doi:10.17746/1563-0110.2023.51.3.009-016

N.K. Anisyutkin
Institute for the History of Material Culture,
Russian Academy of Sciences,
Dvortsovaya nab. 18, St. Petersburg, 191186, Russia
E-mail: leonid.dictyoptera@gmail.com

Core-Shaped Tools from the Early Pleistocene Deposits at Bairaki, Moldova

This article deals with a series of core-shaped tools from Early Pleistocene deposits (layers 5 and 6) of the stratified site of Bairaki, located on high above-floodplain terrace VII of the Dniester, in the outskirts of Dubăsari, Moldova. The site was discovered in 2010 by the joint Russian-Moldovan archaeological expedition and excavated in 2011–2014. The interdisciplinary studies revealed six layers with Early Paleolithic artifacts. Two lowest layers (5 and 6) are associated with the channel alluvium of terrace VII. The paleomagnetic studies have shown that these deposits correspond to the Jaramillo episode of the Matuyama epoch. The lithic industry of layers 5 and 6 are comparable to the Late Oldowan. Most artifacts are made of poor quality flint; there are also pebble tools made of non-silicic rocks. Most lithics are small. A distinct series of core-shaped end-scrapers and side-scrapers made on residual cores (9 spec.), fragments (1 spec.), and flakes (5 spec.) is identified. All these tools are robust and had been processed in a similar way. They are made of pebbles no larger than 6 cm. The steep working edges of all implements in this series are heavily retouched. Similar items have been recorded from the Early Paleolithic materials of the region. Such tools were widespread in the Early Paleolithic of Africa and Eurasia. The earliest pieces were found in the Bed I assemblage of the Olduvai Gorge.

Keywords: *Southwestern part of Eastern Europe, Moldova, Transnistria, Bairaki site, Early Paleolithic, core-shaped tools.*

Introduction

The archaeological complexes of the earliest Paleolithic, including the Oldowan, along with the usual pebble items and flake artifacts, contain cores and core-shaped tools. The core-shaped tools are robust, and many of them resemble end-scrapers. Side-scraper varieties are less common. Residual cores were commonly used as blanks. Series of such tools are usually reported from the Early Paleolithic industries of the pebble-flake and Acheulean traditions. The oldest assemblage of them was found in Bed I of the Olduvai Gorge (Barsky et al., 2018). In the Middle Paleolithic, such tools have been recorded only in the Tayacian assemblages, where they were usually fashioned on robust Clactonian flakes (Anisyutkin, 2016). The morphology of core-shaped end-scrapers has been thoroughly analyzed elsewhere (Lyubin, Belyaeva, 2004a; Barsky et al., 2018).

This article considers core-shaped tools an important component of the Early Paleolithic pebble-flake complex. Particular attention is paid to the features of accommodation. The discussion is based on the lithic industry of the most ancient Early Paleolithic

Archaeology, Ethnology & Anthropology of Eurasia 51/3 (2023) 9–16 E-mail: Eurasia@archaeology.nsc.ru

site in the Russian Plain (about 1 million years old), which originated from lowermost layers 5 and 6 of the site of Bairaki on the outskirts of the city of Dubăsari, in Lower Transnistria.

General description of the site and materials

The Bairaki site was discovered in 2010 by the joint Russian-Moldovan archaeological expedition; excavations and multidisciplinary research were carried out in 2011–2014 (Anisyutkin, Chepalyga, Covalenko, 2015). The site is located on the left side of the Bairaki gully near the city of Dubăsari, Pridnestrovian Moldavian Republic (Fig. 1). The Bairaki gully is relatively short, its upper part is a gentle hollow partially filled with Holocene humic talus. The gully's slopes show different geological structures: the right side is composed of Middle-Upper Pleistocene diluvium; the left side, of the older Early Pleistocene deposits. The excavation unearthed ca 26 m^2. The total thickness of the deposits exceeds 8 m. The following stratigraphic sequence has been recorded within the excavation.

Layer 1 (0–0.7 m). Modern black soil (chernozem), with rodent burrows.

Layer 2 (0.7–1.25 m). Brown to reddish-brown loam, with a minor admixture of humus—a carbonaceous horizon of modern soil.

Layer 3 (1.25–1.60 m). Yellowish-brown to pale yellow loam; diluvial, carbonaceous, loess-like.

Layer 4 (1.6–2.2 m). Brown paleosol sediment; clayey, cloddy, Middle Pleistocene in age.

