	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Total
cylindrical core for bladelets	–	–	–	1	–	1
semi-cyllindrical core for bladelets	–	–	–	2	–	2
cone shape cores for microblades	–	–	–	1	–	1
fragments of cores	2	1	11	13	2	29
Total	2	1	11	17	2	33

Tab. 3

Typological list of core trimming elements of Dam-Dam-Cheshme-1 Rockshelter

Таблица 3

Типологический состав технических сколов грота Дам-Дам-Чешме-1

Types of core trimming elements	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	Total
Debordantes	3	17	11	12	4	47
Lateral trimming spalls	–	1	4	3	–	8
Front core trimming spalls	–	12	8	6	–	26
Platform trimming spalls	–	3	–	–	–	3
Cintrage trimming spalls	–	1	1	–	–	2
Crested blade	–	–	1	–	–	1
Semi-crested blades	–	5	2	2	–	9
Core tablets	–	–	–	1	–	1
Sem-tablets	–	–	1	2	–	3
Rejuvenation of core's terminal part	–	1	3	–	–	4
Total	3	40	31	26	4	104

The blade (lets) that obtained as a result of core reduction at the DDC-1site, as a rule, have regular forms. The blanks have the following morphometric features: longitudinal flaking of the dorsal face (100%), straight (54,6%) or twisted and curved (45,4%) lateral profiles, triangular (60,7%) and trapezium-shaped (34,6) cross-sections, and reduced linear (82,6%) or punctiform (10,8%) striking platforms. The average length, width and thickness of the blades are 32.8 mm (n-11, sd=5.06), 12.3 mm (n-39, sd=2.2) and 2.8 mm (n-39, sd=0.93). The same parameters for bladelets are 25.1 mm (n-24, sd=7.8), 8.3 mm (n-49, sd=1.7) and 2.1 mm (n-78, sd=0.68). Micrblades have dimensions: 20.5 mm (n-11, sd=3.2), 5.4 mm (n-33, sd=1) and 4.1 mm (n-33, sd=0.39).

The tool assemblage in the layer 4 is dominated by end and side-scrapers (fig. 2.-*16, 18–20*) and notched pieces (fig. 2.-*10–11*); also contains perforators (fig. 2.-*5*), backed bladelets (fig. 2.-*2, 4, 12*), several points and single lunates, as well as numerous retouched bladelets (fig. 2.-*1, 3, 6– 9, 14, 15*).

