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At the burin's edge: production and reutilisation of burins in the Mizyn assemblage

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The article is focused on studying the assemblage of complete burins from the Mizyn site. This study investigates the technological aspects of burin production and offers a typological classification. A considerable presence of artefacts with evidence of reutilisation was found, which points to the intensive use of these tools. This paper is a part of the research project “Epigravettian lithic technologies of tool production, use, and discard: a case study of the Mizyn industry” made possible with the support of the German Archaeological Institute within the framework of the fellowship program “Documenting, Recording and Saving Ukrainian Archaeological Heritage”.

Keywords: Middle Dnipro basin, Epigravettian, Mizyn industry, lithics, burins, attribute analysis, technology, typology.

Introduction.

Most Epigravettian sites in the Middle Dnipro Basin (Fig. 1) are characterised by an abundance of burins in their lithic assemblages (Воеводский 1929, с. 64; 1952, с. 108; Воєводський 1947, с. 110; Шовкопляс 1965, с. 131; Величко, Грехова, Губонина 1977, с. 102-103, 109; Хайкунова 1992, с. 123; Величко и др. 1997, с. 96; Григорьева 2008, с. 84–89; Шидловский, Нужный, Пеан 2014, с. 61–62; Нужний 2015, с. 242; Нужний, Шидловський, Лизун 2017, с. 20 табл. 1; Chabai et al. 2022, p. 125 table 4). Burins comprise between 31% and 73% of the tool assemblages, as seen in Dwelling 4 at the Dobranichivka site and the Timonovka I site, respectively (Нужний 2015, с. 264–265; Величко, Грехова, Губонина 1977, с. 102–103).

The Mizyn site contains one of the largest burin assemblages in the region, comprising 2,609 items, comparable to Timonovka I, 4,088 items, Suponevo 2,705 items, and Yeliseevichi 2, 1,871 items (Шовкопляс 1965, рис. 15, 116; Величко, Грехова, Губонина 1977, с. 102–103; Хайкунова 1992,

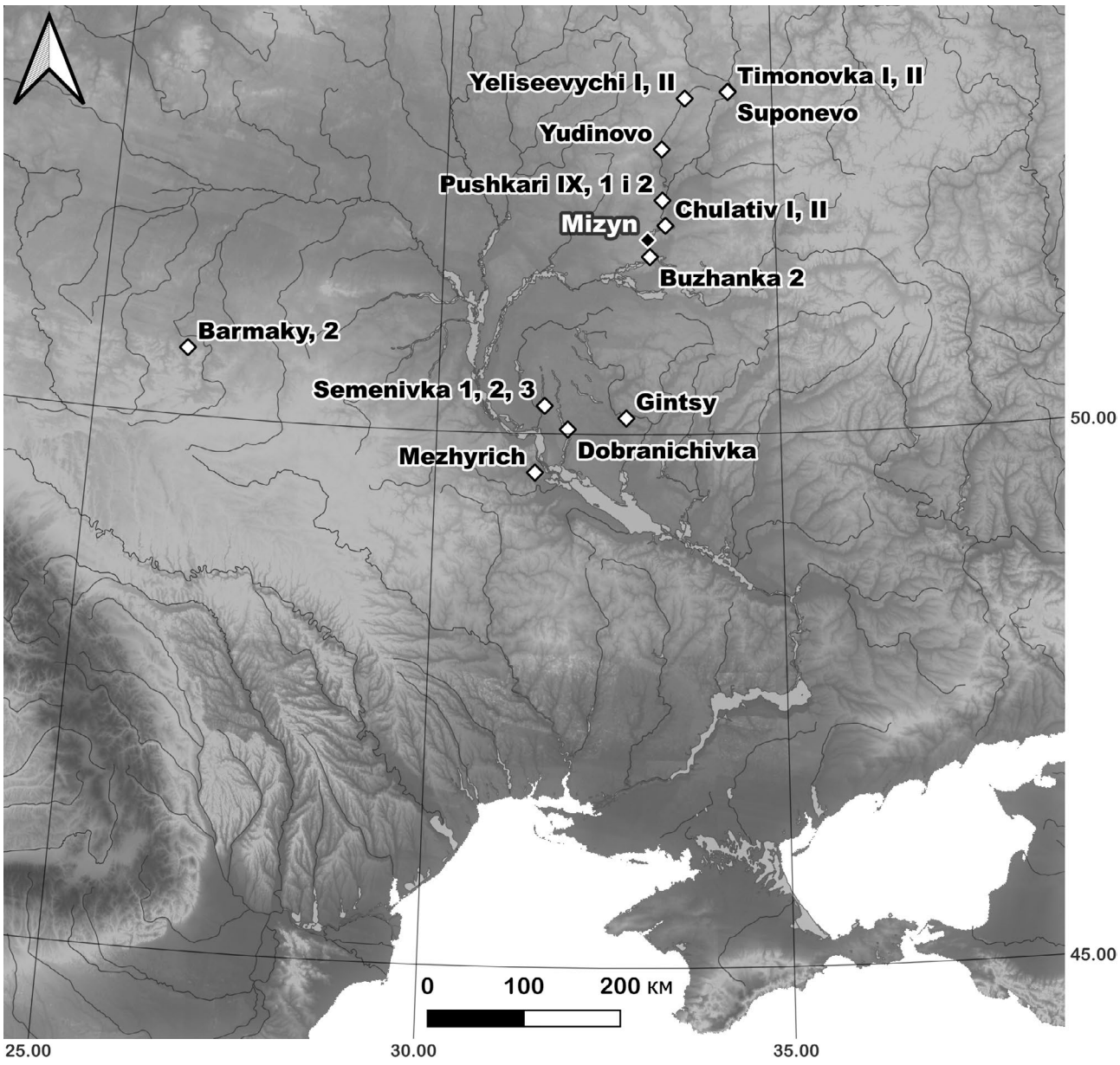


Fig. 1. *Map of the Epigravettian sites in the Middle Dnipro basin region.*

Рис. 1. *Карта епіграветських стоянок басейну Середнього Дніпра.*

c. 125; Величко и др. 1997, c. 126–127). Burins are commonly classified into three main types based on platform preparation: on truncations, angle, and dihedral (Fig. 2). At Mizyn, burins on truncations dominate and are considered a diagnostic feature of the site's lithic complex (Шовкопляс 1965, c. 142). Furthermore, based on this characteristic, Shovkoplias attributed the lithic assemblages of Mizyn, Chulativ I, Yeliseevichi, Yudinovo, Suponevo, Timonovka, and Yurovichi (upper level) to the cultural group of the Early Magdalenian period (Шовкопляс 1965, c. 142–144). Grigorieva suggests that the predominance of burins on truncations in the Epigravettian sites of the Middle Dnipro basin may reflect regional technological traditions (Григорьева 2008, c. 89). It is now believed that Mizyn, Chulativ I and II, Yeliseevichi I and II, Yudinovo, Suponevo and Timonovka I and II belong to the Epigravettian techno-complex (Нужний 2015, c. 401).

Quantitative analysis confirms that burins on truncations comprise more than 50% of the toolkit at most significant sites, including Mizyn, Barmaky, Mezhyrich, Timonovka I, Yudinovo, Yeliseevichi 2, Chulativ II, and Suponevo (Fig. 2). Slightly lower percentages are observed at Dobranichivka and Semenivka 3 (49.5% and 47.1%, respectively), while at Semenivka 2, angle burins predominate. It should be noted that the data for Mezhyrich and Dobranichivka derive from selected dwelling assemblages and therefore do not reflect the complete typological composition of the sites. Dobranichivka, Semenivka 2 and 3 generally have a higher percentage of angle burins, ranging from 30% to 41%, whereas this type does not exceed 20% of the assemblage at the other sites. Interestingly, all three sites belong to the Mezhyrich industry, which may point to a local technological tradition. Additionally, Suponevo is notable for the presence of so-called Suponevo-type burins, transversal burins made both with and without truncation; Suponevo-type burins with truncation are a specific subgroup of burins on truncations (Хайкунова 1992, c. 130).

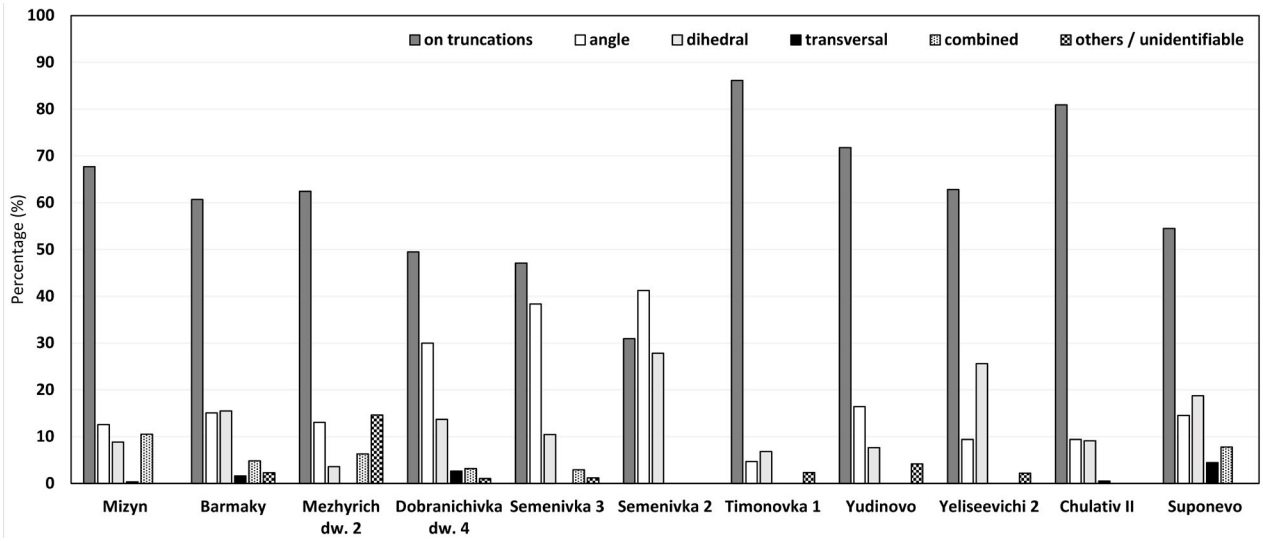


Fig. 2. *Typological distributions of burins in the lithic assemblages of Epigravettian sites in the Middle Dnipro region, Barmaky after Chabai et al. 2022, p. 122, 125 table 4; Mezhyrich and Dobranichivka after Нужний 2015, c. 230–232, 264–265; Semenivka 2 and 3 after Нужний, Шидловський, Лизун 2017, c. 20 табл. 1; Timonovka 1 after Воеводский 1929, c. 64; Yudinovo after Абрамова, Григорьева 1997 c. 82; Yeliseevichi 2 after Величко и др. 1997, c. 126–127; Chulativ II after Воеводский 1952, c. 108; Suponevo after Хайкунова 1992, c. 125.*

Рис. 2. *Типологічна структура різців у колекціях крем'яних знарядь епіграветських стоянок басейну Середнього Дніпра, Бармаки за Chabai et al. 2022, p. 122, 125 table 4; Межиріч та Добранічівка за Нужний 2015, с. 230–232, 264–265; Семенівка 2 і 3 за Нужний, Шидловський, Лизун 2017, с. 20 табл. 1; Тімоновка 1 за Воеводский 1929, с. 64; Юдіново за Абрамова, Григорьева 1997 с. 82; Єлісєєвичі за Величко и др. 1997, с. 126–127; Чулатів II за Воеводский 1952, с. 108; Супонєво за Хайкунова 1992, с. 125.*

Despite the centrality of burins in the lithic assemblages, a dedicated study on the technology of manufacture and reutilisation of burins at the Epigravettian sites of the Middle Dnipro basin has not yet been conducted. Existing evidence regarding the production methods and the process of reutilisation of burins remains fragmentary. At the Barmaky site, researchers observed rejuvenation through truncations (Chabai et al. 2022, p. 123, 128, fig. 21: 6, 8, 9), while at Chulativ II, Voevodskyi recorded burin platform rejuvenation and repeated detachment of burin spalls (Воеводский 1952, с. 109-111, 110, рис. 3: 5, 9–11, 13).