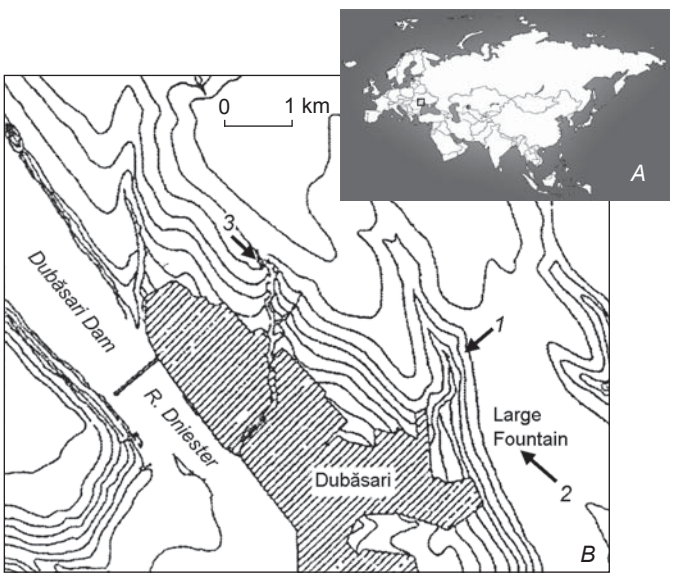

Fig. 1. Map showing location of the Bairaki site in the south of the East European Plain (*A*) and the Early Paleolithic sites within the city of Dubăsari (*B*).
1 – Bairaki; *2* – Bolshoi Fontan; *3* – Creţeşti.

Layer 5 (2.2–2.8 m). Reddish-brown paleosol; double layered, with distinct fissures, which are filled with homogenous reddish-brown sediment. These fissures penetrate into the underlying gley soil. This layer revealed solitary well-preserved flint pieces corresponding to cultural layer 2, as well as patinated items from destroyed archaeological layer 1.

Layer 6 (2.8–3.4 m). Brownish-greenish hydromorphic soil of the gleyzem type, covering the floodplain deposits. It is cut with through cracks from layer 5. The soil contains archaeological layer 3 with solitary weakly rounded flint artifacts and fragments of fossil animal bones.

Layer 7 (3.4–5.1 m). Floodplain alluvium facies: greenish-gray and light brown sandy-argillaceous carbonaceous silt. The lower part of these deposits yielded archaeological layer 4, containing an alignment of limestone slabs and four artifacts of flint and chert.

Layer 8 (5.1–5.8 m). Deposits of oxbow alluvium facies, with alternating thin beds of gray siltstone and orange-brown gley sublayers.

Layer 9 (5.8–6.5 m). The cover of the channel alluvium. Light brown deposits, consisting of coarse-grained sand with thin lenses of fine gravel. Its lower part is dark, owing to manganese inclusions in the brown pebbly substrate. The base is a sublayer of light gray sand with small pebbles, representing the beach facies deposits. Numerous lithic artifacts from archaeological layer 5 were found here, including large pebble pieces and small flint tools, rolled to varying degrees. There are a lot of flint chips, which are usually not preserved in deposits of this type. Among several small fragments of unidentifiable bones, a fragment of the calcaneus of a small Cervidae animal was discovered.

Layer 10 (6.5–7.9 m). Several horizons of gravel-sand deposits. Here, the number of gravel-pebble inclusions, forming lenses in coarse-grained yellowish-gray sand, noticeably increases. The lower horizon is oversaturated with pebbles, but no large or medium pebbles were recorded. Artifacts from this layer were attributed to archaeological layer 5. There are few artifacts, rolled to varying degrees. Tiny flakes and chips are also rather rare. Solitary unidentifiable bone fragments were found.

Layer 11 (7.9–8.2 m). Small-sized gravel, cemented in some areas, often forming

a conglomerate. Pebbles of medium size (5–7 cm) were recorded. The layer was studied on a small area and wasn't excavated completely. It reveals solitary heavily rounded flint artifacts. This is clearly the redeposited and destroyed cultural layer 6.

The main profile of the site shows a complex structure of the lower alluvial part of the ancient terrace, while the upper loess-soil layer is thin. There is no clear division into paleosol and loess levels in this structure. Paleosols lie one over another, and facies are in the form of pedosediments. Taking into account these findings, we made additional profiles in the fills of paleo-incisions of various ages, located down the slope, where the thickness of the deposits noticeably increases. In such geomorphological situations, soils are better preserved and consist of several horizons, separated by diluvial or loess layers. In order to clarify the Bairaki stratigraphy, in the uppermost part of the left side of the gully, a section was made at the northeastern wall of the excavation over a length of more than 70 m. The sections were arranged downwards along the gully's slope (Sychova, Anisyutkin, Khokhlova, 2022). As a result, layers of diluvial loams were identified between the three paleosols, which were better preserved in this part of the gully.