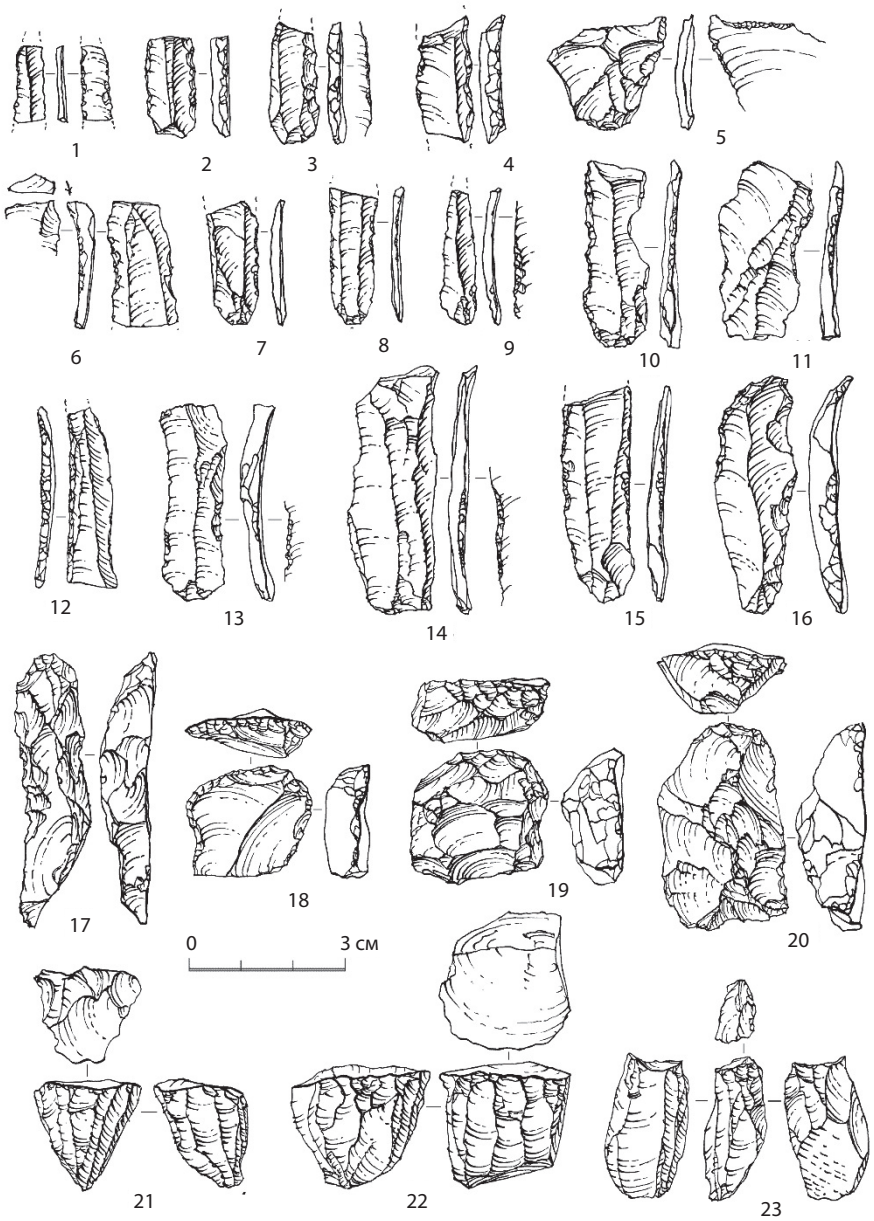

Fig. 2. Lithic assemblage of layer 4 Dam-Dam-Cheshe Rockshelter:
1, 3, 6 – 9, 14, 15 – retouched bladelets; 2, 4, 12 – backed bladelets; 5 – perforator;
10-11 – notched tools; 16, 18–20 – scrapers; 17 – debordant blade; 21–23 – cores

Рис. 2. Каменная индустрия слоя 4 грота Дам-Дам-Чешме-1:
1, 3, 6 – 9, 14, 15 – пластинки с ретушью; 2, 4, 12 – пластинки с ретушь притупления;
5 – перфоратор; 10, 11 – выемчатые орудия; 16, 18–20 – скребки; 21–23 – нуклеусы

Tab. 4

Tool list from Dam-Dam-Cheshme-1 rockshelter

Таблица 4

Типологический лист орудий грота Дам-Дам-Чешме-1

Typology of tool set	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Scrapers					
end-scrapers		6	16	7	
side-scrapers		7	4	2	
circular end-scrapers		1			
nail scrapers			3		
Microliths					
Lunates				1	
Burins			3		
Points	1	2	7	2	
Perforators		1	7	5	
Knifes			2		
Notched tools		1	16	15	1
Backed bladelets		3	6	5	
Retouched elements					
Blades		1	4	4	
Bladelets		3	4	6	
Flakes		6	6	3	
core trimming elements		4	7	3	
blades with ventral retouh			4	4	
bladelets with retouch utilisation		2	2	3	
arrowhead fragments		1			
unrecognazible fragment of tool			2	2	
Total	1	38	93	62	1

2. Layer 3 lithic assemblages

There are no cores in the lithic assemblage of the layer 3, which indicates that splitting was carried out till the cores were completely depleted. It may also indicate that part of the cores may have been used as tools blanks. Core reduction elements (tab. 3) included flaking face trimming spalls, débordante blades (fig. 3. *-17–18*), core tablets, and crested and semicrested blades. There are also trimming elements of the distal part of a core and lateral trimming spalls.

