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THE LITHIC INDUSTRY OF THE MIDDLE PALAEOLITHIC SITE OF NOSOVO I IN PRIAZOV'E (SOUTH RUSSIA) : TECHNOLOGICAL ASPECTS[1]

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In Palaeolithic research, new investigative trends have recently appeared, complementing traditional questions. Among these is technological analysis of archaeological materials. This trend of investigations is closely connected to the customary techno-typological approach in studying lithic industries. Yet it is rather an independent approach, with a different methodology and different techniques: experiments on flaking isotropic and other kinds of stone, bone, and antlers; technological grouping of artefacts from archaeological assemblages, and on this analysis reconstruct the successive interconnected steps of the manufacturing process and treatment of stone, bone and antler tools; as well as other methods. It gives us an opportunity to obtain important additional information about cultural development in the Palaeolithic through detailed study of the process of manufacturing tools in different archaeological contexts from the stage of raw material procurement to the stage of manufacturing different types of artefacts. It is planned to study Middle Palaeolithic sites on the Russian Plain and in Northwest Caucasus in this way. In this paper, we use this approach to study the Middle Palaeolithic site of Nosovo I.

Nosovo I is located in Priazov'e, north-west of Taganrog, on the right bank of Miussky lagoon, near the village of Nosovo (Fig. 1). The site was discovered in 1963 by the author during archaeological survey directed by the Rostov State University professor Yu.P. Efanov. A few years later, this site was twice excavated by N.D. Praslov. The cultural layer was exposed over nearly 48 square metres. The dates of excavations and artefact collections were published by Praslov (PRASLOV, 1968; 1972). Although excavations of this remarkable site should be continued, information about the site is already rather large and various.

The site is located on the right bank of Nosov's gorge, which flows into the lagoon nearly 400 m from its mouth. The cultural layer of the site is bedded about 6 m above the bottom of the gorge in light greyish-brown loam and is approximately dated to Early Würm according to litho-stratigraphical information (PRASLOV, 1984, p. 32). The thickness of the cultural layer is approximately 10 cm. No bones were found, but there were concentrations of ochre and very small flint flakes which demonstrate that the cultural layer is *in situ*. Stone artefacts found here have no patina and are in a good state of preservation (PRASLOV, 1972, p. 76). It should be noted that the lithic industry is remarkable by the existence of tools with bifacial retouch. Consequently in cultural aspect, this site can be compared not only with typical Middle Palaeolithic sites such as Suchaya Mechetka (Lower Volga, Southeast Russian Plain) but also with other Middle Palaeolithic sites on the Russian Plain and in the Crimea which have bifaces.

The assemblage of stone artefacts includes more than 446 pieces. These include different types of working tools, flakes and their by-products. The complete cycle of lithic manufacture was undoubtedly represented at the site. The composition of the lithic assemblage is shown in Figure 2.

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Considering the technological focus of my investigation, I concentrate on the various types of knapping products rather than typology and only give basic information about the quantity of tools with secondary treatment in the context of flake groups (blanks). In figure 2, I present some data about tools with bifacial retouch (manufactured on blanks and cores as well as on unprepared nodules).

I want to say a few words about definitions of some types of *knapping products*. Knapping products are the different types of removals which result from the intentional knapping of cores and unprepared nodules, and which were used as tools or blanks for tools and cores. They include three types of removals: Levallois blanks, ordinary removals, and thick, massive flakes. These three groups have some subdivision. It is rather important to describe some of the distinctive features of Levallois blanks. In my view, *Levallois* blanks are symmetrical flakes or symmetrical, flat, wide blades without any cortex on the dorsal face, have moderate thickness, rather proportionally flat and rather regular shape, and high quality edges which extend nearly the length of the blank. Such blanks were used as finished tools, usually as knives, and more rarely as Levallois points (SHEA, 1993, pp. 24-27: SHCHELINSKY, 1994, p.19). After using them in such a way, they often were shaped and reshaped by retouch into other types of tools with different functions. *Ordinary removals* are simple blades and flakes (including elongated), which have proportions similar to blades, but which are rough and contrast with Levallois flakes and blades. Ordinary removals, in contrast to Levallois blanks, are often asymmetrical, and do not have high quality edges. They are often curved in plan and profile, with numerous irregularities on edges, and cortex or other surface remnants on the dorsal face. Some could be called unsuccessful flakes (knapping error). These include, for example, broken artefacts represented by fragments, partly fragmented artefacts, artefacts with platform broken or crushed during knapping, etc. It is certain that ordinary flakes and blades were intentionally knapped but I think that the knapper did not have the intention to make an artefact with strictly defined features. Some of these flakes, however, were not intentional blanks but were accidentally produced during core and bifacial tool preparation. *Massive flakes* were quite probably intentionally produced as a special type of flake. These were blanks for bifacial tools and cores. Some of them could have been by-products as well (primary core preparation flakes).

All debitage products are grouped according to technological stages. The most important for descriptions of the primary and secondary core preparation process are core preparation flakes: ordinal backed flakes and side unifacial crested flakes.

Primary core preparation flakes have cortex or other unmodified surface of the nodule extending over the entire dorsal face (primary technology). *Secondary core preparation flakes* are produced during core shaping, giving a convex profile (secondary technology). Complete recognition such kinds of flakes in archaeological assemblages is rather difficult. We could only find those which were knapped from previously prepared flake surfaces. They have negatives of preliminary flake scars and remnants of cortex or other unmodified nodule surface on their dorsal faces.

Side unifacial crested flakes (éclats débordants) display a convex dorsal profile and result from the initial shaping or reshaping of prepared cores. These peculiar flakes are the result of knapping from the very edge of a flake surface which was specially prepared in the form of a ridge. The dorsal face of these flakes has negatives from secondary core trimming and part of the back side of the cores (prepared or unprepared). Knapping of these flakes increased the area and convexity of the flaking surface. It should be noted that these are side (marginal) and not the "crested flakes and blades" from cores of blade industries.

Ordinal backed flakes, in my view, are only core preparation flakes although they are rather often identified as a special flake blank ("citrus technique", sausage slices, or *tablettes*) or a special type of prepared tool ("natural backed knife"). As a matter of fact, knapping ordinal backed flakes has the same result as knapping side unifacial crested flakes ("rising" profile of the flake surface) but the edge of the flake surface was not specifically prepared before knapping of ordinal backed flakes. Obviously, the dorsal face of the flake could

equally be just part of the primary cortical surface of the nodule or an unprepared core edge.

Knapping debitage includes small flakes, chips, and flake fragments. Small flakes are unshaped with a length of 2-3 cm and were not included in other technological groups. The lithic assemblage (Fig. 2) of Nosovo I includes two kinds of tools: flake/blade tools and bifacial tools. There were two independent methods of lithic manufacture. Before discussing the different methods of tool manufacture, it is necessary to consider raw materials.

RAW MATERIALS AND THEIR SOURCES

The tools of this site were made on nodules of high quality Cretaceous flint. There are two varieties of flint: dark-grey translucent, and light-grey veined with cracks which are filled in with carbonate inclusions. Both types can be found in a single nodule. The light grey forms the core (middle) of the nodule and dark-grey forms the outer area. The cortex surface is rounded, indicating that nodules were probably found in gorge beds (sediments) and from the river (shingle). The site has no natural flint outcrops; flint was obviously brought from the river and gorge. The nearest outcrop from the site which contains rounded dark- and light-grey flint was on the sandy banks of Mius's lagoon. The raw materials which were found on the site were obviously taken from the lagoon banks or the ancient river that used to flow there. They were brought to the site as blanks for bifacial tools or cores with primary preparation, core preforms and unprepared (or tested) nodules. The lithic assemblage from the site contains three unmodified nodules (length 8.5-10 cm), with no traces of preparation, no definite form, and with several elongated excrescences in the form of icicles. There are 6 rather large nodule fragments (length 7.5-12.5 cm). The cracked surface is fresh and unpatinated (like the other artefacts) and so appear to have been the result of human activity. These "fresh" cracks are distinguished from earlier cracks which are rounded and have a dense, thick, yellowish patina. These fragments are obviously the results of unintentional breaking of nodules during their knapping at the site. Smaller fragments (length 3-7 cm) of nodules from the same source were also found at the site (20 pieces). Most of them are considered to be knapping waste but some of these fragments could have been a reserve of raw material intended for further preparation.

MANUFACTURE OF TOOLS ON FLAKES: KNAPPING AND PREPARATION

Debitage products total 21.3 % (95 pieces). They include four Levallois blanks, two blades, 88 ordinary flakes, and one massive flake. It is rather interesting that there are only a few Levallois blanks and that they are represented by flakes with a length range of 3.8-5.7 cm (Fig. 3:1-3). One of them is a small point (Fig.3:1). Ordinary flakes predominate and were evidently the main aim of debitage on this site (Fig. 3:5-12; Fig. 4:1-3, 5-7, 9). There are only a few blades (Fig.3:4). Common flakes vary in their measurements but most have a length range of 3.1-5 cm (sometimes 5.1-7 cm), with a width of 3.1-4 cm, and thickness 0.5-1 cm (Fig. 5).

