

Interdisciplinary research of the Neolithic Volga-Kama pottery

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ABSTRACT – *In this article, we present a new method of studying Neolithic Volga-Kama pottery, which involves typological and technological analysis and the radiocarbon dating of vessels. As a result of the research, areas with Early Neolithic Volga-Kama pottery traditions are presented.*

IZVLEČEK – *V članku predstavljamo novo metodo preučevanja neolitske lončenine kulture Volga-Kama, ki vključuje tipološko in tehnološko analizo ter radiokarbonsko datiranje posod. V nadaljevanju predstavljamo rezultate teh analiz, s katerimi sva prepoznala območja, kjer so razširjene lončarske tradicije z zgodnje neolitsko Volga-Kama keramiko.*

KEY WORDS – *Neolithic; Volga-Kama; pottery; radiocarbon dating; pottery technology*

Introduction

The majority of Russian researchers link the advent of pottery production to the beginning of the Neolithic. The identification of pottery origins and areas of expansion of early ceramic traditions are priorities in study of Neolithisation of the Volga-Kama culture. The study is based in ¹⁴C dates of events and their contexts.

Our research is aimed at the following problems:

- ❶ ancient pottery nucleation in the Volga-Kama region;
- ❷ detection of areas with an early pottery tradition;
- ❸ establishing the chronological frameworks of this process with the help of radiocarbon dating of pottery;
- ❹ the identification of the developmental stages and peculiarities of the cultural correlation of the Neolithic cultures of Volga-Kama groups with people from neighbouring regions.

The territory of expansion of settlements comprises semi-deserts, steppe, forest-steppe and the forests in the region (Fig. 1).

A series of new methods were used in the analyses of pottery that were previously not implemented in archaeological studies of the Volga-Kama region:

- ❶ detailed morphological grouping of pottery based on the technique of ornamentation and the peculiarities of vessel forms (*Vybornov 2008a*);
- ❷ radiocarbon dating of precise cultural and chronological pottery groups (*Skripkin, Kovalyukh 1998; Vybornov et al. 2009; 2012; Zaitseva et al. 2009*);
- ❸ the technological analysis of pottery (*Bobrinsky 1978; 1999*).

Pottery technology of the Volga-Kama region

By studying the technologies of Neolithic pottery we could reconstruct some cultural processes of the Volga-Kama culture. Nevertheless, to identify the dynamics of cultural processes radiocarbon dates of pottery must be obtained first. Since it is impossible to date each Neolithic vessel individually, morphological grouping of pottery plays an important role in our research. As a result of this procedure, only vessels with clearly defined cultural and relative chronological contexts were the subject of radiocarbon dating. There were only a few Neolithic sites known from the Volga-Kama region before 2007. The pottery analyses were made on the basis of different initial materials in different laboratories, which was the subject of various discussions. In recent years,

we have obtained a series of new radiocarbon dates (*c.* 250) from a large number of Neolithic sites from the region from charred organic remains on pottery samples, chosen on the basis of previously defined cultural contexts (Tab. 3).

The study of the Neolithic pottery technology was performed according to descriptions by Alexander A. Bobrinsky (1978; 1999). This approach includes the use of a binocular microscope, the analysis of use wear traces on artefacts, *i.e.* trasology, and experiments. Approximately 2000 vessels from the Volga-Kama and neighbouring regions were the subject of technological analyses (Tabs. 1–2). First, a general description of the Neolithic pottery in the studied regions was created. The most important elements for studying the problem of the origin and expansion of Neolithic pottery were identified, that include the identification of initial raw material and pottery fabrics. Our research are based on Bobrinsky's hypothesis on pottery origins, which he supported with scientific arguments, numerous ethnographic studies, experimental data and the results of the microscopic study of Neolithic pottery in Eastern Europe and the Near East (Bobrinsky 1978; 1993; 2006). The main point of Bobrinsky's hypothesis is that there was a presumably long pre-pottery period in the so-called 'centres' of pottery origin where organic and



Fig. 1. Map of Neolithic sites in the Volga-Kama region.

other natural raw materials resembling clays were used. Items made from these raw materials were not fired, but only dried, and were used for food storage and transport. The evolution of ancient pottery traditions lay in adding clay to these organic sediments

