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Comparative Characteristics of Stone Tools from the Neolithic Sites on the Upper and Middle Kama

This article presents the results of a comprehensive analysis of stone tools from six Neolithic sites in the Upper and Middle Kama region, three of which belong to the Kama culture, and three to the Volga-Kama culture. Technological, typological, traceological, and spatial analyses were carried out. Differences between the two lithic industries are minor in all aspects. Technologically, both are characterized by regular knapping aimed at the production of blades and blade-like flakes. Tools on flakes are more numerous than those on blades. Marginal retouch was widely used; several tools are bifacial; the most common types are end-scrapers, knives, points, blades, and retouched flakes. In tools from the Kama sites, ventral retouch is more frequent. The traceological analysis revealed that the principal tools were end-scrapers for processing various materials, butchering knives, planing-knives, drills, and perforators. In the Volga-Kama industry, bone-processing tools are more frequent. The spatial analysis demonstrated that zones of various subsistence activities often overlap, or are vaguely delimited. Apparently, adaptation to one and the same environment leveled off any cultural differences.

Keywords: Neolithic, Kama basin, stone tools, Kama Neolithic culture, Volga-Kama Neolithic culture.

Introduction

The Upper and Middle Kama region is situated in the Middle Cis-Urals, in the Perm Territory (Fig. 1). In this region, the Neolithic sites of the Kama and Volga-Kama cultures have been established (Lychagina, 2014: 288). The Kama culture was identified by O.N. Bader (1970: 166; 1973: 103), who subdivided it into two stages: Khutor (Middle Neolithic) and Levshino (Late Neolithic) (1978: 72). With the discovery of the Early Neolithic Kama sites in the 1970s–1980s, one more stage was established, an Early Neolithic one (Vasiliev, Vybornov, 1993). At present, three developmental stages have been

generally accepted: Early Neolithic, Khutor, and Levshino (Lychagina, 2013a: 55–67).

The concept of the Volga-Kama culture was introduced by A.K. Khalikov (1969: 40–92), who subdivided it into five subsequent developmental stages. He proposed stage 1 corresponding to the pre-ceramic Neolithic, stage 2 comprising the sites with pricked pottery, stage 3 with comb pottery, which, as he thought, had arisen on the basis of the preceding pottery-type. Stages 4 and 5 were identified as parallel to the stages of the Bader's classification of the Kama culture (Khutor and Levshino stages, respectively) and were associated exclusively with sites containing comb ceramics. Later on, the idea

of the development of pricked ceramics into comb ones was rejected (Tretyakov, 1972; Kalinina, 1979; Vybornov, 1992: 45–65). In one of his latest papers, Bader suggested restricting the term of Volga-Kama culture exclusively to the culture associated with pricked-incised ceramic ware (1981: 47). This concept has been accepted by modern researchers (Vasilieva, Vybornov, 2012). This culture is subdivided into two main periods: Early Neolithic and Middle Neolithic (Lychagina, 2009).

Identification of the cultures was based mainly on distinctions noted within ceramic complexes: the Kama ceramics are characterized by decoration with comb imprints, while the Volga-Kama have pricked decoration. The lithic industries were considered less significant because it was barely possible to distinguish between technocomplexes at stratified sites. This paper aims at the most comprehensive analysis of stone tools from the sites whose cultural attribution is not in doubt. We have used the method of comprehensive analysis proposed and tested by G.N. Poplevko at the sites in various regions (2007, 2011, 2013, 2014a, b). This method includes typological, technological, traceological, and spatial analyses.

Discussion

The analysis was based on the whole lithic collections from individual sites (Chashkinskoye Ozero IV and VIII), or, more often, on the stone tools from particular excavation areas, having no considerable admixture of artifacts from other cultures. However, a certain intermixture of artifacts cannot be excluded. For that reason, the description of the lithic industry from a particular site was based on the major trend rather than solitary facts, which means that general (not individual) patterns of raw-material selection, features of primary and secondary reduction, blank shapes and dimensions were taken into consideration. Description of tools was focused on most typical forms.

