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THE BARMAKY, LEVEL 2 EPIGRAVETTIAN ASSEMBLAGE: THE CORE REDUCTION STRATEGIES

The Barmaky cultural deposits accumulated under the harsh climatic conditions of the periglacial zone at about 19 kyr cal BP. It is difficult to overestimate the meaning of lithic raw material supply as a component of the technological organization of mobility patterns of hunter-gatherer groups. The applied core reduction strategies are an integral part of the technological chain of raw material management. The two discrete core reduction strategies were defined for the flint assemblage of Barmaky, level 2: blade and bladelet / micro-blade. The former is based on the reduction of the sub-, cylindrical and narrow flaking surface cores; the latter is based on the exploitation of the narrow flaking surface cores. The blade cores were the source of lamellar products for the «domestic» toolkit; the bladelet / micro-blade cores reduction aimed at the insets for distant weapons.

Keywords*: mid-Dnieper basin, Epigravettian, core reduction strategies, typological approach, attribute analysis, cores, technological blanks.*

Introduction. After the pioneering work of Georges Laplace, the term Tardigravettian / Epigravettian was widespread in Southern, Central, and Eastern Europe for the definition of the late Last Glacial Maximum industries (Laplace 1964; Вбrta 1967; Desbrosse, Kozłowski 1988). Along with the number of chronological, environmental, and typological features, the technological characteristics play an essential role in the definition of Epigravettian assemblages (Montoya 2004; Bracco, Montoya 2005; Nuzhnyi 2008; Noiret 2009; Tomasso 2014; Lengyel 2016, 2018; Naudinot et al. 2017; Чабай та ін. 2020a; Béres, Demidemko 2021; Lengyel et al. 2021; Djindjian, Yakovlieva 2021; Ruiz-Redondo et al. 2022).

At the same time, except for V. Lozovski and O. Lozovskaya's studies of Mezhyrich lamellar assemblage, the Mid-Dnieper Epigravettian special technological investigations are unknown (Lozovski, Lozovskaya 2014). The Mid-Dnieper Epigravettian assemblages' core reduction is defined as «prismatic». Such a definition was made in the frames of the general emotional characteristic of Epigravettian, as the «impoverished version of Gravettian» (Залізняк 2021, с. 9; Нужний 2015, с. 442). The continuous cores reduction aimed the blades with a straight lateral profile and width range of 9—19 or 12—15 mm was stated for Desna valley Epigravettian and such assemblages as Semenivka 3, Mezhyrich and Dobranichivka (Гаврилов 2016, с. 55; Нужний та ін. 2017, с. 23—24; Shydlovskyi et al. 2022, p. 213). The cores' typological variability and extensive *débitage* studies were left beyond the research procedure. Obviously, such technological studies were difficult to recognize as enough detailed to be the background for further investigations of subsistence strategies of the Epigravettian population on the edge of the Scandinavian Ice Sheet. Thus, the main aim of the proposed paper is the analytical reconstruction of core reduction strategies of Barmaky, level 2 assemblage.

Methods. The proposed studies are based on the investigations of technologically significant attributes of core-like pieces and *débitage*. Such attributes were adopted for the number of Middle and Upper Paleolithic stone assemblages in the Crimea, Portuguese Estremadura, Levant, Romanian Banat, Central Asia, and Altai (Chabai, Demidenko 1998; Demidenko 2012; Almeida 2000; Monigal 2002; Sitlivy et al. 2012; Колобова 2014; Derevianko et al. 2018). The characteristic feature of this approach consists of the analysis of each artifact through the number of attributes, such as conditions, shapes, the axis of detachment, lateral and distal profiles, cross-sections, dorsal scar patterns, cortex placements and percentages of corticated areas, striking platforms characteristics, measurements, as well as the blank dimensions.

The core-like pieces typology is based on V. Gladilin's classification, which gives the possibility for the precise description of core types' variety (Гладилин 1976). The definition of the difference between burin spalls and microblades is one of the vaguest typological research problems (Demidenko, Chabai 2012, p. 269). In present studies, in addition to the attributes proposed by J. Tixier (1974), the burin spalls were defined as the aggregation of the following attributes: the lateral steep or bilateral steep midpoint cross-sections; the oblique, not abraded, untrimmed, finely faceted or plain striking platform.

The ENTRER 4 program and Mitutoyo digital caliper were applied to analyze the proposed attributes.

Raw material characteristics. The extremely rich flint outcrop is situated about 300 m south of the site. The flint nodules originate in the Turonian chalk / marl deposits. The color of flint is intensively grey or black; the cortex is whitish or light grey; the structure is fine-grained. In Prehistoric studies, such kind of raw material is widely known as a high-quality Volhynian flint.

Rounded nodules, plaquettes, and natural flakes represent the shapes of flints in the Barmaky outcrop. Also, the big primary flakes were often used as the blanks for pre-, cores production. Such variability of raw material shapes might be combined into two groups: 1, the plate-like pieces — *plaquettes* with cortex on two opposite surfaces, the natural and primary flakes with cortex on one surface; 2, the rounded nodules. The main characteristic feature of plate-like pieces consists in the width-to-thickness ratios: width several times prevails over thickness. The average thickness of plate-like pieces is rarely exceeding 5 cm. The maximum length and width of *plaquettes* and natural flakes compose up to 20 cm. The maximum dimensions of rounded nodules compose up to 35—40 cm.

Sample. The 152,617 artifacts found in Barmaky, level 2, excavated on 72 m^2 during the 2018—2020 field campaigns (table 1), represent the flint assemblage. Due to the cryoturbation processes and anthropic activity, the level 2 assemblages were subdivided into several horizons and artificial objects (Чабай та ін. 2022). There are no significant differences in raw material exploitation between studied horizons and objects. There are no indications of imported raw materials. The flints covered by patina, as well as artifacts with naturally damaged edges, are solitary. The general structure of artifacts suggests the on-site cores reduction, tools production, use, and rejuvenation under the condition of flint abundance, *id est* the site-workshop model of raw material exploitation was defined (Чабай та ін. 2020b). The toolkits are represented by burins (≈45 %), truncated pieces (≈20 %), and microliths (≈25 %), while the end-scrapers, perforator-borers, pointed blades, raclettes, and composite tools are not numerous. Thus, Barmaky, level 2 supposed to be a reliable source for technological studies.

Hammer-stones. There are two relatively complete hammer-stones: the fragment of sandstone pebble and a flint pebble. In addition, there are small chunks and flakes of sandstone and quartzite: 692 pieces. Such pieces might be the spalls from crashed hammer-stones. It is likely that some of the flint chunks also originated from hammer stones destruction, given that sandstone and / or quartzite pebbles are absent in the local rivers and flaking instruments therefore rare. The deficit of reliable material for hammer-stones is usual for Volhynian Paleolithic sites (Савич 1975, с. 56—99). The source for sandstone / quartzite pebbles is the Sarmatian deposits available on the Volhynian upland.

Chunks. Fragments of raw material without clear traces of flaking represent chunks. Some pieces exhibit a few negatives, which do not show the clear flaking surface or striking platform. About 20 % of chunks are big enough (≥5 cm in *max* dimensions) to be attributed as the reserve of raw material.

Unidentifiable débitage. This category represents the fragments with definite dorsal and ventral surfaces (table 1). The degree of fragmentation disables its precise definition. The relatively high portion of unidentifiable blanks reflects the application of hard hammer percussion and/ or the evidence of intensive trampling. Latter appears to be the evidence of intensive exploitation of the living floor surface.

Chips. The blanks with flake proportions and maximum dimensions ≤15 mm represent the chips (Marks 1976). The chip component in Barmaky, level 2 assemblage composes more than 80 % (table 1). It might be evidence of both intensive raw material reduction and satisfactory preservation of artifacts in cultural deposits.

Core-like pieces. The core-like pieces are subdivided into the pre-cores and cores. Nodules, plaquettes, and big flakes with either formed striking platform (s) or partly shaped flaking surface (s) represent the former. The latter is represented by nodules, plates, and big flakes with a well-shaped striking platform (s) and flaking surface (s) (fig. 1—4). The number of cores is three times bigger than the pre-cores number (tables 1—3). The common feature for all of the core-like pieces is the application of the trimming method of overhang between the striking platform and flaking surface (fig. 1: 1—4; 2; 3: 2; 4: 1, 3).

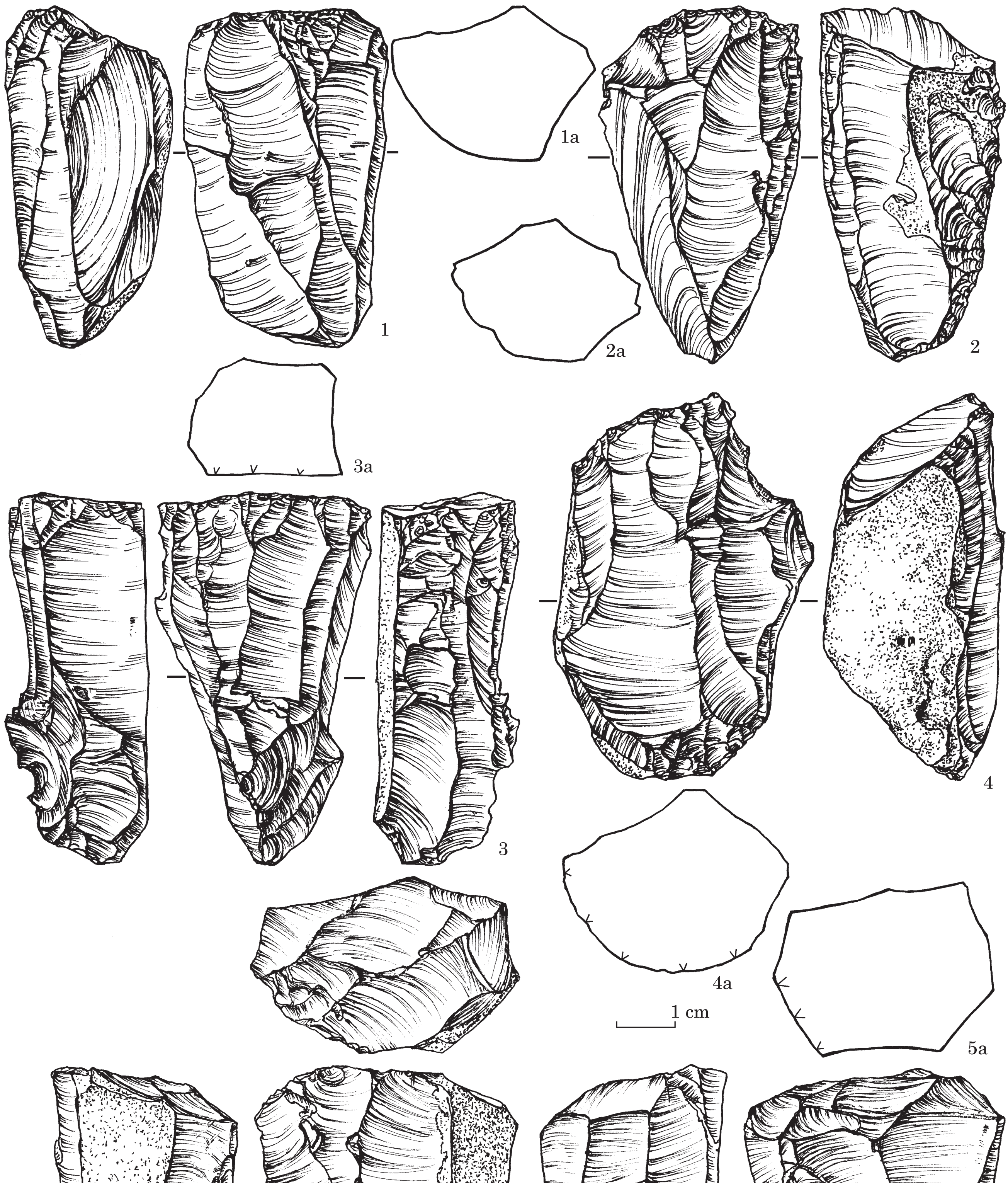


Fig. 1. Barmaky, level 2, the blade (1, 2, 4, 5), and blade / bladelet (3) cores: 1, 4 — unidirectional, sub-cylindrical; 2 — bidirectional-adjacent, sub-cylindrical; 3 — bidirectional, sub-cylindrical / sub-pyramidal; 5 — bidirectional-alternative, sub-cylindrical