AC, monuments	Types of initial plastic raw stuff			Total	
	Silts	Silty clays	Clays		
Northern Prikaspy¹					
	304/100%	–		304/100%	
North-west Prikaspy					
Jangar	15/60%	10/40%	–	25/100%	
The Don Region					
Razdorskaya I	5	–		5/100%	
Rakushechny Jar	11/100%	–	–	11/100%	
Ukraine					
Surskaya AC ²	15/72%	6/28%	–	21/100%	
Bugo-Dnestr AC ³	60/100%	–	–	60/100%	
Dnepr-Don AC ⁴	81/100%	–	–	81/100%	
The steppe Volga Region					
Varfolomeyevka	48/15%	179/57%	88/28%	315/100%	
Orlovka	8/80%	2/20%	–	10/100%	
The Middle Volga Region					
Elshanskaya AC ⁵	47/14%	297/86%	–	344/100%	
The Middle Volga Region AC	155/48%	161/50%	8/2%	324/100%	
Prikamye⁶					
Kama AC		89/49,7%	90/50,3%	179/100%	
Volga-Kama AC		125/70%	53/30%	178/100%	
Total	749/40%	869/47%	239/13%	1857/100%	

- 1 Northern Prikaspy – Kairshak I–IV, Tenteksor I–III, Kyzyl Khack, Tau Tube, Kugat IV, Zhe Kazgan I, Konbakte, *etc.*
- 2 Sura AC – Razdolnoye, Strilchey Skelya.
- 3 Bugo-Dnestr AC – Skibentsy, Bazykov Island, Pechera, Glinskoye, Sokoltsy, Sanchintsy, Zenkovtsy, Shumilovo-Chernyatka.
- 4 Dnepr-Don AC – Pustynka, Buzki, Grini, Vishenki II.
- 5 Elshanskaya AC – Ivanovka, Vilovatoye, Chekalino IV, Ilinka, Nizhnyaya Orlyanka II, Staraya Elshanka, Lebyazhinka IV–V, *etc.*
- 6 Prikamye – Ziarat, Chashkinskoye lake IV, VI, VIII, Khutorskaya, Tetyushkinskaya IV, Shcherbetskaya II, *etc.*

Tab. 1. Results of the raw material analyses of Neolithic ceramics in the Volga-Kama and neighbouring regions.

and, at the same time, firing technology improved from very low temperatures (up to 450°C) to low temperature (450–650°C) and finally to temperatures of 650–750°C.

Due to Bobrinsky's work, it became obvious that the origin of pottery can be explained in other ways, namely, by studying Early Neolithic pottery and the peculiarities of technological choices made by ancient potters about the suitability of different raw materials for pottery making. The various types of these raw materials may prove that Early Neolithic pottery came from different pottery centres.

The microscopic analyses show three types of raw materials of ancient pottery: silts, silty clay and clays (Figs. 2–4). Silts from rivers and silty lake sediments are located in the waterlogged coastal edges of ponds. Silts are natural fabrics suitable for pottery. They include a loamy substratum and mineral inclusions, the rotten remains of vegetation and animal matter. Silts also include filamentous algae, the roots, leaves and stems of rotted hydrophytes and terrestrial plants, the remains of aquatic wildlife (fish bones and scales), fresh water shellfish *etc.* (Bobrinsky, Vasilyeva 2012). In freshly broken pottery sherds, these inclusions in silts can be observed

whole or broken (Fig. 2). Silty clays were gathered near ponds, but can be also found in waterside deposits and more condensed layers of clays (Vasilyeva 2011). At the same time, silty clays have some features of silts, namely their organic and mineral inclusions, but these are usually in a crumbled form, rotten and sparsely distributed (Fig. 3). Clays, *i.e.* sedimentary compacted rocks, can be found both on the banks of basins and reservoirs and in remote areas. The difference between clays, silts and silty clays is the absence of aquatic vegetation and plants that grow near basins and reservoirs (Fig. 4).

The expansion of Volga-Kama pottery traditions

According to the analysis of different types of raw material, from which Neolithic pottery in the Volga-Kama region was made, we could identify three areas of expansion of Early Neolithic pottery traditions:

❶ Areas, where ceramics were made from silts. Cultures with painted and incised decorations on vessels in the Ukraine and in the south of East European Russia in the 6th to 5th millennium BC are included.

❷ Areas of Elshansky culture in the Middle Volga region, where silty clays and chamotte-temper were used as the main ceramic fabrics. It is dated from the 6th to the first half of the 5th millennium BC.

❸ The area of the Kama culture is characterised by the use of natural clays converted into dry matter and mixed with chamotte temper and organic matter in similar quantities. In Prikamyje region near the Kama river it was dated to the 5th to 4th millennium BC.