Given the exceptionally high number of burins at the Mizyn site and the dominance of those made on truncations — considered a diagnostic trait of the Epigravettian sites of the Middle Dnipro basin — the technological aspects of their manufacture and especially their reutilisation deserve focused attention. This need is underscored by evidence from the Barmaky and Chulativ II sites, where signs of burin reutilisation have been documented. Notably, Barmaky is attributed to the Mizyn industry within the Epigravettian techno-complex (Чабай та ін. 2020, с. 122). The lack of dedicated research on this subject is particularly striking, as such a study could provide valuable insights into the model of using flint materials and evidence of technological traditions within the Epigravettian of the Middle Dnipro basin.

Materials and methods.

Shovkoplias states that 2,609 burins and 3021 burin spalls were found at the Mizyn site (Шовкопляс 1965, с. 116). The collection from Shovkoplias`s research is stored in the funds of the Archaeological Museum of the Institute of Archaeology of the National Academy of Sciences of Ukraine. Using attribute analysis, the current research analysed 858 complete burins and 407 complete burin spalls. This method was applied to study the blady debitage and core-like pieces of the lithic assemblages from the Barmaky and Mizyn sites (Дудник 2024; Chabai, Dudnyk 2022).

Two configurations were developed during this analysis: <Mizyn, blanks, tools> for recording burins and <Mizyn, blanks, burin spalls> for recording burin spalls using Entrer 4 (McPherron, Dibble 2002, p. 127–148). Burins were divided into on truncations, angle, and dihedral types based on the Sonneville-Bordes typology (Sonneville-Bordes, Perrot 1955). Burins on truncations were further classified according to Gladylin`s core typology (Гладилін 1976). This approach was employed to analyse the burins from the Barmaky site assemblage (Чабай та ін. 2020, с. 115, табл. 5).

Technological features of burin production.

According to Movius et al. (1968, p. 21), the manufacture of burins involves two main stages: (1) the creation of a spall platform, and (2) the detachment of a burin spall, resulting in the formation of a cutting edge. Based on the first stage, three methods of spall platform preparation can be distinguished: truncation (platform preparation by retouch), dihedral (by previous spall removal), and angle (using an intentionally broken surface) (Movius et al. 1968, p. 23–24). In this study, the category of angle burins includes pieces made on deliberately fractured surfaces and naturally flat surfaces, without any additional preparation. A natural spall platform may be formed by the lateral edge of the blank, its dorsal or ventral surface, the cortex or its natural surface (Кононенко 2018, с. 120). Burins with spall detachments removed perpendicular to the morphological axis are called transversal. A combined burin is one that includes two different types.

The ***blanks*** used to produce burins were obtained mainly from unidirectional sub-cylindrical or narrow flaking surface cores (Дудник 2024, с. 141). The blanks included regular and technological *débitage*. About one-third of the burins were manufactured on technological *débitage* (Fig. 3). Crested blades are the most frequently used blank type, accounting for more than half of all specimens (Table 1). They were especially common in burins on truncations and combined forms. *Débordante* blades also form a substantial portion of the

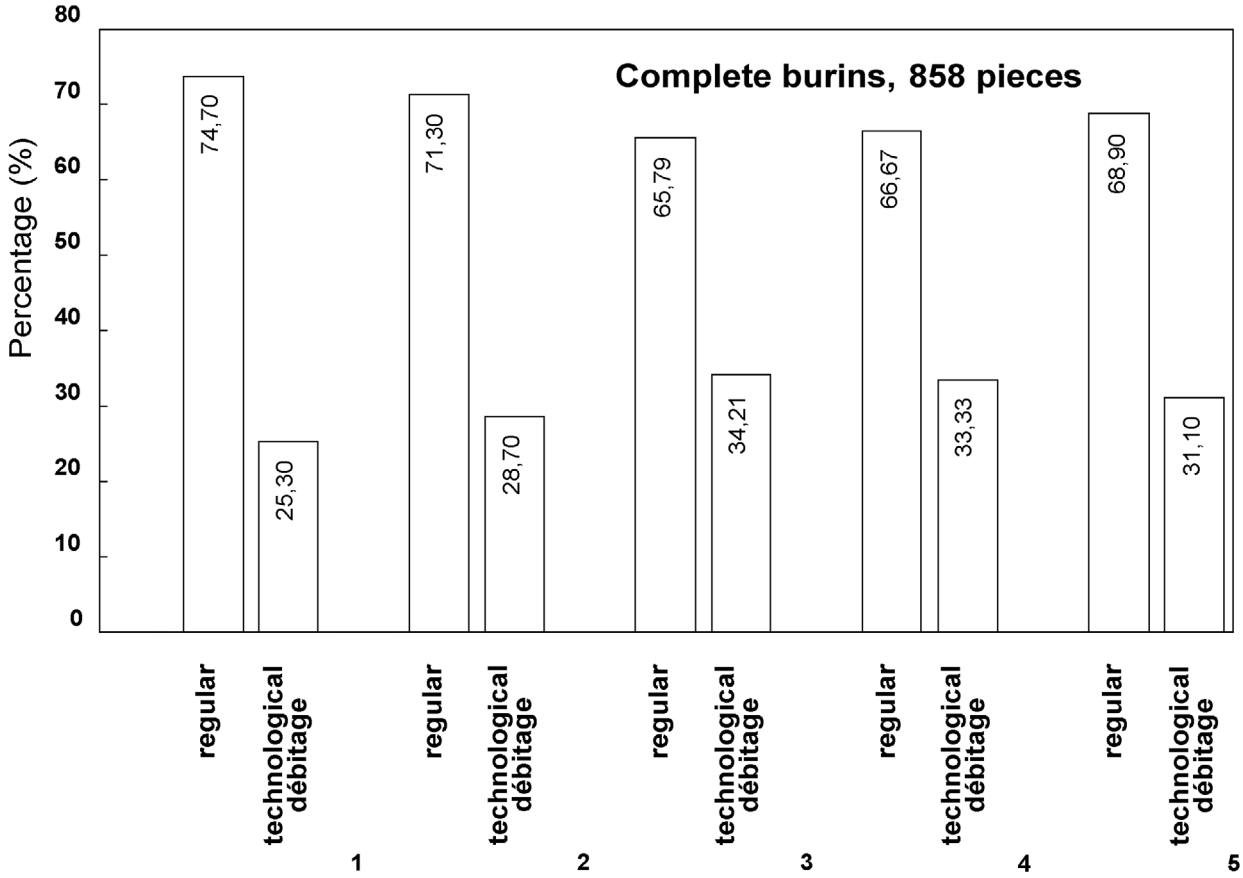


Fig. 3. *Mizyn 1954–1961, distribution of blanks to produce burins: 1 — on truncations; 2 — angle; 3 — dihedral; 4 — transversal; 5 — combined.*

Рис. 3. *Мізин 1954–1961, заготовки для виготовлення різців: 1 — бокові; 2 — кутові; 3 — серединні; 4 — трансверсальні; 5 — комбіновані.*

Table 1. *Mizyn 1954–1961: burins made on technological débitage.*

Табл. 1. *Мізин 1954–1961: різці виготовлені на технологічних сколах.*

Tecnhological *débitage*	**Burin types**					**TOTAL:**	*%*
	on truncations	angle	dihedral	transversal	combined		
Primary blades	3	1	—	—	—	**4**	*1,72*
Crested blades	78	14	8	—	18	**118**	*50,86*
Crested bladelets	1	—	—	—	—	**1**	*0,43*
Crested flakes	5	1	4	—	1	**11**	*4,74*
Débordante blades	41	11	7	—	8	**67**	*28,88*
Débordante flakes	16	2	5	—	1	**24**	*10,34*
Kantenabschläge	2	2	1	1	—	**6**	*2,59*
Core tablets	—	—	—	—	—	**1**	*0,43*
TOTAL:	**146**	**31**	**25**	**1**	**28**	**232**	*100,00*

sample, with a similar distribution pattern. Though less numerous, crested flakes were employed across multiple burin types, including dihedral and combined. *Débordante* flakes were used sparingly but still contributed to various burin forms. A significant number of *débordante* pieces indicates the use of narrow flaking surface core reduction (Chabai, Dudnyk 2022, p. 49; Дудник 2024, с. 141). Primary blades, *Kantenabschläge*, core tablets and crested bladelets were used only occasionally.

Burins on these early-stage blanks suggest they were selected opportunistically due to their robust and morphologically suitable characteristics. This indicates that the knapper was not necessarily aiming for formal perfection or prolonged core exploitation, but instead prioritised functional adequacy. The fact that approximately one-third of all blanks used for burin production derive from technological *débitage* further supports this interpretation.

A discrete core reduction strategy and massive technological *débitage* in the Mizyn assemblage complicate burins' identification and typological classification. Since flat raw materials, such as plaquettes and flakes, were also used to produce bladelets and micro-blades, removal negatives from narrow flaking surface cores may be misidentified as burin spall scars. In some cases, the width of a burin spall negative on a crested or *débordante* blade may exceed that of typical bladelet or micro-blade removals. Moreover, multiple burin spalls detached from the same blank can mimic the appearance of a convex core surface.

During the production of burins, the initial properties of the blanks were modified, including metric parameters such as length and width, as well as qualitative attributes such as shape, profile, distal end type, cross-section, and platform.

Shaping.

A single burin may have between one and four working edges. The combination of the spall platform preparation method and the configuration of the burin edges is reflected in the typological classification of burins, which is below. The 858 Mizyn burins exhibit 1,200 working edges, formed by 1,797 burin spall negatives. The ratio of burins to burin edges is 1:1.40; the ratio of burin edges to burin spall negatives is 1:1.50.

The most common method of producing burins in the Mizyn assemblage is truncation. To create a spall platform, straight, oblique, oblique-convex, oblique-concave, convex or concave truncation was used. The truncation was made mainly by abrupt retouch (approximately 90%). Sometimes, semi-abrupt retouch was applied. Dorsal direction of retouch dominates (92-95%), ventral consists of 3-5%, alternating and opposite are occasionally found. Scalar type of retouch is dominant (66-68%), scalar-stepped retouch is in second place (15-17%). One-blow truncation consists of 4-5%, in several cases, one-blow is combined with scalar retouch (2-4%). Other types, such as parallel and sub-parallel, micro-scalar, marginal and irregular, are not numerous.