The lower paleosol, containing archaeological layer 3, is overlain by stratified brown loam, in which a side-scraper on a thick flint flake was found. Paleomagnetic analysis of a sample of this loam showed reverse polarity, indicating the end of the Matuyama epoch. The underlying hydromorphic paleosol corresponds to one of the latest episodes of this epoch. Samples from archaeological layers 5 and 6 belong to the Jaramillo episode (Chepalyga et al., 2013; Anisyutkin, Chepalyga, Covalenko, 2015). This dating corresponds to the absolute TL-dates of 940 ± 200 and 1100 ± 250 ka BP previously derived for the alluvium from the same terrace, near the village of Kitskany, in the vicinity of Tiraspol (Antropogen…, 1986: 56).

The upper and middle (red-colored) paleosols were separated by a brown loam horizon with solitary flint artifacts from archaeological layer 1. In 2010, a part of this horizon with artifacts bearing white patina was identified in this excavation. Some of these artifacts were found redeposited in the middle (red-colored) soil layer. In total, 15 patinated flint items were found in layer 1, including two cores, four Early Paleolithic tools, and flakes.

Archaeological layer 2 yielded a small collection of flint artifacts (20 spec.) originating from the middle layer of paleosol. The collection includes a chopper, a core-shaped end-scraper, four side-scrapers, two cores, and a pebble stone with traces of working, as well as flakes and solitary chips. All the items bear no patina and show a good state of preservation of surfaces. Several small fragments of unidentifiable bones were found. It is possible that these are the remains or the outskirts of the preserved culture-bearing layer.

Archaeological layer 3 yielded 15 lithic artifacts, including a pick, two choppers, two cores, a side-scraper on flake, three pebbles with flaking scars, and flakes. The tools are slightly rounded and bear a blueish-white patina. Several fragments of unidentifiable bones and a fragment of a mandible with teeth from the Süssenborn horse (*Equus (Allohippus) sussenbornensis*) typical of the second half of the Early and the initial Middle Pleistocene were found in the layer (Stratigrafiya…, 1982: 272).

Archaeological layer 4, associated with floodplain alluvium deposits, yielded four lithic artifacts, three sandstone pebbles, and a fragment of an unidentifiable tubular bone of an ungulate. It also revealed an alignment of limestone slabs approx. 1.5 m^2 in size, which has not been studied yet. The alignment was laid up and covered with deposits.

Cultural layer 5 contained the largest number of lithic artifacts. It was associated with deposits of the beach facies of channel alluvium of the 7th (Kitskany)* above-floodplain terrace of the Dniester; the previous and recent paleomagnetic datings suggest the Matuyama age for these deposits.

The lithic industry from lower layers 5 and 6 belongs (sensu lato) to a pebble-flake complex comparable with the developed Oldowan C (Schick, Toth, 2009). The assemblage from layer 5 contains more than 880 artifacts, including a few pebble and core-shaped items, cores, flakes, and flake tools. Small pieces made from gray and black flint predominate, which is largely explained not only by the simplicity of the technology used, but also by the specifics of the raw materials available. As a rule, small flint nodules rarely exceeding 5 cm were used. All relatively large tools are pieces of pebble often made from non-silicic rocks. These are choppers and picks made from both flint and larger pebbles of Cosăuti and Devonian sandstone. This was a low quality flint with fissures and caverns. The average size of flint flakes and the relevant tools is slightly more than 3.2 cm (Anisyutkin, 2020).

*In some geological publications, the Kitskany terrace is defined as the 8th terrace (Antropogen…, 1986: 18).

Description of the core-shaped stone tools

The set of core-shaped tools under discussion consists of 15 flint items. Some of them are fashioned on residual cores; others are prepared on natural fragments and flakes. These products demonstrate a combination of two common features: robust blanks, and steep working edges of end- and side-scraper-like tools processed with heavy vertical retouch. The majority of these tools were found in layer 5. Residual cores (9 spec.) and flakes (3 spec.) were used as blanks for the manufacture. One end-scraper, recovered directly from a small-pebble conglomerate, was made from a small rounded fragment of gray flint. Two artifacts were identified as side-scrapers on robust flakes. Judging by the totality of their characteristics (the use of rare robust flakes as blanks, distinctive secondary processing of working edges), the tools may well be included in the same group with end-scraper-like tools. The collection also contains several similar, but less expressive, products. These are often combination tools.