Flake manufacture was preceded by core preparation similar to that in many Palaeolithic industries but the intensity and character of primary preparation is different (SHCHELINSKY, 1983, p.81). The lithic assemblage of Nosovo I has 2 preforms which demonstrate the process of core preparation. One of these preforms is partially prepared and is a massive, slightly thinned quadrate - 11x10x6 cm (Fig. 6:2). First, one of its edges was removed by several large blows to form the striking platform. Next, one primary elongated flake was removed from the narrow front of the core. These steps produce a core preform. The second core preform was of the same type but smaller (9.5x7.5x5 cm) and was made on an unformed nodule in the same way as the first. The striking platform was formed as the result of removing of one wide primary flake and then two primary flakes were removed from that platform to form the flake surface (Fig. 6:1). Both core preforms were rather simple and have minimal preliminary preparation and do not have a special shape. In this respect, they are not comparable with "oblupien" described by Polish archaeologists. Nevertheless, we can confirm that the stages of raw material selection and manufacturing of core preforms were present in the technological chaîne opératoire.

CORE REDUCTION

We can describe the techniques of core reduction by the way flakes and blades were produced and by evidence of preceding operations (additional core surface preparation) and the shape of flaking implements. Flake and blade production reflects different ways of using raw materials and there are two different principles. The first is the well-known knapping of consecutive flakes and blades from several narrow outward-jutting adjacent surfaces which results in "prismatic cores" and is more suitable for the production of long, narrow blades. The second is flaking from one wide surface and is called the "principle of thinning or flat reduction". It is typical for Middle Palaeolithic industries and is related to Levallois and ordinary flake technology (SHCHELINSKY, 1983, p. 85).

The lithic assemblages contain three rather exhausted cores (Fig. 7:1-3). At the last stage of utilisation, they produced flakes using the second principle of flaking . The knapping was consecutive from two opposing striking platforms on the core (bi-directional). This method minimises the chances of failure and errors which make further knapping difficult, visible on the dorsal face in the form of step fractures and bumps. These are typically inevitable when knapping in one direction from a single striking platform (unidirectional knapping) to produce multiple wide flakes. At the same time in the knapping process, the location of the striking platform and consequently the direction of knapping was not strictly determined. Further, the direction of fracture changed over the course of reduction. For example, on one core which had opposing striking platforms and flake scars, a third (earlier) striking platform is visible on the left side of the core. Flake negatives from this striking platform disappeared in the process of knapping from the more recent opposed striking platforms (Fig. 7:1). There is also a core with two separate flaking surfaces. After exhausting one wide flake surface, a second flake surface was exploited on the opposite wide side of the core (known as a double core) (Fig. 7:3). The parallel knapping method from one striking platform was used on the first face and consecutive bi-directional flake production on the second face.

The next and more important part of knapping was additional, special trimming of working surfaces before every flake removal. This has the purpose of maintaining a convex profile on the flaking surface. This is optimal for knapping and is why both working surfaces of the core underwent such preparation. We could find traces of such trimming on some debitage products and in some cases on core surfaces.

It was rather difficult to find traces of trimming on the flake surface of the core. We were able to trace it on only one core in the form of partial small flake removals on one lateral edge (Fig. 7:2). This method of trimming was evidently not an important part of technology at this site. It was easier to observe traces of this activity on knapping products: secondary core trimming flakes, side unifacial crested flakes, and backed flakes. The presence of such flakes is very important.

Secondary core trimming flakes (17 pieces) verify that all stages of manufacture of stone tools were present, not only primary core preparation (Fig. 4:4, 8, 10). As we could see from studying preforms (Fig. 6:1, 2), in the process of the primary core trimming, cortex and bumps were removed from the core (visible on the dorsal flake face) (Fig. 8:1-4). These flakes result from primary and secondary core preparation (i.e., initial stages of core preparation).

Trimming of the lateral edges of the core results in the removal of side unifacial crested flakes (Fig. 9:1-7), observable on seven flakes. An additional striking platform was formed on the opposite side of the core and a narrow sharp ridge appeared as a result of such trimming by removing and retouch of the flaking surface. This ridge was then removed, producing the side unifacial crested flake (*éclat débordant*). The typical aim of this operation was to create a rising profile of the flaking surface before blanks were knapped. These reshaping operations took place at all stages of knapping.

The same aim results in the removal of backed flakes (10 pieces) but here the edges of the core were not trimmed (neither dorsal face nor ventral) (Fig. 9:8-10).

The quality of flakes depends on whether the lateral part of the flaking surface adjacent to the striking platform and

the striking platform itself were prepared or not (SHCHELINSKY, 1974, pp. 23-25). After removal of any flake (whether blank or core preparation flake) in this part of the surface, a concave cavity - the negative of the bulb of percussion - appears. This negative must be smoothed or the next flake could be short or thick. There are two ways of smoothing by removing small flakes and faceting chips from the edge of the striking platform. First, one can remove the overhang from the striking platform. In this case, the edge of the striking platform is on the same level as the flake surface. Second, additional deepening can be made of the flake surface edge at the lip. In this case the edge of the striking platform is below the level of the flake surface (deep smoothing of the surface).

In some cases, additional trimming of the striking platform was necessary before knapping each flake. The striking platform was prepared each time for a single flake. This "temporary" striking platform was prepared in order to lift a very small part of it for a subsequent hammer blow. The striking platform was prepared by faceting or by retouch. The striking platform could thus have different forms: slightly convex with two or three faceting scars, slight, flat retouch, and convex retouch.

It should be pointed out that these last operations of additional core preparation differ in their terminology. For example, E.Yu. Giria and P.E. Nechoroshev discuss them in the context of the conception of "knapping technology" and "fracture zone" (GIRIA, 1991, p. 118, 1997, p. 46, 68; NECHOROSHEV, 1993, p. 103-5).

Obviously, traces of additional trimming of the lateral part adjacent to the striking platform and striking platform could only be found on flakes and blades with the proximal part present.

The lithic assemblage from Nosovo I has 78 such flakes (including tools). 36 lack traces of additional trimming on the lateral edge of the striking platform (Fig. 10:1-2; Fig. 11:1-4; 10-15), 18 pieces have traces of overhang removing (Fig. 10:3; Fig. 11:5-6) and 24 pieces have traces of the complicated additional trimming which included not only removal of the overhang but deep smoothing of the surface (Fig. 10: 4-8; Fig. 11:7, 9, 16, 17). It should be observed that this last technological method was used rather often. (Fig. 12).

Additional trimming of the core striking platform, as observable on flakes, was also very important. Remnants of such trimming are visible on 52 flakes. Often we find retouch (46 pieces) and, more rarely, trimming of the striking platform by removal of small flakes (faceting) (Fig. 10:7 8). It is rather interesting that there were two types of retouch: 1) ordinary - perpendicular to the platform (Fig. 11:1-5, 13-17) and 2) special - longitudinal along the platform (Fig. 11:10-12). Sometimes both types were used at the same time (Fig. 11:6-9). The ordinary retouch was widely utilised. Nevertheless, the method of additional trimming of the striking platform by longitudinal retouch could be one of the distinctive features of knapping technology at the Nosovo I site. More often the striking platform was flat and straight (Fig. 11:1-12) but sometimes convex (Fig. 11:13-17). In many cases , the striking platform and lateral edges have minimal or no traces of additional trimming (Fig. 12).

Nothing can be said about flaking implements because no hammerstones were found in the assemblage. This is likely because such implements were made from organic materials.

To summarise, the cores were not specially prepared at the Nosovo I site. Their forms changed during the process of knapping due to changes in the direction of fracture after exhaustion of a face and to systematic additional trimming of flaking surfaces and platform edges.

TOOL MANUFACTURE

The assemblage of lithic artefacts includes 32 tools which were made on flakes of different types. Most often ordinal flakes (23 pieces) were used and production of such flakes was the main aim of knapping on the site. Some tools were made on debitage products: primary core trimming flakes (5), backed flakes (3), and side unifacial crested flake (1).

CORRELATION OF DIFFERENT TYPES OF TOOLS

Every tool type (Table 1) includes tools with some differences in morphology. Among canted sidescrapers, there are two tools which look like points (Fig. 3:5) and one sidescraper with three edges (Fig. 3:6). Segment-shaped knives are similar to canted sidescrapers but are undoubtedly an original tool type typical industry at Nosovo I. This type of knife (Nosov's type) has a straight or slightly concave edge (retouched or not) and the opposite back has convex retouch and is blunted in the central part . Its back and edge converge at the distal end and form a thin sharp beaked point like a bec (Fig. 4:1-3). Diagonal sidescrapers are rather typical at Nosovo I but they are fairly standardised in form. They have a straight and well-retouched edge (Fig. 3:7, 9; Fig. 4:8, 10). Only one transversal sidescraper is present. It has a retouched edge which is perpendicular to the flaking axis. This edge converges with the other, unretouched, edge and thus resemble canted sidescrapers (Fig. 4:9).