The flakes in the assemblage have variable forms and dimensions of both spalls and striking platforms; reduction patterns were identified on 45,22% of the total number of spalls. The morphological characteristics of flakes are the same with blanks from the layer 4.

The layer 3 blade(lets) are characterized by a longitudinal (97%) reduction pattern of the dorsal face, linear (78%) and punctional (8%) striking platforms, triangular (54,3%) and trapezoid (45,6%) cross-sections and straight (62,6%) and lightly twisted (37,4) lateral profile. The average length, width and thickness of the blades are 40.1 mm (n-9, sd=6.5), 14.3 mm

(n-36, sd=2.69) and 3.14 mm (n-36, sd=1.49). The bladelets dimensions are 30.2 mm (n-19, sd=7.9), 8.5 mm (n-94, sd=1.8) and 2.1 mm (n-94, sd=0.8). Microplates have dimensions: 25.3 mm (n-3, sd=0.3), 5.8 mm (n-40, sd=0.9) and 1.5 mm (n-40, sd=0.4).

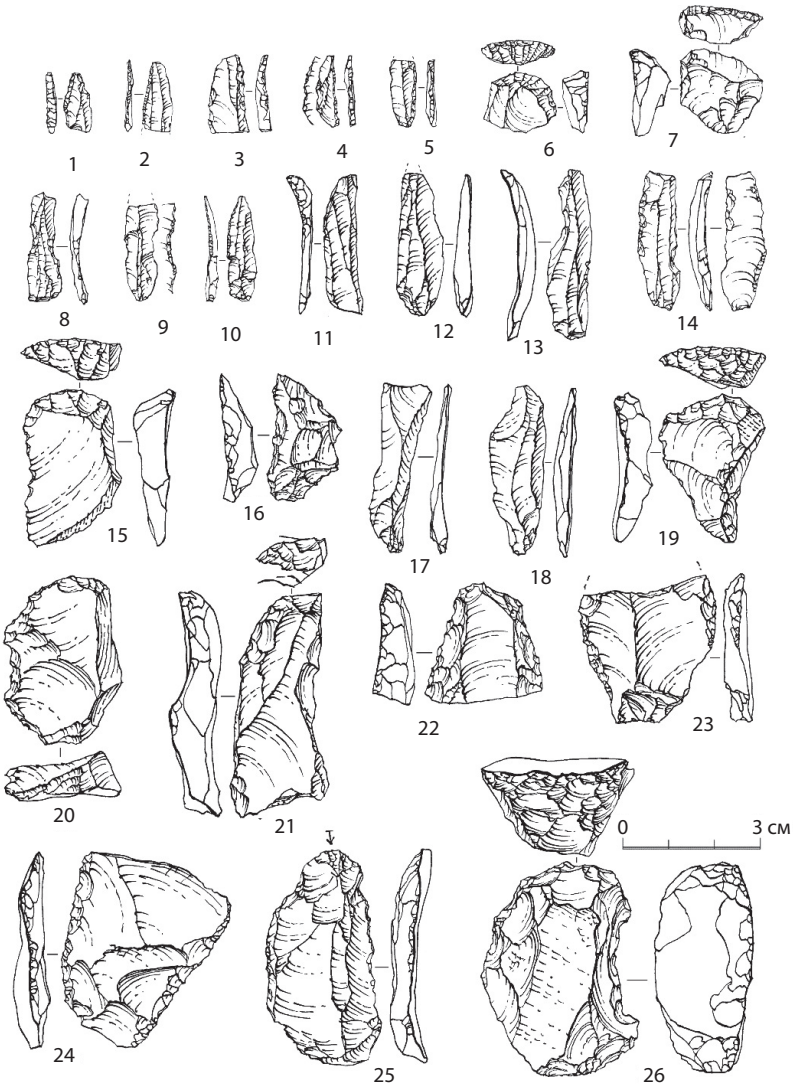

Fig. 3. Lithic assemblage of layer 4 Dam-Dam-Cheshe Rockshelter:
1–2, 10–11 – points; 3–5, 12–14 – retouched bladelets; 6-7, 15, 19–21, 26 – scrapers;
8-9, 16- notched pieces; 17–18 – debordant blades; 22–23, 25 – retouched flakes;
24 – lateral knife