The first pottery tradition can be linked to the area north and northwest of Prikaspy in the steppe Volga Region. According to preliminary results, this area includes the expansion of Sursk, Dnepr and Donetsk, Bug-Dniester and shell-Yarsky cultures. Ves-

AC, monuments	Main recipes of pottery fabrics			Total
	with organic solution	with broken shells	with chamotte	
Northern Prikaspy				
	304/100%	–		304/100%
North-west Prikaspy				
Jangar	15/60%	10/40%	–	25/100%
The Don Region				
Razdorskaya I	5/100%	–	–	5/100%
Rakushechny Jar	11/100%	–	–	11/100%
Ukraine				
Surskaya AC	19/90%	2/10%	–	21/100%
Bugo-Dnestr AC	60/100%	–	–	60/100%
Dnepr-Don AC	81/100%	–	–	81/100%
The steppe Volga Region				
Varfolomeyevka	57/18%	258/82%	–	315/100%
Orlovka	9/90%	1/10%	–	10/100%
The Middle Volga Region				
Elshanskaya AC	294/85%	–	50/15%	344/100%
The Middle Volga Region AC	240/74%	1/0,4%	83/25,6%	324/100%
Prikamyje				
Kama AC	1/0,6%	–	178/99,4%	179/100%
Volga-Kama AC	15/8%	–	163/92%	178/100%
Total	1111/60%	272/15%	474/25%	1857/100%

Tab. 2. Results of the study of Neolithic pottery fabrics in the Volga-Kama and neighbouring regions.

Culture, site	Lab.	Material	Date – BP
Northern Priksy			
Kairshak III	Ki – 14471	pottery	7780±90 BP
Kairshak III	Ua 41359	ceramic food crust	7775±42 BP
TentekSOR	Ki – 14101	pottery	6640±80 BP
TentekSOR	Ua 35267	pottery carbon	6695±40 BP
North-west Priksy			
Jangar 3	Ki – 14639	pottery	7080±90 BP
Jangar 3	Ki – 14640	pottery	6990±90 BP
Jangar 3 – 2		charcoal	6870±130 BP
Jangar 2	Ki – 14641	pottery	6680±90 BP
The Don Region			
Razdorskaya II	Le – 6950	charcoal	7450±100 BP
Rakushechnyi Yar 20	Ki – 6476	pottery carbon	7930±140 BP
Rakushechnyi Yar 20	Ua 37097	ceramic food crust	7290±50 BP
Ukraine			
Surskaya culture:			
Kamennaya mogila	Ki – 4022	bone	7250±95 BP
Surskoy ostrov	Ki – 6691	bone	7245±60 BP
Bugo – Dnestrovskaya culture:			
Sokolchy II	Ki – 6697	bone	7440±60 BP
Dobryanka III	Ki – 11104	bone	7320±130 BP
Dobryanka III	Ki – 11108	pottery	7260±170 BP
Sokolchy I	Ki – 8165	bone	7260±80 BP
Dnepro – Donechkaya culture:			
Buzki	Ki – 8699	pottery	6380±90 BP
Dobryanka	Ki – 9834	pottery	6360±150 BP
The steppe Volga Region			
Orlovskaya culture			
Varfolomeevska 2 A	Ki – 14613	pottery	6540±80 BP
Varfolomeevska 2A	Ua 41361	ceramic food crust	6544±38 BP
The Middle Volga Region			
Elshaniien culture:			
Ivanovskaya	Ki – 14568	pottery	7930±90 BP
Ivanovskaya	Le – 2343	bone	8020±90 BP
Chekalino IV	Spb – 424	pottery	7660±200 BP
Srednevolzhskaya culture:			
Vilovatovskaya	Ki – 14090	pottery	6320±90BP
Prikamye			
Kama AC			
Ziarat	Ki – 15087	pottery	6110± 80 BP
Ziarat	Hela – 2991	crust	6323 ± 43 BP
Volga-Kama AC			
Sherbetskaya	Ki – 14531	pottery	6270 ± 90 BP
Sherbetskaya	Ki – 14098	pottery	6530±90 BP

Tab. 3. ¹⁴C dates of the Neolithic sites in the Volga-Kama and neighbouring regions.

sels are characterised by flat-bottomed vessels with painted and incised decorations (Fig. 5) made from silts (Vasilyeva 1999).