Tool Type	n	%
canted sidescraper	5	15.6
limace	1	3.1
segment-shaped knife	3	9.4
diagonal sidescraper	4	12.5
transversal sidescraper	1	3.1
double sidescraper	1	3.1
simple sidescraper	6	18.8
denticulate	1	3.1
notch	1	3.1
retouched flake	9	28.1
TOTAL	**32**	**100.0**

Table 1. Frequency of tool types.

We cannot say anything concerning preferences of particular blanks for tools because they were only ordinary flakes. Tools of different types were made on similar flakes and sometimes on debitage products.

All tools (different types) were retouched by different kinds of retouch: shallow and small scaled retouch for minimal reshaping of primary forms and deep large retouch for maximal reshaping of blanks. Deep, large (stepped and scaled) retouch was made by a hammer retouching tool, most likely organic (bone, antler, or hardwood). Shallow and small scaled retouch (which formed thin sharp edges and points) was made by pressure retouch.

There were only two pressure retouch tools found at the site. These were specially selected small flat pebbles of dark shale. One of them has a longitudinal form (6.8x3.8x1 cm). One area has numerous traces of utilisation - small, shallow, long scars - which appeared as a result of pressure by retouched tools. This area is located at the end of the pebble, and traces are perpendicular to the long pebble axis (Fig. 13:1). The other pebble was oval (5.9x4.3x1 cm) and has four such areas with the traces of utilisation located at the narrow ends of both sides. Three areas are found on one side. Two of them adjoin but their scars have different directions. Scars of the first area are located parallel to the long pebble axis and those of

the second are oblique. The third area on the other end of the pebble has a few scars located perpendicular to the long pebble axis. One area on the other side of the pebble shows traces of utilisation with a perpendicular orientation (Fig. 13:2). Retouch tools were obviously used for different time durations. The first was used for a short time but the second (with four areas) was used longer and retouched several tools.

MANUFACTURE OF BIFACIAL TOOLS

The lithic assemblage from Nosovo I includes only three bifacial tools. Although they have different forms, they are all completely formed tools. Two of them have the form of a pointed asymmetrical backed knife (Fig.14:2-3). The third tool is more difficult to identify (Fig. 14:1). It has a symmetrical triangular form with one common long edge (7.1x5.2x1.8 cm). Maximal width is at the proximal end and maximal thickness in the middle. The base (platform) is slightly convex in the form of a blade but lacks trimming. A large portion of cortex is adjacent to the base from the dorsal surface. Its lateral edges are also slightly convex and converge to form a rather wide point. The longitudinal profile is slightly curved. Its retouch is not uneven. The ventral face is completely covered with retouch in different directions which thinned the surface and gives slightly concave profile. The dorsal face, in contrast, has a convex profile and is trimmed with slight retouch on only part of its surface. The lateral edges and point on this face of the tool are additionally thinned and pointed by shallow flat retouch. The tool has the form of a spearpoint although its profile is not suitable for such a function.

There are two different types of knives. The first has two edges, an irregular triangular form, and is asymmetrical with a natural back (6.3x4.9xl.8 cm) (Fig.14:2). Maximal width is at the middle part and its back and base (platform) have maximal thickness. The edge (opposite to back) was longer and straighter and has more thorough trimming. Another edge has less thorough trimming. It is connected to the back at a 60° angle to the first edge. The back is straight and nearly parallel to the first edge, and is formed by a vertical surface of natural cracks in the nodule and has no trimming. The base is rather massive with remnants of a striking platform (formed by faceting from one side of the tool). Both sides of the tool have the similar trimming (faceting and retouch) and are convex. The main edge is retouched from both sides.

The second knife is more striking. It is larger (9.1x4.2x1.8 cm) and has an irregular segmented form (Fig. 14:3) with two different edges. The main edge extends from the point to the base (platform) and is concave. The other one, very short and slightly convex, is situated at a 75° angle to the first. This edge gradually turns into the back. Both edges form a beaked point at the joint. The back is long and convex for in contrast to the opposite concave main edge but has no special trimming. It is only a striking platform formed by faceting from the ventral part of the tool. The back connects to the untrimmed base. The base (platform) is the widest part of the tool. The faces of the tool have different retouch. The ventral face has negatives of large flakes so it is flat and looks like the flake surface of a core while the dorsal face is convex and has a "high" profile with partial trimming formed by faceting and deep large step retouch only on the edges.

The tools were made on massive nodules. The triangular knife was made on a flat, not too large nodule (Fig.14:2). The forms of the other nodules are unknown (Fig. 14:1, 3). They were possibly large massive flakes which served as special blanks for bifacial tools.

It was clearly necessary to first thin these blanks by faceting which looks like core knapping. Two method of knapping can be observed. The first has faceting from both ventral and dorsal sides by turns (Fig. 14:2) and the second has faceting from only one side (ventral or dorsal) (Fig. 14:1, 3). In Bonch-Osmolovsky's opinion (1940, p. 100), this method "looks like special imitation tools which used to be made on flakes and so has the flat ventral surface as a result of knapping." I disagree with this interpretation. In my view, it was simply a technological method to simplify manufacture of tools on massive nodules.

When blanks were flat, the final shape was made by means of small blows and then retouched. Various ways of trimming depended on the form of the tool and location

of the working part on the tool: edge, point, base (hafting), back (for hand). Only the edge and point were trimmed. Final retouch was made from both surfaces of the tools (Fig. 14:2). Tools which were made by the second method (with primary thinning on only one surface) have final trimming on the opposite surface. This trimming was intensive (Fig. 14:1, 3). The back of the knife has no additional trimming; it was simply a thick edge of the blank nodule or the striking platform for thinning this nodule.

This is my point of view on the technology of stone knapping and manufacture of stone tools at the Middle Palaeolithic site of Nosovo I. It can help us to understand and determine which culture to which it belongs and the extent to which it resembles the well-known Middle Palaeolithic site of Sukhaya Mechetka which is situated on East Volga on the outskirts of Volgograd (ZAMYATNIN, 1961). Sukhaya Mechetka is older than Nosovo 1 and is dated to the end of the Mikulino Interglacial (Riss-Würm) and the beginning of the Valdai Glacial (Würm) (IVANOVA, 1982, p. 392). I think that both sites belong to one developing cultural tradition as different variants of Mousterian with Acheulian Tradition or East Micoquian. I hope that technological analysis of the lithic assemblage at Sukhaya Mechetka will clarify and give us a solution of this question.

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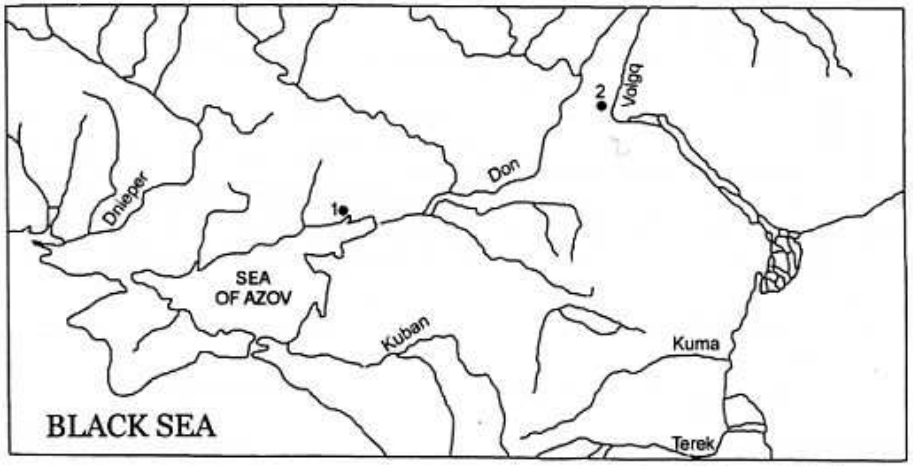

1. Nosovo I; 2.Sukhaya Mechetka

Fig. 1. Location of the Middle Palaeolithic site of Nosovo I.