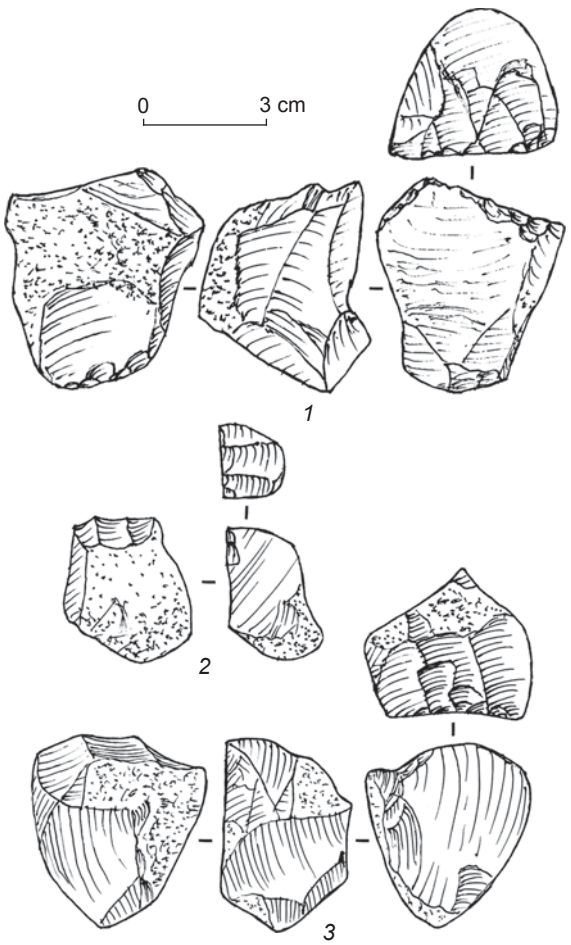

Fig. 2. End-scraper-like tools on residual cores from layer 5 (*1*, *3*) and on a flint fragment from layer 6 (*2*).

The largest tool in the collection was fashioned on a multiplatform core of gray flint, the maximum length of which barely exceeded 5 cm (52 × 48 × 45 mm). This item is partially rounded and is of a light brown color, which is typical of most gray flint artifacts found in layer 5. The exceptions are the steep working edge of the end-scraper-like tool, formed through a series of facets of flattening retouch, and its ventral surface, formed by natural knapping, which are almost not rounded and retain a gray color. This is the case of the secondary use of the item. This pear-shaped tool shows localized traces of wear on the narrowed end, suggesting the use of the artifact as a hammerstone. Upon another percussion, the impact went along a natural crack and formed the necessary element for making an end-scraper-like working edge. It can be assumed that this rounded core was picked up by hominins from alluvium and used as an ordinary hammerstone. Later, it was modified into a massive end-scraper-like tool (Fig. 2, *1*). The necessary raw materials were most likely selected from alluvial deposits.

The second similar item from layer 5 was made of dark gray flint. It is weakly rounded and not colored (Fig. 2, *3*). The blank was a residual core of small size (42 × 40 × 34 mm), retaining natural cortex over almost half of the surface. Negative scars of previous removals are clearly visible. The ventral surface was formed by a single removal. Marginal facets of flattening retouch can be traced on the surface of the clearly visible negative scar of the detached flake. The convex and steep working edge was prepared by elongated facets of "end-scraper" retouch.

A small end-scraper on a natural fragment of gray flint (35 × 30 × 22 mm) is rather expressive. Small facets of utilization can be traced along the working edge prepared by three distinct parallel removals. The fragment is rounded, its surfaces show a light brown color, while the negative scars of the working edge preparation retain the natural color of gray flint. This tool was recovered in 2010 from a block of small-pebble conglomerate lying on the surface of the quarry, overlain by deposits of layer 5 within the excavation area, which allows us to attribute this artifact to layer 6 (Fig. 2, *2*).

The maximum dimensions of the rest of the artifacts barely exceed 3 cm. The steep working edges of these tools were prepared through parallel micro-blade removals. The items are reminiscent of small end-scrapers of the Upper Paleolithic type. One of these tools (27 × 23 × 18 mm), with the working edge formed by distinct parallel micro-blade removals, shows two

well-expressed notches at the sides, which allowed it to be held firmly in the hand (Fig. 3, *1*). A similar end-scraper (28 × 27 × 20 mm), with the narrowed working edge formed by parallel microblade facets, was made on a piece of gray flint (Fig. 3, *2*). A small end-scraper with two opposing working edges (23 × 22 × 17 mm) was formed on a residual round core (Fig. 3, *3*). Noteworthy is a small product made of black flint, reminiscent of a single-platform core with negative parallel scars on one surface and with a striking platform formed by a single removal (30 × 26 × 24 mm). The back side of the "nucleus" retains natural crust. Formerly, this product was identified as a core (Anisyutkin, 2020: 23). However, the analysis of the flaking surface has shown that the detached laminar flakes were very thin and could not have served as blanks. After detachment, they broke up into several pieces. This conclusion has been confirmed experimentally. Therefore, this artifact can also be attributed to end-scraper-like forms (Fig. 3, *4*).