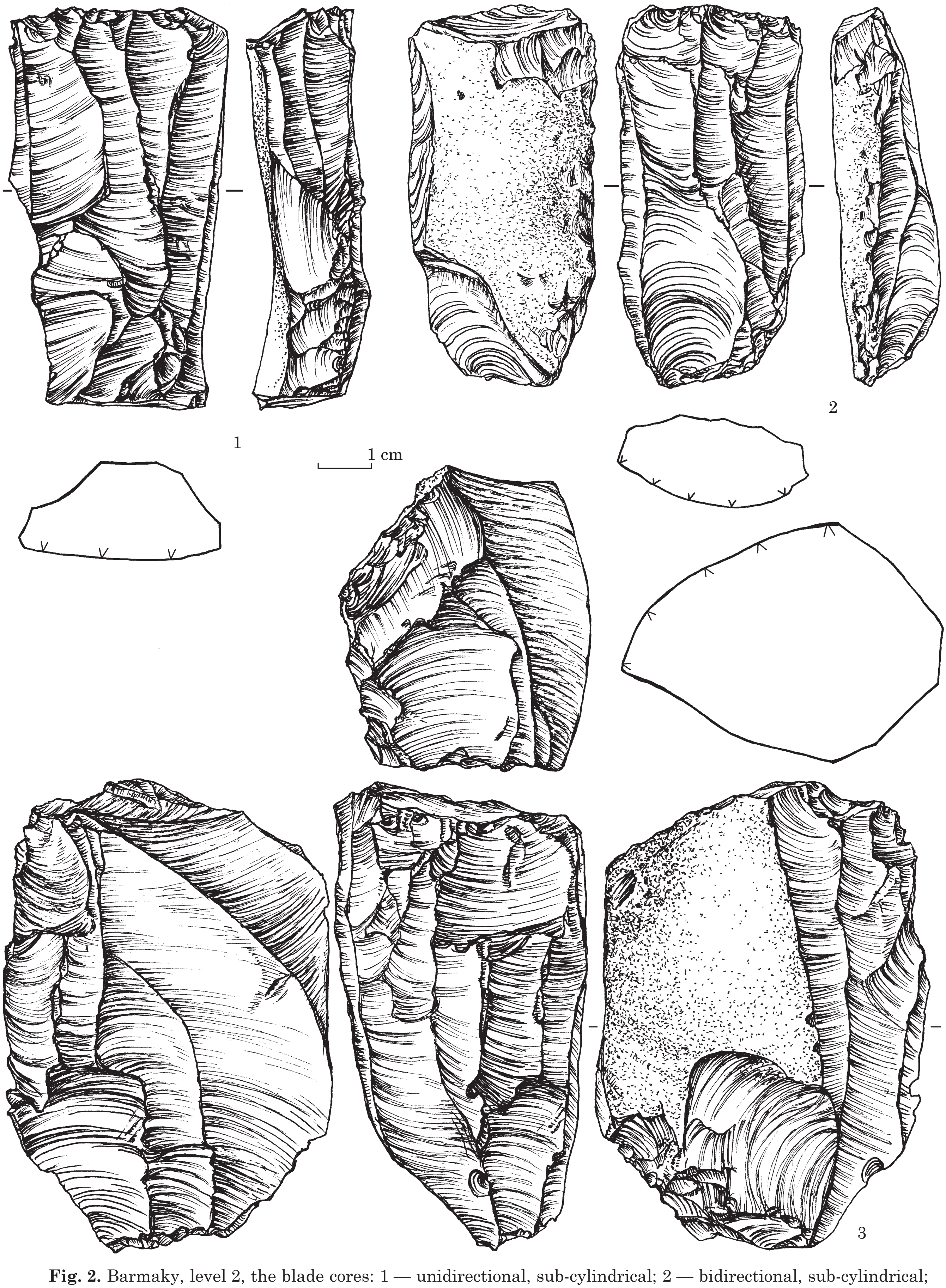


Fig. 2. Barmaky, level 2, the blade cores: 1 — unidirectional, sub-cylindrical; 2 — bidirectional, sub-cylindrical; 3 — bidirectional, narrow flaking surface

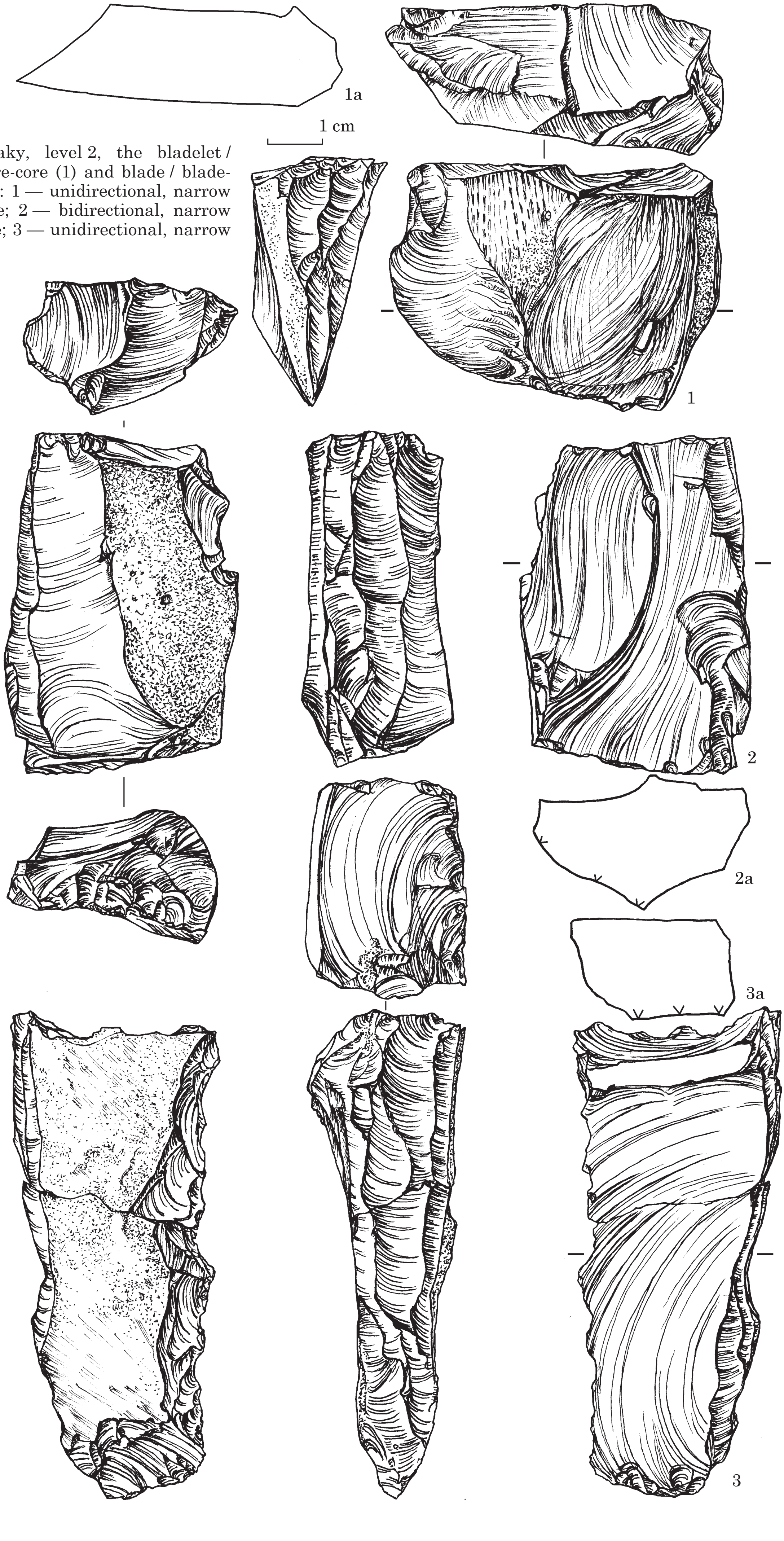
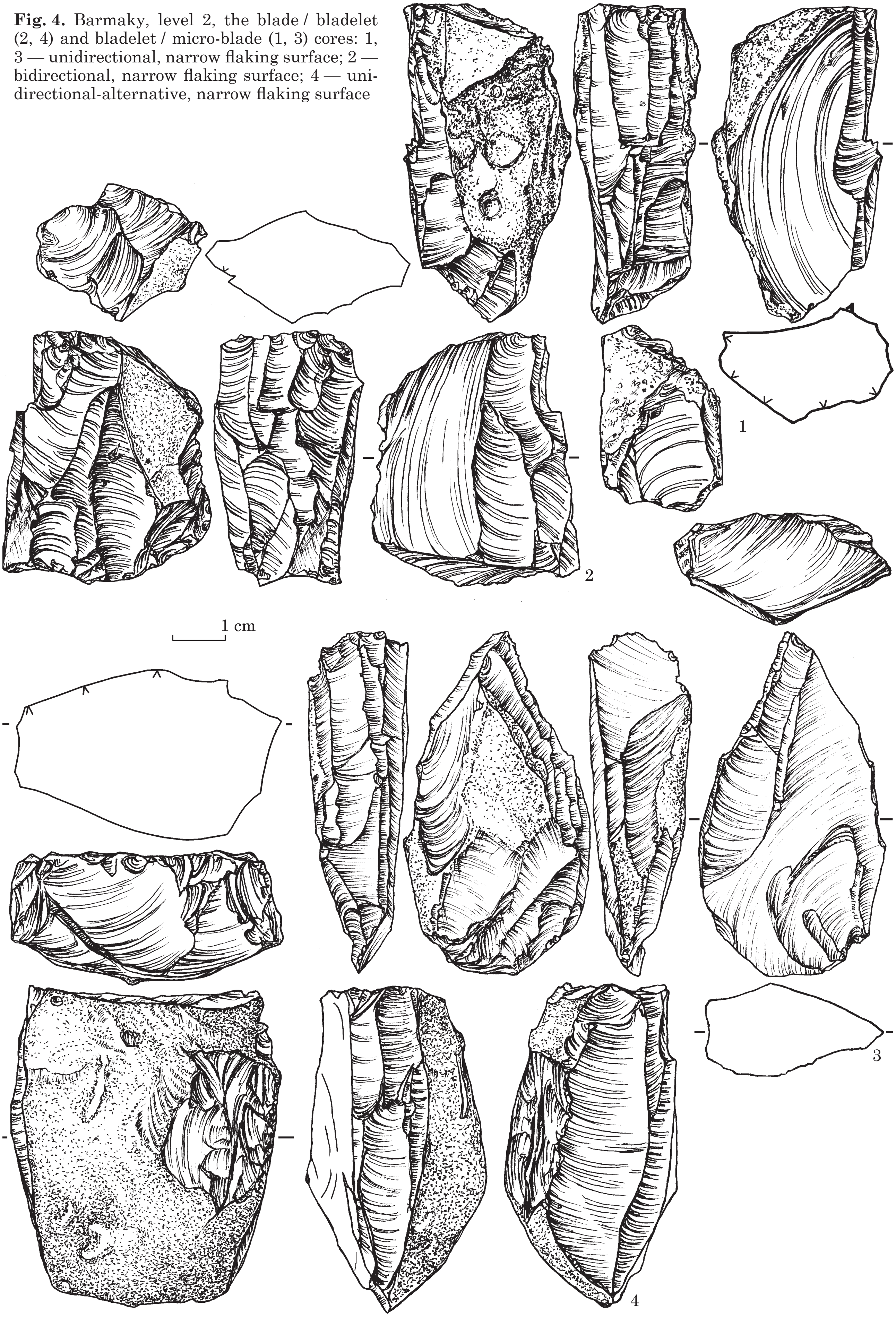


Fig. 3. Barmaky, level 2, the bladelet / micro-blade pre-core (1) and blade / bladelet cores (2, 3): 1 — unidirectional, narrow flaking surface; 2 — bidirectional, narrow flaking surface; 3 — unidirectional, narrow flaking surface

Fig. 4. Barmaky, level 2, the blade / bladelet (2, 4) and bladelet / micro-blade (1, 3) cores: 1, 3 — unidirectional, narrow flaking surface; 2 — bidirectional, narrow flaking surface; 4 — unidirectional-alternative, narrow flaking surface



Based on the width of negatives on the flaking surface (s), the **pre-core assemblage** is subdivided into five main groups. These groups reflect the assumed pre-core function: the flake pre-cores; blade pre-cores; blades / bladelets pre-cores; bladelets / micro-blades pre-cores; and unidentifiable. The flake pre-cores consist of a single fragmented piece.

Five pieces belong to the blade pre-cores. All of them are unidirectional (table 2). Two pre-cores are sub-cylindrical and made of nodules and natural flakes. The latter shows the flaking surface prepared by the lateral crested ridge. The only blade pre-core made on nodule exhibits a narrow flaking surface. Two more blade pre-cores are unidentifiable because of fragmentation. The lengths of blade pre-cores vary from 91.20 to 51.93 mm; the mean length — is 73.21 mm. The width of blade pre-cores varies from 47.55 to 66.42 mm; the thickness variation is 34.03—68.98 mm. The mean dimensions are: length — 73.21 mm; width — 55.26 mm; thickness — 48.06 mm.