The earliest ceramics made of silts at the site Kairshak III was ¹⁴C AMS dated to the first quarter of

the 6th millenium BC (Vybornov 2008b; Zaitseva et al. 2009; Baratskov et al. 2012) (Tab. 3). At the advanced stage of the Neolithic in the steppe Volga region, a switch to new raw materials in the form of silty clays and clays has been noted. We consider the use of silty clays as an inter-medium in the evolution of pottery, where first silts and later clays were used as the main raw materials for ceramics. This conclusion is confirmed by results of the study of the stratified Bartholomew site (Vasilyeva 2009) and its dates (Vybornov et al. 2012) (Fig. 6). It was found that the technological switch to silty clays was not immediate. This change did not occur in settlements at the late Neolithic site TentekSOR I in the northern Kasy region (Fig. 5), which is dated to the second quarter of the 5th millenium BC (Vybornov 2008a). It should be noted that fabrics with chamotte temper were not found among Neolithic materials in the Lower Volga region.

Parellel to the change in the use of silts to silty clays and clays, one pottery tradition was formed *i.e.* the use of an artificially added broken shells as temper. If we consider the hypothesis of pottery origins in connection to the use of organic and silty materials, there should be signs of a pre-pottery period in early ceramic complexes at pottery production centres. These signs of a pre-pottery period are connected to fabric characteristics and to the use of fire more as an object of worships with purifying and magical characteristics than a simple technique (Bobrinsky 1999.96–97). All these characteristics were traced in the assemblages of the Northern Caspian region, and according to this we assume an independent origin of pottery in this region.

The second pottery tradition appears in the Volga-Ural and Middle Volga regions. The earliest pottery of the Elshansky culture dates to the first quarter of the 6th millennium BC (Andreyev et al. 2012) (Tab. 3). These are thin-walled vessels, with straight or smooth profiles and conical bottoms. Later, under the influence of Neolithic communities

from the Lower Volga region, the Elshansky people began to make flat-bottomed ware. Some 20–50% of pottery at different sites has no ornamentations. The remaining vessels are mostly decorated with a horizontal indent around the mouth of the vessels (Fig. 7).

The most popular features of Elshansky pottery are: silty clays used as raw material; sandy ferrous raw materials without shells; and two pottery traditions in the preparation of ceramic fabrics, one with added organic temper (OS) and the other with organic and chamotte temper (SH) (Vasilyeva 2011). Elshansky pottery was mostly made with silty clays, and only some of the vessels were made from silty clays with added mineral inclusions (chamotte). These facts may reflect two processes: firstly, the evolution of the attitude of Elshansky potters to raw materials, *i.e.* from proto-pottery to archae-pottery (Bobrinsky 1999), or, secondly, a certain primordial heterogeneity in the population of the Volga region during its migration to the Volga-Ural region. Due to the analyses of pottery technology, we infer that the pottery was not of local origin. When the Elshansky pottery appeared in the Volga-Ural region, it was more technologically developed than the already present painted pottery and pottery decorated with incisions. We assume that Elshansky pottery evolved in the eastern Caspian region and in central Asia, not in the Volga-Ural and Middle Volga region (Vybornov 2011).

The formation of a Neolithic culture in the Middle Volga region (Fig. 8) dates back to the middle of the 5th millennium BC. The pottery is characterised by a mixture of the two Early Neolithic pottery traditions mentioned above and their development (Vasilyeva, Vybornov 2012a).

The third pottery tradition is linked to the Prikamye region and is connected to the Kama culture. This pottery consists of round-bottomed thick-walled vessels, decorated with a comb and prepared with a specific fabric (Fig. 9). The earliest pottery, excavated at the Ziarat site, dates to the last quarter of the

5th millennium BC (Vybornov 2008). Pottery traditions in this region include specific attitudes to natural raw materials, which is reflected in using dry mixtures of rich clays, mixed with chamotte temper in equal quantities. The clay and temper were then ‘pasted’ together with an organic solution (Vasilyeva, Vybornov 2012b).

The chronology of the Kama culture is based on radiocarbon dates from organic matter on pottery (Vybornov 2008c) and corroborated by AMS radiocarbon dates on pottery (Vybornov et al. 2013). Interestingly, chamotte temper was mixed with raw materials in lower proportions in the Elshansky culture (in most cases, the concentration is no more than 1:5, *i.e.* one part chamotte to five parts of raw material) than in the Kama pottery tradition, where the proportion of clay and chamotte was 1:1 or 1:3. The origin of this pottery tradition is not obvious, but we assume it is not connected to Neolithic cultures of the Middle Volga region.