Additional lateral retouch is present on 50% of the burins, and among these, around 20% show bilateral modification along both lateral edges. Among these, 80.60% of the retouched blanks are blades. Only half of the blanks with retouch exhibit continuously retouched edges. Another 40.2% show partial retouch along the lateral edge, and 8.31% exhibit discontinuous retouch. Regarding angle of retouching, 46.68% of the blanks exhibit semi-abrupt retouch, 29.43% show abrupt retouch, and 23.89% have flat retouch. Dorsal retouch is present on 88.68% of the modified blanks, while ventral retouch occurs on 6.24%. Alternating retouch is observed in 3.93% of the cases, and alternate retouch in 1.39%. Scalar retouch is present on 38.34% of the burins with retouch, followed by marginal retouch (22.63%) and micro-scalar retouch (21.71%). Scalar-stepped retouch occurs in 5.54% of cases, sub-parallel in 1.39%, parallel in 0.23%, and irregular retouch in 10.16%.

Burin types.

Notable predominance of specimens made on truncations (Fig. 4: 1). Among them, the majority were made on blades, followed by flakes, bladelets, chunks, and unidentifiable debitage (Fig. 5: 1). Angle burins are primarily found on blades and flakes, with only a few rare examples on bladelets and unidentifiable debitage (Fig. 5: 2). Most dihedral burins were also produced on blades and flakes, with a single spacement made on unidentifiable debitage (Fig. 5: 3). The dominant blank type for combined burins is likewise blades followed by flakes, chunks, and unidentifiable fragments (Fig. 5: 4). Transversal burins are rare within the assemblage, represented by only three examples, all made on flakes. Blades dominate as the most frequently used blanks across all burin types. Metric analysis of length, width, and thickness was conducted for one-edge burins on truncated blades, as this is the largest group and reveals clear statistical patterns. Too few artefacts represent other groups and display significant variability in their metric values.

The vast majority of burins made ***on truncations*** have one working edge (Fig. 4: 2). Other variants, such as opposite-alternative, opposite, bi-lateral, bi-lateral-alternative, and bi-lateral-opposite burins, are significantly less common.

Among the *one-edge burins* made on truncated pieces, the majority were produced on oblique truncation (Table 2), which represents two-thirds of the group (Fig. 6: 1). This type significantly dominates over all others, including straight, oblique-concave, concave, oblique-convex, and convex truncations. The dataset generally shows a relatively balanced distribution between distal and proximal truncation directions across the various types. However, distal truncations slightly predominate among oblique truncations compared to proximal ones (Fig. 6: 3).

One-tenth of the burins in this group show evidence of reutilisation. These samples are secondary truncated and preserve the negative of a previous burin spall (Fig. 7: 2, 4, 5, 6, 8).

The length of regular one-edge burins on truncated blades ranges from 23.28 mm to 100.72 mm (mean 49.01 mm), while reutilised specimens fall within 32.82 mm to 67.15 mm (mean 48.52 mm). Most regular burins cluster in the 45.00–45.99 mm and 47.00–47.99 mm intervals, whereas reutilised ones peak in the 43.00–43.99 mm range, indicating a slight decrease in length resulting from the reutilisation process (Fig. 8). Regular burins on truncated blades range in width from 12 mm to 33.20 mm, with a mean of 19.23 mm, while reutilised burins vary between 12 mm and 25.82 mm, with a mean of 19.19 mm. Despite the similar averages, the narrower range and distribution peak at the 18.00–18.99 mm interval suggest a trend toward reduced width in the reutilised group (Fig. 9). Thickness clearly distinguishes regular burins from 2.71 mm to 21.49 mm (mean 6.92 mm), and reutilised examples from 3.69 mm to 11.88 mm (mean 7.21 mm). While regular specimens are most often found in the 5.00–5.99 mm range, reutilised ones tend to cluster in the 6.00–6.99 mm interval (Fig. 10). This pattern suggests that thicker blanks were more frequently chosen for secondary modification, potentially to enhance durability during extended use.

Shovkoplias noted that in most cases, burin spalls were detached from the left lateral edge of the terminal part of the burin (Шовкопляс 1965, с. 132). The current analysis confirms this observation: the burin edge was most frequently formed on the left side of the blank (72.62%), while only 27.38% were made on the right (Fig. 6: 5). Research by Jöris has demonstrated that the majority of *Keilmesser* were likely used by right-handed individuals, as evidenced by the predominance of right-sided working edges and consistent patterns of tool morphology and use-wear (Jöris 2001). Assuming that the Mizyn burins were used with the dorsal surface facing upward and held in the right hand, the left edge would have served as the working edge. This suggests that the toolmakers at Mizyn were most likely right-handed.

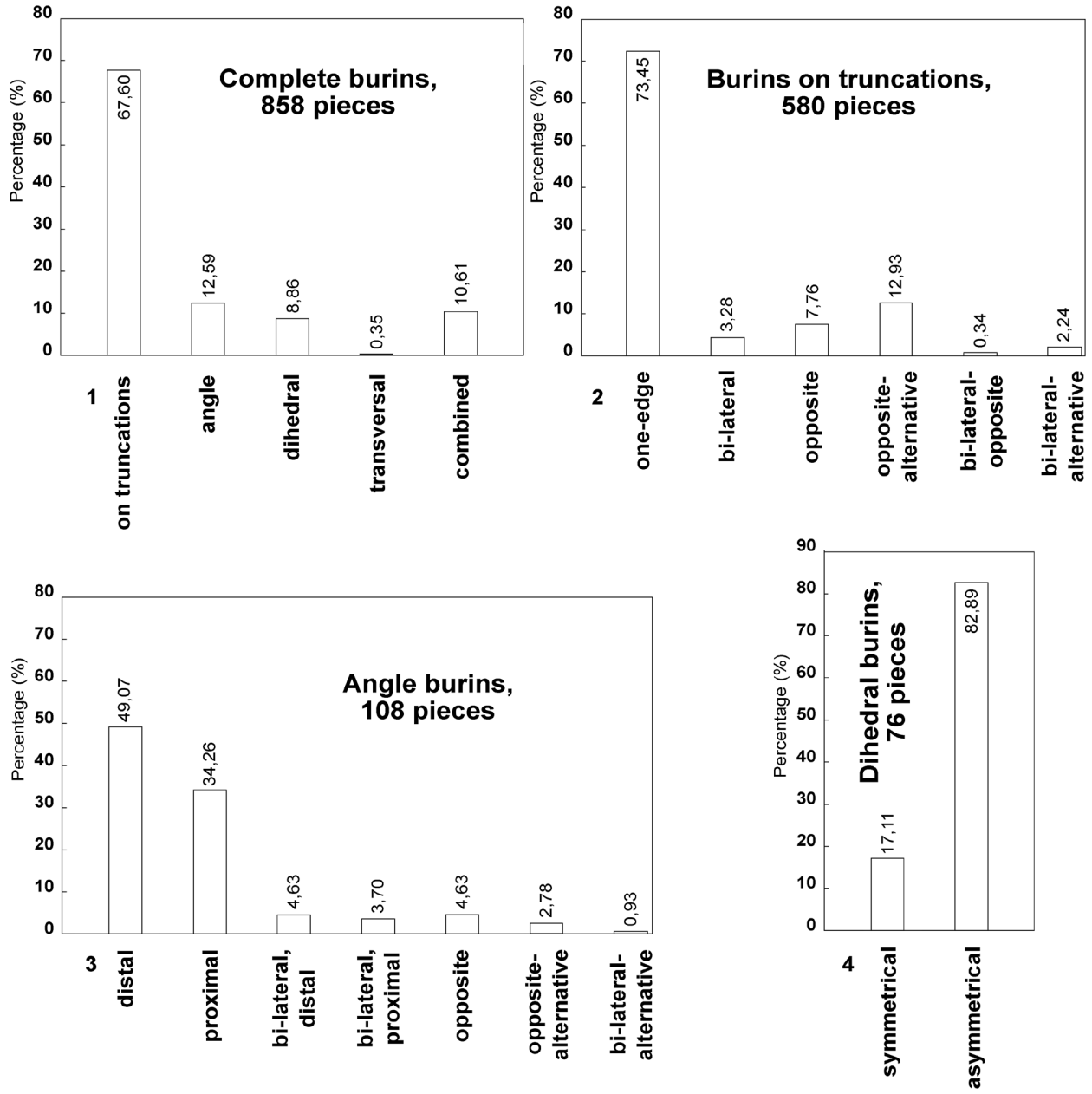


Fig. 4. *Mizyn 1954–1961: 1 — complete burins; 2 — burins on truncated pieces; 3 — angle burins; 4 — dihedral burins.*

Рис. 4. *Мізин 1954–1961: 1 — типологічна структура цілих різців; 2 — типологічна структура бокових різців; 3 — типологічна структура кутових різців; 3 — типологічна структура серединних різців.*

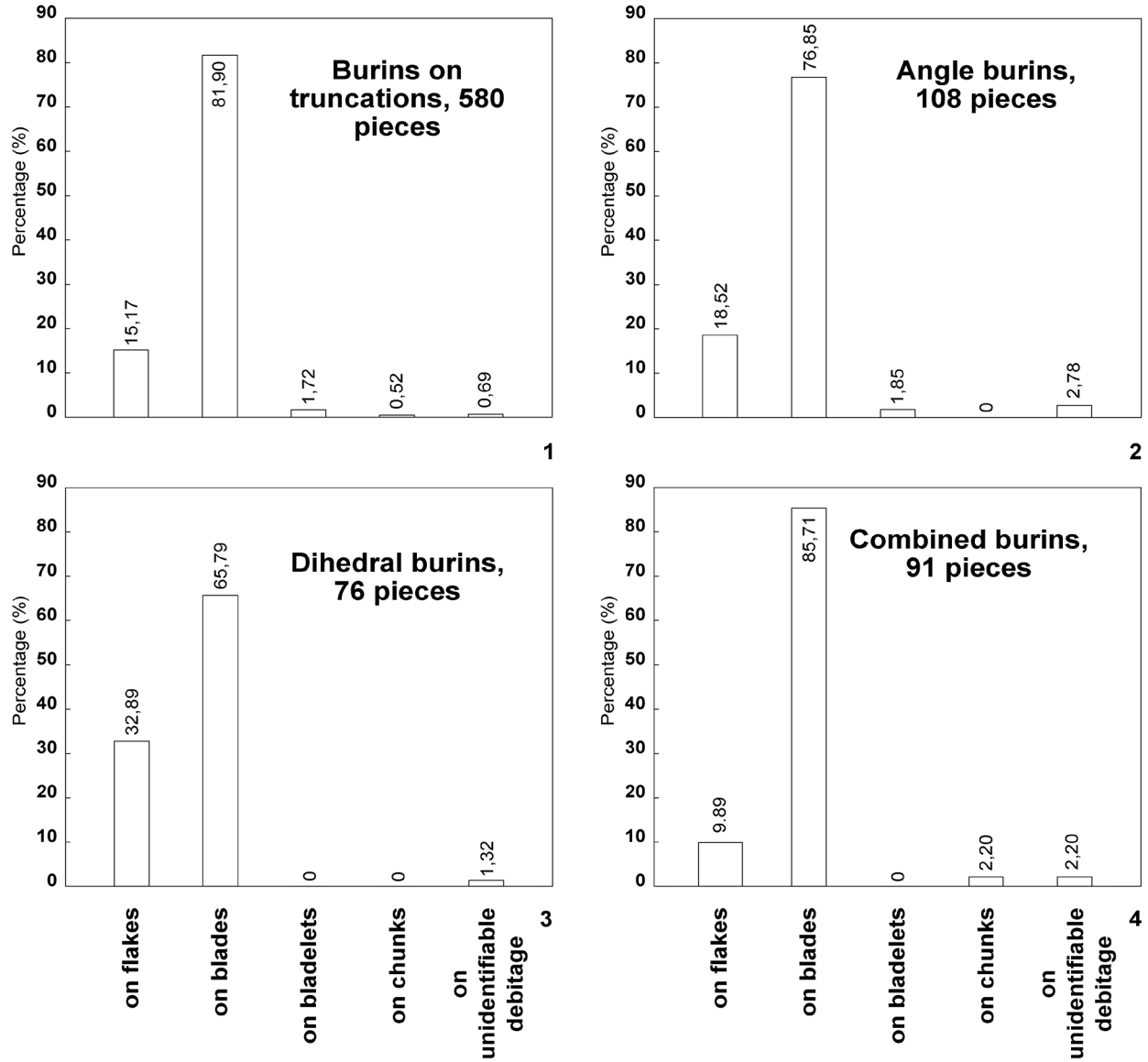


Fig. 5. *Mizyn 1954–1961, blanks for burin production: 1 — burins on truncated pieces; 2 — angle burins; 3 — dihedral burins; 4 — combined burins.*

