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The Lithic Industry of the Kamyane-Zavallia Linearbandkeramik Site in Ukraine (2019 Campaign)

Abstract

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The paper treats a selection of lithic finds from Kamyane-Zavallia (Kam'âne-Zavallâ) – the easternmost Linearbandkeramik culture (LBK) site ever excavated. The lithic assemblage belongs to typical representatives of the early farming lithic industries in the region. It is characterized by prismatic cores for blade production, end-scrapers on fragmented blades and flakes, retouched blades, perforators, and a blade fragment with "sickle gloss". There is a single projectile point of unidentifiable morphology. The authors argue that there is no trace of "Mesolithic heritage" in the assemblage of Kamyane-Zavallia. The assemblage finds close parallels in the sites of Nicolaevca V, Dănceni I, and other LBK sites from Moldova and Romania.

Keywords: Linearbandkeramik, lithic technology, operative chain, trapezes, "Mesolithic heritage"

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Introduction

The study of chipped stone assemblages has been and continues to be an important topic of research in Neolithic studies. Several archaeologists have also attempted to identify and study the different technological traditions in particular lithic industries, especially in the production of lithic tools in the Linearbandkeramik culture (LBK) in the area of its easternmost extent. However, the majority of these studies have focused on typological compositions of assemblages or on certain technological traits (Danilenko 1969; Păunescu 1970; Markevič 1974; Telegin 1985; Larina 1994; Țurcanu 2009). While in Western and Central Europe, the systematic dynamic reconstruction of operative chains became the de-facto standard in research on lithic assemblages of LBK (Allard 2004; Kozłowski and Nowak 2008; Mateiciucova 2008; Allard and Denis 2015), there is yet a long road to be traveled until this approach becomes the standard in Eastern Europe (Vornicu 2012; 2017; Šidlovs´kij and Slêsarêv 2015). Here, we propose a small step in this direction: the publication of a small but quite distinctive lithic assemblage coming from the largest excavation campaign (2019) at the easternmost-ever excavated settlement of LBK – Kamyane-Zavallia (Fig. 1).

The site and the method

Here we will attempt to exemplify the approach by reference to a sample of LBK lithics from the site of Kamyane-Zavallia (Odesa region, Ukraine) recov-

Fig. 1. A – location of Kamyane-Zavallia on the map of Europe (1); B – location of excavation trench 2012–2016 (R12-16) and that of 2019 (R2019, symbols out of scale) (source: Google Earth).

ered during the 2019 campaign. Kamyane-Zavallia is the easternmost LBK site ever excavated (Kiosak 2014; 2017). It was found in 2011 and researched on several occasions in 2012–2016 (Kiosak 2019a). In 2013, a geomagnetic survey of the site was carried out by a team from the University of Regensburg, Germany (Saile *et al.* 2016a; 2016b). The works of 2014–2016 were centered on a large, long pit (Kiosak and Radchenko 2021) over 20 meters long and covering some 120 sq. m. The excavations were carried out in a microstratigraphic way using small excavating tools. These works recovered several hundred lithic items published separately (Kiosak 2019a).

In 2019 a large excavation campaign was conducted by a joint international team (Fig. 2). The strategy of excavations and the methods employed were quite different: the larger area was opened, looking for the spatial organization of features. The opened area (480 sq. m.) contained remains of several Neolithic pits of various shapes (at least 7 features; Fig. 2: A). The excavations resulted in the recovery of 173 chipped stone objects which are studied in this paper. This sample is more than three times smaller than the collection of the 2012–2016 years. However, it is better comparable with the collections previously obtained from the numerous LBK sites because similar excavation methods were utilized, rather than the microstratigraphic "Paleolithic"

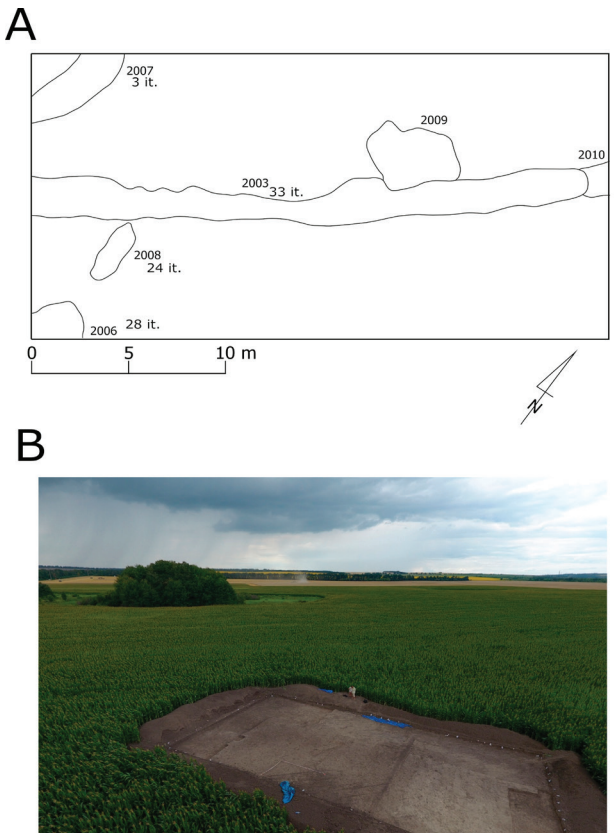

Fig. 2. A – plan of excavation unit of 2019 at Kamyane-Zavallia with an indication of the number of lithics retrieved (2001…2010 – indices of features); B – general photo of the excavation unit of 2019 (drawn by S. Radčenko; photo by S. Radčenko).

way of excavations used in 2012–2016. Thus, these two collections coming from Kamyane-Zavallia should be studied separately in order to account for possible discrepancies related to the different excavation methods.