The pre-cores for blades / bladelets are the most numerous group (table 2). The unidirectional narrow flaking surface pre-cores are the dominant type of pre-core assemblage. Nearly all of them are made of natural flakes (table 2). Also, the natural flakes are the main initial blank for blade / bladelet pre-cores production. Fifteen items demonstrate the crested preparation of the flaking surface, back, and distal extremity. The size variations are the following: length — from 46.14 to 107.65 mm; width — from 14.29 to 39.76 mm; thickness — from 23.98 to 90.63 mm. The average value of length is 71.08 mm; width — 24.99 mm; thickness — 60.61 mm. The width-to-thickness ratio reflects the dominance of narrow flaking surfaces among the blade / bladelet cores.

Seven pre-cores were made for the purpose of bladelet / micro-blade production. Six of them are unidirectional; one piece — is bidirectional; all of them show a narrow flaking surface (table 2; fig. 3: 1). Four bladelet / micro-blade pre-cores were made on natural flakes; two — on *plaquettes*; one — on flake. The single piece exhibits the crested ridge on the flaking surface. The size variations are the following: length — from 45.39 to 108.04 mm; width — from 12.30 to 25.03 mm; thickness — from 34.58 to 106.90 mm. The mean dimensions are the following: length — 63.78; width — 19.33; thickness — 67.56 mm. The width-to-thickness ratio reflects the dominance of narrow flaking surface pieces.

Table 1. Barmaky, level 2: artifact totals

Artifact categories	Total	%	Esse, %
Pre-cores	43	0.03	0.27
Cores	131	0.09	0.82
Tools	811	0.53	5.07
Flakes	7717	5.06	48.27
Blades	2698	1.77	16.88
Bladelets	2488	1.63	15.56
Micro-blades	1359	0.89	8.50
Burin spalls	667	0.44	4.17
Truncation spalls	73	0.05	0.46
Chips	132553	86.85	—
Unidentifiable debitage	4002	2.62	—
Chunks	75	0.05	—
Total	152617	100.00	100.00

Table 2. Barmaky, level 2: pre-cores

Pre-core types	Plate-like pieces	Rounded nodules	Unknown	Total
Pre-cores for flakes / blades				
Unidirectional, unidentifiable	1	—	—	1
Pre-cores for blades				
Unidirectional, sub-cylindrical	1	1	—	2
Unidirectional, narrow flaking surface	—	1	—	1
Unidirectional, unidentifiable	—	—	2	2
Pre-cores for blades / bladelets				
Unidirectional, sub-cylindrical	—	1	—	1
Unidirectional, narrow flaking surface	10	1	—	11
Bidirectional, narrow flaking surface	4	2	—	6
Unidentifiable, narrow flaking surface	2	—	3	5
Pre-cores for bladelets / micro-blades				
Unidirectional, narrow flaking surface	6	—	—	6
Bidirectional, narrow flaking surface	1	—	—	1
Pre-cores unidentifiable				
Unidirectional, unidentifiable	1	—	3	4
Unidentifiable, narrow flaking surface	1	—	—	1
Unidentifiable	—	1	1	2
Total	27	7	9	43

Table 3. Barmaky, level 2: cores

Core types	Plate-like pieces	Rounded nodules	Unknown	Total	%
Cores for flakes					
Bidirectional, sub-cylindrical	1	—	—	1	0.76
Bidirectional-alternate, sub-cylindrical	—	—	1	1	0.76
Bidirectional-transverse, unidentifiable	—	—	1	1	0.76
Multidirectional-multiplatform, sub-cylindrical	1	—	—	1	0.76
Cores for blades					
Unidirectional, sub-cylindrical	1	4	2	7	5.34
Unidirectional, narrow flaking surface	5	1	3	9	6.87
Unidirectional-alternative, narrow flaking surface	—	—	1	1	0.76
Unidirectional, flattened	—	1	1	2	1.53
Unidirectional, unidentifiable	1	—	1	2	1.53
Bidirectional, sub-cylindrical	1	3	3	7	5.34
Bidirectional-adjacent, sub-cylindrical	—	1	4	5	3.82
Bidirectional-adjacent, combined narrow / flat flaking surfaces	—	—	1	1	0.76
Bidirectional-adjacent, unidentifiable	—	—	1	1	0.76
Bidirectional-alternative, sub-cylindrical	—	—	4	4	3.05
Bidirectional, narrow flaking surface	6	—	—	6	4.58
Bidirectional-bilateral, narrow flaking surface	—	—	1	1	0.76
Bidirectional, unidentifiable	—	—	2	2	1.53
Cores for blades / bladelets					
Unidirectional, sub-cylindrical	1	1	1	3	2.29
Unidirectional, sub-cylindrical / pyramidal	—	—	1	1	0.76
Unidirectional, pyramidal,	—	—	1	1	0.76
Unidirectional, narrow flaking surface	9	—	2	11	8.40
Unidirectional-alternative, narrow flaking surface	2	—	—	2	1.53
Unidirectional-alternative, narrow flaking surface / sub-pyramidal	—	—	1	1	0.76
Unidirectional, combined narrow / flattened flaking surfaces	1	—	—	1	0.76
Unidirectional, combined narrow / flattened flaking surfaces / sub-cylindrical	—	—	1	1	0.76
Unidirectional, combined: narrow flaking surface / sub-cylindrical	—	—	1	1	0.76
Unidirectional, combined narrow / flattened adjacent flaking surfaces	—	1	—	1	0.76
Unidirectional, unidentifiable	—	2	1	3	2.29
Bidirectional, sub-cylindrical	—	1	4	5	3.82
Bidirectional, sub-cylindrical / sub-pyramidal	—	—	1	1	0.76
Bidirectional, cylindrical	—	—	1	1	0.76
Bidirectional-adjacent, sub-cylindrical	—	—	1	1	0.76
Bidirectional-adjacent, combined narrow flaking surface / sub-cylindrical	—	—	1	1	0.76
Bidirectional-alternative, sub-cylindrical	1	—	—	1	0.76
Bidirectional, narrow flaking surface	2	—	1	3	2.29
Bidirectional, combined narrow / flattened flaking surfaces	—	—	1	1	0.76
Bidirectional, combined narrow flaking surface / sub-cylindrical	—	—	1	1	0.76
Perpendicular, combined narrow / flattened flaking surfaces	—	—	—	1	0.76
Perpendicular-adjacent, combined narrow / flattened flaking surfaces	2	—	—	2	1.53
Unsystematic, cubic	—	—	1	1	0.76

End of table 3

Core types	Plate-like pieces	Rounded nodules	Unknown	Total	%
Cores for bladelets / micro-blades					
Unidirectional, narrow flaking surface	4	—	2	6	4.58
Unidirectional-alternative, narrow flaking surfaces	1	—	—	1	0.76
Unidirectional, combined narrow flaking surface / sub-cylindrical	—	—	1	1	0.76
Unidirectional, unidentifiable	—	—	1	1	0.76
Bidirectional, sub-cylindrical	—	—	2	2	1.53
Bidirectional, sub-cylindrical / sub-pyramidal	—	—	1	1	0.76
Bidirectional, cylindrical / pyramidal	—	—	1	1	0.76
Bidirectional-alternate, cylindrical	—	—	1	1	0.76
Bidirectional-alternate, narrow flaking surface	—	—	1	1	0.76
Bidirectional, narrow flaking surface	4	1	—	5	3.82
Bidirectional-bilateral, narrow flaking surface	1	—	1	2	1.53
Multi-platform, narrow flaking surface	3	—	1	4	3.05
Perpendicular-adjacent, combined narrow flaking surface / sub-cylindrical	—	—	1	1	0.76
Cores for micro-blades					
Unidirectional, narrow flaking surface, carinated	1	—	—	1	0.76
Cores unidentifiable					
Unidirectional, unidentifiable	—	—	4	4	3.05
Unidentifiable	—	—	2	2	1.53
Total	49	16	66	131	100.00

In addition, there are seven fragmented pre-cores (table 2). One of them clearly shows the narrow flaking surface. Two flaking surfaces exhibit traces of the crested ridge preparation. There is no sense to mention the dimensions of unidentifiable pre-cores because of fragmentation.

In sum, the preferable blanks for pre-cores were the plate-like primary flakes, natural flakes, and *plaquettes* (fig. 5: 3). These led to the appearance of the narrow flaking surface pieces, which prevail over the pre-cores with the sub-cylindrical flaking surface (fig. 5: 2). The pre-cores reduction presumes the surface / back crested ridge (s) preparation. The single-platform unidirectional items dominate the pre-core assemblage (fig. 5: 1). The narrow flaking surface pre-cores on flakes and *plaquettes* serve for blade / bladelet / micro-blade production, while the sub-cylindrical pre-cores on nodules serve for blade production. The mean values of pre-core sizes are represented by the following numbers: length — 67.98; width — 29.17; thickness — 58.27 (fig. 6: 7—9). The width-to-thickness ratio reflects the orientation of plate-like pieces of raw material towards the narrow surface flaking. In general, 27 of 34 identifiable pre-core blanks belong to the middle-size plate-like, relatively thin forms: *plaquettes*, primary and natural flakes (table 2; fig. 5: 3). The remainders of pre-cores were made on roundish elongated nodules close to the cylindrical shape. The former aimed the bladelet / micro-blade production, while the latter is supposed to be the blanks for blade cores. Thus, the careful selection of the initial blank for core reduction predetermines the further results of the knapping process.

According to the assumed function, six main groups present the **cores' assemblage** (table 3). The most numerous are the cores for blades (36.64 %), cores for blades / bladelets (34.35 %), and cores for bladelets / micro-blades (20.61 %). These groups consist of types' variety that reflects the number of orientations, arrangements, and shapes of the flaking surfaces and striking platforms. Such variety was not initially intentional. The cores types' variety reflects the necessity to solve the numerous unexpected problems during the process of cores reduction.

Nearly equal numbers represent the unidirectional and bidirectional cores for blades: 21 and 27 pieces, respectively (table 3; fig. 5: 4). The bidirectional blade cores show the clear difference between striking platforms: the main striking platform is arranged at the nearly right angle to the flaking surface, while the opposite supplementary platform is arranged at a very sharp angle toward the flaking surface (fig. 1: 2; 2: 2, 3). In addition, the main striking platforms are much wider and thicker than supplementary platforms

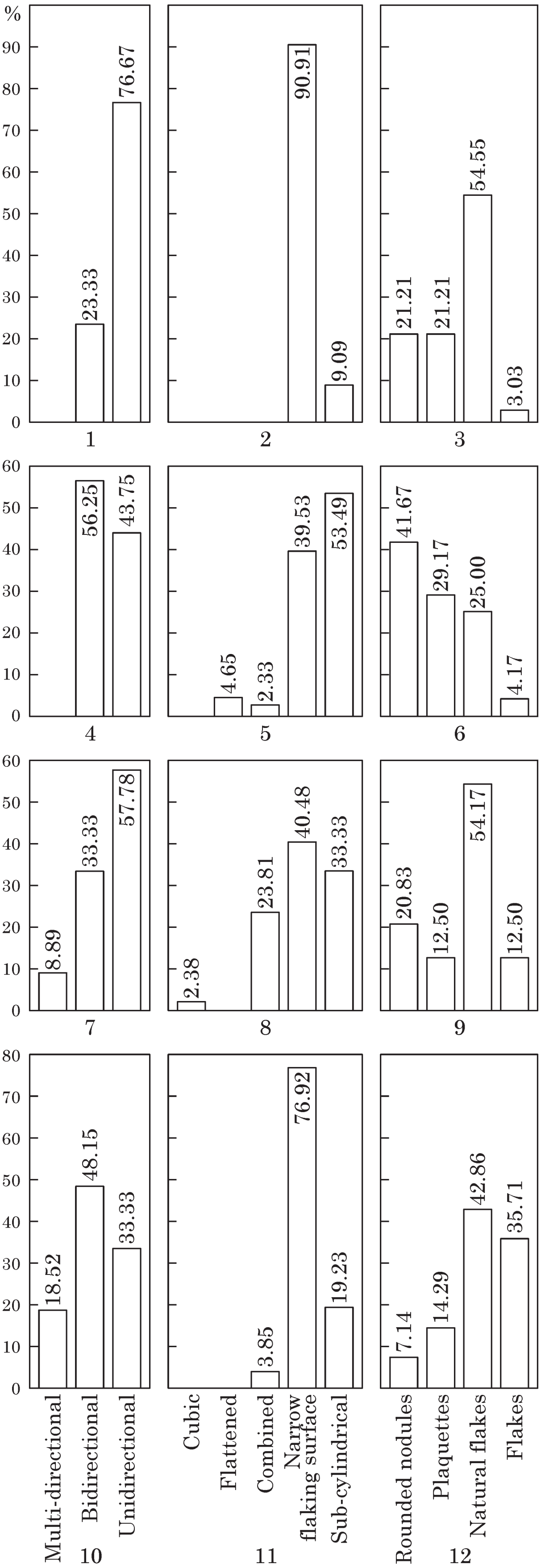


Fig. 5. Barmaky, level 2, the attributes of core-like pieces: 1—3 — lamellar pre-cores; 4—6 — blade cores; 7—9 — blade / bladelet cores; 10—12 — bladelet / micro-blade cores

(fig. 1: 5). About half of the bidirectional cores are represented by two adjacent or alternative flaking surfaces (fig. 1: 2, 5). The «real» bidirectional cores with alternating negatives on a single flaking surface are known, as well (fig. 2: 2, 3). The shapes of flaking surfaces are mainly represented by sub-cylindrical and narrow flaking surfaces (table 3; fig. 1; 2; 5: 5). Most blade cores were made on rounded nodules (fig. 1: 4). Also, the *plaquettes*, natural flakes, and flakes were used as blanks for blade cores production (table 3; fig. 5: 6). The metric ranges of blade cores are the following: length — from 47.16 to 91.80 mm; width — from 24.76 to 69.25 mm; thickness — from 17.28 to 83.43 mm. The mean blade cores dimensions are the following: length — 65.37 mm; width — 39.44 mm; thickness — 40.19 mm.