Рис. 5. *Мізин 1954–1961, сколи на яких виготовлені різці: 1 — бокові різці; 2 — кутові різці; 3 — серединні різці; 4 — комбіновані різці.*

Table 2. *Mizyn 1954–1961: burins on tuncations with one working edge.*

Табл. 2. *Мізин 1954–1961: бокові різці з одним робочим краєм.*

One-edge burins on truncated pieces	On flakes	On blades	On bladelets	On chunks	On unidentifiable debitage	**TOTAL:**	*%*
On straight truncations	**18**	**24**	—	**2**	—	**44**	*10,33*
distal	14	10	—	1	—	25	—
distal, reutilised	—	1	—	–	—	1	—
proximal	4	11	—	1	—	16	—
proximal, reutilised	—	2	—	—	—	2	—
On oblique truncations	**35**	**238**	**7**	—	**2**	**282**	*66,20*
distal	23	118	3	—	2	146	—
distal, reutilised	3	14	—	—	—	17	—
proximal	8	96	4	—	—	108	—
proximal, reutilised	1	10	—	—	—	11	—
On oblique-convex truncations	**3**	**23**	—	—	—	**26**	*6,10*
distal	2	13	—	—	—	15	—
distal, reutilised	1	—	—	—	—	1	—
proximal	—	9	—	—	—	9	—
proximal, reutilised	—	1	—	—	—	1	—
On oblique-concave truncations	**7**	**27**	**1**	**1**	—	**36**	*8,45*
distal	5	10	1	1	—	17	—
distal, reutilised	1	1	—	—	—	2	—
proximal	1	13	—	—	—	14	—
proximal, reutilised	—	3	—	—	—	3	—
On convex truncations	**1**	**1**	—	—	—	**2**	*0,47*
distal	1	1	—	—	—	2	—
On concave truncations	**7**	**29**	—	—	—	**36**	*8,45*
distal	5	12	—	—	—	17	—
distal, reutilised	1	4				5	—
proximal	1	12	—	—	—	13	—
proximal, reutilised	—	1	—	—	—	1	—
TOTAL:	**71**	**342**	**8**	**3**	**2**	**426**	*100,00*

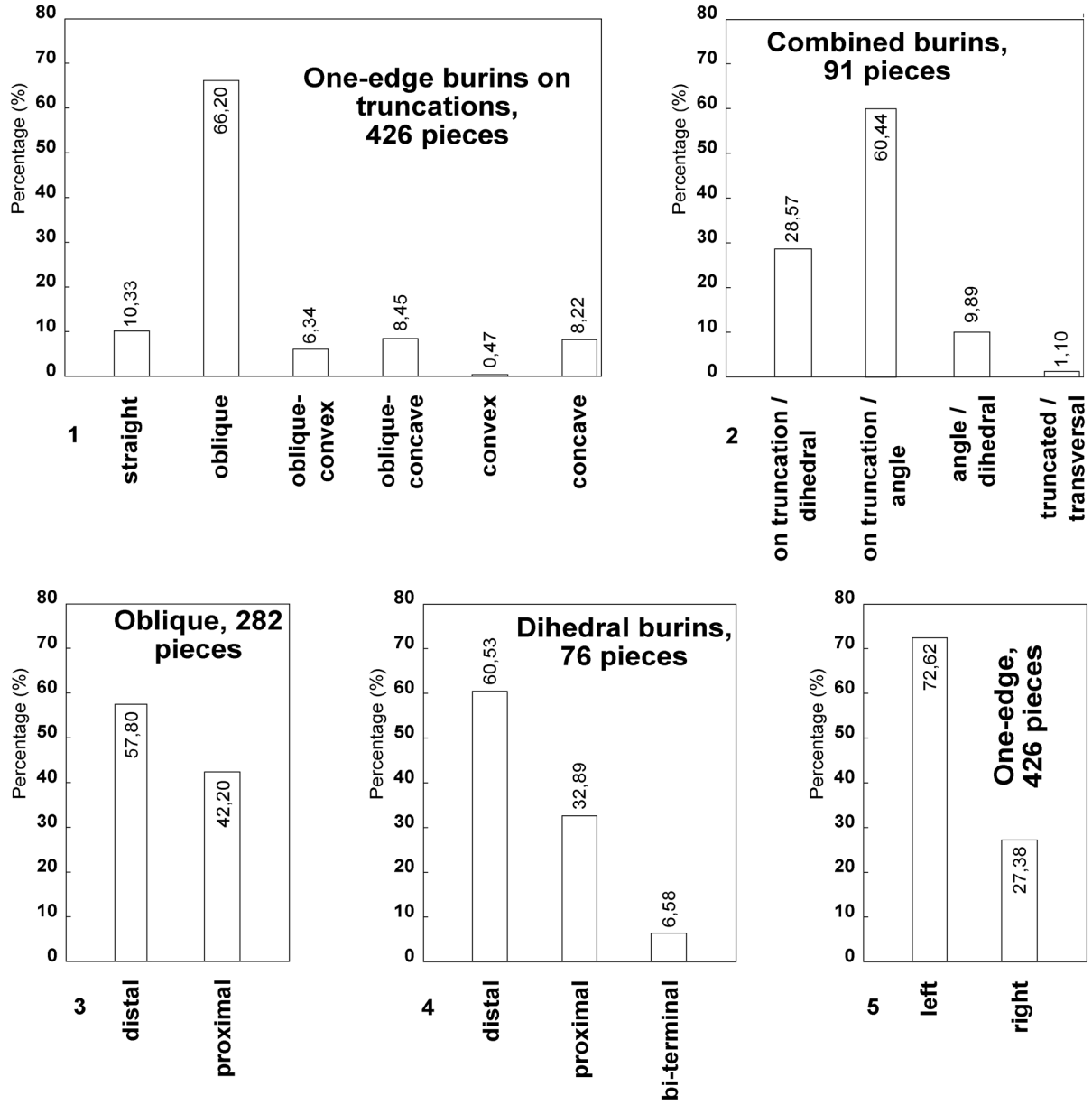


Fig. 6. *Mizyn 1954–1961: 1 — types of one-edge burins on truncated pieces; 2 — types of combined burins; 3 — blank orientation of obliquely truncated one-edge burins; 4 — blank orientation of dihedral burins; 5 — lateral working side used in production of one-edge burins.*

Рис. 6. *Мізин 1954–1961: 1 — типи однолезових бокових різців; 2 — типи комбінованих різців; 3 — орієнтація заготовки для виготовлення однолезових косо-тронкованих бокових різців; 4 — орієнтація заготовки для виготовлення серединних різців; 5 — латераль, на якій були виготовлені однолезових бокові різці.*

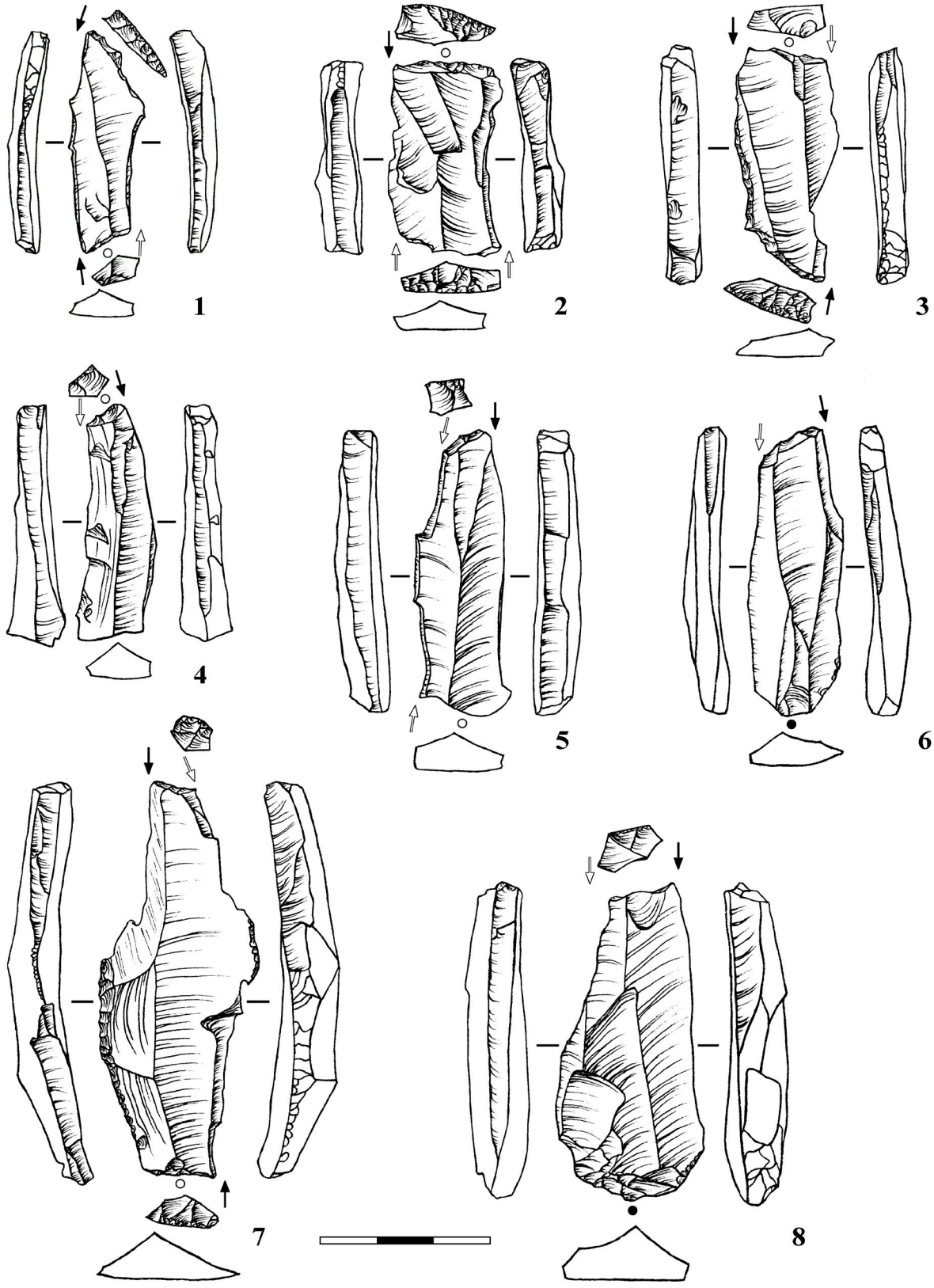


Fig. 7. *Mizyn 1954–1961, reutilised burins, secondary truncated pieces: 1 — opposite; 2, 4 — one-edge, proximal; 3, 7 — opposite-alternative; 5, 6, 8 — one-edge, distal.*