Three tools were made from flakes. All of them are small and thick. One of these tools from black flint was found on the surface of the quarry, in the remains of pebble conglomerate, which suggests its attribution to layer 6. The scraper's working edge was prepared by vertical retouch (Fig. 3, *5*). The opposing robust tip was fashioned through discontinuous bifacial processing (43 × 41 × 23 mm). This item has been classified as a combination tool. Its ventral surface is the inverse face of the flake, which may be of natural origin, judging by the indistinctness of the curvature. The second tool was made from a black flint flake (40 × 33 × 24 mm). The end-scraper-like working edge was formed on the place of the striking platform, which was removed by secondary working (Fig. 4, *1*). Its ventral surface, retaining the elements of the flake inverse face, shows clear series of flattening faceting scars on the lower edge of the end-scraper; this faceting was used for the edge sharpening. Signs of accommodation can be observed here. The third tool was made from a shortened primary flake of dark gray flint (24 × 29 × × 20 mm). Its surface has a slight yellowish-gray color. An extremely steep end-scraper-like working edge was fashioned on the place of the removed striking platform, and processed with abrupt and vertical retouch (Fig. 4, *2*). The main features distinguishing these tools from conventional end-scrapers on small flakes, with their working edges prepared on distal ends (Fig. 4, *3–5*), are their greater robustness and location of the working edge on the place of the removed striking platform of the original flake.

Noteworthy are two side-scrapers from layer 5. One of these is fashioned on a black flint flake (46 × 32 × × 27 mm). An insignificant area of the residual striking platform bears natural cortex (Fig. 4, *6*). The notched working edge of the tool was formed by large removals in combination with fine marginal retouch. The notch is well prepared. The implement can be classified as either a notched tool or a side-scraper. The presence of widespread retouch suggests its identification as a side-scraper with a concave working edge. It can be assumed that the notch was formed as a result of the intense use of the tool. This is confirmed by the clearly visible use-wear signs on the opposite edge. The second side-scraper shows a steep and convex working edge and a poorly distinguished tip. A thick flake of black flint (31 × 29 × 26 mm) was used as a blank. The plain and very wide striking platform with negative

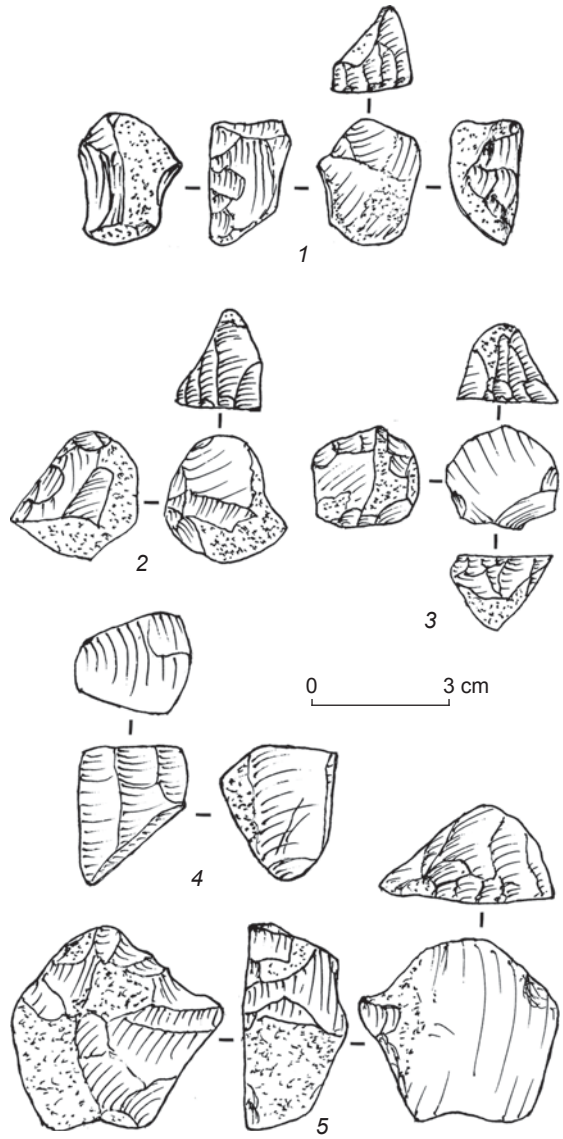

Fig. 3. End-scraper-like tools on cores and core-shaped fragments from layer 5 (*1–4*) and a scraper-point on a flake from layer 6 (*5*).