The comprehensive analysis of lithic industries associated with the most important Neolithic sites in the Upper and Middle Kama was based on collections from the following sites: Khutor (trench VI), Chernushka (trench II), and Chashkinskoye Ozero IIIa (trench II) attributed to the Kama culture, and Chashkinskoye Ozero IV, VI (trench I, 2005), and VIII belonging to the Volga-Kama culture (Lychagina, 2008; Lychagina, Poplevko, 2011, 2012; Lychagina, Poplevko, Tsygvintseva, 2014). All Kama sites pertain to the Middle (Khutor) stage. The Volgo-Kama site of Chashkinskoye Ozero VIII belongs to the Early Neolithic, while the two other sites represent the Middle Neolithic period.

Technological analysis. This analysis was carried out using microscope MBS-9 (50–98x magnification)

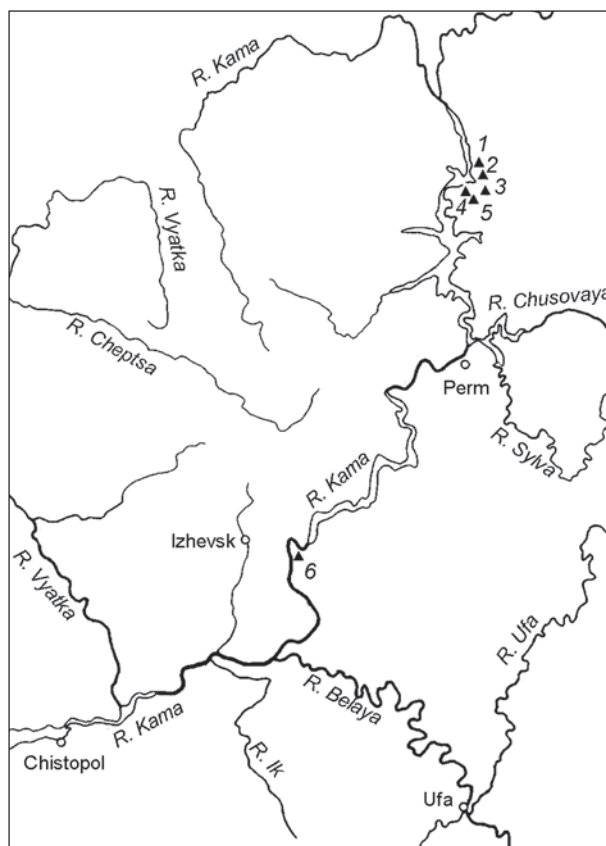


Fig. 1. Map showing locations of the sites under study. 1 – Chashkinskoye Ozero VI; 2 – Chashkinskoye Ozero VIII; 3 – Chashkinskoye Ozero IV; 4 – Chashkinskoye Ozero IIIa; 5 – Khutor; 6 – Chernushka.

in the Laboratory for Archaeological and Ethnographic Research of the Perm State Humanitarian Pedagogical University. The analysis has shown that during the Neolithic, various techniques of primary reduction were used by the populations of the Upper and Middle Kama. Flaking was performed with a stone or bone hammer; pre-cores were prepared using pressure technique or percussion through intermediate technique. Tool-blanks were also obtained using pressure technique and percussion through intermediate technique. The Volga-Kama evidence suggests that tools were made on flakes removed with a hard (stone) hammer (Lychagina, Tsygvintseva, 2013: 24–27).

The core-trimming elements display the preparation of flaking surface with reduction of overhang and subsequent platform flattening. However, the majority of flakes were detached without any rejuvenation of the flaking surface. The striking platforms on tools show mostly scars of overhang reduction in combination with abrasive trimming. The abovementioned features provide sufficient grounds to infer the broad distribution, in the Neolithic of the Upper and Middle Kama, of intentional and regular stone-knapping aimed at production of

blades and blade-like flakes for the manufacture of tools. At the same time, it has been noted that tools were also made on occasional spalls and primary flakes, without any signs of preparation. This situation is equally typical for the sites of both Kama and Volga-Kama cultures (Lychagina, Poplevko, Tsygvintseva, 2014: 16–17; Lychagina, 2014).

At the Volga-Kama sites, the predominant raw material was local gray, beige, or dark brown pebble flint of varying quality. Judging by the split pebbles in the assemblages, pebbles 3 to 5 cm long were used as pre-cores. Large tools were produced of silica limestone, silica clay, dolomite, or quartzitic sandstone. Bifacially worked tools (points and knives) were made of gray or brown semitransparent chalky flint, or high-quality colored flint. No chalky flint outcrops have been discovered close to the sites, which suggests long-distance transportation of the raw material. No tools made of tabular flint were found. Some artifacts show signs of firing, but these signs were not related to stone-heating before knapping. Most likely, signs of firing represent post-depositional effects.