The analysis relies on a "techno-typological characteristic", a work-flow developed by V. N. Stanko (Stanko 1982; Stanko *et al*. 1999; Stanko and Kiosak 2010) for the analysis of Mesolithic chipped stone assemblages. It is based on a consecutive analysis of the main components attributable to certain stages of a generalized operative chain of knapping: 1) primary treatment: decortication, core preparation, detachment of blades and flakes, maintenance; and 2) secondary treatment: retouch, trimming, or burin blow. The debitage has been subdivided into flakes and laminar pieces – and the latter into microblades (<0.7 cm wide), medium blades or bladelets (0.7–1.2 cm wide), large blades (1.2–2.0 cm wide), and very large blades (>2.0 cm wide). Intact specimens are few, making a metric classification based on their length impossible. The tools were described according to the regional typological list for the Neolithic (Telegín 1976), with additions and modifications.

The finds

The excavation of 2019 yielded 173 chipped stone items; 126 were collected as individual finds (and thus, have associated coordinates). Others can be only attributed to a certain square or to a certain feature.

The raw material is represented mainly by light-grey, transparent and semi-transparent flint of excellent quality. It has a smooth chalk cortex. A similar macroscopic group coming from the earlier excavations at Kamyane-Zavallia is identical to so-called Volhynian flints as defined by petrographic analysis (done by Helen Wehren) (Kiosak 2019a). Other groups are only represented by some items: alluvial flint from valleys of Southern Buh and Dniester, and non-transparent dark-gray flint of Ukrainian Crystalline Shield. Some artefacts are heavily patinated or burnt, so their raw material cannot be examined. According to the materials of the Kamyane-Zavallia collection, high-quality raw materials of the Volhynian type account for more than 75% of the studied sample. The vast majority of the analyzable objects have retained a primary flint crust, which indicates a connection with the primary deposits of this raw material. The closest of them are recorded in the north of the modern Khmelnytskyi region, more than 250 km northwest of the settlement (Petrougne 1995). Thus, despite settling down, early farmers from Kamyane-Zavallia were able to provide themselves with high-quality raw materials from afar, likely via an exchange network (Kiosak 2019a).

The collection comprises a pebble, three cores, 14 technological flakes, 63 flakes, 39 laminar and lamellar detachments, five chunks, and 41 retouched tools (Tab. 1).

The cores belong to different varieties: an exhausted core for bladelets (21 × 18 mm); a flank, mas-

Table 1. Summary of the collection.

N	Group of inventory	2019	%	2012–2016	%
1	Pebble	1	0.58	3	0.47
2	Cores	3	1.73	8	1.26
3	Core-like fragments (as defined by Stanko *et al*. 1999)	3	1.73	2	0.32
4	Technological flakes	14	8.09	56	8.85
	Incl. primary and half-corticated flakes	4	2.31	21	3.32
5	Flakes and chips	63	36.42	279	44.08
6	Blades and bladelets	39	22.54	97	15.32
7	Microblades	0	0.00	3	0.47
8	Chunks	5	2.89	15	2.37
9	Tools	41	23.70	170	26.86
	Total	173	100.00	633	100.00

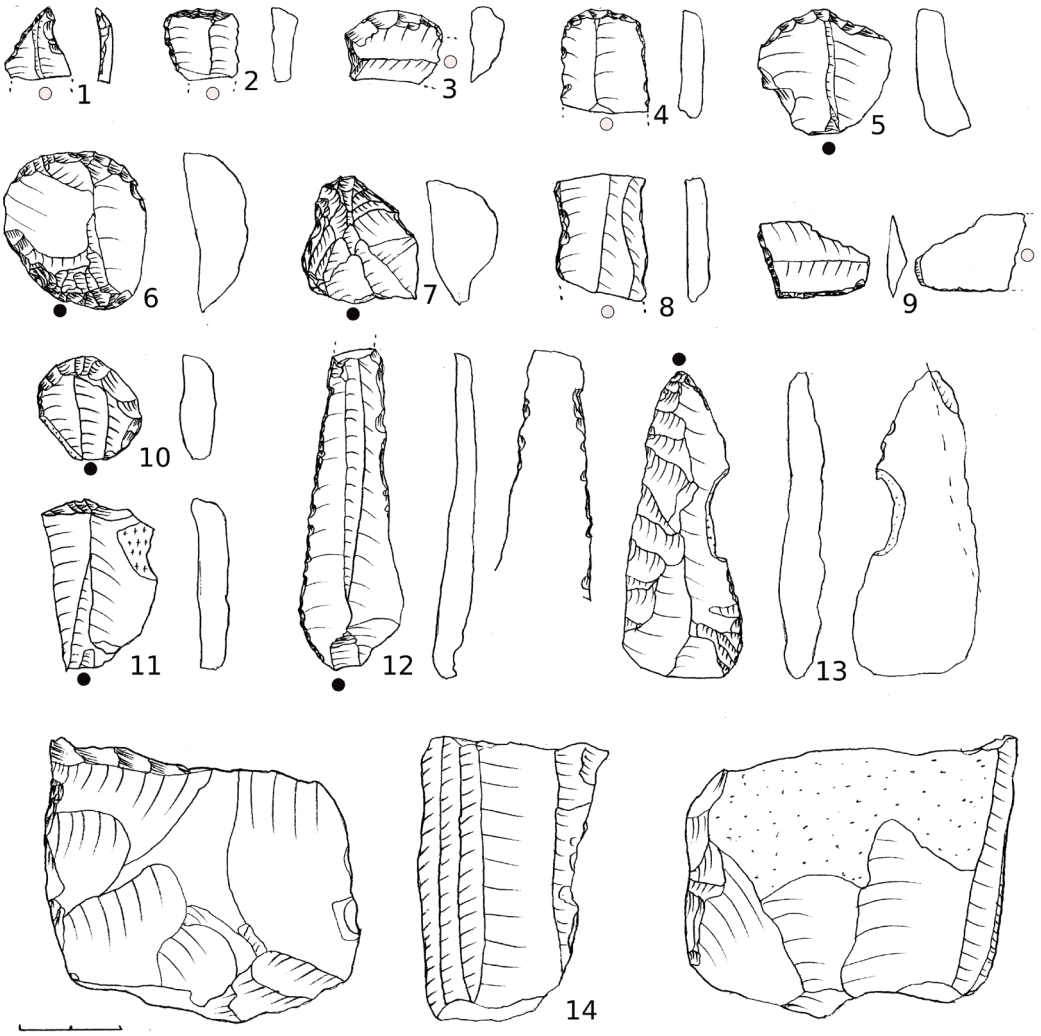

Fig. 3. Lithic finds of Kamyane-Zavallia, 2019 campaign (drawn by D. Kiosak). Dots indicate the point of impact: filled dots – preserved, empty dotes – not preserved.
1 – bladelet with oblique truncation; 2–7, 10–11 – end-scrapers; 9 – microlithic point; 8, 12–13 – retouched blades; 14 – core.

sive core for blades with a single striking platform (Fig. 3: 14); and a core for bladelets with two platforms with diverging working surfaces.