The Volga-Kama region became an area of blending and interaction of two different Neolithic cultures, the populations of the Middle Volga region that migrated here from the south, and the Kama population, which was perhaps also immigrant to this region. The Volga-Kama culture appeared as a combination of the Middle Volga and Kama culture. The presented results of the complex studies of Neolithic pottery in the Volga-Kama region are still in their preliminary stages. In the future, we will continue our research of Neolithic pottery from the Don and Higher Volga regions and from the right bank of the Middle Volga region.

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Fig. 2. Photomicrograph of raw materials of Neolithic pottery in the lower Volga region (silts): 1 to 3 impressions of water plants (1 Varfolomeyevka; 2 Kair-Shack III; 3 Lebiashinka V); 4 to 6 shells of fresh water molluscs (Kair-Shack III, Tenteksor); 7 fish bones (Kair-Shack III); 8 impressions of fish scales (Kair-Shack III).

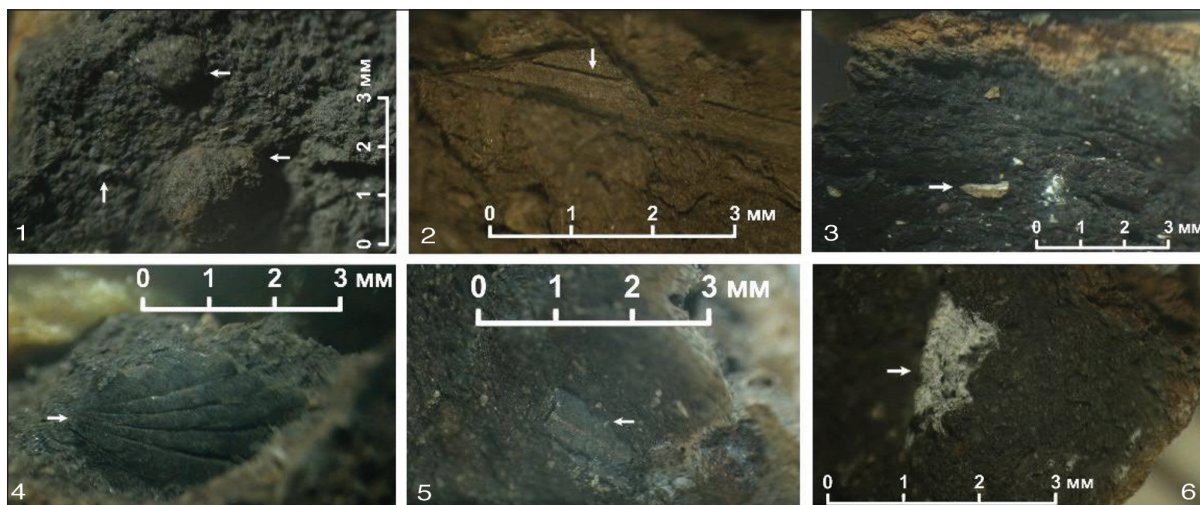
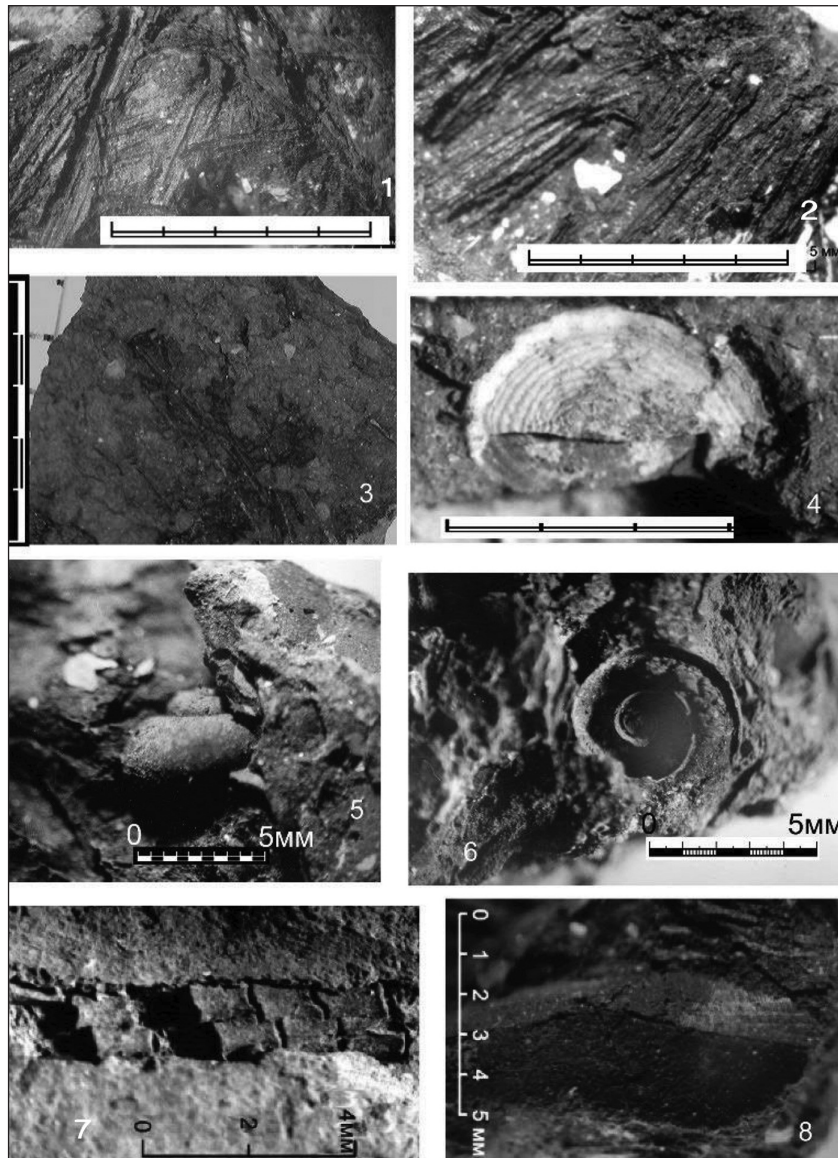