At the Kama sites, the main raw material also included local low-quality pebble flint of the same colors as above. However, at Chernushka, approximately 40 % of tools were made of the high-quality, semitransparent chalky flint. The degree of the raw material's utilization was maximal. Judging by the insignificant amount of chalky flint chips and scales, this raw material was brought to the site in the form of cores and ready tools. At the Khutor site, the tool collection contains ca 30 % of items made of grayish-dark-red, fine-grained quartzitic sandstone. As the quality of this raw material is not particularly high, we can explain this by its easy accessibility for the inhabitants of the site. The tools of quartzitic sandstone are generally bigger than those made of flint. Wide use of the former material was possibly related to the absence of comparatively large (> 5 cm) flint pebbles. At all Kama sites, bifacial tools made of gray or light brown tabular flint have been discovered. The proportion of these tools does not exceed 20 % of all typologically distinct tools at any site. However, the use of tabular flint is a characteristic feature of the Kama Neolithic culture, which makes it distinct from both the Volga-Kama Neolithic and the Kama Mesolithic cultures. As with the Volga-Kama sites, some artifacts demonstrate signs of firing that suggest post-depositional effects.

The majority of sites under study are characterized by the use of small flakes (< 3 cm) for manufacturing tools. This was likely because of the dimensions of the raw material (small flint pebbles) rather than intended microlitization of the tools. The only exception were the sites of Khutor and Chashkinskoye Ozero IV, where medium-sized flakes (3–5 cm) were typical. At the

Khutor site, this was likely related to the use of quartzitic sandstone, as mentioned above. In the case of the Chashkinskoye Ozero IV site of the Volga-Kama culture, we can hypothesize the intentional selection of larger flakes for tool manufacture.

The analysis of blades has also shown that at the Kama sites, smaller blanks were used than at the Volga-Kama sites. Thus, at the Kama sites, the proportion of small blades (up to 1 cm wide) is not lower than 50 % of all the traceologically defined tools on blades; while at the Volga-Kama site of Chashkinskoye Ozero VI (which is the largest among those under study), this proportion is 45 %. Further multidisciplinary studies of the Neolithic industries in the Kama basin will show if this trend was stable.

Typological analysis. One of the basic indexes of any lithic industry is the ratio between the stone tools made on flakes and those on blades. Various researchers have mentioned that the proportion of tools on blades in the Kama collections did not exceed 15 % (Bader, 1978: 72; Denisov, 1960: 52–53), while in the Volga-Kama collections, tools on blades predominate (Gabyashev, 1976: 37–41; 2003: 37). However, during this study, it has been established that tools on flakes prevail over those on blades at almost all sites under study, irrespective of their cultural affiliation. The only exception is Chernushka, where tools on blades prevailed (Fig. 2).

Thus, our results did not support the orthodox idea that the Kama culture was characterized by the flake-based lithic industry, and the Volga-Kama industry was dominated by blades. Moreover, the percentage of tools on blades was higher in the Kama collections than in those of Volga-Kama culture. At Chernushka, the high proportion of tools on blades is explained by the features of the area (riverside, where butchering was performed with side-bladed tools) (Lychagina, Poplevko, Tsygvintseva, 2014), while at other Kama sites, the excavated areas represented multi-purpose zones (as identified by the traceological and spatial analysis), and the established toolkit was rather typical (Lychagina, Poplevko, 2011). In general, the two-fold predominance of the tools on flakes over the tools on blades should be regarded as a characteristic feature of the Middle Neolithic Kama culture (Fig. 2).

The low proportion of tools on blades in the Volga-Kama collections requires additional study. The Chashkinskoye Ozero VIII provided an apparent explanation: the site was determined to have been a workshop where heavy-duty tools for woodworking were produced (Lychagina, 2008); but other sites did not reveal any specific features. It is possible that the high percentage of blade-based tools, noted by various researchers, was typical of the early period of the Volga-Kama culture development; while at the sites of the more recent period, this proportion might have significantly

Fig. 2. The ratio of the typologically defined tools on flakes (a) and on blades (b).