Corticated detachments include seven flakes and four blades. They reflect the on-site exploitation of objects still bearing primary cortexes, so transported from an outcrop in the shape of raw nodules/pebbles or pre-forms retaining large surfaces covered by cortex. The technical flakes comprise an edge flake, a reorientation flake, a crested flake, a flake of the working element of a hammerstone, a semi-crested blade (*lame demi-crête*), and four rejuvenation flakes. The latter include both real *tablettes* and narrow flakes knapped along an edge of core's platform. The set of technological pieces reflects on-site knapping of cores oriented both for blades and flake production, sometimes with a complex preparation of a working surface or a striking platform. However, their numbers and the number of cores are disproportionally small in comparison with the retouched tools in the collection.

Non-retouched flakes (Tab. 2) outnumber non-retouched blades (36%:22%). However, the latter were most often used as blanks for retouched tools. Thus, we can suppose that the blades were intended products of knapping.

The typical laminar detachment is an elongated flake with subparallel sides and a regular dorsal pattern, relatively thick and wide. It has wavy negatives of previous detachments on its dorsal surface and no traces of removal of an overhang between a butt and a dorsal surface. It is likely that most of the blades, in particular those which retained an overhang, were made by means of the punch technique (Pelegrin 2012).

Table 2. Flake sizes.

Size (cm)	No cortex	With cortex	Semi--corticated	Primary	Total
0–1	2	1	0	0	3
1–3	24	7	2	5	38
3–5	12	6	1	2	21
> 5	0	1	0	0	1
	38	15	3	7	63

Table. 3. Blade and bladelets: size and fragmentation.

Mm	0–7	7–12	12–20	> 20	Total
Intact	0	1	5	0	6
Proximal	0	5	13	1	19
Medial	0	3	2	1	6
Distal	0	4	4	0	8
Total	0	13	24	2	39

The retouched tools comprise 23% of the chipped stone items (Tab. 4). This is slightly less than in the collection of 2014–2016. In general, the share of retouched tools is close to 25% of the lithic assemblage. This percentage indicates that some share of the tools was not produced on-site but was imported from elsewhere and, thus, Kamyane-Zavallia is a *consument* settlement similar to LBK sites from the Dniester basin: Nicolaevca V and Dănceni I (Kiosak *et al.* 2021).

End-scrapers make up the most numerous group (slightly less than one in two tools, 17 items, 41.5%, Table 4). Mostly they are made on ends of blades or elongated flakes (Fig. 3: 2, 4–6, 8, 11). Some end-scrapers are microlithic and resemble typical *unguiform* end-scrapers (Fig. 3: 4). There is also a relatively thick end-scraper with a *caréné* working front (Fig. 3: 7). The typological variability is augmented by single specimens of a double end-scraper, an end-scraper on an end and a side, a subcircular end-scraper, and an end-scraper on a retouched blank. A particular side-scraper is retouched along the edge of the medial section of the blade (Fig. 3: 3).

Retouched blades make up the second largest group, comprising 10 items (24.4%). Half of these are fragments with irregular retouch. However, there are regularly retouched edges as well (Fig. 3: 8, 12, 13). A single blade bears a retouched notch. A retouched blade fragment has a distinctive gloss and thus can be provisionally attributed to so-called "sickle inserts".

Table 4. Tool types.

№	Type	N	%
1	Retouched blades	10	24.4
	– with regular retouch	5	12.2
	– with irregular retouch	5	12.2
3	Retouched flakes	2	4.9
	– truncated	0	0.0
4	Notched flakes	0	0.0
5	End-scrapers	17	41.5
	On flakes	12	29.3
	– on an end	8	19.5
	– on a side	1	2.4
	– subcircular	1	2.4
	– double	1	2.4
	– on an end and a side	1	2.4
	On blades	5	12.2
	– on an end	4	9.8
	– on a side	1	2.4
6	Side-scraper on a blade	1	2.4
7	Truncated blades	3	7.3
	– obliquely	2	4.9
	– straight	1	2.4
8	Notched blades	1	2.4
9	Blade with gloss (sickle insert)	1	2.4
10	Retouched chunk	1	2.4
11	Perforators	2	4.9
	On flakes	1	2.4
	On blades	1	2.4
13	Projectile ("rhomboid") point	1	2.4
14	*Pièce esquillée*	1	2.4
15	Hammerstone	1	2.4
16	Total	41	100.0

The excavation of 2019 has not yielded a single geometric microlith, which were systematically recovered in 2014–2016 (Kiosak 2019a). However, there is an item in the 2019 collection which could be a projectile point. It is a medial fragment of a regular blade with an oblique truncation and a retouched side (Fig. 3: 9). The other end of the fragment was removed by "burin-like" detachment, likely a macro-impact. This item was conventionally classified as a rhomboid point, although it is quite far from the classic rhomboid points of the Early Trypillia (Šidlovs´kij and Slêsarêv 2015).

Other formal tools are two perforators on blades. A retouched chunk and a *pièce esquillée* complete the list of retouched tools.

The spatial distribution of the finds is uneven (Tab. 5; Fig. 2). Most of them were recorded outside the structures, in the cultural layer (conventionally designated as feature 2001). In fact, the long, narrow pit 2003 brought 33 flint finds. Another fully investigated, much smaller pit 2008 contained 24 objects, while partially investigated pit 2006 yielded 28 items. A further three items came from the partially investigated pit 2007. The structure of the finds from pits 2001, 2003, 2006 corresponds to the general structure of the 2019 collection. In the sample from pit 2008, the almost complete absence of retouched products is noteworthy (the only product is a retouched chunk, which is only a situational tool at best). However, the small size of the sample and the pit itself rather suggests that it reflects a specific episode of flint knapping and handling rather than any specific economic characteristics of feature 2008.