The unidirectional types (26 items) are the most numerous blade / bladelet cores, followed by bidirectional (15 items), and multi-platform (4 items) types (table 3; fig. 1: 3; 3: 2; 4: 2, 4; 5: 7). Two third of blade / bladelet cores are represented by sub-, cylindrical / pyramidal, and narrow flaking surfaces (fig. 1: 3). A combination of adjacent narrow and flattened / sub-cylindrical flaking surfaces and cubic types are not numerous (table 3; fig. 5: 8). More than half of blade / bladelet cores were made on natural flakes (fig. 3: 2; 4: 2, 4; 5: 9). The rounded nodules were used for sub-, cylindrical unidirectional, and bidirectional blade / bladelet cores. The narrow flaking surface blade / bladelet cores were produced on plate-shaped raw material. The values of blade / bladelet cores dimensions are represented by the following ranges: length — from 30.78 to 123.51 mm; width — from 15.83 to 59.29 mm; thickness — from 15.20 to 86.20 mm. The average blade / bladelet core dimensions are represented by the following values: length — 55.30 mm; width — 32.03 mm; thickness — 39.50 mm.

The narrow flaking surface types dominate the bladelet / micro-blade cores assemblage (table 3; fig. 3: 3; 4: 1, 3; 5: 11). Both unidirectional and bidirectional bladelet / micro-blade cores are important (fig. 5: 10). The plate-shaped pieces are the main types of raw material blanks for bladelet / micro-blade cores production (table 3; fig. 3: 3; 4: 1, 3; 5: 12). Some of the narrow flaking surface bladelet / micro-blade cores demonstrate the wedge-shaped working surfaces (fig. 3: 3; 4: 3). Along with the bladelet / micro-blade cores with pyramidal / pencil-shaped working surfaces, the wedge-shaped items were recognized as the probable evidence of indirect percussion technology and origin of pressure flaking (Svoboda 1995, p. 651; Нужний 2008, с. 202). The following ranges represent the bladelet / micro-blade cores' dimensions: length — from 36.66 to 123.49 mm; width — from 14.56 to 35.76 mm; thickness — from 14.56 to 35.76 mm. The mean bladelet / micro-blade core dimensions are represented by the following values: length — 55.13 mm; width — 23.17 mm; thickness — 33.83 mm. The average width and thickness values reflect the im-

Table 4. Barmaky, level 2: *débitage* structure including tools

Débitage types	Flakes		Blades		Bladelets		Micro-blades	
	#	%	#	%	#	%	#	%
Regular	5631	71.60	1967	63.43	1838	71.74	1119	76.59
Lateral *débordantes*	435	5.53	227	7.32	184	7.18	155	10.61
Cortical *débordantes*	198	2.52	185	5.97	118	4.61	40	2.74
Natural *débordantes*	137	1.74	142	4.58	134	5.23	46	3.15
Crested	407	5.18	487	15.70	255	9.95	97	6.64
Core tablet	54	0.69	13	0.42	1	0.04	—	—
Kantenabschläge	284	3.61	—	—	—	—	—	—
Primary	639	8.13	80	2.58	32	1.25	4	0.27
Natural	79	1.00	—	—	—	—	—	—
Total	7864	100.00	3101	100.00	2562	100.00	1461	100.00

portance of narrow flaking items in bladelet / micro-blade core assemblage.

In sum, both pre-core and core assemblages are characterized by a relatively significant portion of relatively short (50.00—65.99 mm) pieces (fig. 6: 1, 2, 7). The width and thickness measurements demonstrate the binary distribution of values. The widths of approximately 80 % of cores and pre-cores belong to the 15.00—39.99 mm interval. The second metrical group shows the range of width measurements in 40.00—69.99 mm intervals (fig. 6: 3, 4, 8). The same trend is characteristic of the distribution of length values. About 50 % of pre-cores demonstrate the thickness in 55.00—79.99 mm intervals. Three-quarters of cores are thinner than 49.99 mm (fig. 6: 5, 6, 9). The presented size characteristics suggest the orientation of core reduction strategies toward the production of middle-length and both narrow and relatively wide lamellar products.

Thus, the following characteristic features of the lamellar core-like assemblage were defined.

1. The purposeful selection of plate-shaped pieces of raw material for narrow flaking surface pre-cores and cores production.

2. The purposeful selection of rounded nodules of raw material for sub-, cylindrical pre-cores and cores production.

3. The bladelet / micro-blade production was based on the narrow flaking surface cores reduction; mean cores' measurements — 53.91 × 22.82 × 34.25 mm.

4. The blade production was based on the sub-, cylindrical and narrow flaking surface cores reduction; mean cores' measurements — 65.57 × 40.01 × 41.10 mm.

5. Both core reduction strategies were based on the exploitation of mainly unipolar cores by hard hammer direct percussion from the right-angled striking platform with an application of the overhang trimming procedure.

6. The main reasons for core discard are transverse breakage and hinge fractures on the flaking surface.

7. The main method of cores' flaking surface repair is the detachments from the opposite supplementary platform.

***Débitage*, general characteristics**. Including tools on blanks, the *débitage* assemblage consists of 19,809 pieces. The *débitage* assemblage is represented by the following classes: flakes — 39.70 %; blades — 15.65 %; bladelets — 12.93 %; micro-blades — 7.38 %; burin spalls — 3.37 %; truncation spalls — 0.37 %; unidentifiable — 20.61 %. The proposed core reduction strategies studies are based on the attributes of 14,988 pieces, which are subdivided into flakes, blades, bladelets, and micro-blades. All of the blanks were subdivided into «regular» and technical *débitage*. Technical *débitage* consists of primary pieces, core tablets, crested items, *Kantenabschläge*, and three types of *débordante* blanks (table 4).

The trapezoidal and rectangular pieces detached off-axis prevail among the **«regular» flake** assemblage (fig. 7: 1, 17). More than half of «regular» flakes show differently incurve lateral profiles (fig. 7: 5). About two-thirds of «regular» flakes exhibit the feathering distal extremities (fig. 7: 9). The sum of multiple and trapezoidal cross-sections amount the half of the assemblage (fig. 7: 13). The unidirectional scars dominate the types of dorsal patterns (fig. 8: 1). The lateral and distal cortex placements prevail among the variants of cortex placement. The primary pieces compose 10.41 % of «regular» flakes. The totality of items with cortex on the dorsal surface reaches up to 55 % of «regular» flakes (fig. 8: 5). The flakes' striking platforms are mainly plain, without overhang trimming, and not abraded (fig. 8: 9, 13). The dominating right-angled (73.15 %) and un-lipped (88.25 %) butts correspond with pronounced bulbs (79.21 %). Latter is supposed to be the indication of direct hard hammer percussion (Pelegrin 2000, p. 75—76). The «regular» flakes are short, often transversal, and relatively thin (table 5). Mentioned characteristics suggest the origin of «regular» flakes from the pre-cores and cores shaping and maintenance procedures.

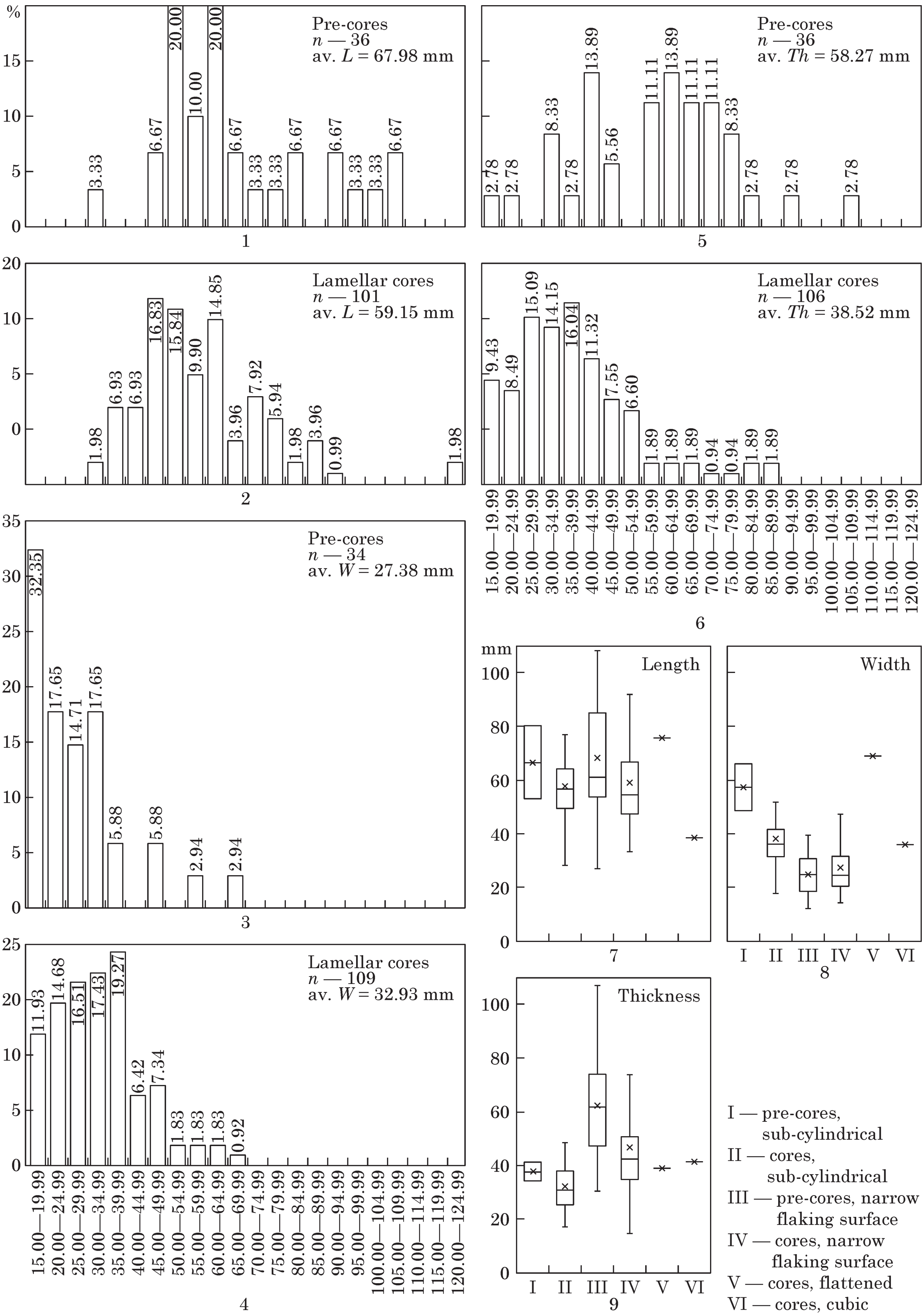


Fig. 6. Barmaky, level 2, the core-like pieces: 1, 2 — length dimensions distributions by metrical intervals; 3, 4 — width dimensions distributions by metrical intervals; 5, 6 — thickness dimensions distributions by metrical intervals; 7—9 — core-like pieces mean values of length, width, and thickness dimensions, by types