Рис. 7. *Мізин 1954–1961, реутилізовані, повторно тронковані різці: 1 — зустрічні; 2, 4 — однолезові, проксимальні; 3,7 — зустрічно-альтернативні; 5, 6, 8 — однолезові, дистальні.*

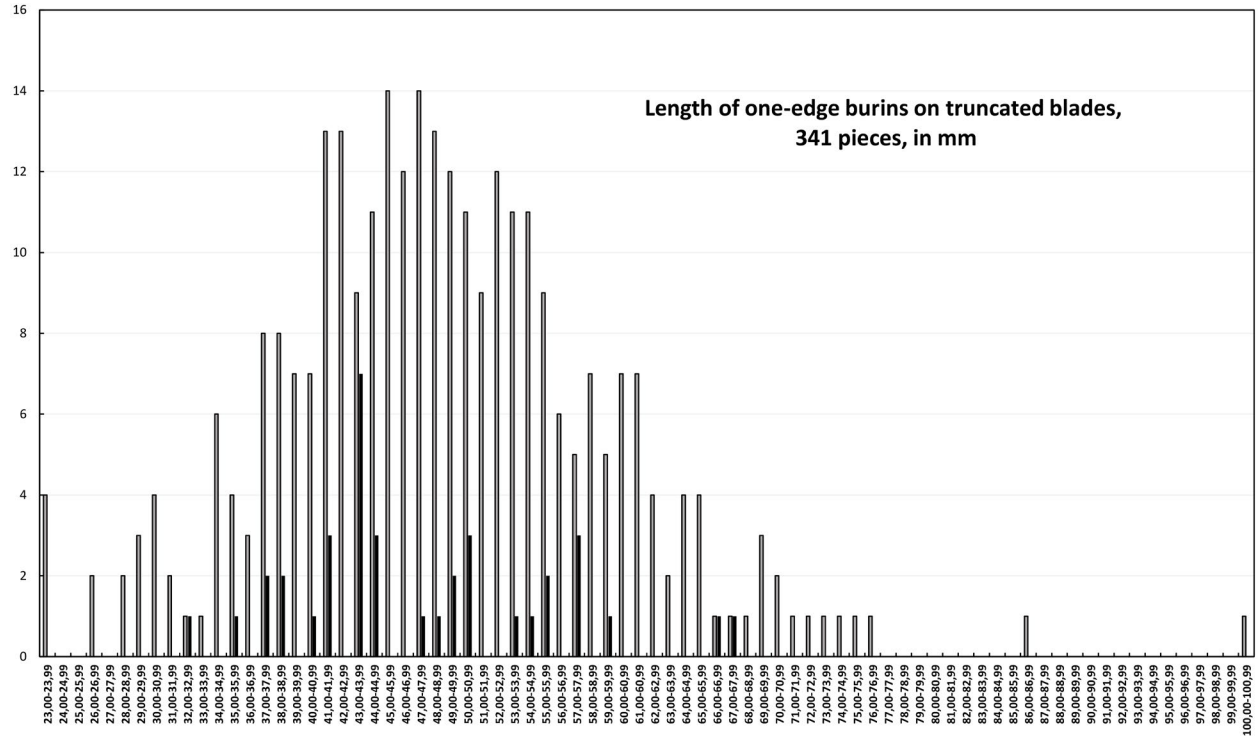
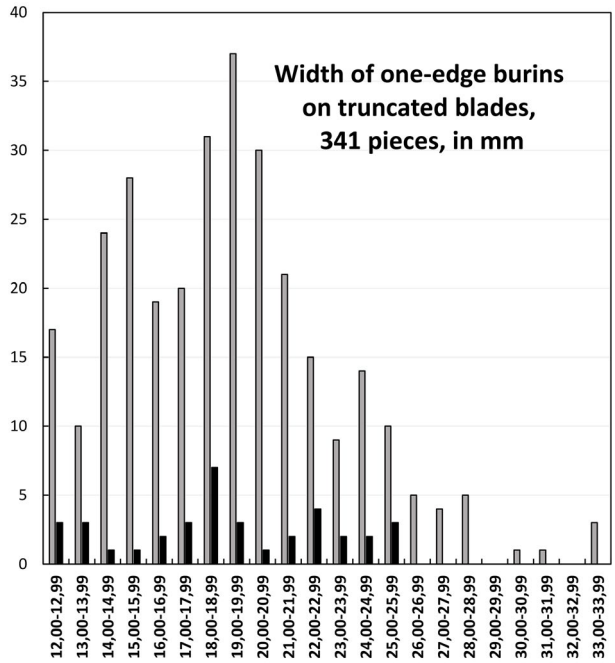


Fig. 8. *Mizyn 1954–1961: length dimensions distributions in mm of one-edge burins on truncated blades; reutilised pieces are highlighted in black.*

Рис. 8. *Мізин 1954–1961: розподіл однолезових бокових різців на пластинах за довжиною у мм відповідно до метричних інтервалів; реутилізовані різці виділено чорним кольором.*



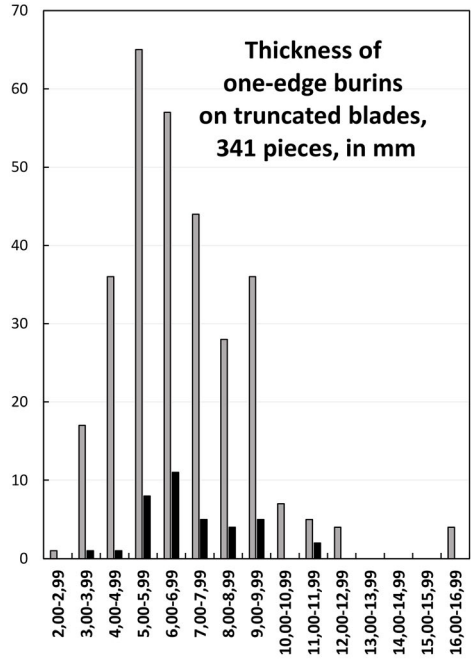


Fig. 9. *Mizyn 1954–1961, one-edge burins on truncated blades: width dimensions distributions in mm; reutilised pieces are highlighted in black.*

Рис. 9. *Мізин 1954–1961, однолезові бокові різці на пластинах: розподіл за шириною у мм відповідно до метричних інтервалів; реутилізовані різці виділено чорним кольором.*

Fig. 10. *Mizyn 1954–1961, one-edge burins on truncated blades: thickness dimensions distributions in mm; reutilised pieces are highlighted in black.*

Рис. 10. *Мізин 1954–1961, однолезові бокові різці на пластинах: розподіл за товщиною у мм відповідно до метричних інтервалів; реутилізовані різці виділено чорним кольором.*

A total of 19 *bi-lateral burins* on truncated pieces were identified, most of which were manufactured on blades, followed by flakes, and a single specimen on unidentifiable *débitage* (Table 3). Most specimens are associated with straight truncations, predominantly on the distal end. Oblique, concave, and oblique-convex truncation types are less frequently represented, but all occur exclusively on the distal end. Only one burin was created on a proximal straight truncation. Only one burin shows evidence of reutilisation by secondary truncation (the proximal end of this specimen was truncated after removing the previous burin spall).

Tools with two opposite or opposite-alternative working edges constitute 20% of the burins on truncations (Fig. 4: 2). Opposite edges were produced along the same lateral side using opposing spall platforms, whereas opposite-alternate edges were formed on different lateral sides, also employing opposing spall platforms.

Opposite burins on truncated pieces exhibit considerable variability in distal and proximal truncation types (Table 4). The most common configuration involves an oblique distal truncation paired with an oblique proximal one, followed by combinations of oblique-convex / oblique, oblique-concave / oblique, and other mixed variants. Although most of these burins were manufactured on blades, a few examples were made on flakes. Overall, the assemblage reflects a broad morphological diversity, with oblique truncations — either on the distal or proximal end — particularly prevalent. Twelve out of forty-five burins show traces of reutilisation by secondary truncation (Fig. 7: 1; 11: 5).

Opposite-alternative burins on truncated pieces that nearly double the number of opposite-edge burins demonstrate a wide range of truncation type combinations, though several configurations dominate. The most frequent is the combination of oblique distal and oblique proximal truncations, followed by oblique-convex / oblique and oblique distal / oblique-convex proximal (Table 5). Other observed variants — such as concave / oblique, oblique-concave / oblique, or straight / concave — are represented by only a few examples each. Most of the burins were made on blades, with a small number produced on flakes, bladelets, or unidentifiable debitage. Like other opposite-type burins, oblique truncations, whether distal or proximal, are especially frequent across the assemblage. Thirteen burins show traces of reutilisation; ten are secondary truncated (Fig. 7: 3, 7), and three are reoriented (Fig. 12: 2, 3).

Bi-lateral-alternative, or three-edged burins, have truncations at both distal and proximal ends. One of these ends bears two burin edges — one on each lateral side — and is therefore referred to as bi-lateral in the description. The opposite end has only a single burin edge, resulting in the tool having three burin edges. This type is represented by 13 specimens in the assemblage (Table 6). Regarding configuration, most specimens exhibit two burin edges on the proximal end, while the dual-edge is located distally in four cases. Despite their limited number, they display a notable range of truncation combinations. The most commonly employed truncation types are oblique, followed by concave, straight, oblique-concave, oblique-convex, and convex, often in mixed configurations. Most of these tools were made on blades, with a few examples on flakes. Five burins were reutilised by secondary truncation, and one by type change.

Bi-lateral-opposite or four-edged burins on truncated pieces are extremely rare in the assemblage, represented by two pieces. One was made on a blade and has straight distal and concave proximal truncations; the other was made on a flake and has oblique-concave distal and straight proximal truncations.

Simple distal and proximal configurations dominate among ***angle burins***, with a slight prevalence of distal forms (Fig. 4: 3). These two categories comprise over 83% of all angle burins recorded in the assemblage. Distal angle burins were often made on blades (n = 33) and flakes (n = 17), with three additional specimens produced on unidenti-

fiable *débitage*. Proximal variants were primarily manufactured on blades (n = 34), with two examples on bladelets and one on a flake. More complex configurations are less common. Bi-lateral types are represented by five distal and four proximal examples, all made on blades. Opposite angle burins appear equally rarely and were produced on both flakes (n = 2) and blades (n = 3). Three opposite-alternative burins were made on blades, and only a single bi-lateral-alternative specimen with a distal bi-lateral configuration was identified.

Quite often, truncation retouch extends into lateral retouch. In some cases, the inclination of the negative relative to the morphological axis of the burin approaches 90°, resembling Suponevo-type burins. However, the presence of oblique or oblique-convex truncation remnants indicates that the blank's terminal, rather than the lateral edge, was initially modified. Therefore, such burins are classified as truncation-type.