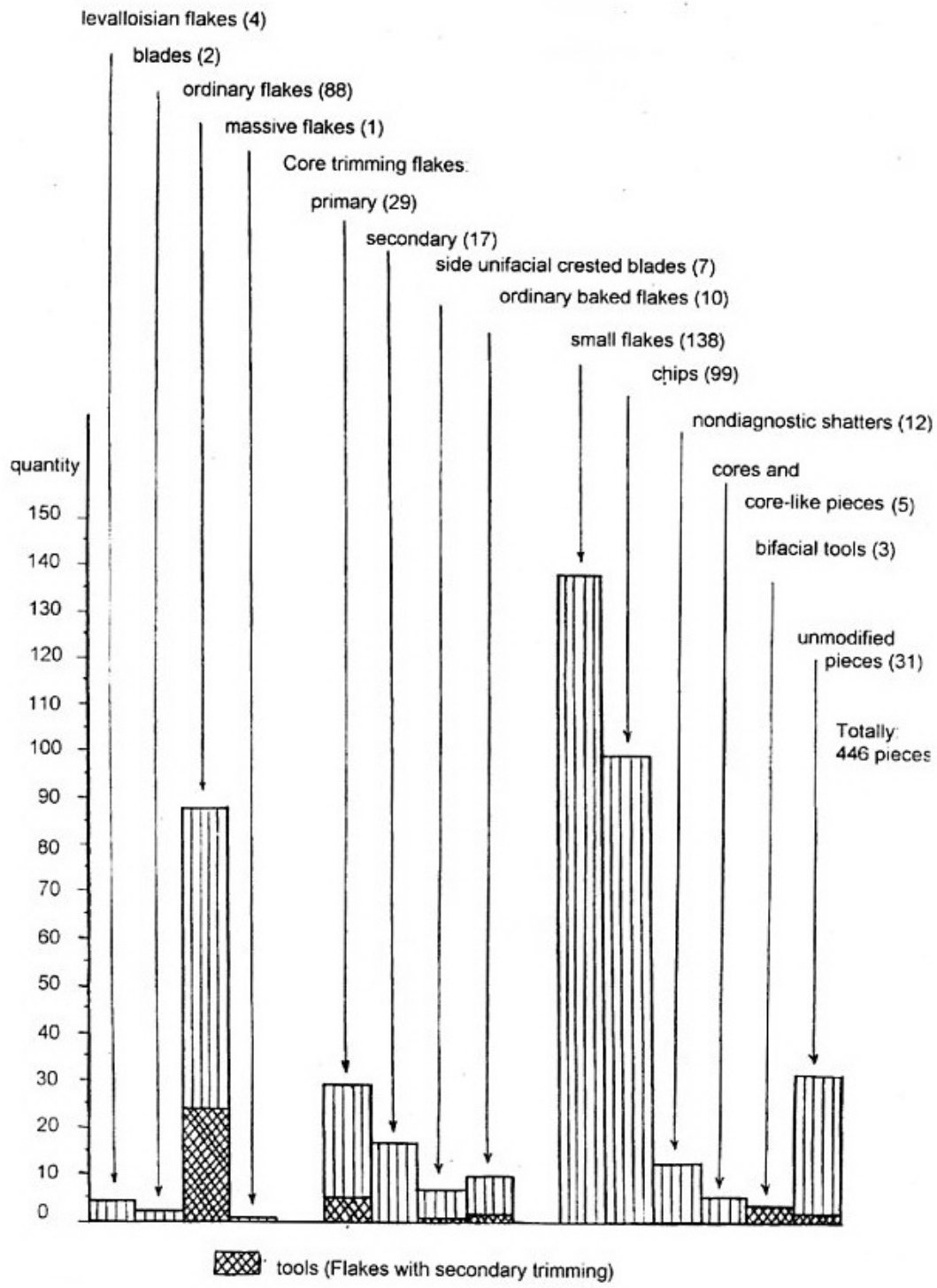

Fig. 2. Nosovo I. Lithic assemblage.

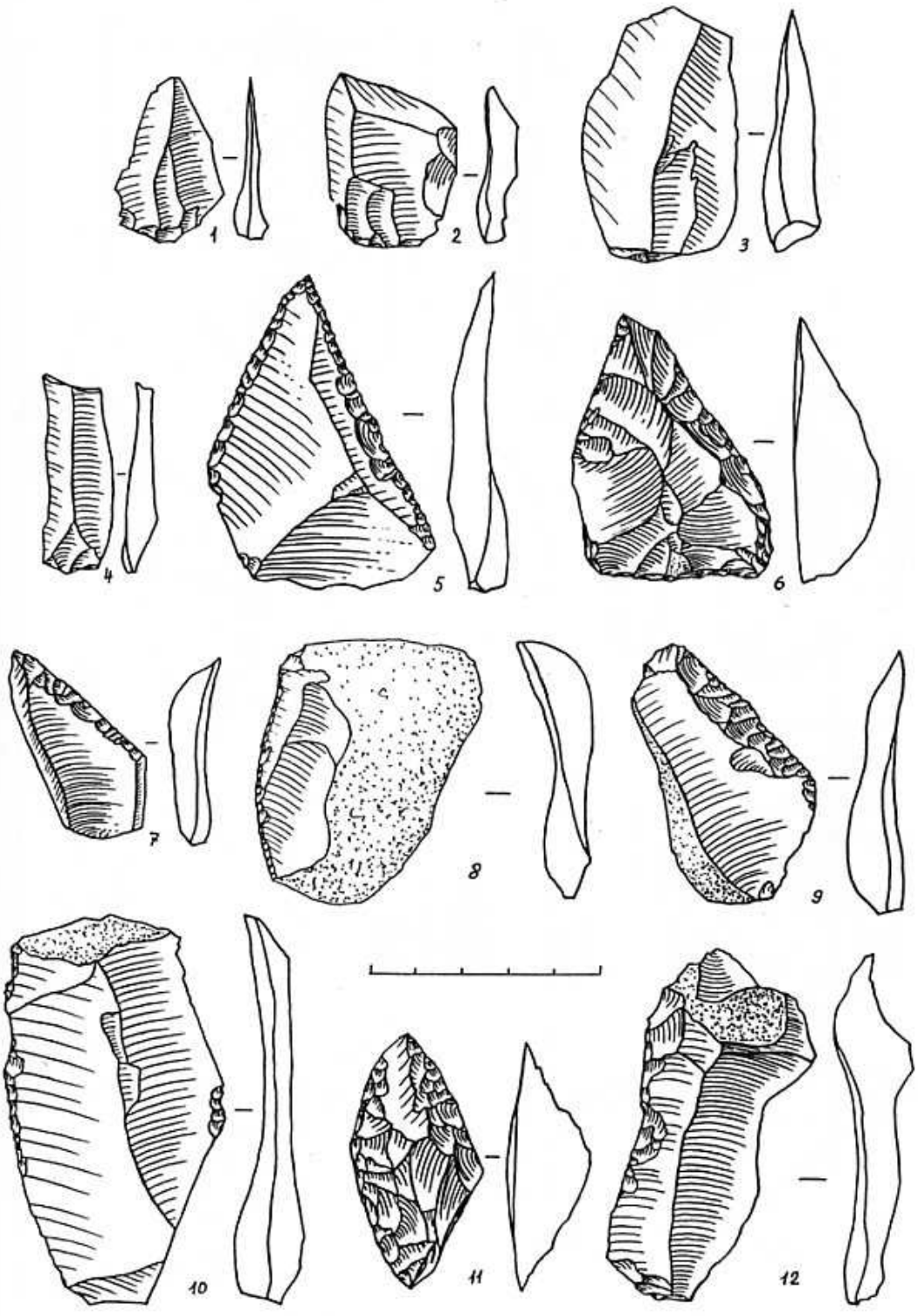

Fig. 3. Nosovo I. Types of flake blanks and tools made on these blanks: 1-3 -Levallois flakes; 4 - blade; 5-12 - ordinary flakes (5 - point, 6 - canted sidescraper, 7, 9 - diagonal sidescrapers, 8, 12 - simple sidescrapers, 10 - retouched flake, 11 - fragment of limace).