Рис. 3. Каменная индустрия слоя 4 грота Дам-Дам-Чешме-1:
1–2, 10–11 – острия; 3–5, 12–14 – пластинки с ретушью; 6-7, 15, 19–21, 26 – скребки;
8-9, 16 – выемчатое орудия; 22–23, 25 – отщепы с ретушью; 24 – боковой нож

There is no major differences in tool types between layers 4 and 3, except for a general decrease in the tool number from the level 4 to the lever 3 (table 4). This layer also characterized by domination of end and side-scrapers (fig. 3.- *6-7, 15, 19–21, 26*) and notched pieces (fig. 3. -*8–9, 16*); also contains several points (fig. 3.-*1–2, 10–11*) and single triangle and numerous retouched bladelets (fig. 3.-*3–5, 12–14*) and flakes (fig. 3.-*22–23, 25*). Additionally, there are side-burins and lateral knifes (fig. 3.-*24*) in the layer 3, but at the same time there are no lunates.

3. Layer 2 lithic assemblages

The lithic collection of the layer 2 includes 534 artifacts, including 227 pieces of debris (table 1). Morphologically distinct core types are not presented in the layer 2, with the exception of a single core fragment. Core blanks include eclats débordante, front core trimming spalls, distal part of core, lateral trimming spalls and semicrested blades.