Discussion

Comparison of collections of 2012–2016 and 2019

Structurally, the collection of 2019 represents all the main technical and typological groups (Fig. 4), suggesting that the knapping was carried out directly on site, although no distinct flint knapping sites were identified during the excavations. On the other hand, there are some important discrepancies when it is compared with the collection from excavations of 2012–2016. The density of finds varies greatly: 4.8 lithic finds per sq. m during the earlier works and 0.36 lithic find per sq. m in 2019. This dissimilarity probably arose from different strategies of excavations: in 2019 an attempt to open a wide area was made, resulting in excavations of a space between structures with a low density of finds in general. Meanwhile, in 2012–2016 works were concentrated on the large "long pit" (pit 1), which alone yielded 418 flints, 2928 bones, and 1395 pottery fragments, measured and inserted into the database as individual finds. Different strategies of excavations also resulted in somewhat different typological composition: some categories of microlithic tools like trapezes or microblades were found in small series in 2012–2016 and are not represented in the collection of 2019. On the other hand, meticulous microstratigraphic excavations applied in 2012–2016 are rarely used in Neolithic studies in the region and, thus, the collection of 2019 is more comparable to other lithic assemblages recorded on the sites of the region.

Table 5. Distribution of lithic finds by the objects of the excavation pit-2019

N	Group of inventory	Total	N2001	N2003	N2006	N2007	N2008
1	Pebble	1	1				
2	Cores	3	2	1			
3	Core-like fragments	3	2				
4	Technological flakes	14	12	3	1		5
	Incl. primary and half-corticated flakes	4	7	1	1		2
5	Flakes and chips	63	18	14	9	2	8
6	Blades and bladelets	39	14	7	6		10
8	Chunks	5	4	0	2		0
9	Tools	40	21	8	9	1	1
10	Hammerstone	1			1		
	Total	173	74	33	28	3	24

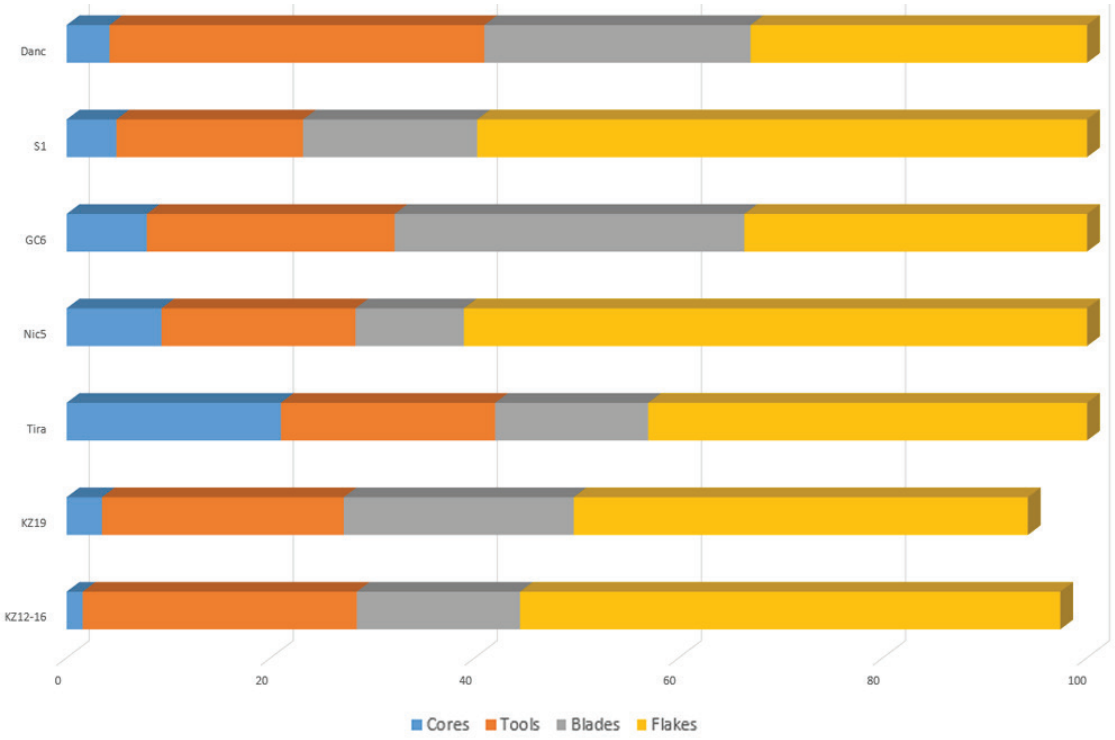

Fig. 4. Comparison of main techno-typological groups of both Kamyane-Zavallia collections and lithic assemblages from the sites of the region.
GC6 – Gura Camencii 6; Danc – Dănceni 1; Nic5 – Nicolaevca V; S1 – Sîngerei I; KZ – Kamyane-Zavallia (2012–2016 and 2019 – years of excavations respectively), Tira – Târa 1.

Comparison with other LBK sites in the region

The lithic collection recovered in 2019 generally corresponds to the structure of the flint complex from previous years of work and as well to the ideas about the flint industry of the *Notenkopf* phase of the LBK east of the Carpathians (Gaskevič 2003). In order to be understood, it should be compared with other well-published lithic collections of the LBK.

The typological structure of the LBK is characterized by the predominance of end-scrapers and knife-like blades with various types of retouch (Kaczanowska 1980). In Kamyane-Zavallia almost half of all tools are end-scrapers, and the second largest group of products is that of retouched blades.