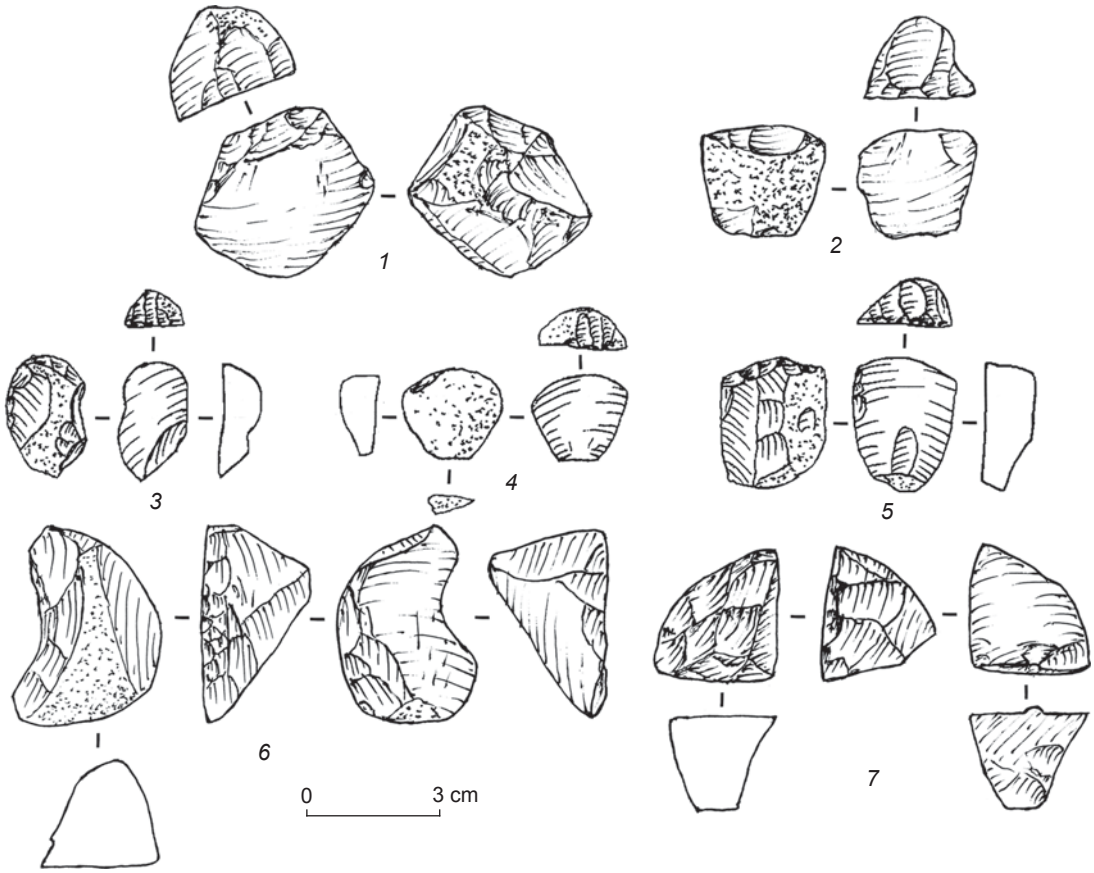

Fig. 4. Core-shaped end-scrapers (*1*, *2*), common end-scrapers on flakes (*3–5*), side-scrapers (*6*, *7*) from layer 5.

scars of removals forms a right angle with the ventral surface, which obviously indicates the orthogonal flaking technique. A cone and a convex percussion bulb are clearly visible. The steep working edge of the side-scraper is formed by the large negative scars of direct percussion with retouch facets along the edge (Fig. 4, *7*). The tool is noticeably rolled, but has no traces of collisions. The absence of such traces on almost all the artifacts described above suggests that this roundness is the result of wave abrasion. The abandoned sites were recurrently flooded, and the items deposited at a shallow depth were shifted within the deposition horizons by strong wind and rough water. Small particles of sand and silt, suspended by waves from the bottom, polished the artifacts' surfaces. The large and medium-sized pebbles were absent in layer 5, the number of small pebbles was small; this prevented obvious damage to the surface of lithic products. Moreover, the abundance of tiny flakes and chips in this layer indicates indirectly that there was no noticeable current.