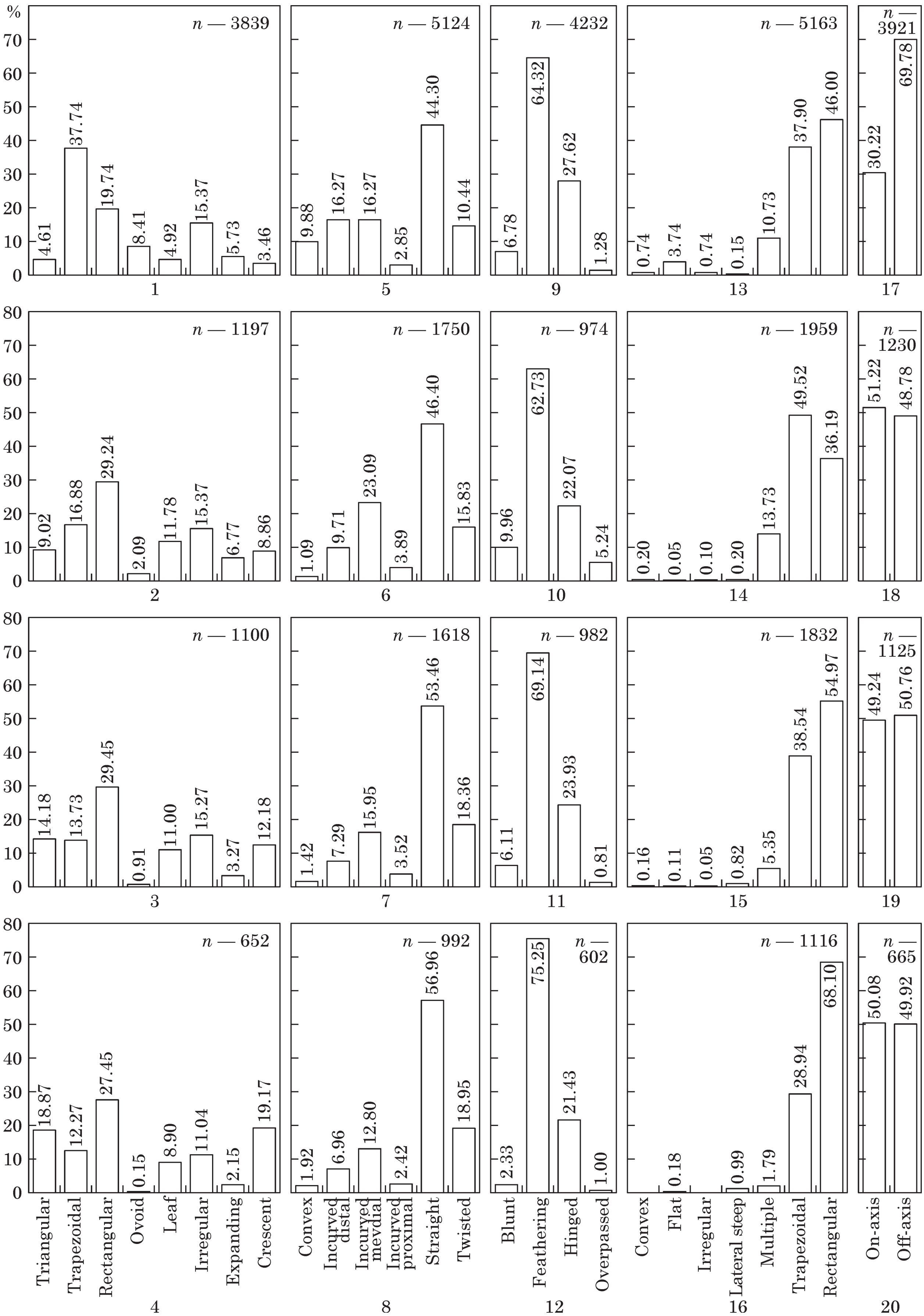


Fig. 7. Barmaky, level 2, the «regular» *débitage* attributes: 1—4 — the shapes; 5—8 — the lateral profiles; 9—12 — the distal end profiles; 13—16 — the cross-sections; 17—20 — the axis (1, 5, 9, 13, 17 — flakes; 2, 6, 10, 14, 18 — blades; 3, 7, 11, 15, 19 — bladelets; 4, 8, 12, 16, 20 — micro-blades)

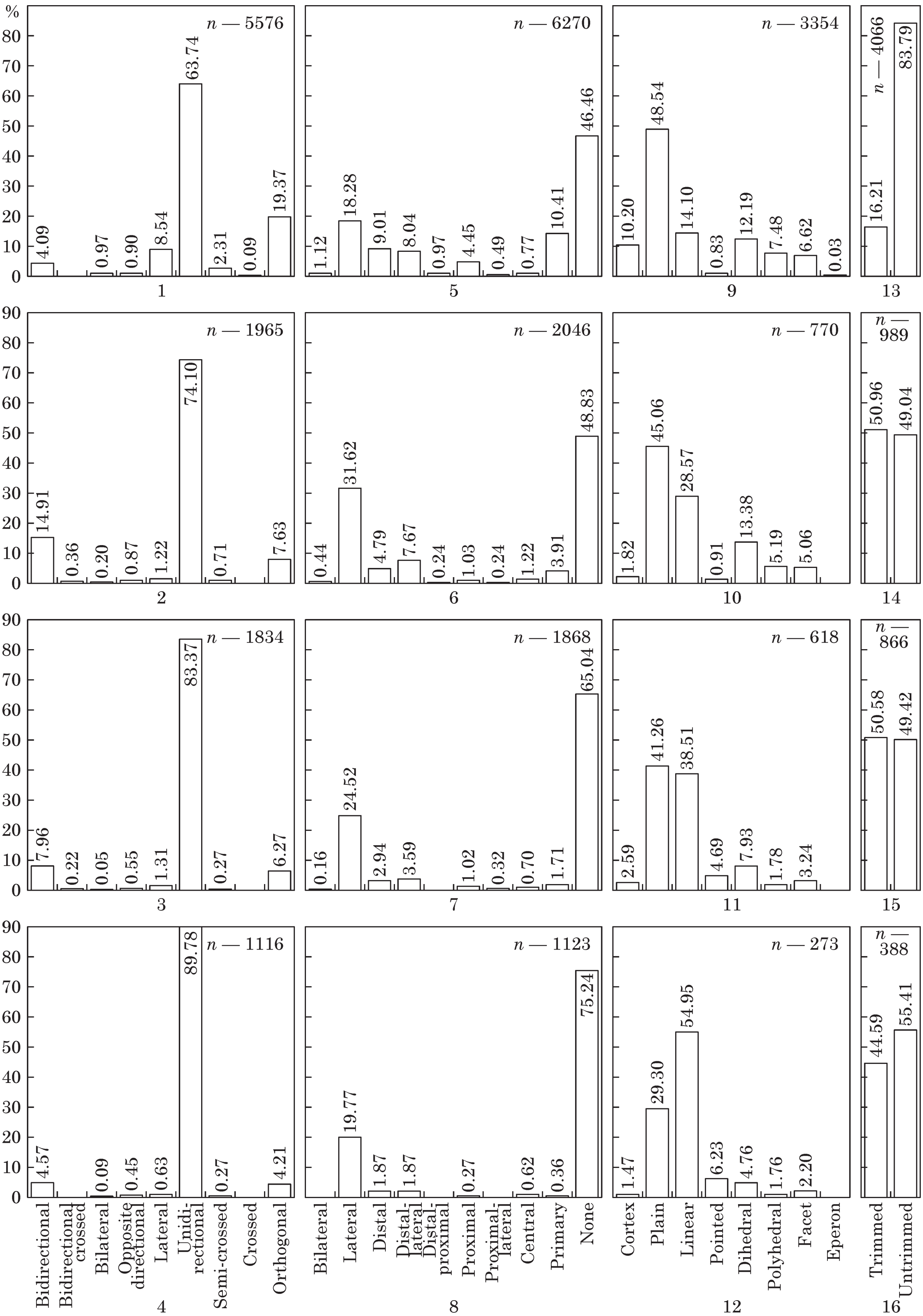


Fig. 8. Barmaky, level 2, the «regular» *débitage* attributes: 1—4 — the dorsal scar pattern types; 5—8 — the variants of cortex arrangement on dorsal surfaces; 9—12 — the striking platform types; 13—16 — the overhang trimming types (1, 5, 9, 13 — flakes; 2, 6, 10, 14 — blades; 3, 7, 11, 15 — bladelets; 4, 8, 12, 16 — micro-blades)

Table 5. Barmaky, level 2, *débitage:* the mean values of measurements including tools, in mm

Débitage types	Length	Width	Width, complete pieces	Thickness	Thickness, complete pieces	Width, platforms	Thickness, platforms
Flakes «regular»	21.19	20.54	21.19	3.57	3.79	10.24	2.91
Blades «regular»	46.80	17.36	18.15	4.65	4.93	7.34	2.36
Bladelets «regular»	25.65	9.21	9.18	2.43	2.31	4.50	1.48
Micro-blades «regular»	18.73	5.54	5.63	1.73	1.63	2.93	1.09
Kantenabschläge	22.64	32.27	32.50	7.67	7.74	14.28	4.90
Flakes primary	25.71	22.45	24.49	4.21	4.92	11.57	3.81
Flakes core-tablet	30.98	31.19	32.65	7.72	8.61	18.25	5.54
Flakes *débordante*	28.79	22.40	23.06	5.14	5.34	10.88	3.60
Blades *débordante*	47.79	17.69	17.84	6.05	6.24	8.09	3.02
Bladelets *débordante*	28.26	9.33	9.46	3.19	3.15	4.76	1.84
Micro-blades *débordante*	20.93	5.36	5.68	2.13	2.16	3.15	1.32
Flakes crested	31.31	24.32	26.03	6.40	6.68	10.32	3.78
Blades crested	55.70	18.69	19.37	7.81	8.32	8.30	3.50
Bladelets crested	31.81	9.49	9.57	4.48	4.33	4.72	2.17
Micro-blades crested	24.70	5.34	5.71	2.77	2.81	3.45	1.34

The **«regular» blades, bladelets, and micro-blades** show more similarities than differences. On the other hand, the lamellar *débitage* is distinct from the «regular» flake assemblage by the number of attributes. Due to the increasing portion of shapes, such as crescent, leaf, rectangular, and triangular, the lamellar blanks look geometrically more regular (fig. 7: 2—4). Moreover, about half of them were detached on-axis (fig. 7: 18—20). Compared with «regular» flakes, the lamellar regular *débitage* shows the more significant component of blanks with straight profiles and feathering distal ends (fig. 7: 6—8, 10—12). The lamellar blanks with unidirectional negatives dominate among the dorsal scars types (fig. 8: 2—4). The percentages of primary lamellar products are insignificant. The pieces with mainly lateral and distal cortex on the dorsal surfaces compose about half of the blades, one-third of bladelets, and a quarter of micro-blades (fig. 8: 6—8). Along with the plain, the linear striking platforms become more important (fig. 8: 10—12). Compared with flakes, the role of overhang trimming increased three times for lamellar pieces (fig. 8: 14—16). At the same time, the values of unlipped (88—95 %), pronounced bulbs (75—81 %), not abraded (96—97 %), and right-angled striking platform (77—85 %) did not change much. The relatively high amount of crushed striking platforms (16—20 % for all types of *débitage*), pronounced bulbs, and un-lipped butts are characteristic of the hard hammer direct percussions.

The mean values of length and width of lamellar *débitage* and lamellar cores are well corresponding (table 5; fig. 6). The elongation indexes for blades, bladelets, and micro-blades compose 2.58, 2.79, and 3.32, accordingly. That is, the «regular» lamellar blanks are both not very long and not very elongated. At the same time, the lamellar pieces are relatively thick; the width-to-thickness ratios for blades, bladelets, and micro-blades compose 3.68, 3.97, and 3.46, accordingly.

In sum, the «regular» lamellar assemblage attributes suggest an application of mainly unipolar, hard-hammer direct detachment, supplemented by overhang trimming to obtain medium size, relatively thick blanks. Compared with «regular» flakes, it is necessary to underline the more careful preparation of striking platforms, the increasing roles of straight profiles, feathering distal ends, and on-axis «regular geometrical shapes» of the lamellar assemblage.

Technological *débitage*. One of the most characteristic features of Barmaky, level 2 *débitage* assemblage is the high percentage of technological blanks: crested pieces, different types of *débordante* blanks, core tablets, *Kantenabschläge,* and primary pieces. In sum, the technological blanks comprise 25—35 % of the different classes of blanks (table 4).

The ***Kantenabschläge*** and **primary** flakes play a significant role in *débitage* assemblage (table 4). The *Kantenabschläge* is the result of the preliminary stage of crested ridges and striking platforms preparation on plate-shaped pieces of raw material (Richter 1997, p. 186—187). The *Kantenabschläge* shows the distally / medially incurved lateral profile, a blunt distal end, which plane is nearly parallel to the plane of the acute striking platform (fig. 9: 13, 15, 16).