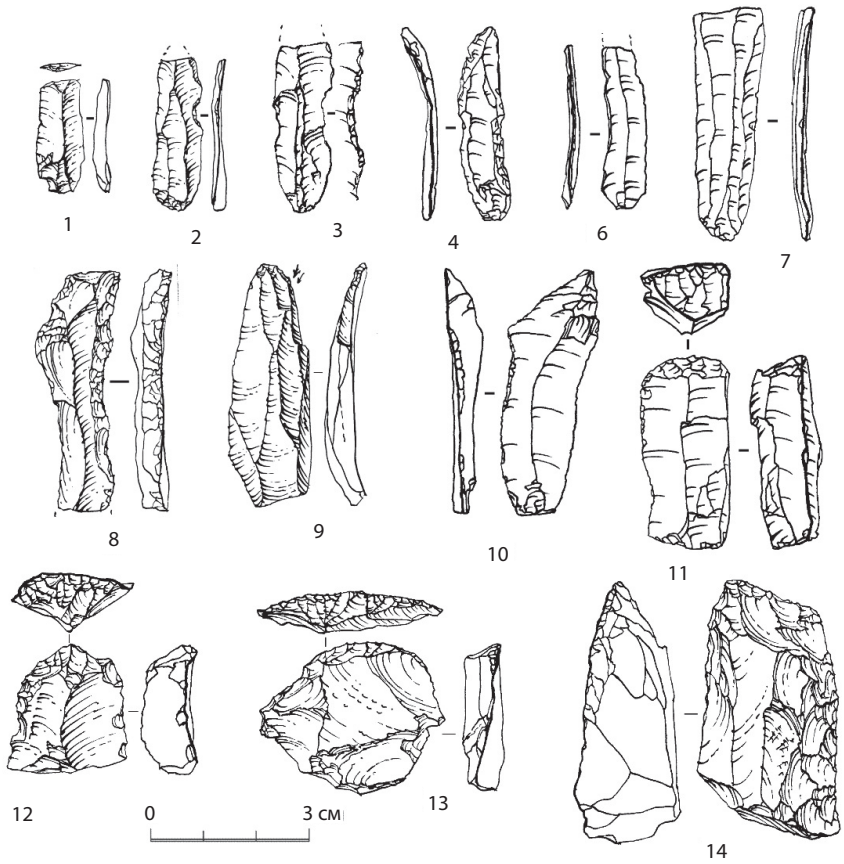

Fig. 4. Lithic assemblage of layer 2 Dam-Dam-Cheshe Rockshelter-1:
1–3, 5–7 – retouched bladelets; 4, 10 – points; 8 – backed tools; 9 – burin; 11–14 – scrapers

Рис. 4. Каменная индустрия слоя 2 грота Дам-Дам-Чешме-1:
1–3, 5–7 – пластинки с ретушью; 4, 10 – острия;
8 – пластинки с притупленным краем; 9 – резец; 11–14 – скребки

In the spall category we identified 101 flakes, 42 blades and 92 bladelets and 17 microblades (table 1). The morphometric features of the flakes are not standard; they are characterized by planar and linear striking platforms, longitudinal or bidirection flaking scars on the dorsal face. Flakes with cortical surface are presented in a small amount.

Blade(lets) from the layer 2 are characterized by longitudinal (82,9%) and bidirectional (13,1%) reduction pattern of the dorsal face, linear (52,3%), planar (28,5%) and punctional (12,7%) striking platforms, triangular (68,4%) and trapezoid (31,6%) cross-sections and straight (53,9%) and lightly twisted (30,9%) and curved (11,2%) lateral profile. The average length, width and thickness of the blades are 39.5 mm (n-9, sd=5.5), 12.9 mm (n-42, sd=3.3) and 3.3 mm (n-42, sd=1.3). The same parametres for bladelets are 29.5 mm (n-12, sd=8.2), 8.1 mm (n-92, sd=2) and 2.5 мм (n-92, sd=2.8). Microblades have dimensions: 17 mm (n-1, sd=0), 5.2 mm (n-17, sd=1.1) and 1.3 mm (n-17, sd=0.3).

The tool set of the layer 2 includes 38 pieces, consists scrapers (fig. 4.-*11–14*), arrowheads, perforators, burins (fig. 4.-*9*), points (fig. 4.-*4, 10*) and baldelets with ventral and dorsal retouch (fig. 4.- *1–3, 5–7*). The predominant tool categories are side and end-scrapers. The points, perforators and backed tools (fig. 4.-*8*) are presented in single copies; they are made of baldelets.

Results, Discussion and Conclusion

An attributive analysis of the stone industry of the Dam-Dam-Cheshme-1 site, carried out using materials from G.E. Markov's excavation, made it possible to determine its characteristics and trace the relationships between different layers. A small amount of debris in the collection (from 15.7% to 73%) is explained by the fact that during excavations in the 1950's, no soil washing/sifting was carried out. This trend is typical for Stone Age sites throughout Central Asia (Shnaider et al., 2019; Alisher kyzy et al., 2020).

As mentioned above, G.E. Markov attributed the materials of layers 2 and 3 to the Neolithic period, and the materials of layers 4 and 5 to the Mesolithic. Within the framework of this study, we conducted a comparative analysis of industries from different layers. The small number of stone artifacts from the layer 1 (19 copies) and the layer 5 (79 copies) does not allow us to determine their technical and typological characteristics, and therefore they were not included in the comparative analysis.

Unfragmented cores are present in small quantities only in the layer 4. In other layers there are only fragments without any technological features. This fact indicates that blade production was carried out until the cores were completely depleted, and/or may indicate that some of the cores may have been used as tool blanks. The core analysis show that the bladelet blanks was obtained from subprismatic cores was by using soft hummer percussion technique, prismatic and conical cores microblades by pressure technique.