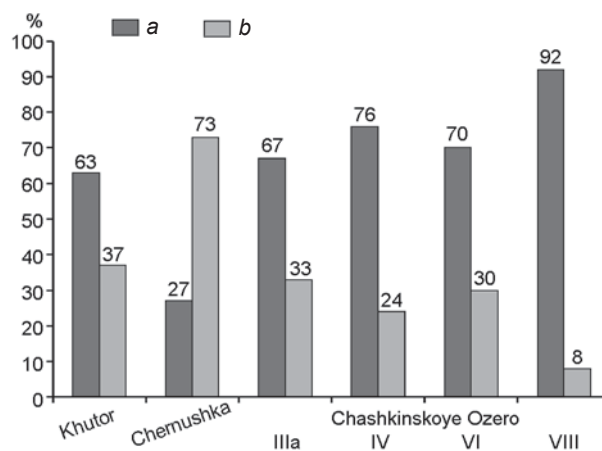
decreased. Discovery and investigation of new sites of the Volga-Kama culture in this region would produce new information on the topic.

Analysis of the pattern of secondary working has shown the following features (Table 1). In all cases, the majority of artifacts (over 60 %) displayed marginal unifacial retouch. Dorsal retouch predominated. At Kama sites, up to 15 % of the total number of tools showed ventral retouch, while at Volga-Kama sites this was used very rarely. One of the Chernushka-specific features is the significant (29 %) proportion of artifacts with bifacial retouch, which is probably due to the maximal utilization of blanks of the high-quality, semi-transparent chalky flint. This is supported by the results of traceological analysis: all artifacts with such retouch were made of this type of raw material, and each of them had two working surfaces on the opposite faces.

The idea that bifacial working was not typical of the Volga-Kama culture has not been confirmed by this study. Bifacial retouch was used for manufacturing arrowheads, knives, and chisel-like tools in both the Kama and Volga-Kama industries. For instance, the Chashkinskoye Ozero VI collection contains such tools in association with a small number of Kama pottery (Lychagina, 2007a), while in the collections from Chashkinskoye Ozero IV and VIII no such pottery has been found (Lychagina, 2007b).

Major tool categories at the sites of these two cultures were end-scrapers, knives, points, and retouched blades and flakes (Table 2). No significant distinctions in the toolkits have been noted.

Thus, the typological analysis has not shown any significant distinctions between the lithic industries of the Kama and Volga-Kama sites. Both industries are characterized by the prevalence of tools on flakes over



those on blades, the wide use of marginal unifacial retouch, and bifacial retouch on some tools, as well as by the predominance of end-scrapers, knives, points, and retouched blades and flakes. The only distinction is a broader use of ventral retouch in the Kama collections. However, this assumption requires further study of a larger sample in order to exclude the element of randomness.

Traceological analysis. This analysis was carried out using microscopes MBS-9 (50–98x magnification), Micromed MC-2-ZOOM, and POLAR-2 (80–400x magnification) in the Laboratory for Archaeological and Ethnographic Research of the Perm State Humanitarian Pedagogical University and the Experimental-Traceological Laboratory of the Institute of History of Material Culture of the Russian Academy of Sciences. All collections of stone tools have been examined microscopically, irrespective of the presence or absence of signs of secondary working. As a result, use-wear traces were found on blades, flakes, and spalls from cores that did not have any clear signs of secondary working. Some artifacts had more than one working-surface. Therefore,

Table 1. Features of secondary working

Sites	Marginal retouch			Bifacial working	Burin spall	Abrasion
	Dorsal	Ventral	Bifacial			
Khutor	61 (72)	13 (15)	1 (1)	6 (7)	4 (5)	–
Chernushka	8 (47)	2 (12)	5 (29)	2 (12)	–	–
Chashkinskoye Ozero IIIa	18 (62)	–	–	7 (24)	–	4 (14)
Chashkinskoye Ozero IV	39 (78)	2 (4)	4 (8)	5 (10)	–	–
Chashkinskoye Ozero VI	126 (91.5)	4 (3)	3 (2)	2 (1.5)	3 (2)	–
Chashkinskoye Ozero VIII	11 (52.5)	2 (9.5)	–	4 (19)	–	4 (19)

Note: The first numeral represents the number of tools with such type of working, the second numeral (in brackets) shows the percentage of the given category to the total number of tools at the site.