The *Kantenabschläge* dorsal surfaces are completely or partially covered by the cortex; the shapes are mainly transversally trapezoidal, detached off-axis. The specific type of *Kantenabschläge* dorsal scar pattern is defined as a transversal crested ridge, perpendicular to the axis of detachment. The *Kantenabschläge* is characterized as the widest and thickest type of *débitage*,

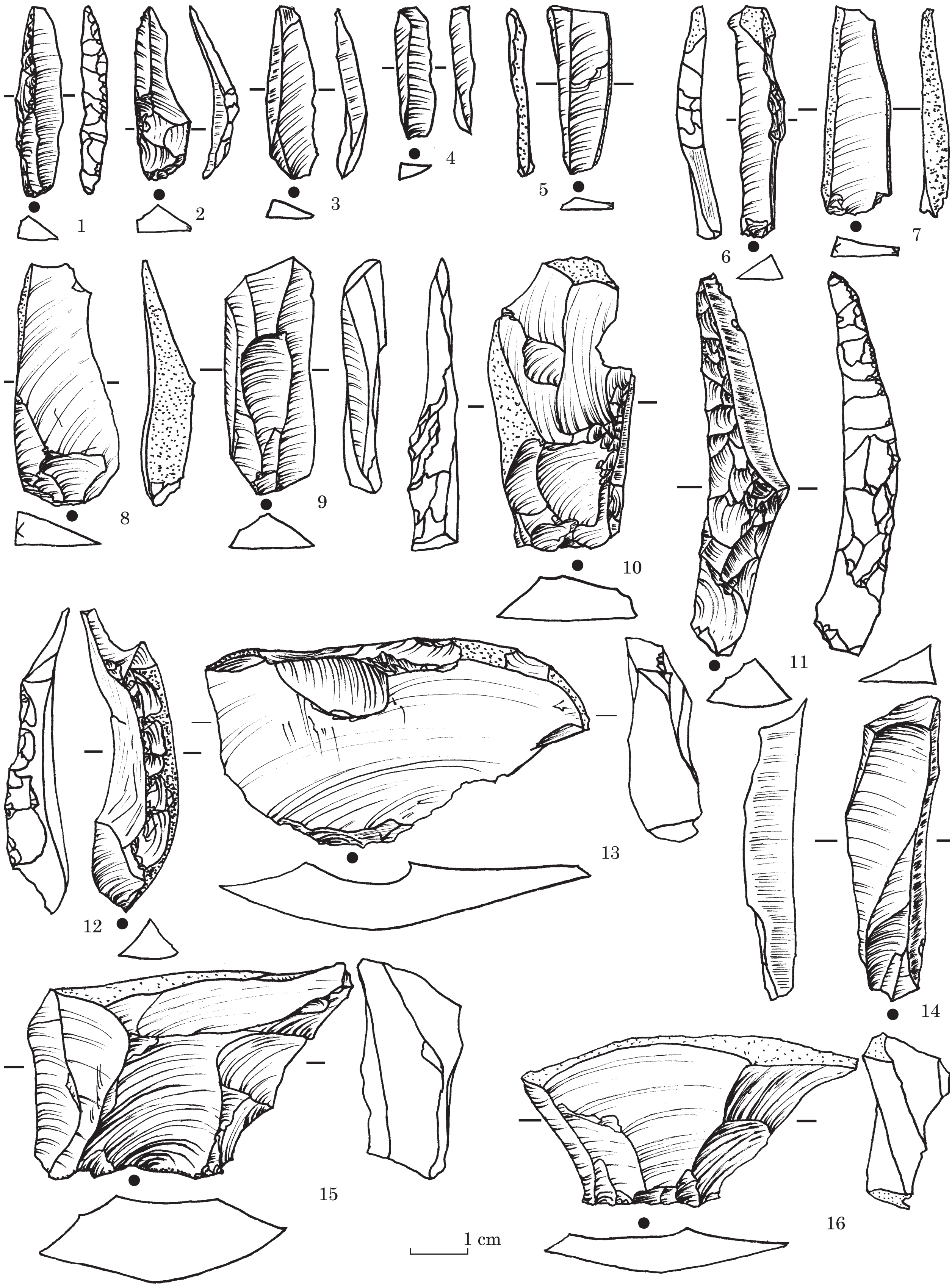


Fig. 9. Barmaky, level 2, the technical *débitage*: 1 — bladelet, crested-unidirectional; 2 — bladelet, crested-unidirectional, on lateral *débordante*; 3 — bladelet on lateral *débordante*; 4 — micro-blade on lateral *débordante*; 5 — bladelet on cortical *débordante*; 6 — bladelet, crested-unidirectional, on natural *débordante*; 7, 8 — blades on cortical *débordante*; 9 — blade on lateral *débordante*; 10 — one-side crested blade on natural *débordante*; 11, 12 — one-side crested blades; 13, 15, 16 — the *Kantenabschläge*; 14 — blade on natural *débordante*

including the platform dimensions (table 5). No specific attributes of primary flakes were recognized. The primary flakes' average dimensions are not sufficiently different from the measurements of «regular» flakes (table 5). The primary pieces with maximum dimensions >50 mm compose only 7.72 % of primary flakes assemblage. It looks like, most numbers of the primary flakes originate from the repeated stages of cores shaping.

Having in mind the number of cores, the number of **core-tablets** is not impressive (table 4). Table 5 represents the average dimensions of core-tablet pieces. The mainly transversal proportions of core-tablet flakes suggest their origin from sub-, cylindrical cores striking platform shaping (table 5). A few flakes and lamellar core-tablets might be associated with narrow flaking surface core striking platforms maintenance.

The ***débordante*** **blanks** are the detachments from the lateral sides of cores. The main attribute of the *débordante* pieces is the lateral steep cross-section (fig. 9: 3—5, 7—9, 14). The «steep» side of the *débordante* piece is arranged at a nearly right angle to the ventral surface (Boëda, Geneste, Meignen 1990). These pieces are also known as «corner» blanks (Giria, Bradley 1998). The main technological reason for *débordante* detachment consists in the creation of the needed transversal convexity of the core flaking surface. Depending on the conditions of the «steep» lateral side the *débordante* pieces were subdivided into cortical — covered by the cortex, natural — exhibiting the natural surface, and lateral — exhibiting the negatives from previous detachments (Derevianko et al. 2018, p. 379). The *débordante* to regular pieces ratios constitute 1 to 7.31 for flakes, 1 to 3.55 for blades, 1 to 4.22 for bladelets, and 1 to 4.41 for micro-blades. Such significant ratios, especially for lamellar items, reflect the big role of *débordante* blanks in narrow flaking surface core reduction.

Half of the *débordante* pieces belong to the lateral type; the other half is equally divided between natural and cortical types (table 4). Except for the declared lateral-steep cross-section and dimensions, the attributes for *débordante* flakes and lamellar pieces are nearly similar to those mentioned for corresponding «regular» types of *débitage*. In fact, in Barmaky, level 2 assemblage the differences between flake and lamellar *débordante* consists in blank proportions, only.

Thus, the *débordante* pieces are a little bit longer and wider, but sufficiently thicker than their «regular» analogs (table 5). The same is true for *débordante* and regular *débitage* striking platforms measurements. In addition, the length / width proportions for *débordante* flakes are bigger than for «regular» flakes. The distribution of length and width values of «regular» and *débordante* lamellar pieces demonstrate different patterns. The plateau pattern characterized the

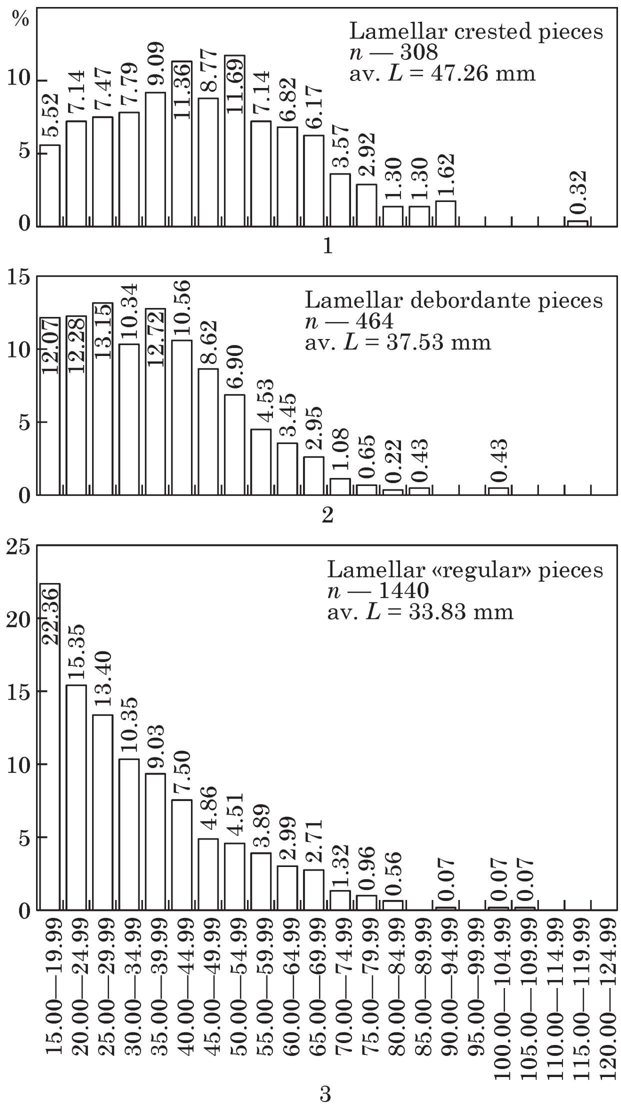


Fig. 10. Barmaky, level 2, the length dimensions distributions by metrical intervals: 1 — the lamellar crested pieces; 2 — the lamellar *débordante* pieces; 3 — the lamellar «regular» pieces

distribution of *débordante* lengths, and «regular» lamellar and *débordante* widths values (fig. 10: 2; 11: 2, 3). The peak pattern is common to the length values of regular lamellar items, as well as thickness values for both *débordante* and «regular» lamellar pieces (fig. 10: 3; 12: 2, 3). The size of the plateau, which reflects the distribution of the *débordante* length values, is composed of about 30 mm (from >15 to 45 mm) and summarized about 70 % of all lamellar *débordante* products. In other words, 70 % of *débordante* are shorter than the mean length of lamellar cores (fig. 6: 2). That is, the efficiency of the *débordante* method of flaking surface maintenance might be evaluated as problematic, but still important.

The plateaus of both *débordante* and regular lamellar width values correspond to the width of bladelet / micro-blade pieces and cover about 60 % of all available lamellar *débordante* (fig. 11: 2, 3). In sum, the plateau of the width of both

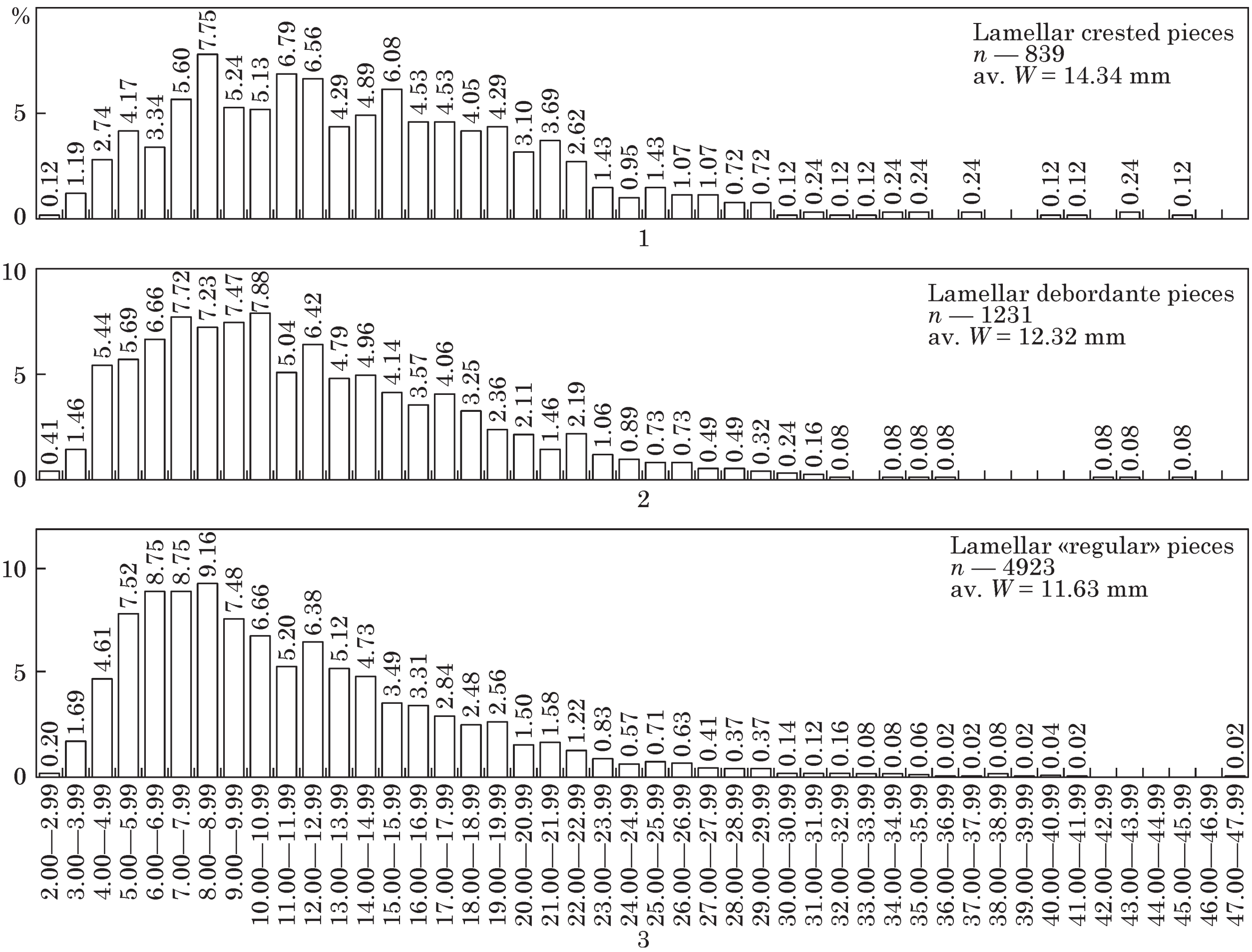


Fig. 11. Barmaky, level 2, the width dimensions distributions by metrical intervals: 1 — the lamellar crested pieces; 2 — the lamellar *débordante* pieces; 3 — the lamellar «regular» pieces

Table 6. Barmaky, level 2: the typological structure of crested pieces including tools

Crested pieces types	Flakes		Blades		Bladelets		Micro-blades	
	#	%	#	%	#	%	#	%
Crested one-side	79	19.41	80	16.46	62	24.22	31	31.96
Crested double-sides	50	12.29	20	4.12	12	4.69	—	—
Crested alternating	6	1.47	12	2.47	7	2.73	1	1.03
Crested unidirectional	163	40.05	182	37.45	100	39.06	40	41.24
Crested bidirectional	13	3.19	54	11.11	22	8.59	2	2.06
Secondary crested unidirectional	86	21.13	112	23.05	43	16.80	22	22.68
Secondary crested bidirectional	10	2.46	26	5.35	10	3.91	1	1.03
Total	407	100.00	486	100.00	256	100.00	97	100.00

débordante and regular lamellar is defined in the 4.00—12.99 mm range and reflects the dominating role of bladelet / micro-blade production. The 1.00—2.99 mm thick pieces compose about half of the lamellar *débordante* and regular *débitage* (fig. 12: 2, 3).