Fig. 3. Photomicrograph of raw materials of Neolithic pottery in the Middle Volga region (silty clays): 1 sandy initial raw material with clay pellets (Nizhnyaya Orlyanka); 2 impressions of plants (Ivanovka); 3 single inclusions of shells (Lebyazhinka IV); 4 impression of fish scale (Ilinka); 5 fragment of fish bone (Ilinka); 6 organic solution (Lebyazhinka IV).

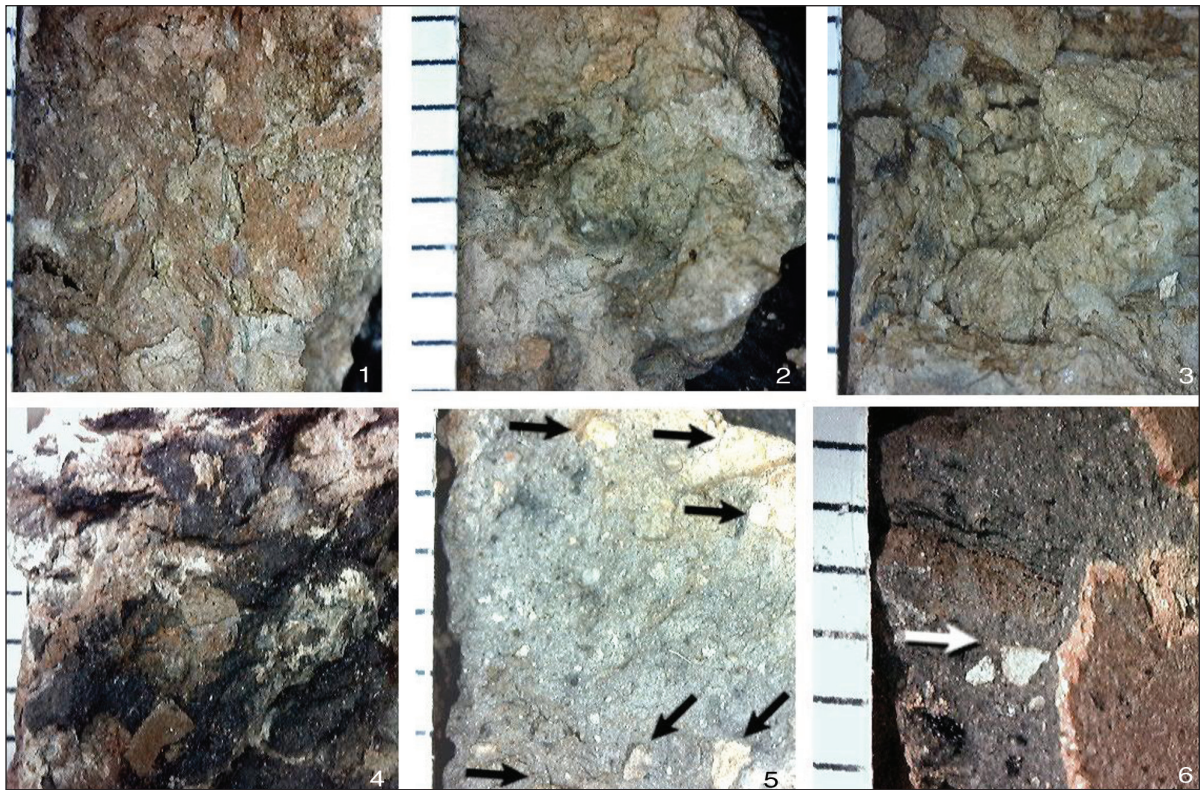


Fig. 4. Photomicrograph of raw materials and fabrics of Neolithic pottery at Prikamyie: 1 to 4 broken plastic raw material, fabric