Correlations

In the Bairaki Early Pleistocene collection, the category of core-shaped tools, including atypical forms, presents a distinct series. In the oldest regional Paleolithic, the parallels to the Bairaki artifacts were observed in the materials from the contemporaneous site of Cretesti (Anisyutkin, Stepanchuk, Chepalyga, 2013; Anisyutkin et al., 2021). Similar tools were found in Cretesti upper layer 2 and at the site of Bolshoi Fontan. Both these assemblages are dated to the Mindelian or Cromerian stages, within the range of 700–450 ka BP (Chetvertichnaya paleografiya…, 1996: 145; Sycheva, Anisyutkin, Khokhlova, 2022: 12). The latest lithic industries containing such tools date back to the early Middle Paleolithic. These are the Tayacian assemblages, where similar end-scrapers are common. The collection from layers 4 and 5 of Duruitoarea Veche Cave in Moldova can be considered an example (Anisyutkin, Ketraru, Covalenko, 2017: 76, 93).

Similar tools were recorded in the materials of the ancient sites of Taman and Dagestan (Shchelinsky, 2014: 141). However, these collections do not include small end-scrapers with micro-blade flaking of the working edges, which is probably explainable by the specifics of the raw materials. The ancient Paleolithic of Armenia also lacks the expressive varieties of such tools. This is likewise due to the characteristics of raw materials (Belyaeva, 2022: 36–39). Pebble end-scraper-like tools have been reported from the Oldowan industry of Dmanisi in Georgia (Lyubin, Belyaeva, 2004a: Fig. 3, 4; Barsky et al., 2018: Fig. 4). In the younger Early Paleolithic assemblages of the Caucasus, such tools were recorded in the Acheulean materials from Kudaro I, Yashtukh, Darvagchay-1, and other sites (Lyubin, Belyaeva, 2004b: 148; Derevianko, 2015: 182, 184). Very interesting parallels were reported from the ancient Paleolithic of Africa, where these tools are defined as rabot (Piperno, Bulgarelli, Galotti, 2004: 563). They are larger than the core-shaped tools from Bairaki. In other features, the differences, including the blank's robustness and the shape of the steep working edge prepared by subparallel and even parallel flaking, are not significant.

Conclusions

The core-shaped tools were prepared on very robust blanks, including residual cores, natural flint fragments, and flakes. The pieces on flakes are distinguished by the location of their working edge on the place of the striking platform. Scraper edges were prepared through the abrupt retouch; small pieces often bear parallel facets of micro-blade retouch. The degree of exhaustion of the angle of the working edge depends entirely on the intensity of the tool's use. The small size of the pieces from Bairaki layers 5 and 6 can be explained by the features of the raw material. Clear traces of accommodation are noticeable.

Core-shaped tools were typical implements in the earliest Paleolithic, including the Oldowan. These tools, along with choppers and other pebble and core-shaped varieties, as well as tools on flakes, are characteristic of the pebble-flake complex of Africa and Eurasia, spanning a wide range of regions and periods. These tools are also typical of the Acheulean, and disappear at its terminal stages. In Africa and neighboring regions of Western Asia, these tools survived till the end of the Acheulean (Lyubin, Belyaeva, 2004a: 164).

Acknowledgements

This study was carried out under the Program of Basic Scientific Research of the RF state academies of sciences on the topic of the State Assignment "The Ancient Inhabitants of the North of Eurasia: Human Settlement in the Stone Age, Production Technologies" (FMZF 2022-0012). I am grateful to Academician A.P. Derevianko for his invaluable help in making this research possible, and to all the colleagues who participated in the field survey.

References

Anisyutkin N.K. 2016
Dubossarskiy rannepaleoliticheskiy kompleks na territorii Pridnestrovya. *Rivista Arheologica*. S. n., vol. 1 (1/2): 6–19.

Anisyutkin N.K. 2020
Tekhnologiya pervichnoy obrabotki kamnya kompleksa sloya 5 eopleistotsenovoy stoyanki Bayraki v Pridnestrovye. *Arkheologicheskiye vesti*, iss. 30: 11–28.

Anisyutkin N.K., Chepalyga A.L., Covalenko S.I. 2015
Predvaritelniye itogi pyatiletnikh issledovaniy (2010–2014 gg.) drevneishey na territorii Vostochno-Yevropeiskoy ravniny mnogosloynoy stoyanki rannego paleolita Bayraki (Pridnestrovye). *Arkheologicheskiye vesti*, iss. 21: 11–30.

Anisyutkin N.K., Ketraru N.A., Covalenko S.I. 2017
Mnogosloynaya paleoliticheskaya stoyanka v grote Stariye Duruitory i mesto yeyo kamennykh industriy v rannem i srednem paleolite Yevropy. St. Petersburg: Nestor-Istoriya.