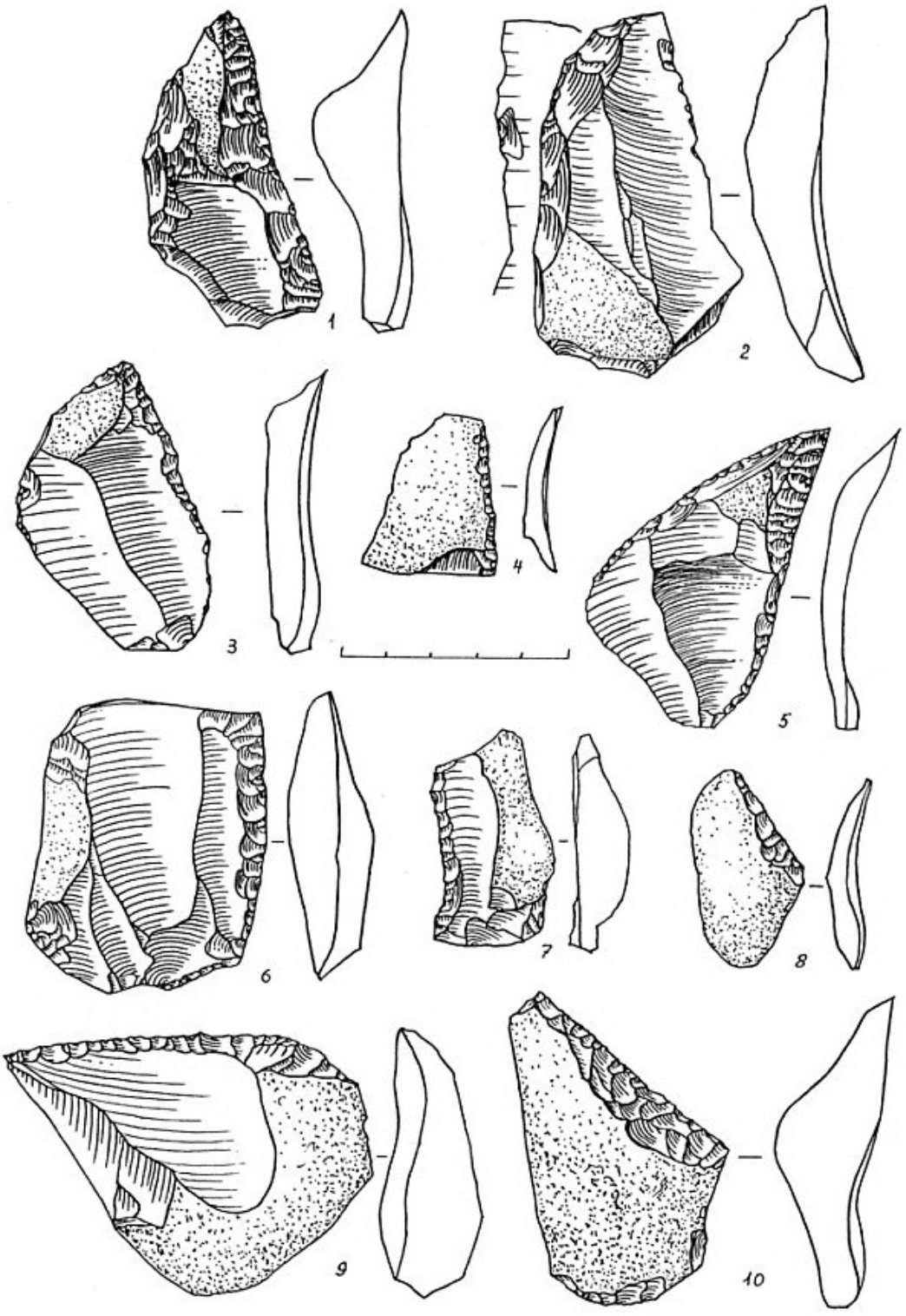

Fig. 4. Nosovo I. Types of flake-blanks and tools: 1-3, 5-7, 9 - ordinal flakes (1-3 - segment-shaped backed knives, 5 - canted sidescraper, 6-7 - simple sidescrapers, 9- transversal sidescraper); 4, 8, 10 - primary flakes (4 - simple sidescraper; 8-10 - diagonal sidescrapers).

types of flakes	Intact	length. cm					width. cm					thickness cm				
		2-3	3.1-5	5.1-7	7.1-10	>10	1-2	2.1-3	3.1-4	4.1-5	>5	<0.5	0.5-1	1.1-1.5	1.6-2	>2
levalloisian flakes	3		2	1				2	1				2	1		
blades	1		1				1						1			
ordinary flakes	34	3	18	11	2		5	5	17	6	1	2	24	6	2	
massive flakes	1				1						1					1
Core trimming flakes primary	16	6	8	1	1		1	6	3	4	2	1	7	4	2	2
secondary	11		7	4			1	3	4		3		6	2	3	
side unifacial crested blade	5		4	1			1		2	1	1		1	3	1	
backed ordinary flakes	9		6	3				4	4	1			6	3		

Fig. 5. Nosovo I. Measurement of different types of flakes.

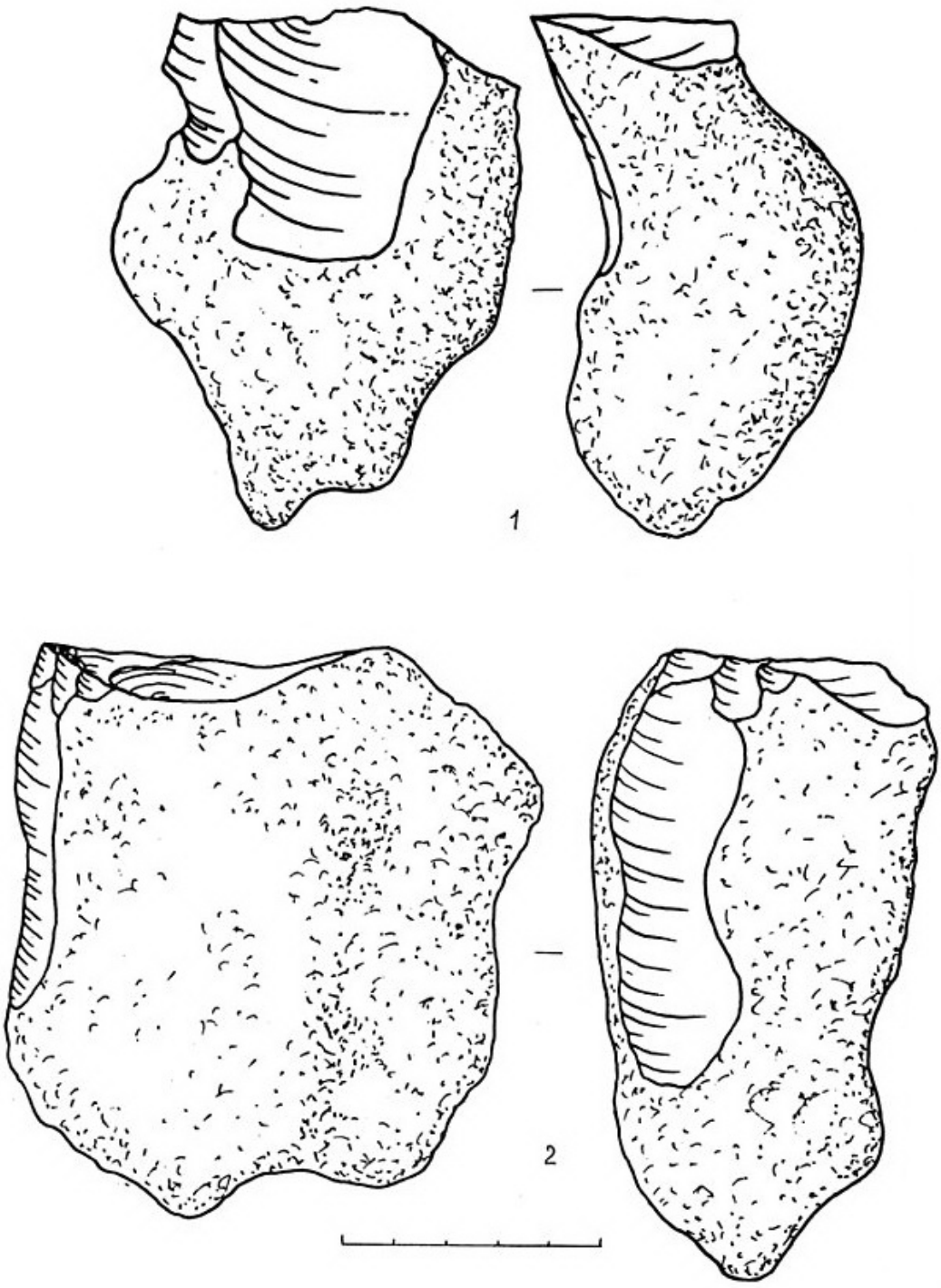

Fig. 6. Nosovo I. Unprepared raw material with primary knapping. Core preforms.