Table 2. Type list of the typologically defined tools

Category	Khutor	Chernushka	CO IIIa	CO IV	CO VI	CO VIII
End-scrapers	31 (36.5)	3 (16.7)	7 (17)	14 (26.5)	39 (27.9)	1 (4.75)
Scraper-knives	4 (4.5)	1 (5.5)	1 (2.5)	5 (9.5)	19 (13.6)	–
Scraper-like tools	2 (2.5)	–	1 (2.5)	–	–	–
Knives	12 (14)	–	5 (12)	7 (7.5)	21 (15)	7 (33.5)
Arrowheads	1 (1.5)	1 (5.5)	4 (9.5)	5 (9.5)	2 (1.4)	2 (9.5)
Burins	4 (4.5)	–	–	–	3 (2.1)	–
Cutters	1 (1.5)	–	–	–	–	–
Hammerstones	2 (2.5)	–	–	1 (2)	–	1 (4.75)
Chisel-like tools	–	2 (11.25)	1 (2.5)	4 (7)	5 (3.6)	1 (4.75)
Adzes	–	–	1 (2.5)	–	–	1 (4.75)
Drills	3 (3.5)	–	1 (2.5)	2 (3.5)	6 (4.3)	–
Borers	4 (4.5)	1 (5.5)	–	1 (2)	3 (2.1)	–
Combination tools	–	–	1 (2.5)	–	–	–
Retouched blades	15 (17.5)	6 (33.3)	3 (7)	5 (9.5)	19 (13.6)	1 (4.75)
Retouched flakes	6 (7)	2 (11.25)	2 (5)	6 (11.5)	16 (11.5)	1 (4.75)
Sinkers	–	1 (5.5)	1 (2.5)	–	2 (1.4)	–
Blanks, tool fragments	–	1 (5.5)	2 (5)	–	4	5 (23.75)
Abraders	–	–	9 (22)	2 (3.5)	–	–
Anvil	–	–	2 (5)	1 (2)	1 (0.7)	–
Axes	–	–	–	–	–	1 (4.75)
<i>Total</i>	85 (100)	18 (100)	41 (100)	53 (100)	140 (100)	21 (100)

Note: CO – Chashkinskoye Ozero; numerals in brackets represent the percentage from the total number of tools at the site.

the number of tools (working-faces) established by use-wear analysis has turned to be greater than that established by the typological analysis (Table 3).

As a result of the traceological analysis, the proportion of tools on blades has increased as compared to that on flakes (Fig. 3). This proportion remained unchanged only for Chernushka site, where these dominated anyway. The most noticeable changes were mentioned in the collection from Chashkinskoye Ozero VI, where the number of traceologically identified tools on blades became predominant.

Analysis of the technical blanks, which were used as tools or for tool-manufacture, attests to the selection of small and medium-sized flakes, as well as blades of various widths (Table 4). This was described in more detail above.

The toolkit is dominated by end-scrapers, butchering knives, and planing-knives. Arrowheads, perforators, and drills form small but stable sets (see Table 3). Neither

typological nor traceological analysis has shown any significant distinctions in the toolkits from the Kama and Volga-Kama sites.

Analysis of the subsistence activities of populations of the Upper and Middle Kama in the Neolithic has shown the following. All Kama sites contained the main set of tools relating to processing of game and fish, totaling from 45.0 % to 59.5 % (Fig. 4). The next numerous category was represented by wood-working tools, the proportion varying from 29.5 % to 41.0 %. Two other established sets were comparatively small. The small number of stone-working tools can be explained by the fact that the excavated sites mostly represented open utility zones where butchering and finishing of wooden tools took place. The only exception is Chashkinskoye Ozero IIIa, which yielded a considerable set of hammer-stones, abraders, and anvils (Fig. 4). A small number, or absence (Chernushka), of tools for bone/horn working is characteristic of the