D. L. Gaskevič distinguishes two variants of the flint industry of the LBK of Ukraine and Moldova. One of them is associated with the Middle Dniester region, which lies in only some 125 km from Kamyane-Zavallia. This aspect of lithic industry is distinguished by the presence of subconical nuclei, scalene trapezes and parallelograms, and some subcircular end-scrapers on flakes. The "sickle inserts" are represented by unretouched blade fragments. The peculiarities of the variants are explained by the influence of other Neolithic cultures of the region (Gaskevič 2003, 6). O. V. Larina describes a very similar flint inventory of the sites of the Republic of Moldova (Larina 1994, 46–50). The large collection of Dănceni I contains a regular conical nucleus and two asymmetrical trapezoids bearing ventral retouching. The LBK materials from the Romanian Carpathian region are described by A. Păunescu on the example of the settlements of Glăvăneştii Vechi and Traian Dealul Fântânilor. He notes the presence of pencil-shaped nuclei at Glăvăneştii Vechi. Geometric microliths are represented by parallelograms. Among the products with retouch, end-scrapers on flakes and blades prevail (Păunescu 1970, 38–40). S. Ţurcanu considers the peculiarities of the LBK inventory to be a homogeneous structure with a predominance of end-scrapers and retouched blades, an almost complete absence of burins, the presence of geometric microliths, sometimes (Traian Dealul Fântânilor) in a significant proportion. More than 60% of the tools are microlithic and only 2% are macrolithic (Ţurcanu 2009). Romanian researchers tend to point out archaism (S. Ţurcanu), and Tardenoisian vestiges (A. Păunescu) in the LBK industry of the region. O. V. Larina came to similar conclusions (Larina 1994). Ukrainian scholars have recently suggested that the LBK in western Ukraine was based on a local Mesolithic substratum (Man´ko and Telíženko 2016; Telizhenko and Silaiev 2022).

Kamyane-Zavallia has brought some sub-conical cores, geometric microliths (trapezes) and its end-scrapers sometimes are circular and sub-circular (Kiosak 2019a). Thus, Kamyane-Zavallia is closer to the Dniester variant by typology of lithic assemblage (Kiosak 2017), but we are inclined to approach the issue of the interpretation of its peculiarities as evidence of "Mesolithic heritage" cautiously.

In order to develop the interpretation, we need to place Kamyane-Zavallia into wider context and compare them to lithic collections from other sites of the region: Ţâra II, Nicolaevca V, Gura-Camencii VI, Sîngerei I, Dănceni I (Larina 1994; Kiosak 2017). The primary composition of complexes indicates important differences (Fig. 4, 5). In Dănceni I, retouched tools outnumber blades. In others, flakes are very numerous indicating on-site production. Ţâra II has the highest share of cores.

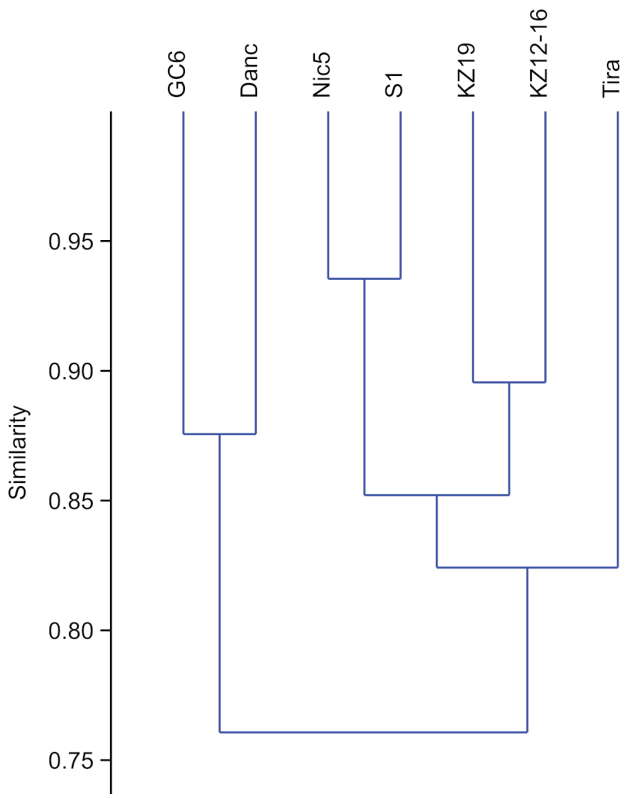

Fig. 5. Hierarchical cluster analysis of assemblage composition with an application of the Bray-Curtis similarity index (done in PAST4.13 software).
GC6 – Gura Camencii 6; Danc – Dănceni I; Nic5 – Nicolaevca V; S1 – Sîngerei I; KZ – Kamyane-Zavallia (2012–2016 and 2019 – years of excavations respectively), Tira – Ţâra 1.

Hierarchical cluster analysis of assemblage composition with an application of the Bray-Curtis similarity index (done in PAST4.13 software; Fig. 5) reveals important differences between sites. The first pair of sites are the sites with high indices of retouched tools, Dănceni I and Gura-Camencii VI. They are clearly "consumer" sites. Their assemblages do contain not enough knapping debris to account for the amount and types of retouched tools found on these sites. The group of "producer sites" with abundant evidence of on-site knapping is heterogeneous. They are sites with blade-oriented industries (like Kamyane-Zavallia) and flake-producing sites (like Nicolaevca V), while Ţâra II complex is, in fact, a selection of items resulting from the blade-producing facility, probably with an intention of their further re-utilization (Kiosak *et al.* 2021). Noteworthy, both collections of Kamyane-Zavallia are classified into the same pair. Thus, "producer sites" include sites with a predominance of flake knapping techniques reflected in the composition of the assemblages as well as in the set of technologies used (Nicolaevca V, Sîngerei I), as well as sites with clear evidence of blade production, but with a lack of finished products in the collection (Ţâra 2). The site of Kamyane-Zavallia stands apart as it shows both evidence of on-site production and developed laminar and lamellar technology (Kiosak 2019a).

The issue of "Mesolithic heritage"

The metric composition of the Kamyane-Zavallia laminar and lamellar detachments contrasts with that of the local Mesolithic industries. The latter are represented, first of all, by sites of the Kukrek cultural tradition (Gaskevič 2005). Microblades (up to 0.7 cm wide) are quite numerous and often predominate (Kiosak *et al.* 2022) in the latter. The industry of Kamyane-Zavallia, on the contrary, is characterised by the predominance of medium-wide blades (Tab. 3).