Anisyutkin N.K., Stepanchuk V.N., Chepalyga A.L. 2013
Kretseshty, novoye mestonakhozhdeniye rannego paleolita s galechnoy industriyey na Dnestre: Kamenniye izdeliya, geologicheskiye usloviya, vozrast. In *Drevneishiy Kavkaz: Perekrestok Yevropy i Azii*. St. Petersburg: IIMK RAN, pp. 89–103.

Anisyutkin N.K., Stepanchuk V.M., Ryzhov S.M., Chepalyga A.L. 2021
The Lower Palaeolithic site Cretesty in the Dnister Basin. *Praehistoria.* N. S., vol. 3 (13): 61–81.

Antropogen i paleolit Moldavskogo Pridnestrovya: Putevoditel ekskursiy VI Vsesoyuznogo soveshchaniya po izucheniyu chetvertichnogo perioda. 1986
Kishinev: Shtiintsa.

Barsky D., Verges J.-M., Titton S., Guardiola V., Sala L., Isidro Toro Moyano. 2018
The emergence and significance of heavy-duty scrapers in ancient stone toolkits. *Comptes Rendus Palevol*, vol. 17 (3): 201–219. URL: https://doi.org/10.1016/j.crpv.2017.09.002

Belyaeva E.V. 2022
Ashelskiye pamyatniki Zakavkazskogo nagorya. St. Petersburg: Peterburg. vostokovedeniye.

Chepalyga A.L., Anisyutkin N.K., Sadchikova T.A., Trubikhin V.M., Pirogov A.N. 2013
Geoarkheologiya rannego paleolita (oldovan) Severnogo Kavkaza i doliny Dnestra: Vozmozhniye puti migratsii drevneishikh arkhantropov v Yevropu. In *VIII Vserossiyskoye soveshchaniye po izucheniyu chetvertichnogo perioda*. Rostov-on-Don: Izd. YuNC RAN, pp. 667–670.

Chetvertichnaya paleogeografiya ekosistemy nizhnego i srednego Dnestra. 1996

O.M. Adamenko, A.V. Golbert, V.A. Osiyuk, Z.N. Matviishina, S.I. Medyanik, V.E. Motok, N.A. Sirenko, A.V. Chernyuk (eds.). Kyiv: Feniks.

Derevianko A.P. 2015

Tri globalniye migratsii cheloveka v Yevrazii. Vol. I: Proiskhozhdeniye cheloveka i zaseleniye im Yugo-Zapandoy, Yuzhnoy, Vostochnoy, Yugo-Vostochnoy Azii i Kavkaza. Novosibirsk: Izd. IAET SO RAN.

Lyubin V.P., Belyaeva E.V. 2004a

Nuklevidniye skrebki rannego paleolita. In *Arkheologiya i paleoekologiya Yevrazii*. Novosibirsk: Izd. IAET SO RAN, pp. 159–164.

Lyubin V.P., Belyaeva E.V. 2004b

Stoyanka *Homo erectus* v peshchere Kudaro I (Tsentralniy Kavkaz). St. Petersburg: Peterburg. vostokovedeniye. (Trudy IIMK RAN; vol. XIII).

Piperno M., Bulgarelli G.M., Galotti R. 2004

Prehistoric archaeology: The site of Garba IV: The lithic industry of Level D: Tools on pebble and percussion material. In *Studies on the Early Paleolithic Site of Melka Kunture, Ethiopia*, J. Chavallion, M. Piperno (eds.). Florence: Instituto Italiano di Preistoria e Protoistoria, pp. 545–580.

Schick K., Toth N. 2009

An overview of the Oldowan industrial complex: the sites and the nature of their evidence. In *The Oldowan: Case Studies: Into the Earliest Stone Age*, N. Toth, K. Schick (eds.). Gasport: Stone Age Inst., pp. 3–42.

Shchelinsky V.E. 2014

Eopleistotsenovaya rannepaleoliticheskaya stoyanka Rodniki 1 v Zapadnom Predkavkaze. St. Petersburg: IIMK RAN.

Stratigrafiya SSSR: Chetvertichnaya sistema. 1982

Half-volume 1. Moscow: Nedra.

Sychova S.A., Anisyutkin N.K., Khokhlova O.S. 2022

Multilayered Lower Paleolithic site of Bairaki (Lower Dniester Basin): Paleosols, palaeotopography, deposits and lithic assemblages. *Catena*, vol. 211 (8).

Received March 6, 2023.
Received in revised form March 25, 2023.