The **crested *débitage*** composes 8.31 % of all identifiable blanks. The crested *débitage* consists of flakes (32.66 %), blades (39.00 %), bladelets (20.55 %), and micro-blades (7.78 %). In general, the attributes for crested flakes and lamellar pieces are nearly similar to those mentioned for corresponding «regular» and *débordante* types of *débitage*. Based on the negative arrangements on dorsal surfaces the crested pieces are subdivided into several types (table 6). These types reflect the crested ridges applications during the primary (one-side, double-sides, alternating) and subsequent (combinations of crested ridges and uni-, bidirectional negatives) stages of pre-cores and cores reductions (fig. 9: 1, 2, 6, 10—12). In total, the pieces of subsequent stages compose 66—76 % of all crested pieces. It suggests the repeated preparation of crested ridges during the

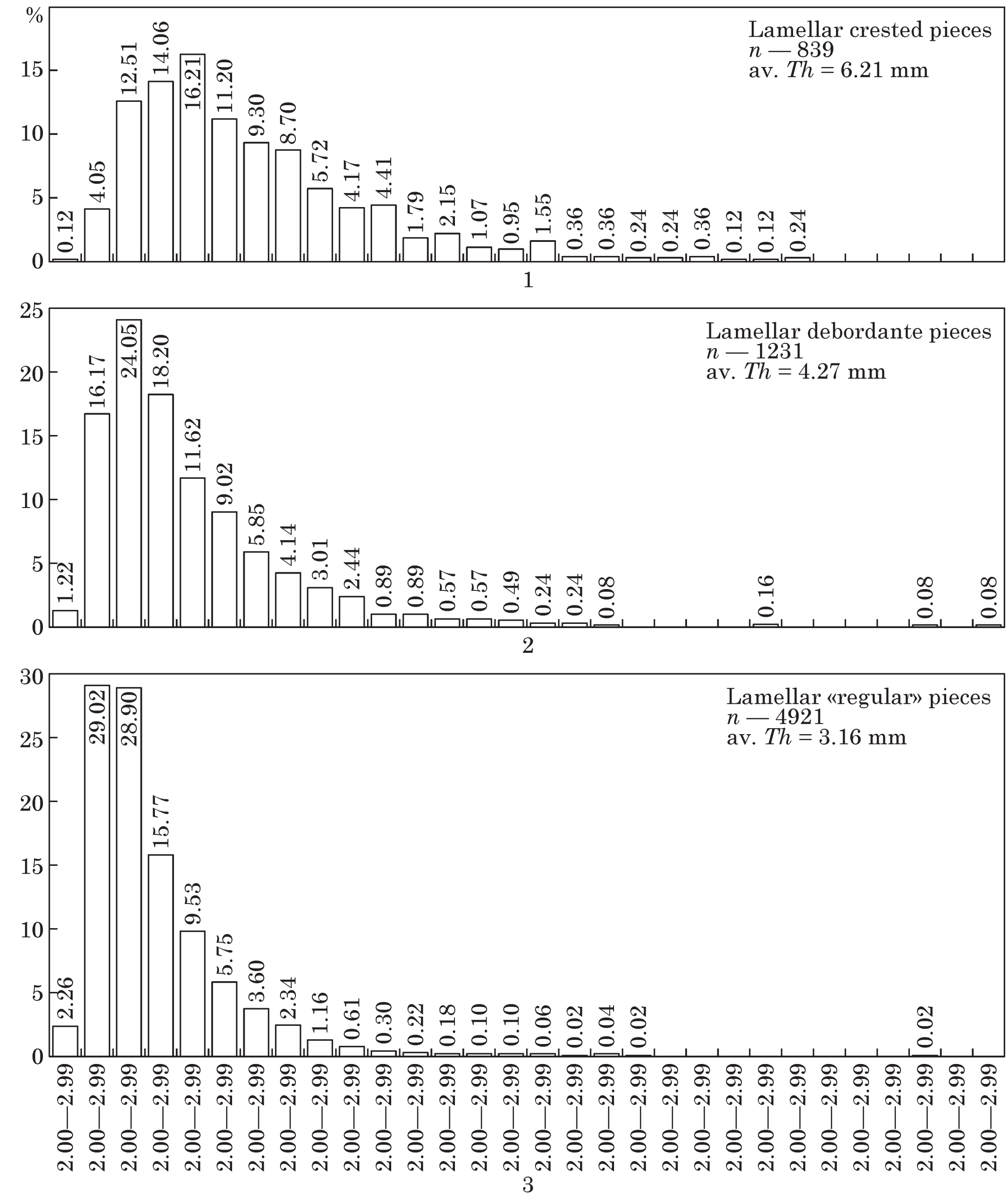


Fig. 12. Barmaky, level 2, the thickness dimensions distributions by metrical intervals: 1 — the lamellar crested pieces; 2 — the lamellar *débordante* pieces; 3 — the lamellar «regular» pieces

whole stage of core exploitation. Relatively often (21.62—34.02 %) the crested ridges were made on *débordante* blanks (fig. 9: 2, 6, 10). The crested flakes, blades, bladelets, and micro-blades are sufficiently longer, wider, and thicker than «regular» and *débordante* analogs (table 5). The pattern of length distribution of the values of crested lamellar pieces is quite different from the same of «regular» and *débordante* lamellar products (fig. 10: 1—3). The plateau of length values of crested lamellar pieces shows nearly equal percentages distribution in the range up to 54.99 mm (fig. 10: 1). The plateau of width values shows a relatively equal distribution of values in the range from 4.00 up to 19.99 mm (fig. 11: 1). The peak-like diagram of thickness values reflects that the crested pieces are thicker than the rest of lamellar items (fig. 12: 1).

Thus, the technical meaning of *débordante* and crested pieces are similar: the construction of working surface transversal convexity by detachments of lateral blanks. The typology and diagrams of length and width values of both *débordante* and crested pieces suggest its detachment during all stages of cores reduction. Also, the presence of *débordante* and «primary» crested bladelets and micro-blades underline the existence of special bladelet / micro-blade pre-cores and cores.

Discussion. Thus, the proposed studies of technologically significant attributes of core-like pieces and *débitage* might be summarized as follows.

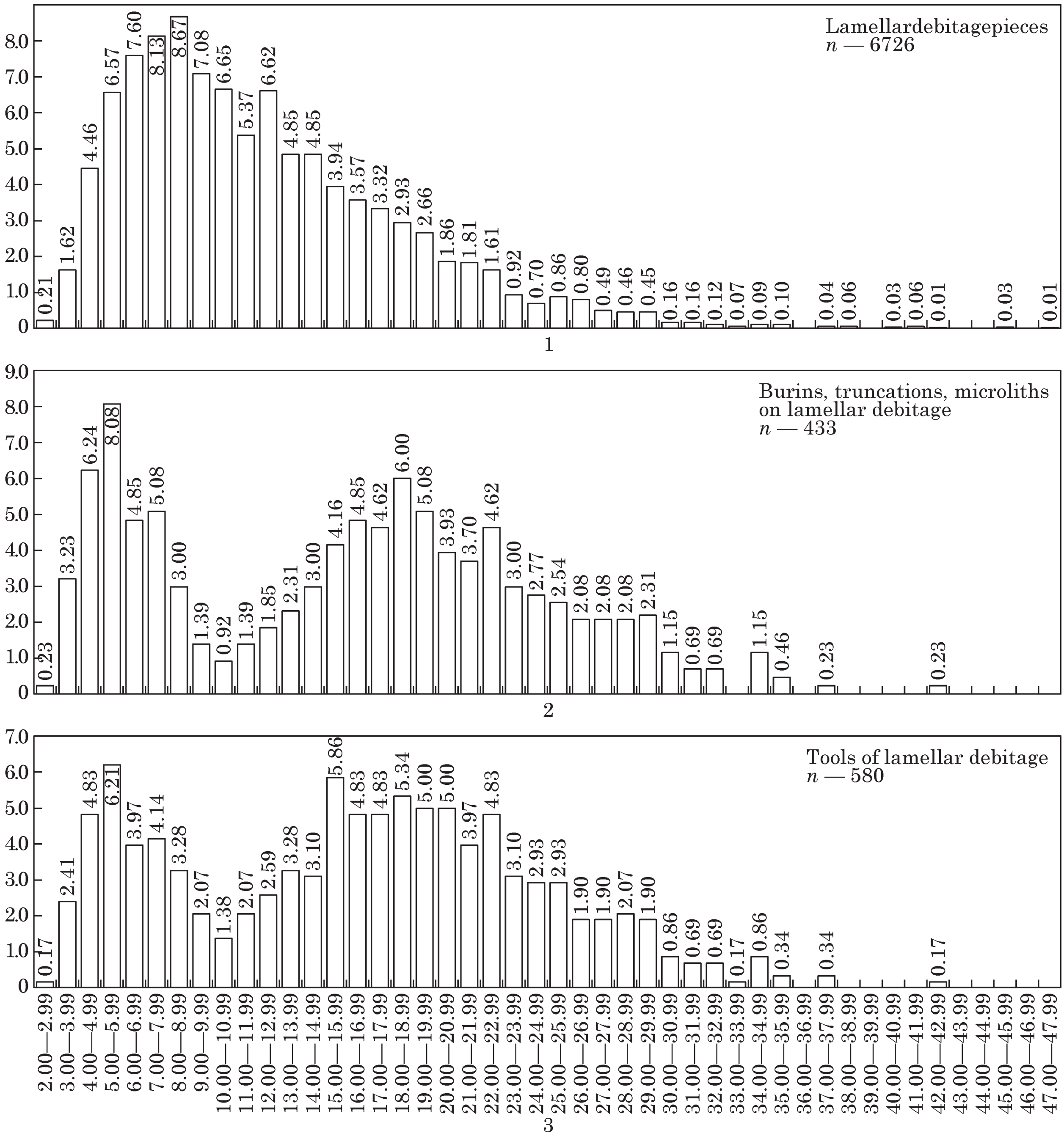


Fig. 13. Barmaky, level 2, the width dimensions distributions by metrical intervals: 1 — the lamellar pieces; 2 — the microliths, burins, and truncated pieces on lamellar *débitage*; 3 — the tools on lamellar *débitage*

1. The pre-cores and cores' typological attributes and measurements suggest the presence of two discrete core reduction strategies: blade and bladelet / micro-blade knapping. The former is based on the exploitation of sub-cylindrical and narrow flaking surface cores. The latter is based on the exploitation of narrow flaking surface cores. Both core reduction strategies are based on the intentional selection of pieces of raw material of different shapes: plate-like (*plaquettes*, natural and primary flakes) pieces for narrow surface flaking cores and rounded nodules for sub-, cylindrical cores. Both core reduction strategies are based on the implication of direct hard hammer percussion.

2. The special methods of flaking surface and striking platforms preparations for blade and bladelet / micro-blade cores were not defined. Unidirectional flaking is the main method of cores reduction. The flaking surface shaping is based on the crested pieces and *débordante* detachments. The striking platforms preparation is based on the extensive use of the overhang trimming method. The isolated striking platforms were not found.