Table 3. Type list of the traceologically defined tools*

Category	Khutorskaya	Chernushka	CO IIIa	CO IV	CO VI	CO VIII
Scrapers	36 (38.5)	1 (2.4)	10 (11)	16 (26)	83 (30.3)	4 (18.3)
Scraper-knives	–	3 (7)	6 (7)	10 (16)	30 (10.9)	–
Chisels	–	3 (7)	5 (5.5)	–	3 (1.1)	2 (9)
Adze	–	1 (2.4)	–	–	–	–
Knives	31 (33.5)	20 (47.6)	27 (30.5)	15 (24.5)	78 (28.4)	4 (18.3)
Arrowheads	1 (1)	1 (2.4)	4 (4.5)	4 (6.5)	1 (0.4)	–
Drills	6 (6.5)	2 (4.8)	5 (5.5)	3 (5)	20 (7.3)	1 (4.5)
Borers	1 (1)	1 (2.4)	5 (5.5)	4 (6.5)	4 (1.5)	1 (4.5)
Planing-knives	8 (8.5)	4 (9.6)	6 (7)	3 (5)	19 (7)	4 (18.4)
Burins	5 (5.5)	–	–	2 (3)	–	2 (9)
Cutters	3 (3.5)	1 (2.4)	2 (2.5)	–	22 (8)	–
Retoucher	–	–	–	1 (1.5)	–	–
Saws	–	–	–	–	–	2 (9)
Harpoon inserts	–	1 (2.4)	4 (4.5)	–	4 (1.5)	–
Cutter-scraper-knife	–	2 (4.8)	–	–	5 (1.8)	–
Gouge	–	1 (2.4)	1 (1)	–	2 (0.7)	–
Sinkers	–	1 (2.4)	1 (1)	–	2 (0.7)	–
Whetstones	–	–	9 (10.5)	2 (3)	–	–
Hammerstones	2 (2)	–	–	1 (1.5)	–	1 (4.5)
Anvils	–	–	2 (2.5)	1 (1.5)	1 (0.4)	–
Tool fragments	–	–	1 (1)	–	–	–
Ice picks	–	–	–	–	–	1 (4.5)
<i>Total</i>	93 (100)	42 (100)	88 (100)	62 (100)	274 (100)	22 (100)

*See note to Table 2.

Kama sites. Only the Khutor site yielded a relatively significant set of such tools (11 %).

The Volga-Kama collections also revealed two most numerous assemblages: tools for processing game and fish, and those for woodworking (Fig. 4). The collections from the sites of Chashkinskoye Ozero IV and VI contain a considerable number of tools for bone/horn-working (ca 20 %). Stoneworking tools at all sites of Volga-Kama culture are represented by isolated specimens.

Thus, the particular distinctive feature between the utility tools at the Kama and Volga-Kama sites concerns the amount of bone/horn-working tools. In the Kama collections, such tools were quite few; while at the Volga-Kama sites, the proportions of these tools were comparable with those of woodworking tools (Chashkinskoye Ozero IV). Further traceological studies

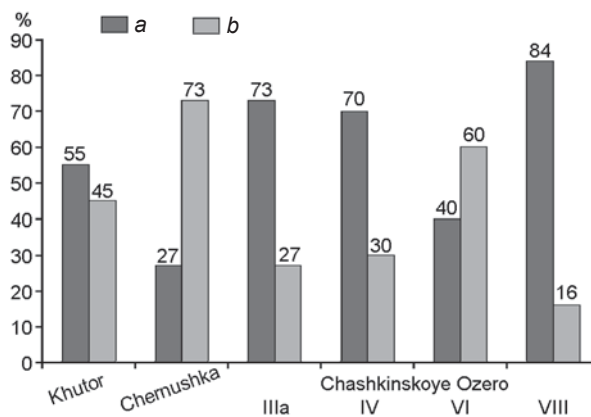


Fig. 3. The ratio of the traceologically defined tools on flakes (a) and on blades (b).

Table 4. Classification of the traceologically defined tools by the blank types

Blanks	Khutor	Chernushka	CO IIIa	CO IV	CO VI
Flakes	32	3	24	28	77
large (above 5 cm)	3	–	1	2	–
medium (3–5 cm)	22	–	6	20	16
small (below 3 cm)	2	2	17	5	61
fragments	5	1	–	1	–
Blade-like flakes	10	6	17	8	16
large (above 5 cm)	3	–	–	–	–
medium (3–5 cm)	4	1	5	8	4
small (below 3 cm)	3	5	12	–	12
Blades	35	24	15	16	143
large (above 1.5 cm)	2	2	3	1	33
medium (1.0–1.5 cm)	4	10	2	4	44
small (below 0.5–1.0 cm)	25	12	10	10	53
microblades (below 0.5 cm)	5	–	–	1	12
Core-like fragments	7	2	8	6	18
Tablets	5	4	9	3	9
Pebbles and fragments	4	3	15	1	11
<i>Total</i>	93	42	88	62	274