Two simple angle burins were reutilised by secondary breakage (Fig. 11: 1). One simple and one opposite-alternative angle burin have the rest of the previous burin spall negative and secondary truncation on the opposite spall platform.

Dihedral burins demonstrate a clear predominance of asymmetrical forms, while symmetrical examples are relatively rare (Fig. 4: 4). The majority of these tools were made on blades (n = 50), followed by flakes (n = 25) and a single piece on unidentifiable debitage. Regarding truncation placement, distal forms are the most common, whereas proximal variants occur less frequently, and bi-terminal examples are comparatively rare (Fig. 6: 4). Ten pieces are reutilised by type change as they have the rest of the truncation before creation of the dihedral burin (Fig. 11: 2, 3, 6, 8). One piece has the rest of the previous burin spall negative and secondary truncation on the opposite spall platform.

Combined burins represent a highly heterogeneous group, encompassing a variety of production strategies that integrate features of truncated, dihedral, angle, and, more rarely, transversal forms (Fig. 6: 2). These tools can be divided into three major subgroups based on the type of combination: truncated / dihedral; truncated / angle and dihedral / angle. Only one specimen represents the truncated / transversal combination. The assemblage primarily consists of blades. In contrast, flakes, chunks, and debitage are also present (Fig. 5: 4).

Truncated / dihedral burins include tools with a truncation at one end and a dihedral one at the other (Table 7). Distal and proximal truncations are represented, with a slight predominance of oblique variants. Asymmetrical dihedral ends appear more frequently than symmetrical ones. Most of these specimens were made on blades, with only a few on flakes. Four pieces have traces of reutilisation. Two burins were changed in type, and two were secondary truncated.

Truncated / angle burins are the largest subgroup, dominated by combinations of truncation and angle edges, often involving opposite or opposite-alternate configurations (Table 8). Oblique truncations are particularly common, both in distal and proximal positions. Production is primarily associated with blades; in several cases, flakes or chunks were used as blanks. Eleven of these burins were reutilised. Eight pieces were reoriented (Fig. 11: 4; 12: 1, 4), and three were secondary truncated.

Dihedral / angle burins are a smaller group that reflects hybridisation between dihedral and angle techniques. Dihedral elements are either symmetrical or asymmetrical and combined with an angle edge, including bi-lateral ones (Table 9). Eight of the nine specimens were made on blades and one on a flake.

A single *truncated / transversal* burin was also identified. It was made on a blade with an oblique distal truncation, while a transversal burin spall negative is present at the proximal end.

Table 3. *Mizyn 1954–1961: burins on tuncations with two working edges, bi-lateral.*

Табл. 3. *Мізин 1954–1961: бокові різці з двома робочими краями, білатеральні.*

Bi-lateral burins on truncated pieces	On flakes	On blades	On unidentifiable debitage	**TOTAL:**
On straight truncations	**3**	**6**	**1**	**10**
distal	3	4	1	8
distal, reutilised	—	1	—	1
proximal	—	1	—	1
On oblique truncations	**2**	**2**	—	**4**
distal	2	2	—	4
On oblique-convex truncations	—	**1**	—	**1**
distal	—	1	—	1
On concave truncations	**2**	**2**	—	**4**
distal	2	2	—	4
TOTAL:	**7**	**11**	**1**	**19**

Table 4. *Mizyn 1954–1961: distribution of the two-edged opposite burins on truncated pieces.*

Табл. 4. *Мізин 1954–1961: дволезові бокові різці із зустрічними лезами.*

Opposite burins on truncated pieces	On flakes	On blades	TOTAL:	%
on straight distal / straight proximal truncations, reutilised	—	1	**1**	*2,22*
on straight distal / oblique proximal truncations	1	2	**3**	*6,67*
on straight distal / oblique-concave proximal truncations	—	1	**1**	2,22
on straight distal / oblique-concave proximal truncations, reutilised	—	1	**1**	*2,22*
on straight distal / concave proximal truncations, reutilised	—	1	**1**	*2,22*
on oblique distal / oblique proximal truncations	—	13	**13**	*28,89*
on oblique distal / oblique proximal truncations, reutilised	1	6	**7**	15,56
on oblique distal / oblique-convex proximal truncations	—	1	**1**	*2,22*
on oblique distal / oblique-convex proximal truncations, reutilised	—	1	**1**	*2,22*
on oblique distal / oblique-concave proximal truncations	—	1	**1**	*2,22*
on oblique-convex distal / oblique proximal truncations	—	5	**5**	11,11
on oblique-convex distal / oblique-concave proximal truncations	—	1	**1**	*2,22*
on oblique-concave distal / oblique proximal truncations	—	2	**2**	*4,44*
on oblique-concave distal / oblique proximal truncations, reutilised	—	1	**1**	*2,22*
on oblique-concave distal / oblique-convex proximal truncations	—	1	**1**	2,22
on oblique-concave distal / convex proximal truncations	—	1	**1**	*2,22*
on convex distal / oblique proximal truncation	—	1	**1**	*2,22*
on concave distal / oblique proximal truncation	—	2	**2**	*4,44*
on concave distal / oblique-concave proximal truncation	—	1	**1**	*2,22*
TOTAL:	**2**	**43**	**45**	*100,00*

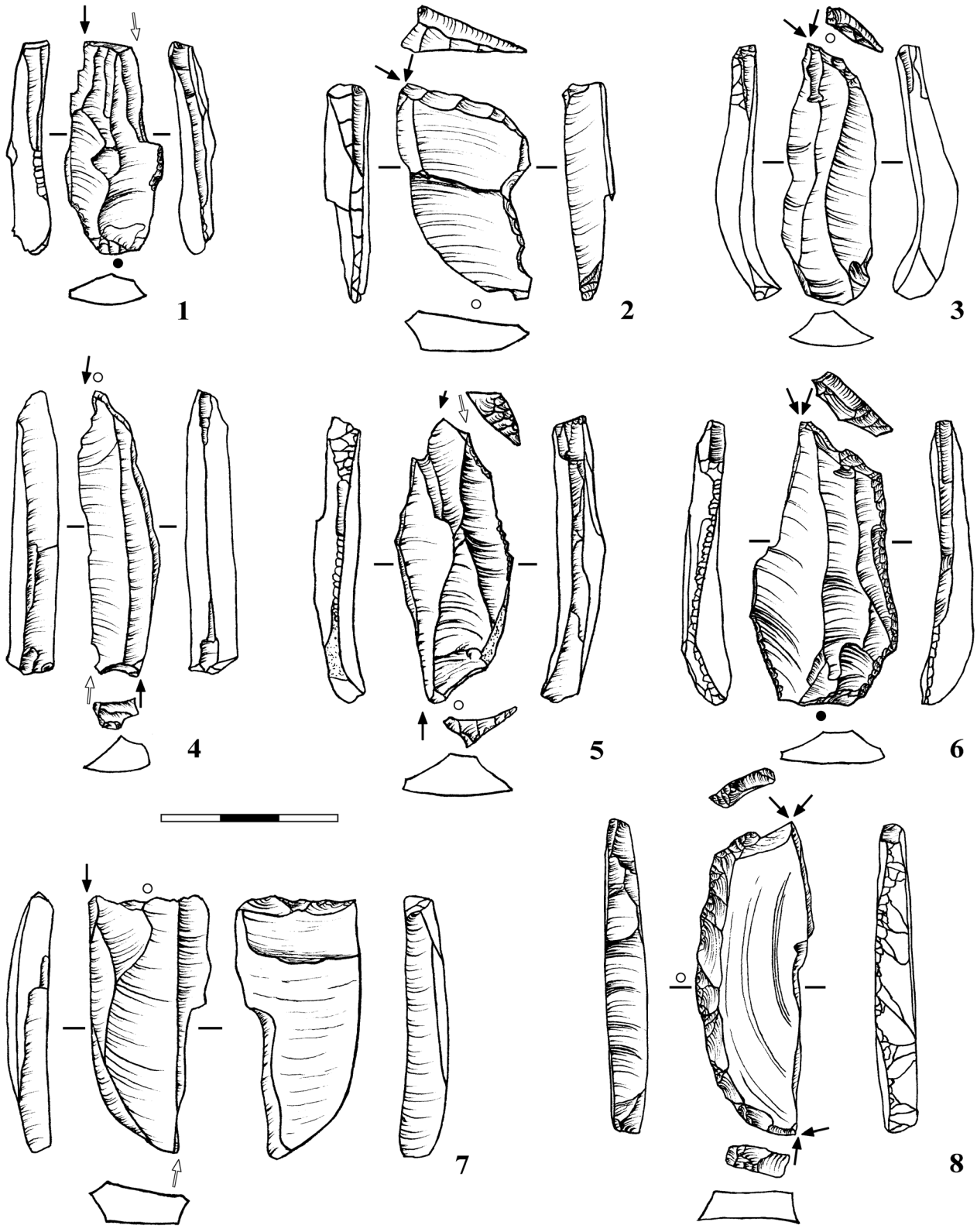


Fig. 11. *Mizyn 1954–1961, reutilised burins: 1 — angle, secondary broken piece; 2, 3, 6, 8 — dihedral, type changed pieces; 4 — combined, reoriented; 5 — opposite on truncation, secondary truncated; 7 — one-edge on truncation, reoriented.*

Рис. 11. *Мізин 1954–1961, реутилізовані різці: 1 — кутовий, повторно зламаний; 2, 3, 6, 8 — серединні, змінений тип; 4 — комбінований, переорієнтований; 5 — боковий, зустрічний, повторно тронкований; 7 — боковий однолезовий, переорієнтований.*

Table 5. *Mizyn 1954–1961: distribution of the two-edged opposite-alternative burins on truncated pieces.*

Табл. 5. *Мізин 1954–1961: дволезові бокові різці із зустрічно-альтернативними лезами.*

Opposite-alternative burins on truncated pieces	On flakes	On blades	On bladelets	On unidentifiable debitage	**TOTAL:**	*%*
on straight distal / straight proximal truncations	—	1	—	—	**1**	*1,33*
on straight distal / straight proximal truncations, reutilised	—	1	—	—	**1**	*1,33*
on straight distal / oblique proximal truncations	—	1	—	—	**1**	*1,33*
on straight distal / oblique proximal truncations, reutilised	—	1	—	—	**1**	*1,33*
on straight distal / concave proximal truncations	—	2	—	—	**2**	*2,67*
on oblique distal / straight proximal truncations	—	2	—	—	**2**	*2,67*
on oblique distal / oblique proximal truncations	1	22	1	—	**24**	*32,00*
on oblique distal / oblique proximal truncations, reutilised	—	2	—	—	**2**	*2,67*
on oblique distal / oblique-convex proximal truncations	—	8	—	—	**8**	*10,67*
on oblique distal / oblique-convex proximal truncations, reutilised	1	—	—	—	**1**	*1,33*
on oblique distal / oblique-concave proximal truncations	—	3	—	—	**3**	*4,00*
on oblique distal / oblique-concave proximal truncations, reutilised	—	1	—	—	**1**	*1,33*
on oblique distal / concave proximal truncations	—	1	—	1	**2**	*2,67*
on oblique distal / concave proximal truncations, reutilised	—	2	—	—	**2**	*2,67*
on oblique-convex distal / straight proximal truncations	—	1	—	—	**1**	*1,33*
on oblique-convex distal / oblique proximal truncations	—	9	—	—	**9**	*12,00*
on oblique-convex distal / oblique proximal truncations, reutilised	—	1	—	—	**1**	*1,33*
on oblique-convex distal / oblique-convex proximal truncations, reutilised	—	1	—	—	**1**	*1,33*
on oblique-convex distal / concave proximal truncations	—	1	—	—	**1**	*1,33*