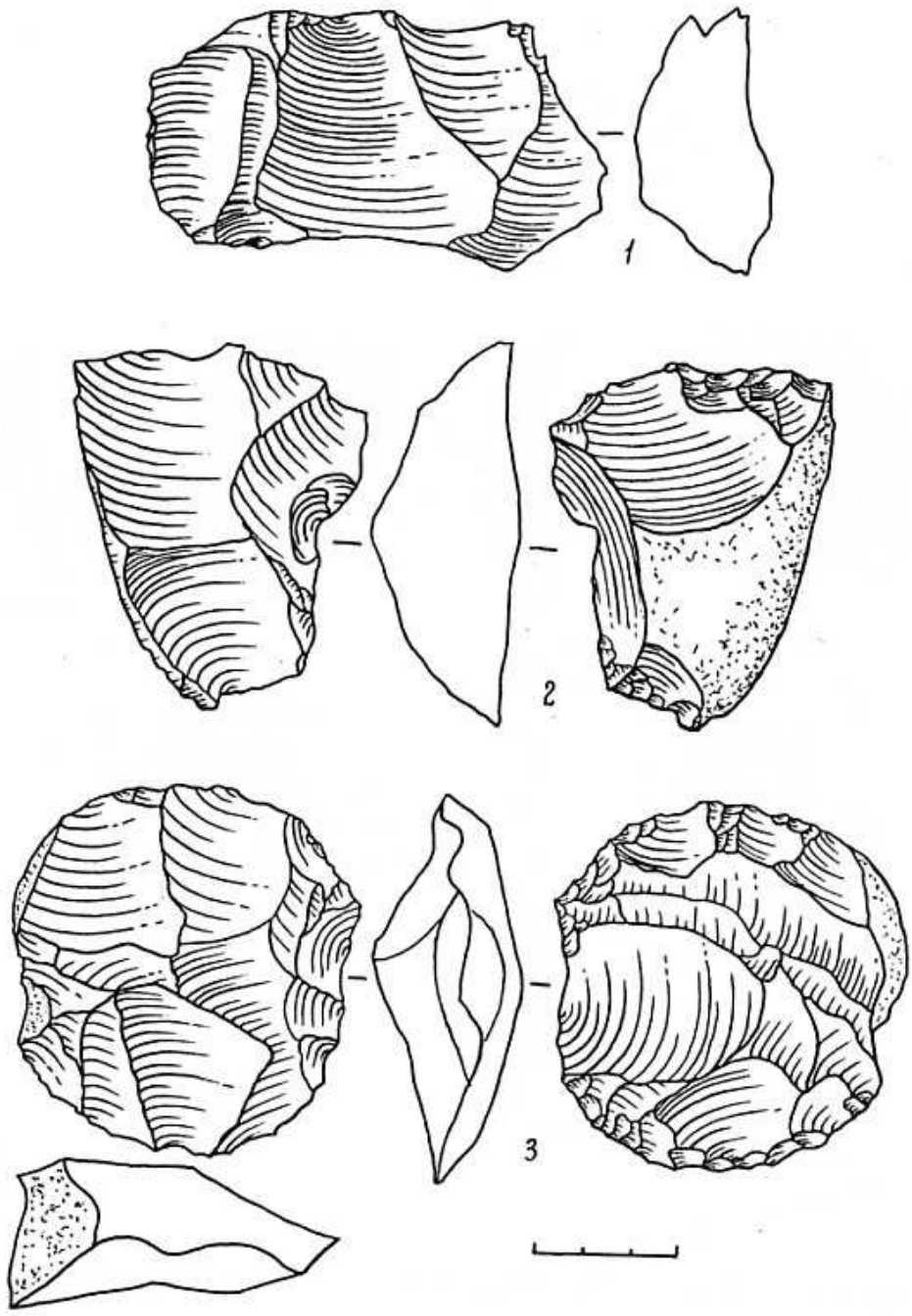

Fig. 7. Nosovo I. Cores with flat flake surface: 1 - bidirectional knapping; 2 - bidirectional knapping and partly convergent knapping; 3 - double/bifacial cores with two flat flake surfaces, one side with bidirectional knapping and the other with parallel knapping (unidirectional).

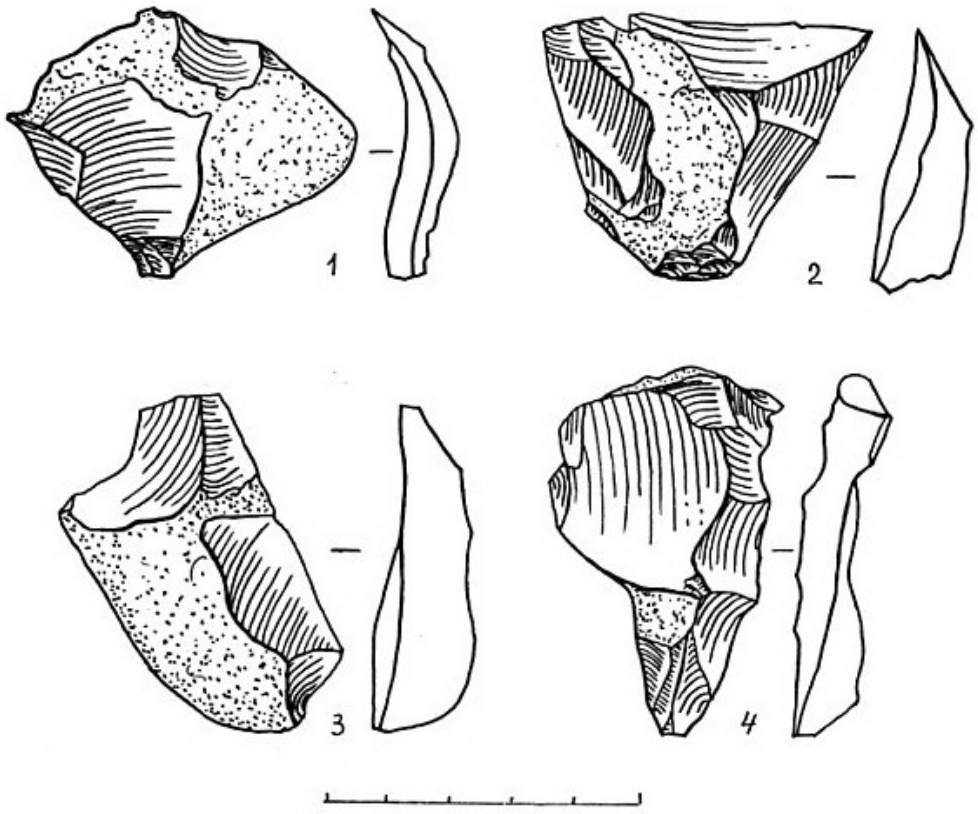

Fig. 8. Nosovo I. Primary core trimming flakes (removing cortex, bumps, irregularities, bruised surfaces, etc.).

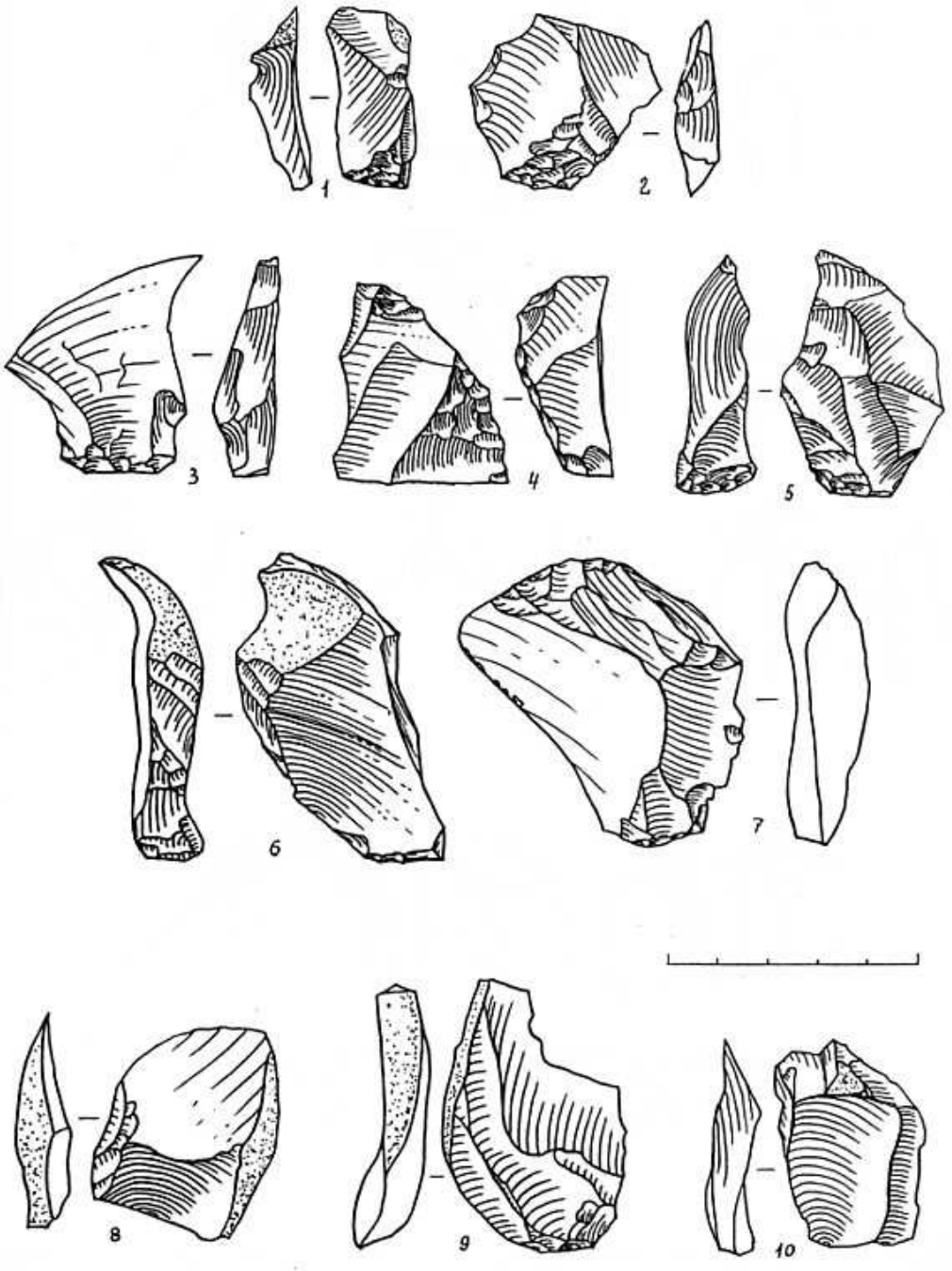

Fig. 9. Nosovo 1. Secondary core trimming flakes (shaping of the convex profile): 1-7 - side unifacial crested blades; 8-10 - backed flakes.