with high concentrations of chamotte and organic solution in pottery with comb decoration (1 and 2 Ziarat; 3 Lebedino I; 4 Balakhchinskaya site); 5 and 6 raw materials in natural condition, fabric with low concentration of chamotte and organic solution in pottery with incised decoration (II Sherbetskaya site).

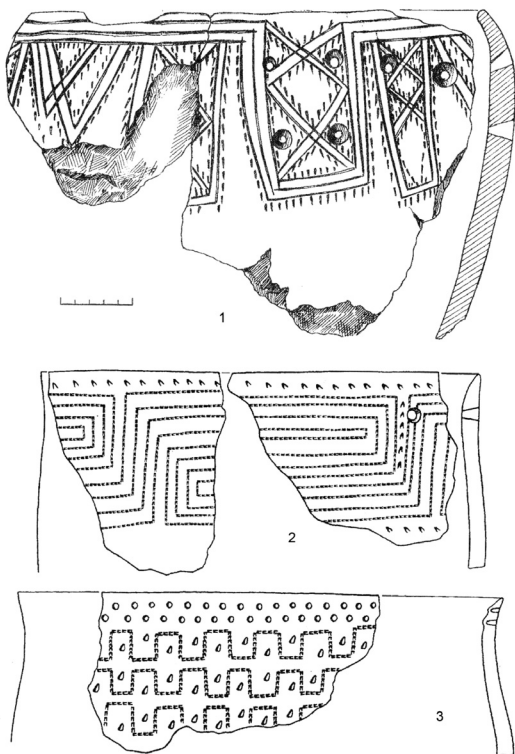


Fig. 5. Pottery. 1 Kairshak III site; 2-3 Tenteksor I site.

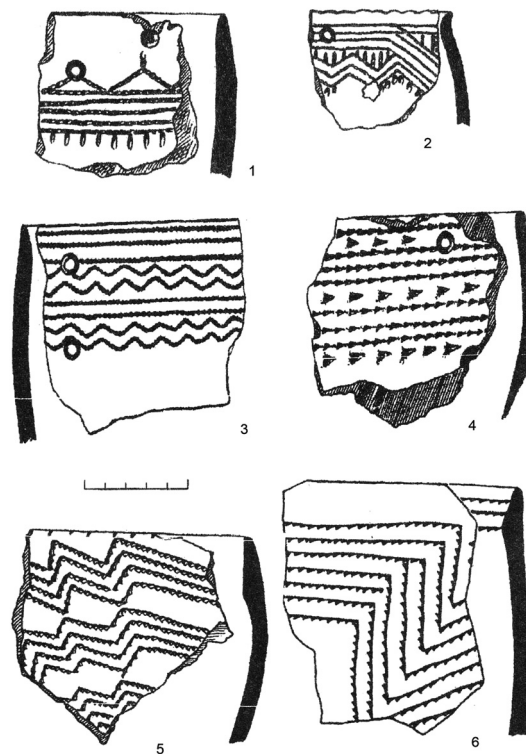


Fig. 6. Varfolomeevskaya site. Pottery. 1-2 layer 3; 3-4 layer 2B; 5-6 layer 2A.