Continuation of Table 5. *Mizyn 1954–1961: distribution of the two-edged opposite-alternative burins on truncated pieces.*

Продовження Табл. 5. *Мізин 1954–1961: дволезові бокові різці із зустрічно-альтернативними лезами.*

Opposite-alternative burins on truncated pieces	On flakes	On blades	On bladelets	On unidentifiable debitage	**TOTAL:**	*%*
on oblique-concave distal / straight proximal truncations	—	1	—	—	**1**	*1,33*
on oblique-concave distal / oblique proximal truncations	—	2	1	—	**3**	*4,00*
on oblique-concave distal / oblique-convex proximal truncations	—	1	—	—	**1**	*1,33*
on oblique-concave distal / concave proximal truncations	—	1	—	—	**1**	*1,33*
on oblique-concave distal / concav proximal truncations, reutilised	—	1	—	—	**1**	*1,33*
on convex distal / oblique proximal truncations, reutilised	—	1	—	—	**1**	*1,33*
on concave distal / oblique proximal truncations	—	1	—	—	**1**	*1,33*
on concave distal / oblique proximal truncations, reutilised	1	—	—	—	**1**	*1,33*
on concave distal / concave proximal truncations	—	1	—	—	**1**	*1,33*
TOTAL:	**3**	**69**	**2**	**1**	**75**	**100,00**

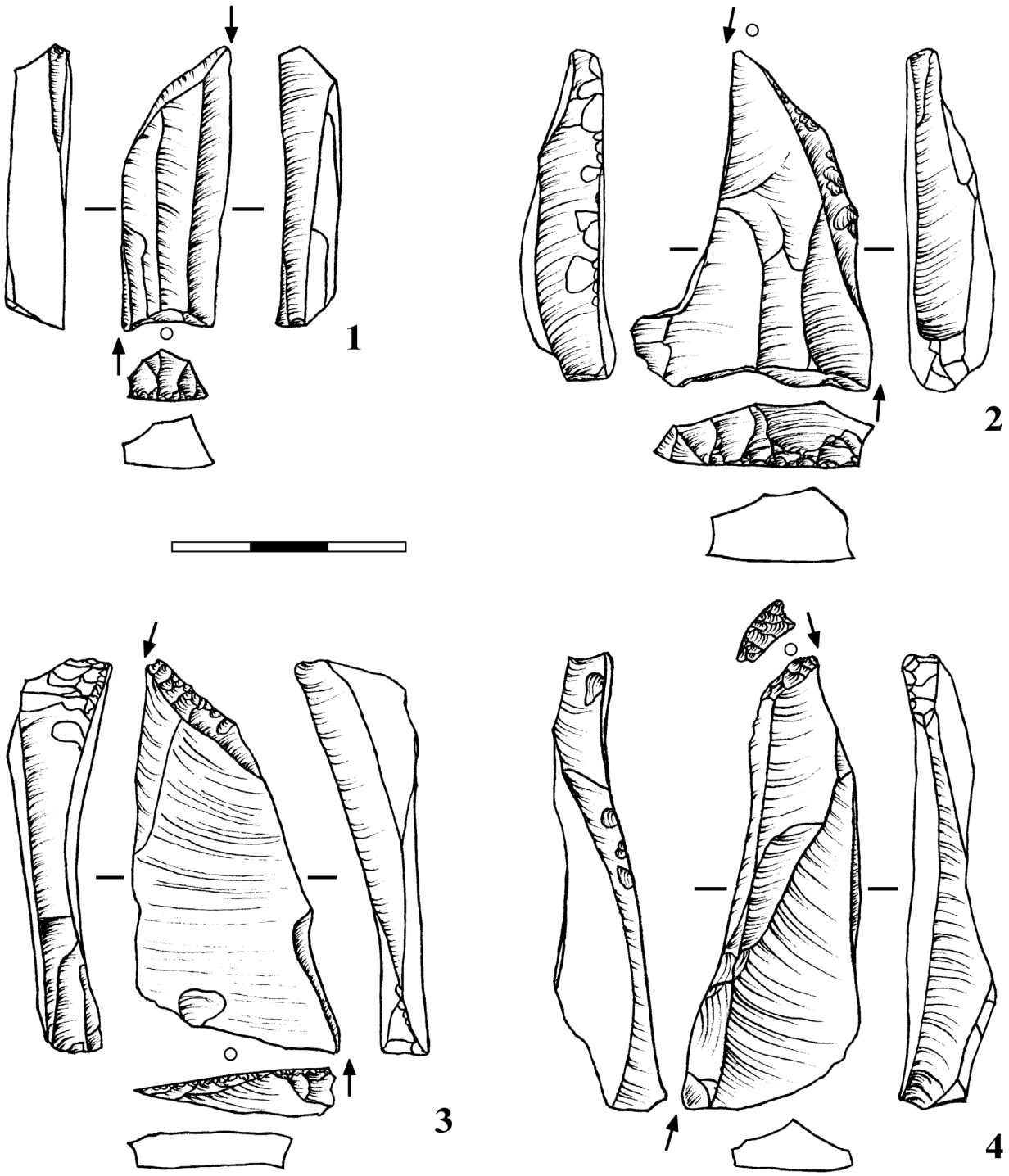


Fig. 12. *Mizyn 1954–1961, reutilised burins, reoriented: 1, 4 — combined, truncated / angle; 2, 3 — opposite-alternative on truncations, reoriented pieces.*

Рис. 12. *Мізин 1954–1961, реутилізовані різці, переорієнтовані: 1, 4 — комбіновані, тронковані / кутові; 2, 3 — зустрічно-альтернативні, бокові, переорієнтовані.*

Table 6. *Mizyn 1954–1961: distribution of the three-edged bi-lateral-alternative burins on truncated pieces.*

Табл. 6. *Мізин 1954–1961: трилезові бокові різці із зустрічно-альтернативними лезами.*

3-edged bi-lateral-alternative burins on truncated pieces	On flakes	On blades	**TOTAL:**
on oblique distal, bi-lateral / straight proximal truncations, reutilised	1	—	1
on oblique distal / oblique proximal, bi-lateral, truncations	—	1	**1**
on oblique distal / oblique proximal, bi-lateral, truncations, reutilised	—	1	**1**
on oblique distal / concave proximal, bi-lateral, truncations	—	1	1
on oblique-convex distal / concave proximal, bi-lateral, truncations	—	1	**1**
on oblique-convex distal / concave proximal, bi-lateral, truncations, reutilised	1	—	1
on oblique-concave distal straight proximal, bi-lateral, truncations	—	1	**1**
on oblique-concave distal, bi-lateral / oblique proximal truncations, reutilised	—	1	**1**
on oblique-concave distal, bi-lateral / oblique-concave proximal truncations	—	1	1
on oblique-concave distal / concave proximal, bi-lateral, truncations	—	1	**1**
on concave distal / straight proximal, bi-lateral, truncations, reutilised	1	—	1
on concave distal / oblique proximal, bi-lateral, truncations, reutilised	—	1	**1**
on concave distal, bi-lateral / convex proximal truncations	—	1	**1**
TOTAL:	**3**	**10**	13

Table 7. *Mizyn 1954–1961: distribution of the combined truncated / dihedral burins.*

Табл. 7. *Мізин 1954–1961: комбіновані бокові із серединними різці.*

Combined truncated / dihedral burins	On flakes	On blades	**TOTAL:**
on straight truncation (distal) / dihedral-asymmetrical, reutilised	1	—	1
on straight truncation (proximal) / dihedral-symmetrical	—	1	**1**
on straight truncation (proximal) / dihedral-asymmetrical	—	1	**1**
on oblique truncation (distal) / dihedral-symmetrical	—	1	1
on oblique truncation (distal) / dihedral-asymmetrical	—	1	**1**
on oblique truncation (proximal) / dihedral-symmetrical	1	—	1
on oblique truncation (proximal) / dihedral-asymmetrical	—	1	**1**
on oblique truncation (proximal) / dihedral-asymmetrical, reutilised	—	1	**1**
on oblique-convex truncation (distal) / dihedral-asymmetrical	—	1	1
on oblique-convex truncation (proximal) / dihedral-symmetrical	—	1	**1**
on oblique-concave truncation (distal) / dihedral-asymmetrical, reutilised	1	—	1
on oblique-concave truncation (proximal) / dihedral-symmetrical	—	1	**1**
on oblique-concave truncation (proximal) / dihedral-asymmetrical	—	1	**1**
on convex truncation (proximal) / dihedral-symmetrical	**1**	—	1
on concave truncation (proximal) / dihedral-asymmetrical, reutilised	—	**1**	1
bi-lateral on concave truncation (proximal) / dihedral-symmetrical	—	**1**	1
TOTAL:	**5**	**21**	**26**

Table 8. *Mizyn 1954–1961: distribution of the combined truncated / angle burins.*

Табл. 8. *Мізин 1954–1961: комбіновані бокові / кутові різці.*

Combined truncated / angle burins	On flakes	On blades	On chunks	On unidentifiable debitage	**TOTAL:**
on oblique truncation (distal) / bi-lateral angle	—	1	—	—	**1**
on oblique-convex truncation (distal) / bi-lateral angle, reutilised	—	1	—	—	**1**
on concave truncation (distal) / bi-lateral angle	—	1	—	—	**1**
bi-lateral on oblique-convex truncation (proximal) / angle, reutilised	—	1	—	—	**1**
bi-lateral on concave truncation (distal) / angle, reutilised	—	1	—	—	**1**
bi-lateral on concave truncation (proximal) / angle, reutilised	—	1	—	—	**1**
opposite: on straight truncation (distal) / angle	—	3	—	—	**3**
opposite: on oblique truncation (distal) / angle	—	4	—	—	**4**
opposite: on oblique truncation (proximal) / angle	—	8	1	—	**9**
opposite: on oblique-convex truncation (distal) / angle	1	3	—	—	**4**
opposite: on oblique-concave truncation (proximal) / angle	—	1	—	—	**1**
opposite: on convex truncation (proximal) / angle	—	1	—	—	**1**
opposite: on concave truncation (proximal) / angle	1	—	—	1	**2**
opposite-alternate: on straight truncation (distal) / angle	—	1	—	—	**1**
opposite-alternate: on straight truncation (proximal) / angle, reutilised	—	1	—	—	**1**
opposite-alternate: on oblique truncation (distal) / angle	1	4	—	1	**6**
opposite-alternate: on oblique truncation (distal) / angle, reutilised	—	1	—	—	**1**
opposite-alternate: on oblique truncation (proximal) / angle	—	5	—	—	**5**
opposite-alternate: on oblique truncation (proximal) / angle, reutilised	—	1	—	—	**1**
opposite-alternate: on oblique-convex truncation (distal) / angle	—	1	—	—	**1**
opposite-alternate: on oblique-convex truncation (distal) / angle, reutilised	—	1	—	—	**1**
opposite-alternate: on oblique-convex truncation (proximal) / angle	—	—	1	—	**1**
opposite-alternate: on oblique-concave truncation (distal) / angle	—	1	—	—	**1**
opposite-alternate: on oblique-concave truncation (distal) / angle, reutilised	—	1	—	—	**1**

Continuation of Table 8. *Mizyn 1954–1961: distribution of the combined truncated / angle burins.*

Продовження Табл. 8. *Мізин 1954–1961: комбіновані бокові / кутові різці.*

Combined truncated / angle burins	On flakes	On blades	On chunks	On unidentifiable debitage	**TOTAL:**
opposite-alternate: on oblique-concave truncation (proximal) / angle, reutilised	—	3	—	—	**3**
opposite-alternate: on concave truncation (distal) / angle	—	4	—	—	**4**
opposite-alternate: on concave truncation (proximal) / angle	—	8	1	—	**9**
opposite-alternate: on concave truncation (proximal) / angle, reutilised	1	3	—	—	**4**
TOTAL:	**3**	**48**	**2**	**2**	**55**

Table 9. *Mizyn 1954–1961: distribution of the combined dihedral / angle burins.*

Табл. 9. *Мізин 1954–1961: комбіновані серединні / кутові різці.*

Combined dihedral / angle burins	On flakes	On blades	**TOTAL:**
dihedral-symmetrical (proximal) / angle	1	1	**2**
dihedral-asymmetrical (distal) / angle	—	4	**4**
dihedral-asymmetrical (proximal) / angle	—	2	**2**
dihedral-asymmetrical (distal) / bi-lateral angle	—	1	**1**
TOTAL:	**1**	**8**	**9**

Burin spalls.