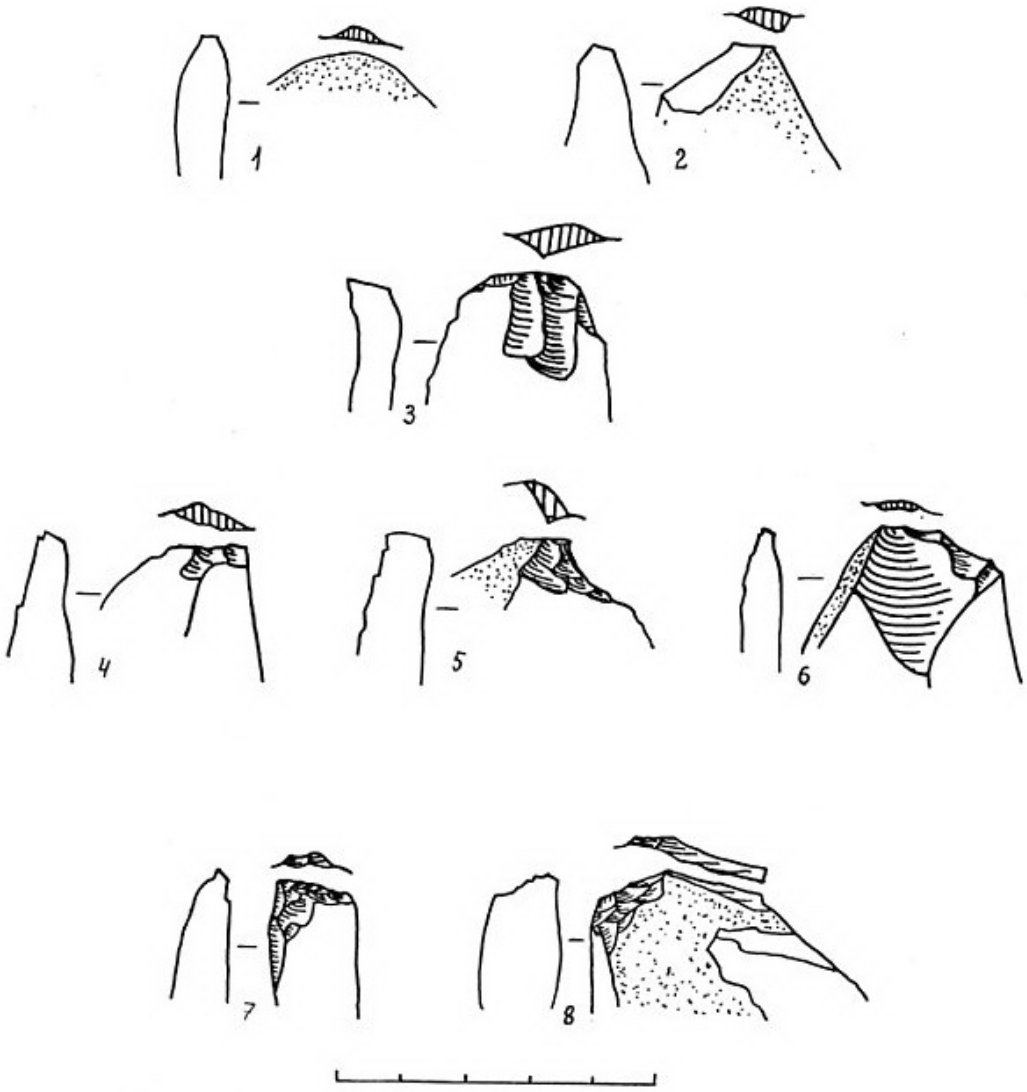

Fig. 10. Nosovo I. Different ways of preparing striking platform and lateral edges of the platform (remnants visible on flakes). 1-6 - striking platform without any additional preparation. Lateral edges of the platform without any additional preparation (1-2), with removal of overhang (3), or deep smoothing of the surface (4-6). 7-8 - bifacial striking platform and lateral edges of the platform prepared by deep smoothing of the surface.

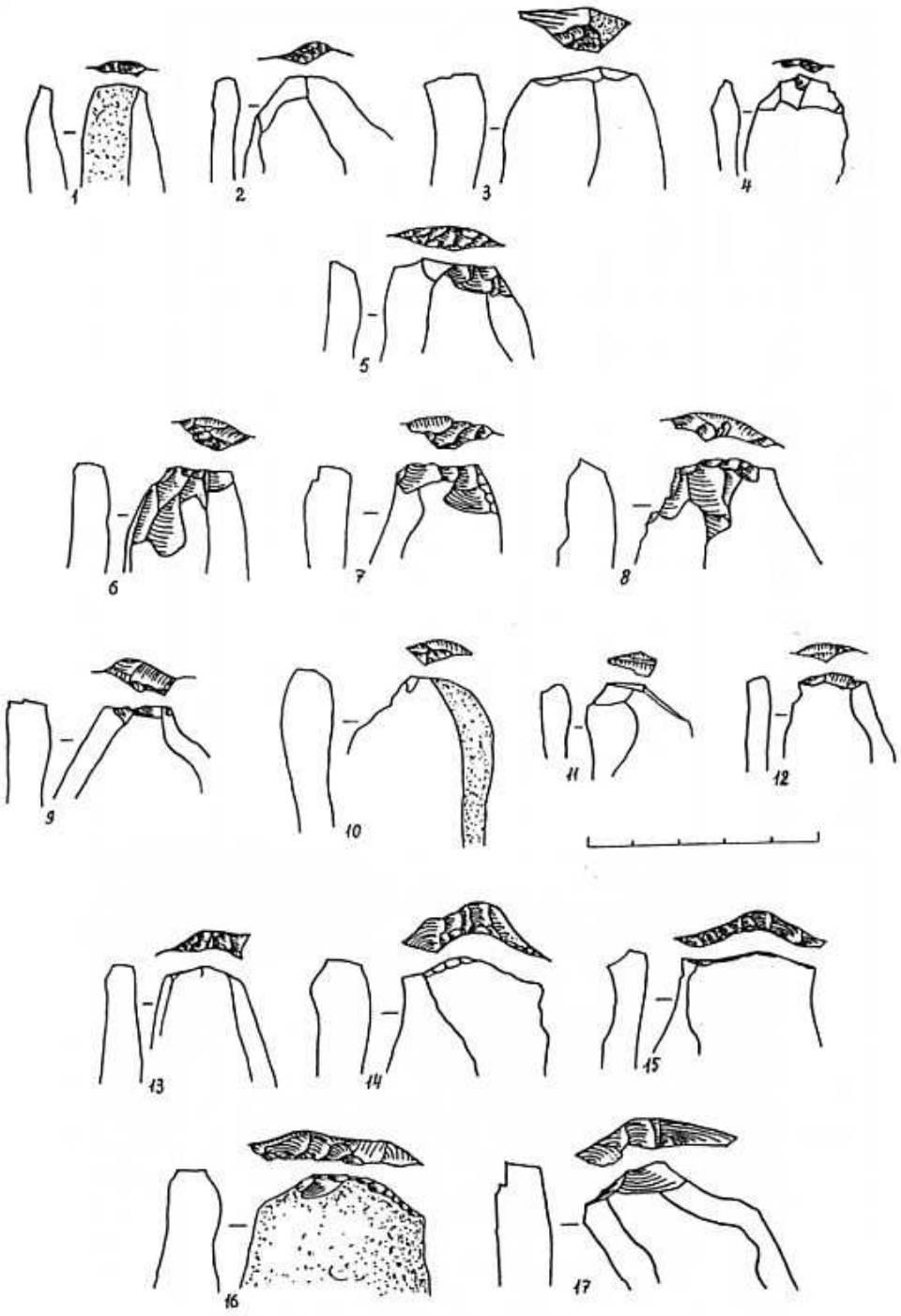

Fig. 11. Nosovo 1. Different ways of preparing striking platform and lateral edges of the platform (remnants visible on flakes). 1-5 - retouched, straight striking platform. Lateral edges of the platform without any additional preparation (trimming) (1-4), or with removal of overhang (5). 6-12 - retouched, straight striking platform (ordinary and longitudinal lengthwise retouch) (6-9) and longitudinal retouch only (10-12). Lateral edges of the platform prepared by removal of overhang (6), deep smoothing of the surface (7-9), or without any additional preparation (10-12). 13-17 - retouched convex striking platform: lateral edges of the platform without any additional preparation (13-15) or prepared by deep smoothing of the surface (16-17).