Several asymmetrical trapezes make the Kamyane-Zavallia complex expressive. These geometric microliths are made from small blanks (microblades) by means of a steep truncation of one end of the blank and retouching of the recess at the other end of the blank (Fig. 6: 71–75).

The preservation of Mesolithic culture remnants is traditionally assumed for Neolithic cultures of Moldova and Ukraine on the basis of finds of regularly faceted (including pencil-shaped) nuclei for blades and microblades and trapezoidal geometric microliths (Zalíznâk 1998; 2005; Telegin *et al.* 2003; Dergachev and Dolukhanov 2007). At the same time, both types of artefacts are widely known in almost every Neolithic culture, and in each of them they are considered evidence of Mesolithic influence (Păunescu 1970; Ţurcanu 2009). Both the pressure-flaking technique and geometrical microliths are known in the Middle East, the distant origin point of most of the Neolithic

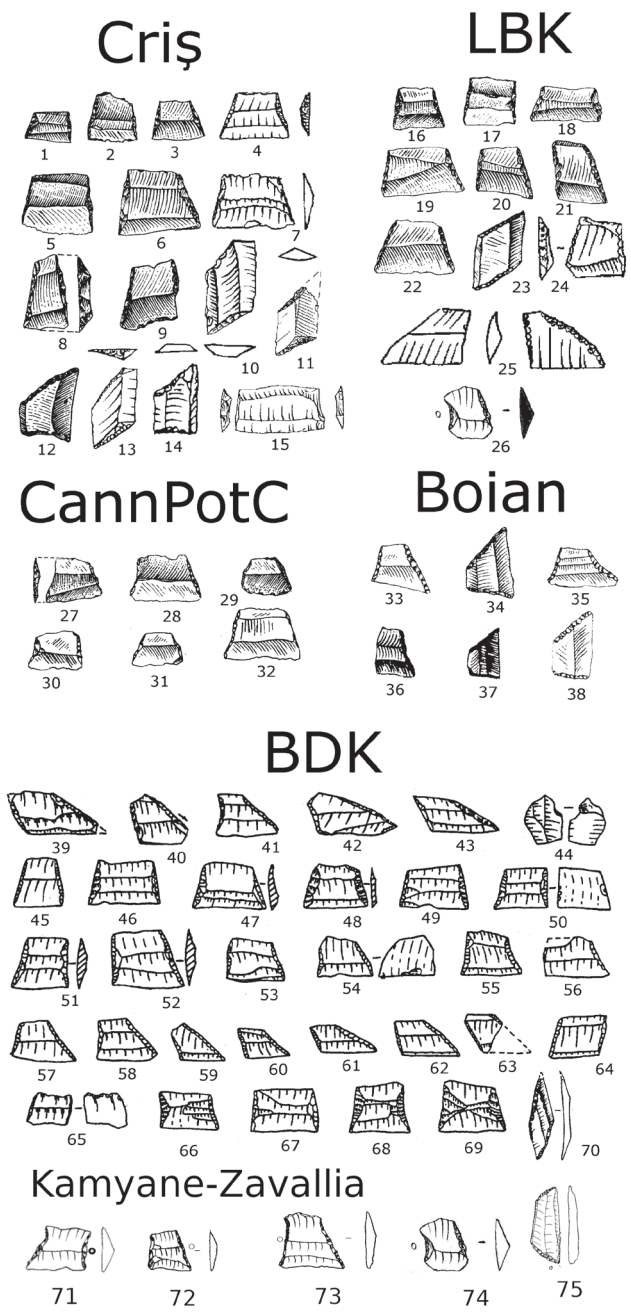

Fig. 6. Geometric microliths of Neolithic from Carpathian-Danubian region and trapezes from Kamyane-Zavallia (after Kiosak 2016 with modifications). Cris – Criș culture (1–15), including Sacarovca group (4, 7, 11, 13–15); LBK – LinearBandkeramik Culture (16–26); CannPotC – Cannellated Ceramic Culture (Dudești (27–29), Vinca-Tordoș (30–32)); Boian – Boian culture (33–38); BDK – Buh-Dniester culture (39–70).
1–3, 5–6, 8 – Cuina Turcului-Dubova; 4–7, 10–11, 13–15 – Sacarovca; 9 – Balș; 12 – Trestiana; 16–17 – Bereşti; 18–22 – Traian-Dialui-Fîntînilor; 23 – Glăvenești Vechi; 24 – Chișchereni V; 25 – Dănceni I, 26 – Kamyane-Zavallia; 27, 29 – Dudești; 28 – Dragceanu; 30–32 – Cleanov Fiera; 33–35, 37–38 – Cernica; 36 – Giulești-București; 39–44 – Gard 3 (44 – micro-burin); 45–69 – Gard 4; 70 – Soroca 5; 71–75 – Kamyane-Zavallia (according to: Păunescu 1970; Markevič 1974; Larina 1994; Tovkajlo 2005; Kiosak 2019a).

cultures of south-eastern Europe, and they could have been brought to the Balkans as part of the "Neolithic package" (Tringham 1973; Connolly 1999; Zaliznyak 2006; 2020; Binder 2008). Undoubtedly, they were a part of technological repertoire of the Criș-Starcevo, Dudești, Boian and LBK cultures (Fig. 6). At least in the Carpathian-Dniester region there is no reason to suppose a new contact with the Mesolithic people in any of the Neolithic cultures with trapezes. It is possible that the ability to produce geometric microliths came from the preceding Neolithic communities, without the direct need to find surviving hunter-gatherer groups to teach them how to manufacture the arrows of the archers of the early farming communities.

Thus, the analysis of the lithic inventory of Kamyane-Zavallia points instead to the Balkan and Central European directions of the LBK population's connections with the territory north of the modern Odesa region (Kiosak 2017). No clear traces of contacts with the local Mesolithic population have been found so far (Kiosak 2019a). Perhaps with time and an increase in the volume of the empirical data such contacts will be confirmed, but today we have to state that there is no empirical evidence (at least based on the composition of the flint industry) of a significant contribution of the local Mesolithic substrate to the formation of the LBK in the easternmost part of its range.