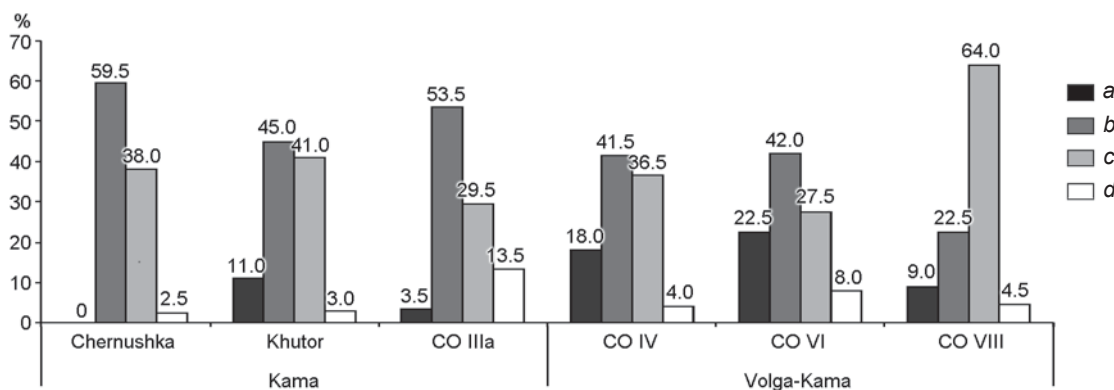


Fig. 4. Classification of tools by their utility types.

a – bone/horn-processing; b – game/fish-processing (meat, skin); c – woodworking; d – stoneworking. CO – Chashkinskoye Ozero.

of stone tools from the sites of both cultures will show if this trend is accurate.

Spatial analysis. This analysis has allowed us to identify at some sites (Khutor, Chernushka, Chashkinskoye Ozero IV and VI) the areas for processing meat and fish, manufacturing and repair of the side-bladed tools made of horn and bone, and wood-processing (Lychagina, Poplevko, 2011; 2012; Lychagina, Poplevko, Tsygvintseva,

2014). In particular, at Khutor site, areas for butchering (sq. K/213 and JI/211) and manufacture and repair of side-bladed bone/horn tools (sq. K–JI/212–213) have been discovered (Fig. 5, 1). At Chashkinskoye Ozero IV, utility zones for meat-processing and woodworking were located in the (presumably) central area of the settlement (sq. 3–И/43–44), overlapping each other (Fig. 5, 3). At Chernushka, tools for meat-processing were

concentrated in sq. III-Э/89–90, while woodworking tools were accumulated in sq. Ф-III/85–86 and Ф-III/87–88 (Fig. 5, 2). At Chashkinskoye Ozero VI, the butchering zone could have been located in sq. K/40 and K-M/41, while the largest accumulation of various wood-working tools has been noted in sq. M-O/38–39. Bone/horn-

working tools (scrapers, a cutter, and a chisel) were concentrated in sq. H/37–39 (Fig. 5, 4).

In general, the spatial analysis demonstrated that zones of various subsistence activities often overlapped each other, or were vaguely delimited. This was likely because of the specifics of the excavated portions of the