3. The main method of cores' flaking surface repair is the creation of an opposite supplementary platform for the removals from the conjoined or alternate flaking surface. The core exhaustion led

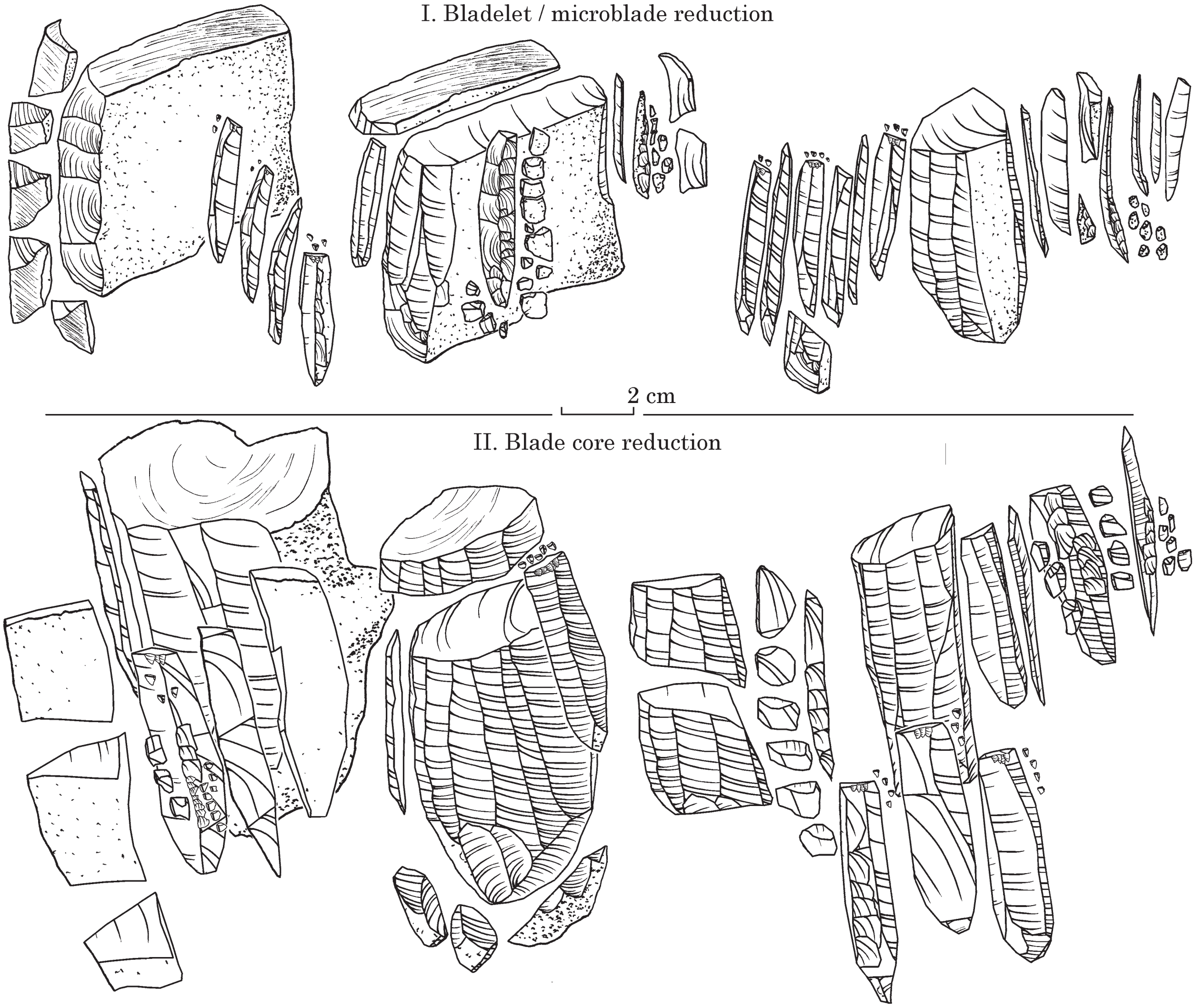


Fig. 14. Barmaky, level 2, the core reduction strategies: I — bladelet / micro-blade core reduction; II — blade core reduction

to the appearance of flattened types. That is, the core reduction led to a decrease mainly in thickness and lesser in width and length dimensions. The exhausted cores are rare.

4. The results of blade core reduction are represented by the middle-size blade (av. 46.80 × 18.15 × 4.93 mm), mainly of rectangular shapes, straight lateral profiles, and feathering distal ends.

5. The bladelet / micro-blade core reduction resulted in the middle-size (av. 25.65 × 9.18 × 2.31 mm) bladelets / micro-blades, mainly of rectangular shapes, straight lateral profiles, and feathering distal ends.

6. The results of blade cores reduction were used for all types of tool production, except microliths. The results of bladelet / micro-blade cores reduction were used for backed microlithic insets production (fig. 13: 1—3).

Thus, the proposed reduction strategies were applied to the production of different toolkits (fig. 14). The production of the «domestic» toolkit was the main aim of the blade core reduction. While the production of distant weapon insets was the purpose of bladelet / micro-blade cores reduction. Along with the reconstructed site-workshop model of raw material exploitation, the presence of dwelling structure, and pits, the application of double-purpose core reduction strategies might be evaluated as the characteristic features of the base camp (Чабай та ін. 2022). Quantitatively the summarized amount of bladelet and micro-blade pieces prevails over the blade number. The microlithic insets constitute about a quarter of the tool kit. Moreover, some number of the insets were produced for off-site use and lost in hunting episodes outside the camp area.

Such a dual approach to the reduction strategies contradicts the concept of continuous reduction strategy, proposed for the Epigravettian assemblages from Desna valley, and such Mid-Dnieper assemblages as Semenivka 3, Mezhyrich, and Dobranichivka (Гаврилов 2016, с. 55; Нужний, Шидловський, Лизун 2017, с. 23—24). Also, the method of butt abrasion known from the Mezhyrich assemblage is not found in Barmaky (Lozovski, Lozovskaya 2014). The meaning of the difference between mentioned assemblages might be of chronological and / or stylistic values. At least, the relatively early age of Barmaky assemblage in the frames of Mid-Dnieper Epigravettian supports the hypothesis of the chronological meaning of technological variability. The chronological meaning of continuous and discrete reduction strategies has been reported as a characteristic feature for the beginning of Middle Magdalenian in southwestern France, between 19 and 17.5 kyr cal BP (Langlais et al. 2016). For the region of the Northern Mediterranean Basin, discrete blade and bladelet flaking were reconstructed for Early Epigravettian, while blade cores characterize the Late Epigravettian assemblages (Naudinot et al. 2017). Also, the presence of micro-blade wedge-shaped narrow flaking surface cores is supposed to be the characteristic feature of Early Epigravettian assemblages from Moravia and Silesia, «*probably dated into the time span of the several millennia around the Last Glacial Maximum*» (Svoboda 1995, p. 655). The Hungarian Early Epigravettian site Vác 1 assemblage is characterized by bladelet core reduction and backed pieces, as the main aim of production (Béres, Demidenko 2021). On the other hand, the discrete blade and bladelet / micro-blade reduction strategies were studied for Prut / Dniester Epigravettian assemblages (Noiret 2009, p. 458—461). Taking into account the spatial and chronological proximity of Barmaky to Dniester valley Epigravettian and the typological similarity between Barmaky and Mizyn assemblages, the proposed studies might open a new direction in the investigations of the late Last Glacial Maximum industries' origin of the Mid-Dnieper basin.

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THE BARMAKY, LEVEL 2 EPIGRAVETTIAN ASSEMBLAGE: THE CORE REDUCTION STRATEGIES

This paper is devoted to the analytical reconstruction of the core reduction strategies of the Barmaky site, level 2 assemblage. Studying the technological features of knapping is significant to determining the characteristics of lithic industries and techno-complexes. In Eastern, Southern, and eastern parts of Central Europe, the late Last Glacial Maximum industries mainly belong to the Epigravettian techno-complex. Along with typological descriptions, the characteristic of core reduction strategies is essential for Epigravettian techno-complex definition. At the same time, the comprehensive description of Epigravettian assemblages' core reduction of the Mid-Dnieper basin is still unclear. Excavated at 2018—2020 field campaigns, the exceptionally reach Barmaky, level 2 artifact assemblage gave such an opportunity. The 152,617 flint artifacts, including 174 core-like pieces and 14,988 *débitage* items, originate from 72 m² of the excavation area (tables 1—3). The pre-cores and cores' typological attributes and measurements suggest the presence of two discrete core reduction strategies: blade and bladelet / micro-blade (fig. 1—6). The unidirectional sub-, cylindrical, and narrow flaking surface cores were the sources for blades. The bladelet / micro-blade assemblage is the result of narrow flaking surface cores exploitation. Both core reduction strategies are based on the intentional selection of differently shaped pieces of raw material: plate-like pieces (plaquettes, natural and primary flakes) for narrow surface flaking cores and rounded nodules for sub-, cylindrical cores. The middle-size blade (av. 46.80 × 18.15 × 4.93 mm), mainly of rectangular shapes, straight lateral profiles, and feathering distal ends represents the results of blade core reduction (fig. 7—14). The bladelet / micro-blade core reduction results are represented by the middle-size bladelets / micro-blades (av. 25.65 × 9.18 × 2.31 mm), mainly of rectangular shapes, straight lateral profiles, and feathering distal ends. The detachment of such technological blanks as débordante and crested pieces are characteristic of both reduction strategies (tables 4—6; fig. 9). The results of blade cores reduction were used for all types of tool production, except microliths. The blade cores were the source of lamellar products for the «domestic» toolkit; the bladelet / micro-blade cores reduction aimed at the insets for distant weapons. The existence of two discrete reduction strategies at Barmaky, level 2 is consistent with the technological characteristics of the Early Epigravettian of the Northern Mediterranean Basin and Prut / Dniester basins. Consequently, the spatial and chronological proximity of Barmaky to Dniester valley assemblages and the typological similarity of Barmaky and Mizyn assemblages raises several problematic issues in the investigations of the late Last Glacial Maximum industries' origin of the Mid-Dnieper basin.

Keywords: mid-Dnieper basin, Epigravettian, core reduction strategies, typological approach, attribute analysis, cores, technological blanks.

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ЕПІГРАВЕТСЬКА СТОЯНКА БАРМАКИ, ШАР 2: ТЕХНОЛОГІЇ РОЗКОЛЮВАННЯ НУКЛЕУСІВ

Стаття присвячена аналітичній реконструкції технологій нуклеусного розколювання стоянки Бармаки, шар 2. Для визначення особливостей кам'яних індустрій та технокомплексів, вивчення технологічних особливостей розколювання є надзвичайно важливим. У Східній і Південній Європі та східній частині Центральної Європи індустрії пізньої доби максимуму льодовиків'я здебільшого належать до епіграветського технокомплексу. Комплексні типологічні і технологічні характеристики відіграють важливу роль у визначені індустрій і технокомплексів. Проте, наразі відсутні вичерпні характеристики нуклеусного розколювання для епіграветських колекцій басейну Середнього Дніпра. Матеріали дослідженої протягом 2018—2020 польових сезонів стоянки Бармаки, шар 2 є якісним джерелом для технологічних досліджень: 152617 артефактів, включно з 174 нуклеподібними і 14988 сколами, походять із 72 м² дослідженої площі (табл. 1—3). На основі комплексного аналізу техніко-типологічних і метричних ознак пре-нуклеусів і нуклеусів зроблений висновок щодо використання мешканцями Бармаків двох дискретних технологій розколювання нуклеусів: для виготовлення пластин і пластинок / мікропластин (рис. 1—6). Для виготовлення пластин використовувались повздовжні під-, циліндричні і торцеві нуклеуси. Пластинки і мікропластини були результатом розколювання повздовжніх торцевих нуклеусів. Обидві технології базуються на цілеспрямованому відборі різної за формами сировини: плитчастої (кременеві плитки, природні відщепи, відщепи) для торцевих нуклеусів і округлих жовн для під-, циліндричних нуклеусів. Пластини середніх розмірів 46,80 × 18,15 × 4,93 мм, загалом, прямокутних форм, з прямими латеральними профілями і пероподібними дистальними закінченнями є результатом розколювання нуклеусів для пластин (рис. 7—14). Результати розколювання нуклеусів для пластинок / мікропластин представлені заготовками з середніми розмірами 25,65 × 9,18 × 2,31 мм, прямокутних форм, з прямими латеральними профілями і пероподібними дистальними закінченнями. Для обох технологій є характерними реберчасті і *débordante* сколи (табл. 4—6; рис. 9). Нуклеуси для пластин використовували для виготовлення сколів для «домашнього» набору знарядь. Нуклеуси для пластинок / мікропластин слугували джерелом для виготовлення вкладенів дистанційного озброєння. Така дискретна система розколювання нуклеусів є характерною для раннього епігравету Північного Середземноморського басейну та Пруто-Дністровського регіону. Відтак, територіальна близькість Бармаків до долини Дністра, вік стоянки, а також типологічна подібність до Мізину відкриває нові перспективи у дослідженні походження індустрій пізньої доби максимуму льодовиків'я в басейні Середнього Дніпра.

Ключові слова: Середньодніпровський басейн, епігравет, технології розколювання, типологічний підхід, аналіз технологічних ознак, нуклеуси, технологічні сколи.

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