Conclusion

The easternmost LBK settlement ever excavated yielded a set of lithic tools that is very similar to lithic inventories of LBK sites situated much closer to its *Heimatland* – Central Europe. In particular, it finds close parallels in early farmers' settlements from Moldova and Romania. The lithic industry is based on non-local flint, in a neat contrast with local Mesolithic (Kukrek) and para-Neolithic cultures. The metrical standards of laminar and lamellar products differ clearly between local Mesolithic sites and the LBK, thus making likely pronounced technological differences between these cultural aspects. The scalene trapezes from Kamyane-Zavallia could be treated as evidence of the influence of hunter-gatherers. However, the presence of trapezes in the microlithic set cannot in itself speak of a "Mesolithic tradition". Every Neolithic culture in the region already had some geometric microliths in its lithic inventory (Fig. 6). The microlith-production technique is much more informative. Unfortunately, materials for its reconstruction are scarce in the communities of the easternmost LBK and its neighbors.

The LBK groups are a migratory phenomenon in south-western Ukraine (Saile 2020; *contra* Man´ko and Telíženko 2016), and there is little if any indication of local "Mesolithic heritage" in their lithic inventories so far (Kiosak 2019b). The early farming societies were able to supply their settlements with excellent-quality raw materials coming from a notable distance and, in times of need, performed a full-cycle production on the local varieties of chert, which is less suitable for knapping (Kiosak *et al*. 2021). Thus, a straightforward search for a "Mesolithic tradition" underestimates the ingenuity and flexibility of past technological systems.

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References

Allard P. 2004. *L'industrie lithique des populations rubanées du Nord-Est de la France et de la Belgique*. Rahden: Verlag Marie Leidorf.

Allard P. and Denis S. 2015. The Circulation of Flint Raw Materials in the Northern France and Belgium during the Early Neolithic. In T. Kerig and S. Shennan (eds.), *Connecting Networks: characterising contact by measuring lithic exchange in the European Neolithic*. Oxford: Archaeopress, 64–73.

Binder D. 2008. Technologie lithique et comportement social dans le PPN de Çayönü tepesi: un aperçu à travers l'analyse des matières premières. *Paléorient* 34(1), 5–21.

Connolly J. 1999. Technical strategies and technical change at Neolithic Catalhoyouk, Turkey. *Antiquity* 73(282), 791–800.

Danilenko V. N. 1969. *Neolit Ukrainy. Glavy drevnej istorii Ûgo-Vostočnoj Evropy*. Kiev: Naukova dumka.

Dergachev V. A. and Dolukhanov P. M. 2007. The Neolithisation of the north Pontic area and the Balkans in the context of the Black Sea floods. In V. Yanko-Hombach, A. S. Gilbert, N. Panin, and P. M. Dolukhanov (eds.), *The Black Sea Flood Question. Changes in Coastline, Climate and Human Settlement*. New York, Dordrecht, Heidelberg, London: Springer, 489–514.

Gaskevič D. L. 2003. Krem'ânij inventar neolitičnih kul´tur Ukraïni. Kyiv: manuscript of dissertation of candidate of historical sciences in the archive of the Institute of Archaeology National Academy of Sciences of Ukraine.

Gaskevič D. L. 2005. Krem'âní virobi kukreks´koï kul´turnoï tradicíï v ínventarí bugo-dnístrovs´kih pam'âtok Pobužžâ. *Arheologìâ* 3, 24–37.

Kaczanowska M. 1980. Steinindustrie der Kultur der Linienbandkeramik. In J. K. Kozłowski and J. Machnik (eds.), *Problemes de la Neolithisation dans certaines regions de l' Europe*. Wroclaw: Zakład Narodowy im. Ossolińskich, Wydawnictwo Polskiej Akademii Nauk, 79–96.

Kiosak D. 2014. Settlements and Indigenous Populations at the Easternmost Fringe of the Linear Pottery Culture. *Eurasia Antiqua* 20, 117–141.

Kiosak D. 2016. K interpretacii kremneobrabotki Prekuckten´ - Tripol´e A. *Tyragetia* 10(1), 147–163.

Kiosak D. 2017. Kamyane-Zavallia, the eastermost Linear Pottery culture settlement ever excavated. *Sprawozdania Archeologiczne* 69, 253–270.

Kiosak D. 2019a. *Lithic Industries of Early Farmers between Carpathians and Dnieper: Social Context and Organization of Production*. Odesa: Odesa I. I. Mechnikov National University.

Kiosak D. 2019b. The Mesolithic of the north Pontic Region and the transition to the Neolithic. *Eurasian Prehistory* 15(1–2), 279–292.

Kiosak D., Dębiec M., Saile T. and Ţerna S. 2021. Lithic industry of two Linearbandkeramik sites in Moldova (Nicolaevca V and Ţâra II). *Sprawozdania Archeologiczne* 73(1), 303–330. DOI: 10.23858/SA/73.2021.1.2605

Kiosak D., Kotova N., Radchenko S., de Capitani A., Gobet E., Makhortykh S., Nielsen E., Szidat S., Tinner W., Tuboltsev O. and Dzhos V. 2022. Chipped Stone Assemblage of the Layer B of the Kamyana Mohyla 1 Site (South-Eastern Ukraine) and the Issue of Kukrek in the North Meotic Steppe Region. *Open Archaeology* 8(1), 85–113. DOI: 10.1515/opar-2022-0226.

Kiosak D. and Radchenko S. 2021. 3-D pit: Linear pottery culture long pit reconstructed through point-cloud analysis. *Digital Applications in Archaeology and Cultural Heritage* 21, 1–6. DOI: 10.1016/j.daach.2021.e00188.

Kozłowski J. K. and Nowak M. 2008. Problems in reading Mesolithic–Neolithic relations in South-Eastern Europe. In J. K. Kozłowski and M. Nowak (eds.), *Mesolithic/Neolithic Interactions in the Balkans and in the Middle Danube Basin* (= *BAR International Series* 1726). Oxford: Archaeopress, 103–115.

Larina O. V. 1994. Neoliticul pe teritoriul Republicii Moldova. *Thraco-Dacica* 15, 41–66.