Types of preparing striking platform (remnants on the flakes)	quantity	Types of preparing non-edge zone of splitting (remnants on the flakes)		
		unprepared	"overhang" removing	deep smoothing of the surface
Cortex	1		1	
Smooth	15	5	4	6
Smooth, small point-shaped	10	7	1	2
Double-facial	6	1	2	3
Retouched	26	12	7	7
Retouched (perpendicular and longitudinal , and only longitudinal)	10	5		5
Retouched convex	10	6	3	1
Totals	78	36	18	24

Fig. 12. Nosovo 1. Correlation of different types of striking platform preparation and lateral edges of the platform.

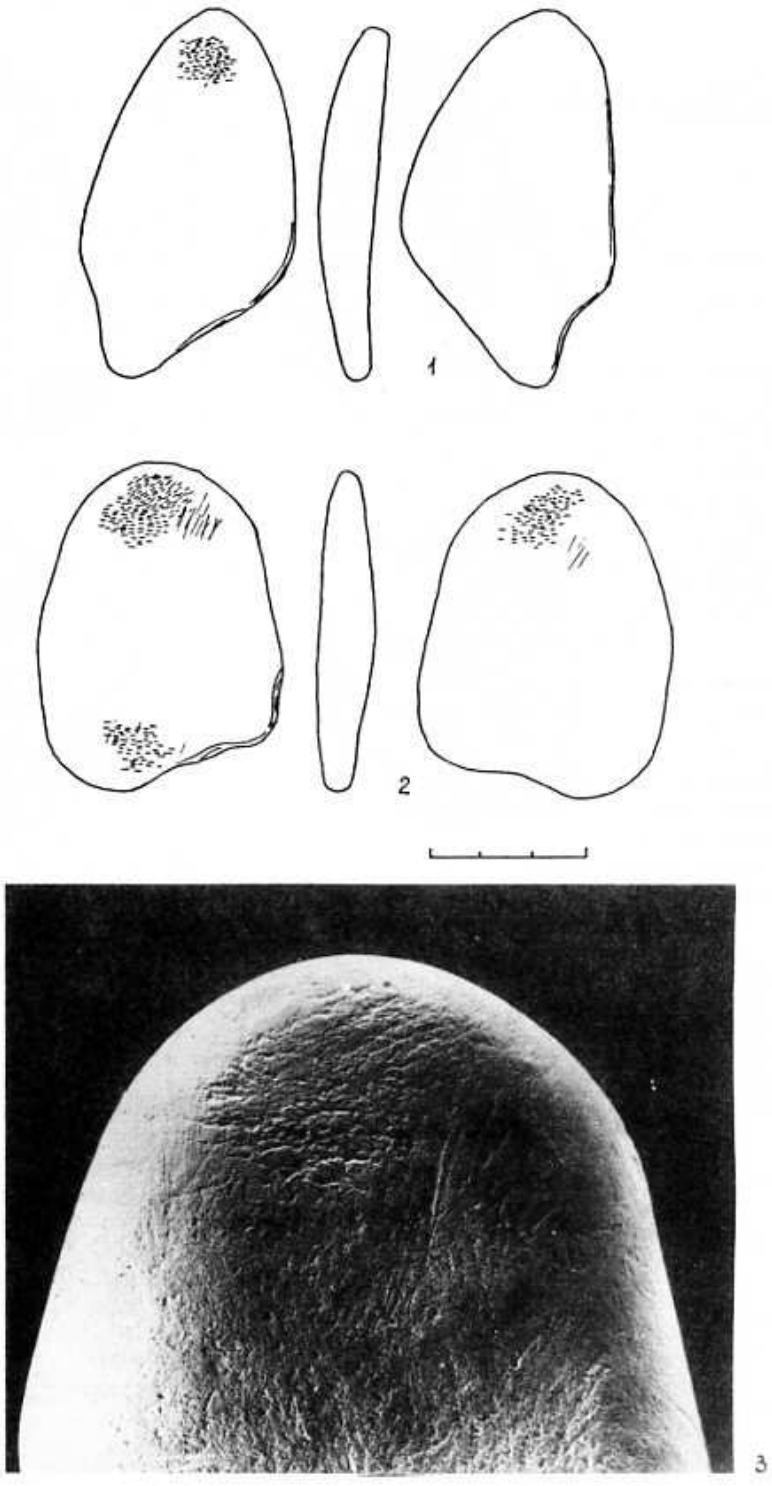

Fig. 13. Nosovo 1. Pressure retouch tools. 1 - pressure retouch tool; 2 - shale pebble; 3 - microphotograph of use-wear traces on tool no. 2.

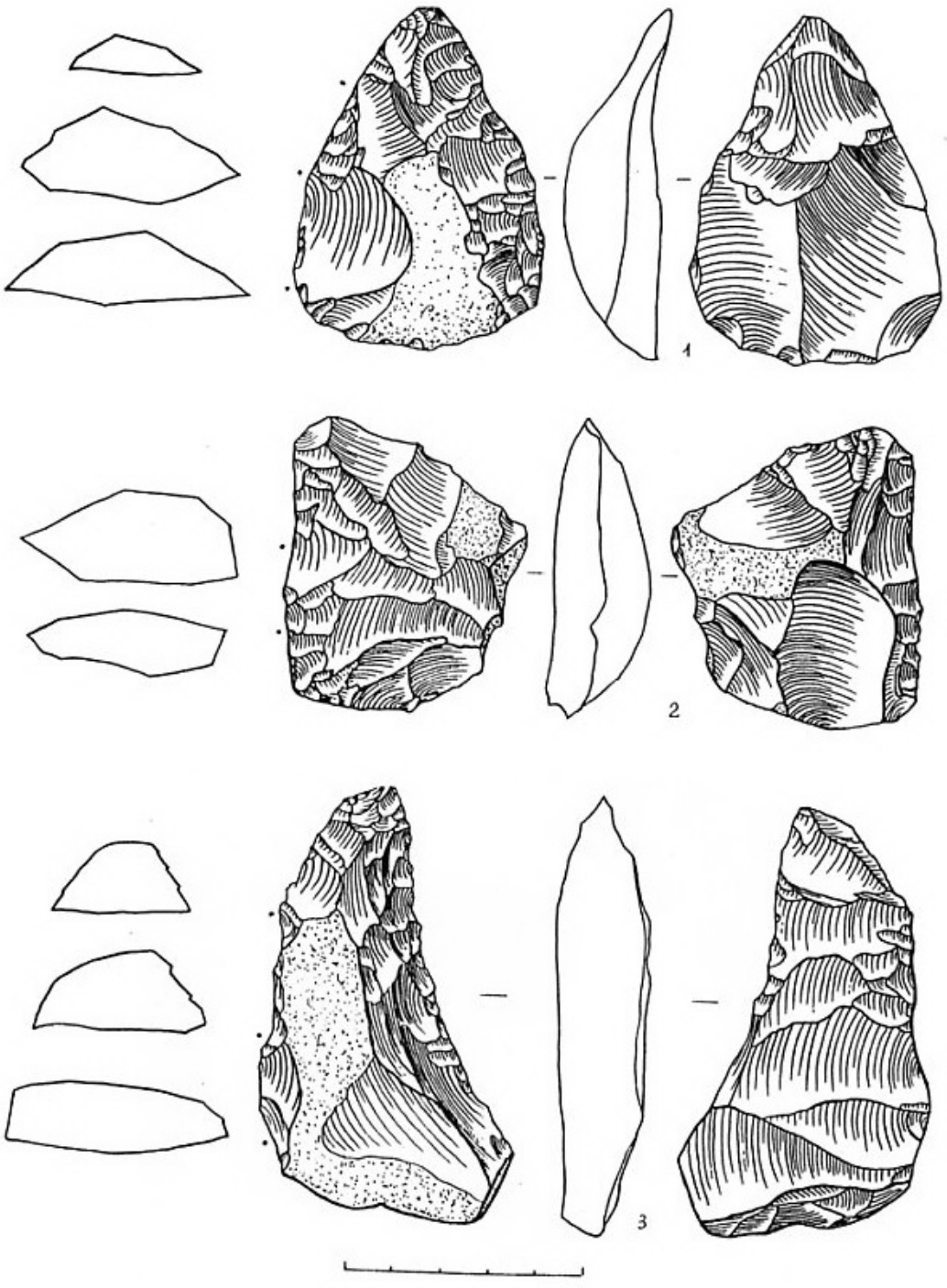

Fig. 14. Nosovo 1. Bifacial tools.