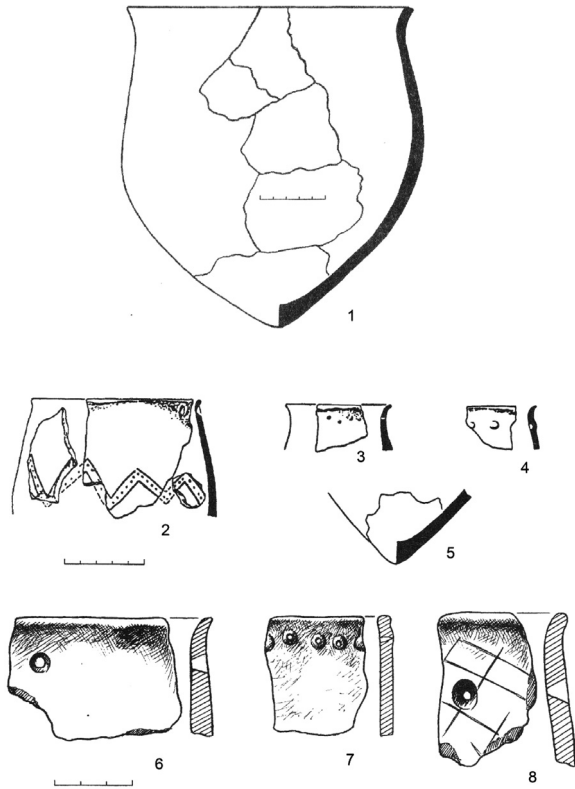


Fig. 7. Pottery. 1 Ivanovskaya site; 2-5 Chekalino IV site; 6-8 Bolshaya Rakovka site.

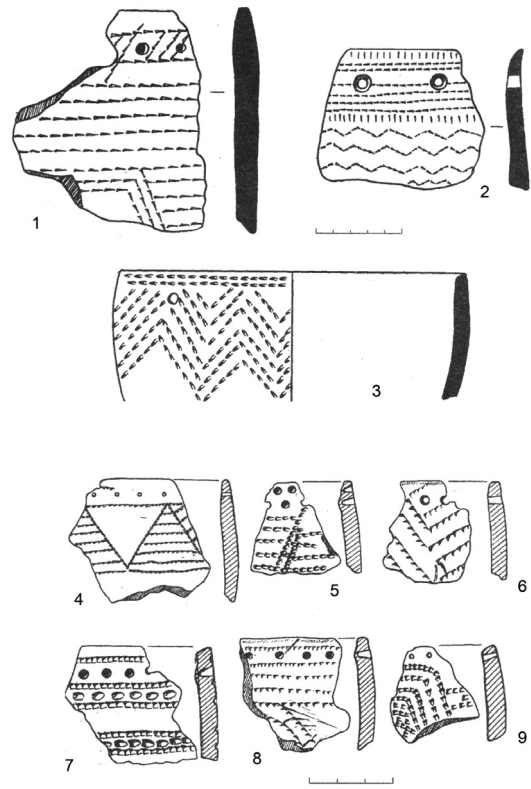


Fig. 8. Pottery. 1-3 Ivanovskaya site; 4-9 Vilovatskaya site.

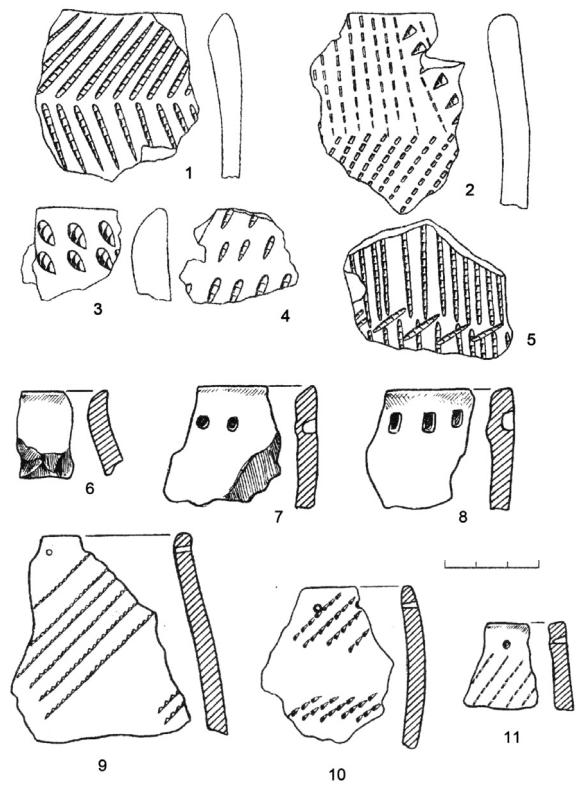


Fig. 9. Pottery. 1-5 Ziarat site; 6-11 Sherbetskaya site II.