Man´ko V. O. and Telíženko S. 2016. Problemi pohodžennâ kul´turi líníjno-stríčkovoï keramíki na zahodí Ukraïni. In L. Vojtovič (ed.), *Naukovì studìï*, 9: *Datuvannâ – hronologìâ – perìodizacìâ*. Rìznì aspekti času v arheologìï. Vinniki, Žešiv, L´vìv: Vidavnictvo Aprìorì, 3–24.

Markevič V. I. 1974. *Bugo-Dnestrovskaâ kul´tura na territorii Moldavii*. Kišinev: Štiinca.

Mateiciucova I. 2008. *Talking stones: the chipped stone industry in Lower Austria and Moravia and the beginnings of the Neolithic in Central Europe (LBK), 5700–4900 BC*. Brno: Masarykova Univerzita.

Păunescu A. 1970. *Evoluția uneltelor și armelor de piatră cioplită descoperite pe teritoriul României*. București: Editura Academiei Republicii Socialiste România.

Pelegrin J. 2012. New Experimental Observations for the Characterization of Pressure Blade Production Techniques. In P. Desrosiers (ed.), *The emergence of pressure blade making*, 465–500. New York, Dordrecht, Heidelberg, London: Springer.

Petrougne V. F. 1995. Petrographical-lithological characteristics of stone materials from the late-Tripolye cemeteries of Sofievka-type. *Baltic-Pontic Studies* 3, 190–199.

Saile T. 2020. On the Bandkeramik to the east of the Vistula River: At the limits of the possible. *Quaternary international* 560–561, 208–227, DOI: 10.1016/j.quaint.2020.04.036.

Saile T., Dębiec M., Posselt M., Ţerna S. and Kiosak D. 2016a. Zur Bandkeramik zwischen Pruth und Südlichem Bug. *Praehistorische Zeitschrift* 91, 1–15. DOI: 10.1515/pz-2016-0001.

Saile T., Posselt M., Dębiec M., Kiosak D. and Tkachuk T. 2016b. Zwei Magnetometerprospektionen auf ukrainischen Fundstellen des Cucuteni-Tripolje-Komplexes an Dnjestr und südlichem Bug. *Archäologisches Korrespondenzblatt* 46, 465–477.

Šidlovs´kij P. and Slêsarêv E. 2015. Tehnologíční osoblivostí krem'ânogo kompleksu rann´otripíl´s´kogo poselennâ Bernašívka I. *Kam'âna doba Ukraïni* 16, 204–224.

Stanko V. N. 1982. *Mirnoe. Problema mezolita stepej Severnogo Pričernomor´â*. Kiev: Naukova dumka.

Stanko V. N., Dolukhanov P. M., Seferiades M., Smyntyna O. V., Pylypenko G. and Holoborodova E. 1999. Mesolithic of the southern Bessarabia. *Papers of Faculty of History* 8, 8–67.

Stanko V. N. and Kiosak D. 2010. The Late Mesolithic Settlement of South-Western Ukraine. *Atti della Società per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* 17, 27–100.

Telegín D. 1976. Pro nomenklaturnij spisok krem'ânih virobív dobi mezolítu-neolíu. *Arheologìâ* 19, 21–45.

Telegin D. 1985. Voprosy kul´turno-istoričeskogo členeniâ i sinhronizacii pamâtnikov neolita. In D. Telegin (ed.), *Arheologiâ Ukrainskoj SSR*, 1: *Pervobytnaâ arheologiâ*. Kiev: Naukova dumka, 110–118.

Telegin D. Y., Lillie M., Potekhina I. D. and Kovaliukh M. M. 2003. Settlement and economy in Neolithic Ukraine: a new chronology. *Antiquity* 77(297), 456–470. DOI: 10.1017/s0003598x00092528.

Telizhenko S. and Silaiev O. 2022. Lithic Assemblages of the Linear Pottery Culture Settlement Modrychi-I. *Arheologia*, 17–31. DOI: 10.15407/arheologia2022.03.017.

Tovkajlo M. 2005. *Neolít Stepovogo Pobužžâ* (= *Kam'âna doba Ukraïni* 6). Kiïv: Šlâh.

Tringham R. 1973. The Mesolithic of Southeastern Europe. In S. K. Kozłowski (ed.), *The Mesolithic in Europe*. Warsaw: University Press, 531–550.

Ţurcanu S. 2009. *Industria litică cioplită din Neoliticul Moldovei*. Iași: Editura Universității Alexandru Ioan Cuza.

Vornicu D. M. 2012. Industria litică cioplită a comunităților Precucuteni. Studiu de caz: așezările de la Isaiia și Târgu Frumos, Iași, unpublished PhD thesis in the archive of the Al. I. Cuza University in Iași.

Vornicu D. M. 2017. The chipped stone assemblage from the Early Chalcolithic settlement at Isaiia – Balta Popii. *Materiale și cercetări arheologice* 13, 191–212.

Zalíznâk L. L. 1998. *Peredístoríâ Ukraïni X–V tis. do n. e.* Kiïv: Bìblìoteka ukraïncâ.

Zalíznâk L. L. 2005. *Fínal´nij paleolít í mezolít kontinental´noï Ukraïni. Kul´turnij podíl ta períodizacía* (= *Kam'âna doba Ukraïni* 8). Kiïv: Šlâh.

Zaliznyak L. 2006. Grebeniky culture of Odessa region as a possible consequence of the Black Sea Flood. In V. Yanko-Hombach (ed.), *Extended Abstracts of 2nd Plenary Meeting and Field Trip of Project IGCP-521 "Black Sea-Mediterranean corridor during the last 30 ky: sea level change and human adaptation (2005–2009)"*. Odessa: Astroprint, 180–181.

Zaliznyak L. L. 2020. Landscape change, human–landscape interactions and societal developments in the Mesolithic period. In M. Lillie and I. D Potekhina (eds.), *Prehistoric Ukraine. From the First Hunters to the First Farmers*. Oxford: Oxbow Books, 87–110. DOI: 10.2307/j.ctv13nb9rs.8.

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