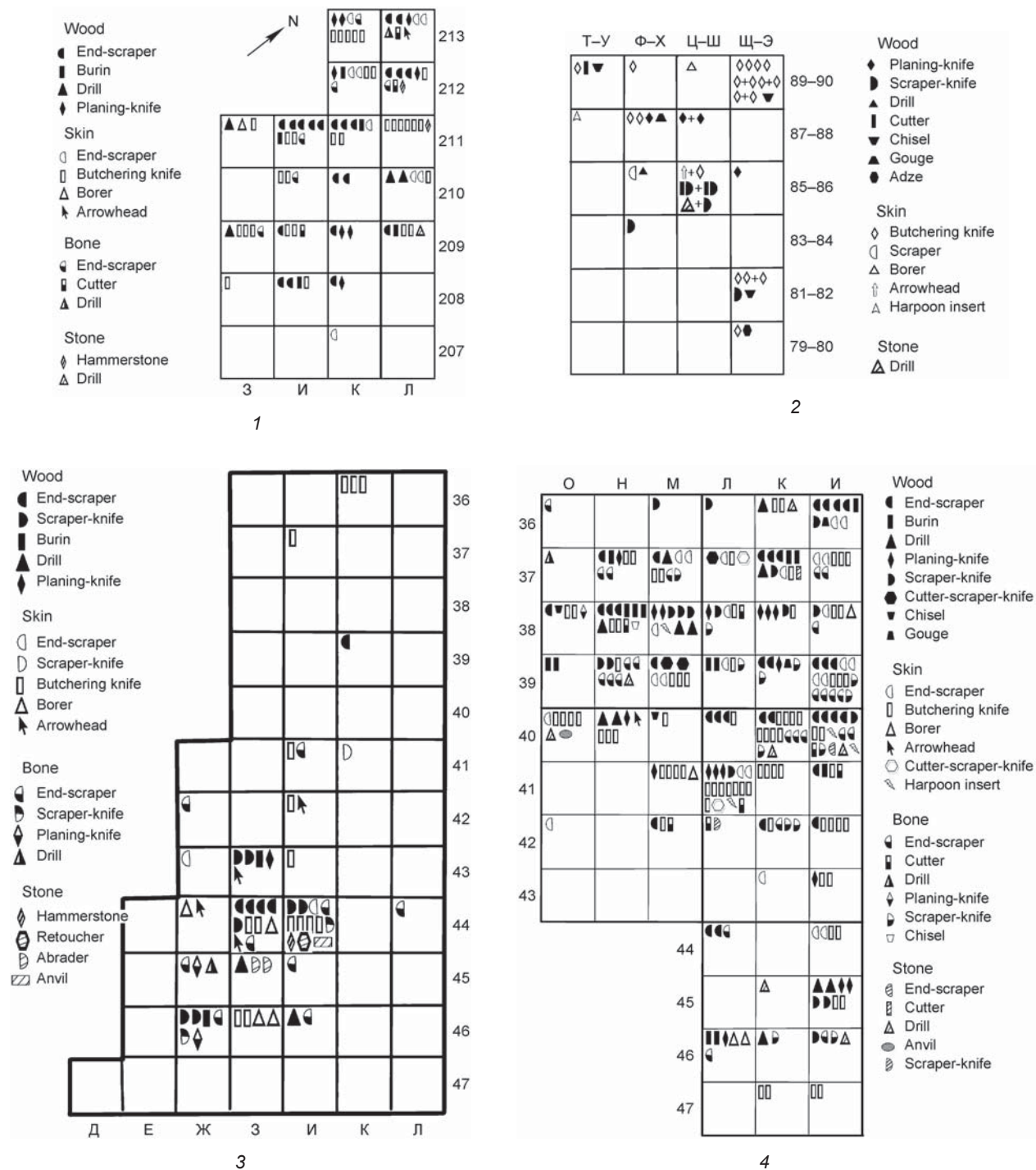


Fig. 5. Spatial analysis.

1 – Khutor; 2 – Chernushka; 3 – Chashkinskoye Ozero IV; 4 – Chashkinskoye Ozero VI.

sites: riverside where various utility areas could have been located in different periods of time. However, it cannot be excluded that some of them could have co-existed in one utility area.

Conclusions

Thus, the comprehensive analysis of stone tools from the Upper and Middle Kama Neolithic sites has shown a high degree of similarity in the following features: shape of blank, method of primary and secondary working, and the type-list of the recovered tools. Minor distinctions have been noted only in the dimensions of blanks (smaller blades and possibly flakes used in the Kama sites), in the occurrence of ventral retouch (more frequently used at the Kama sites), and in the role of bone/horn-processing tools in the utility assemblages (significant number of such tools at the Volga-Kama sites). Apparently, the need for adaptation to similar environmental conditions led to the leveling off of cultural differences in the lithic industries. This concerns mostly the Middle Neolithic. Possibly, comprehensive analysis of stone tools from the Early Neolithic sites might show greater distinctions. However, the currently available source base doesn't provide a sufficient sample for such analysis (Lychagina, 2013b).

Notably, the obtained analytical data do not always support the generally accepted conceptions of the Kama and Volga-Kama cultures. In particular, the thesis as to scarcity of tools on blades at the Kama sites and to their prevalence at the Volga-Kama sites has not been confirmed.

Further studies of the subsistence activities of the Kama populations during the Neolithic require comprehensive analysis of lithic industries from other sites in this region, a search for new sites (primarily those belonging to the Early Neolithic), and research in the paleoenvironment of the region.

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