Judging by the morphology of available cores and the collection composition, the primary goal of reduction in these assemblages was blade removal. The industries of all layers are characterized by bladelets industry, the ratio of blade(lets) blanks in all layers is almost the same (approximately 12% of blades, 25% of bladelets, and 6–10% of microblades). The morphometric characteristics of the blade(lets) are similar and indicate that the soft hummer percussion technique was used for their produce. However, in the complex of layers 4 and 3, there are signs that may potentially indicate the use of a pressure technique. First of all, the proportion of microblades in these layers is significantly luger compared to the complex of the layer 2.

In addition, bladelets and microblades are noted, which are characterized by the regular edge, straight profile (instead of a curved profile), a maximum width at the shoulder (i.e., right below the bulb), and the presence of a very small point-like pressure bulb on microblades. Given these characteristics, it can be assumed that they were obtained by the pressure technique.

These morphometric features, along with the absence of flake cores, suggests that the flakes in this assemblage were not the ultimate goal of lithic reduction, but were by-products of core preparation. Primary flakes with cortical surface account for less than 10% of the total amount, which testifies in favor of implementation of the decortication process outside the excavated area.

A comparative analysis of lithic collection from the layers 2–4 shows that the chipped stone assemblage of the DDC-1 site are heterogeneous. The main part of the tools in all layers are scrapers and notch/denticulates, points and perforators are less present. However, it should be noted that in the layers 4 and 3 in toolset the number of bladelete blanks increases. The toolset of these layers are characterized by predominance of backed bladelets and bladelets with dorsal and ventral retouch. The fragment of the arrowhead from layer 2, knives and incisors from the layer 3 are worth special mention. The single geometric microliths are represented by a triangle (in layer 3) and a lunate (in layer 4).

A general comparison of the industries of the layers 4 and 3 reveals a significant technical and typological similarity in the primary splitting strategies (soft hummer percussion and pressure) and the toolsets composition. This degree of similarity usually indicates that the complexes developed within the same cultural context (Kolobova et al., 2013; Kolobova, Shnaider, Krivoshapkin, 2016; Shnaider et al., 2018, p. 8–15; Bar-Yosef, 1970). At the same time, technical and typological differences are fixed the industries of the 2nd layer and the industries of the 3rd and 4th layers, both in the primary splitting (there are no signs of pressing) and in the tool kit.

The main cultural and chronological markers for the Early Holocene complexes in this region are geometric microliths and the use of a pressure technique. In the industry of the collection considered here, geometric microliths are presented only in single copies in the form of segments and triangles. The coexistence of single segments and pressure techniques is typical for the layer 4 industry of the Dam-Dam-Cheshme-2 site, the late Mesolithic stage of the East Caspian development line (Alisher kyzy et al., 2020; Alisher kyzy, 2022). The predominance of backed bladelets and points also confirms the final Mesolithic attribution of the layers 3 and 4 materials. For the assemblages of the layer 2, the presence of burins and bladelets with ventral retouch confirm their relationship with Oyuklin Neolithic culture, which are located in the Northern Balkhan region (Markov, 1961, fig. 1). However, the knapping technique in the layer 2 assemblages is different from Oyuklin one, since the Oyuklin culture is characterized by pressure technique, while in the layer 2 soft hummer percussion was noted. The only chronological marker in the layer 2 is a fragment of an arrowhead with bifaced retouch processing, which is characteristic only for Neolithic complexes in this region (Korobkova, 1996). Thus, based on the available analogies, we conclude that the layers 3 and 4 industries can be attributed to the Late Mesolithic, while the layer 2 materials may belong to the Neolithic.

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INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

Saltanat Alisher kyzy, Candidate of Historical Sciences, Junior Researcher of Institute of Archaeology and Ethnography, Novosibirsk, Russia.

Алишер кызы Салтанат, кандидат исторических наук, младший научный сотрудник Института археологии и этнографии Сибирского отделения Российской академии наук, Новосибирск, Россия.

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