A total of 407 complete burin spalls were analysed and categorised into three main groups: primary, secondary, and multiple. Secondary spalls exhibit a single negative from a prior removal, whereas multiple spalls display two or more overlapping negatives. Collectively, secondary and multiple spalls outnumber primary ones (Table 10). Some multiple burin spalls bear opposite-facing negatives, indicating that the burin was reoriented during use. Approximately one-third of all burin spalls show evidence of retouching before detachment. A comparable structure of the burin spall assemblage was also observed at the Barmaky site (Chabai et al. 2022, p. 123).

The majority of spalls (85%) were removed off-axis. An incurved profile is most common, found in about 50% of the sample, with the curvature typically concentrated in the medial section. Most spalls terminate in a hinged distal end and exhibit a steep lateral cross-section. Platform characteristics are consistent across the assemblage: they are often faceted, untrimmed, unabraded, and unlipped, with either pronounced or diffuse bulbs. The platform angles vary between right and acute.

Truncation spalls were observed during the analysis of the burin assemblage. Some rejuvenating truncation spalls had been previously mistakenly identified as burin fragments. These three identified specimens exhibit remnants of dorsal truncation as well as negatives from previous burin spall removals. Such spalls related to the rejuvenation and reshaping of truncated burin ends were identified during the study of the Barmaky site (Нужний 2015, с. 175, рис. 91: 30, 31; с. 176, рис. 92: 34–36; с. 177; с. 178, рис. 93: 31–34; Chabai et al. 2022, p. 123).

Conclusions.

Reutilisation traces are observed on 12.35% of the burin assemblage. This group of tools was defined within the framework of broader burin types, as all burins were typologically classified based on the nature of the final spall platform preparation and the characteristics of burin spall removals. Reutilised burins were divided into four groups:

1. Secondary truncation (Fig. 7: 1–8; 11: 5) is the most frequent form of burin reutilisation (74.53%), observed on most reused specimens. This secondary use is most frequently associated with previously using a burin as a truncation or angle type, and then making the subsequent burin spall removal on the opposite lateral side after rejuvenation of the spall platform by secondary truncation. Analysis of metric dimensions indicates a slight decrease in length resulting from the reutilisation process (Fig. 8).
2. A smaller group of pieces reflects a change in tool type (13.21%), most frequently involving the transforming one burin form into another, particularly from burins on truncations into dihedral. These burins have burin spall nega-

Table 10. *Mizyn 1954–1961: distribution of the burin spalls.*

Табл. 10. *Мізин 1954–1961: різцеві сколи.*

Burin spalls	Regular	Retouched	**TOTAL:**	*%*
Primary	105	81	**186**	*45,70*
Secondary	114	27	**141**	*34,64*
Multiple	41	15	**56**	*13,76*
Multiple, bidirectional	19	5	**24**	*5,90*
TOTAL:	**279**	**128**	**407**	*100,00*

tive above the previous truncation (Fig. 11: 2, 3, 6, 8). The intention was probably to rejuvenate the spall platform rather than change the burin type.

Sometimes, the axis of modification and flake removal do not coincide (Fig. 11: 8), which may lead to misinterpretation. Among the analysed specimens are flakes of *Kantenabshläge*. Their massive form and transverse orientation relative to the flaking axis made it possible to produce high-quality truncated-type burins and reutilise them.

3. Reorientation is recorded in 10.38% of cases, where a new truncation or working edge was prepared on a different axis or end of the blank. Usually, it differs from regular three- or four-edged burins because of clear evidence of using the previous burin spall negative as a spall platform for the new burin spall removal (Fig. 11: 4; 12: 1–4). In these cases, burin spalls are plunging spalls (Inizan et al. 1999, p. 38, 135, fig. 61: 4, 5). One burin was reoriented as indicated by the remains of a previous burin spall negative on the opposite lateral side (Fig. 11: 7). There is a risk of incorrectly identifying reoriented burins as dihedral, since the negative from a burin spall of the plunging type (Fig. 12: 1) or opposite removal (Fig. 11: 7) may create a misleading impression of a previous removal used to form a dihedral burin.
4. Two burins were reutilised by creating secondary breakage (Fig. 11: 1). It is the angle burin in the final stage of its use; previously, it could also be an angle or truncated burin.

Reutilisation thus emerges as an integral part of the burin use-life cycle, with technological flexibility and tool longevity maintained through targeted reuse strategies, particularly via truncation renewal.

The significant proportion of reutilised burins indicates a high intensity of use of these tools. Considering that the raw material outcrops used for their production are located near the site, the extensive exhaustion of the burins cannot be explained by a shortage of raw material. The large number of burins and the high intensity of their use were evidently related to the activities of the site's inhabitants. At the Mizyn site, numerous bone and ivory artefacts have been documented, the production of which would have required the frequent use of burins (Шовкопляс 1965, с. 179–257).

Discussion.

Burins on truncated pieces dominate all Epigravettian technocomplex industries in the Middle Dnipro basin. Producing burins through truncation was likely the most efficient method, as it ensured the strength of the blank and allowed for repeated rejuvenation. Nonetheless, the Mezhyrich industry, especially at sites like Dobranichivka and Semenivka 2 and 3, is characterised by a significantly higher frequency of angle burins than other Epigravettian assemblages. This pattern may reflect a stylistic characteristic or the specific quality of raw materials employed in these complexes. Whereas the Mizyn industry utilised flint raw material primarily in nodules and plaquettes, the Mezhyrich industry relied mostly on pebbles, which differ in their properties from nodules and plaquettes. Generally, blade blanks from Mezhyrich industry sites exhibit dimensional differences compared to those from Mizyn and Barmaky. While the blade lengths at Barmaky and Mizyn range between 46 and 55 mm, those from Mezhyrich, Dobranichivka, and Semenivka 3 are generally shorter, falling within the range of approximately 30 to 40 mm (Chabai, Dudnyk 2022, p. 47; Нужний, Шидловський, Лизун 2017, с. 46, рис. 16). It is possible that smaller blanks were more difficult to truncate, which may have led to the use of intentional breakage as a method for producing angle burins. However, this may reflect a local feature or a functional difference between burin types.

At the current research stage, it is impossible to determine whether each burin type served a distinct function. Due to the properties of the flint raw material, the cutting edge tends to become dull rela-

tively quickly, necessitating regular rejuvenation. The significant number of reutilised burins indicates a high intensity of use of these tools. However, traces of reutilisation could be absent, so applying the refitting method might be helpful. Nevertheless, the patterns observed in this study point to a considerable presence of reutilised burins and suggest that reutilisation was a common and systematic practice.

In addition, the typological analysis of the Mizyn burins, especially the frequent occurrence of bi-lateral, bi-lateral-alternative, and bi-lateral-opposite forms, indicates an intensive use of blank volume. The high proportion of combined burins also indicates the maximised efficiency in blank exploitation.

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На краю різця: виготовлення та реутилізація різців у колекції Мізинської стоянки

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Різці становлять найчисельнішу категорію знарядь у колекціях усіх епіграветських пам'яток басейну Середнього Дніпра. Домінуючою категорією майже на всіх стоянках є різці на тронкованих сколах (бокового типу). Попри це, технологія виготовлення та реутилізації цих знарядь залишається недостатньо вивченою. Представлена робота є результатом дослідження проведеного завдяки стипендіальній програми від Німецького археологічного інституту в рамках проекту «Documenting, Recording and Saving Ukrainian Archaeological Heritage».

Метою дослідження було виявлення технологічно значущих рис виготовлення різців, класифікація та з'ясування наявності та значення явища реутилізації серед колекції цілих виробів (858 екз.) Мізинської стоянки за 1954-1961 рр. розкопок. Для цього було застосовано метод attribute analysis, за допомогою якого вивчалися як якісні, так і кількісні параметри артефактів. Для класифікації було використано підхід апробований при дослідженні стоянки Бармаки (Чабай та ін. 2020, с. 115, табл. 5), поки що єдиної відомої аналогії Мізину.

Загалом, різці та пластинчасті сколи стоянки Мізин, як і Бармаки, мають більші розміри (Chabai, Dudnyk 2022, p. 47), аніж на стоянках Межиріч, Добранічівка та Семенівка 3 (Нужний, Шидловський, Лизун 2017, с. 46, рис. 16), що вірогідно пояснюється особливістю сировини. Найпоширенішим методом виготовлення різців у колекції Мізину є тронкування, виконане переважно за допомогою крутої дорсальної скалярної ретуші. Також, половині різців притаманне латеральне ретушування (здебільшого напів-круте дорсальне скалярне / маргінальне). Часто тронкування переходить у латеральну часткову чи безперервну ретуш. Співвідношення кількості різців до кількості ріжучих країв — 1:40, а ріжучих країв до негативів різцевих сколів — 1:50, що свідчить про високу інтенсивність використання цих знарядь.

Про інтенсивність експлуатації потенціалу заготовки свідчить і значна кількість різців, що мають більше одного різцевого краю, наявних серед усіх типів. Окрім того, поширеними є різці

комбінованого типу, що вірогідно утворювалися ситуативно, виходячи з особливостей та потенціалу заготовки. Також на інтенсивність використання різців вказує переважання вторинних різцевих сколів на первинними.

Реутилізовані різці наявні серед усіх типів, представлені такими способами виготовлення як повторна тронкація, переорієнтація вісі заготовки, зміна типу різця та повторний злам заготовки. Аналіз метричних показників цілих звичайних та реутилізованих різців на тронкованих пластинах свідчить про те, що в процесі їх повторного використання довжина та ширина зменшувалася. Наявність підживлюючих сколів тронкації підтверджує факт повторного тронкування та використання різців.

Ключові слова: басейн Середнього Дніпра, епігравет, мізинська індустрія, крем'яний комплекс, різці, attribute analysis, технологія, типологія.