

Ekaterina N. Dubovtseva

## THE USE OF CORD IN ORNAMENTATION OF NEOLITHIC POTTERY IN THE NORTH OF WESTERN SIBERIA

### Abstract

This article presents the results of studies on the Neolithic pottery of the North of Western Siberia (Russia). Vessels, ornamented with cord impressions, were studied through traceology and by means of experimental archaeology replicating pottery decoration. The paper considers the variety of cord stamps and the techniques used for decorating the Neolithic ceramic vessels. This tradition was spread in the taiga and forest-steppe zones of Western Siberia, in the territories of Khanty-Mansiysk Autonomous District, Sverdlovsk, Tomsk, Tyumen, Omsk, and Novosibirsk regions. Previously, pottery with textile and cord imprints was thought to appear only in the Eneolithic (the 4<sup>th</sup> millennium BC). However, radiocarbon dates clearly indicate that cord design emerged in Western Siberia in the Neolithic period (the 7<sup>th</sup> – the first third of the 4<sup>th</sup> millennium BC). The question of its genesis has not been solved yet. It is probable that the tradition originates in Eastern Siberia and the Far East, but also convergent development of this ornamentation technology is a possibility – the specificity of tools for making cord ornaments and decoration techniques argue in favour of the latter assumption.

Keywords: Neolithic, Western Siberia, pottery, cord ornamentation, experimental archaeology, traceology

Ekaterina N. Dubovtseva, Federal State Institution of Science, Institute of History and Archaeology, Ural Branch of Russian Academy of Sciences, ul. Kovalevskaya 16, 620990 Yekaterinburg, Russia: ket1980@yandex.ru.

Received: 7 June 2016; Accepted: 21 September 2016; Revised: 20 November 2016.

### INTRODUCTION

Patterns made with different types of cords are present in various parts of Eurasia since the Early Neolithic. K.V. Salnikov (1951) was the first researcher in Western Siberia who paid attention to the cord imprints. The aim of this article is to present the results of experimental studies on pottery with such ornaments, and to investigate the geographical and chronological distribution of this decorating style during the Neolithic in Western Siberia (Russia) – the research area comprises of the Khanty-Mansiysk Autonomous District, as well as the Sverdlovsk, Tomsk, Tyumen, Omsk, and Novosibirsk regions (Fig. 1).

This paper is an updated and amended version of an article published previously in Russian (Dubovtseva 2011).

As a rule, researchers have associated textile impressions on ceramics with vessel manufacturing techniques or their surface treatment (Glushkov & Glushkova 1992). A technological (traceological) study of ceramics showed, however, that only part of these imprints represented, in fact, traces of textile: imprints had also been produced by rolling a cord over the surface or by paddling the vessel with a patterned mallet (Glushkov & Glushkova 1992). On the other hand, there are a lot of ceramics with cord impressions, most likely made for

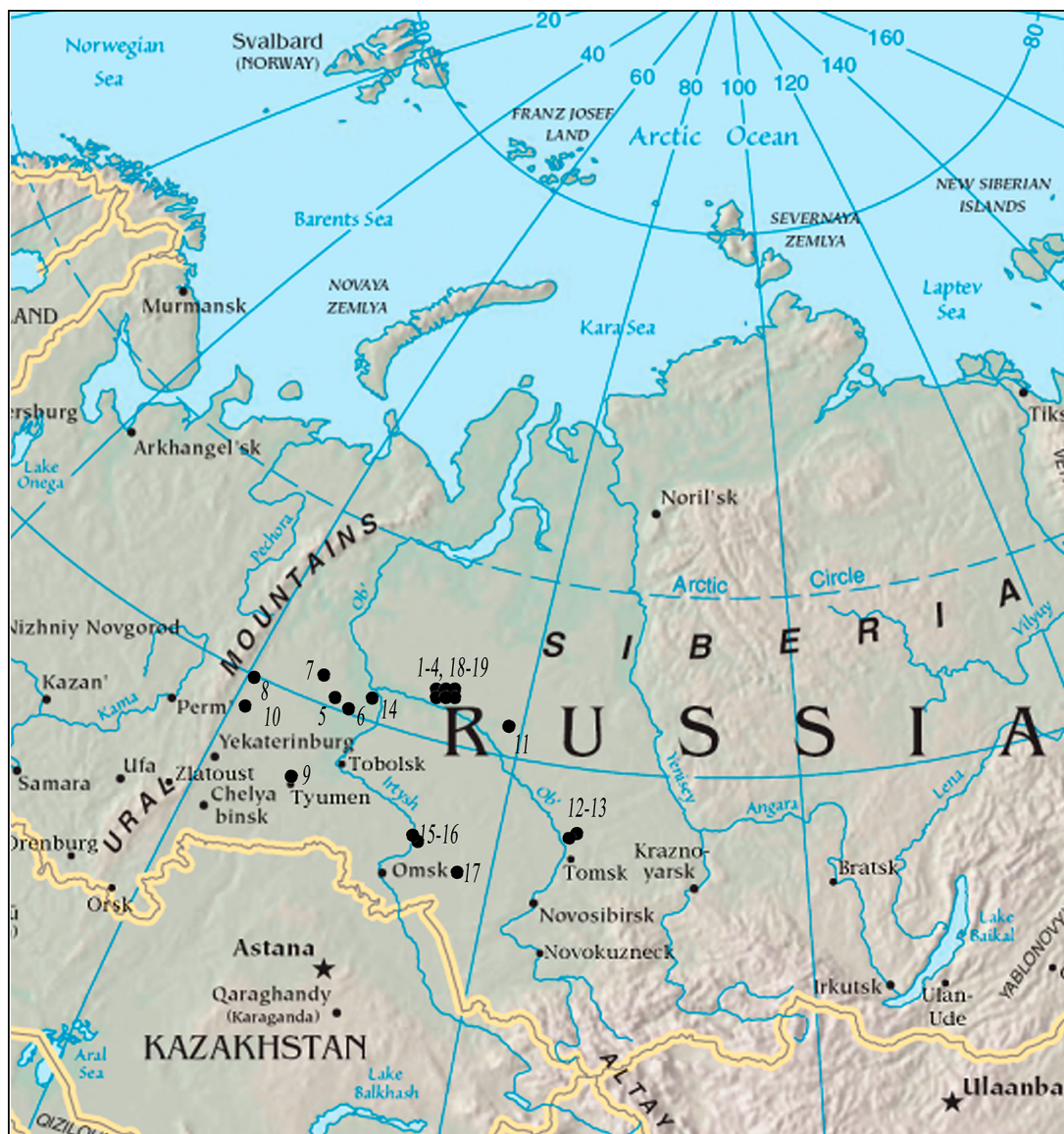


Fig. 1. The sites containing cord-ornamented pottery in the territory of Western Siberia. 1 – Pykhty I; 2 – Bystriy Kulyogan 66; 3, 4, 18, 19 – Barsova Gora II/8, II/10, II/19 and II/42; 5 – Sumpanya IV; 6 – Leushi VII; 7 – Enyya 12; 8 – Nizhnee Ozero III; 9 – VIII point on Lake Andreevo; 10 – Koksharov hill; 11 – Bolshoy Laryak settlement II; 12, 13 – Igrekovo I and II; 14 – Chilimka V; 15, 16 – Ust-Tara VI and XXVIII; 17 – Avtodrom 2. Map: E.N. Dubovtseva (base map: yandex.ru).

decorating purposes only. I.G. Glushkov (2005: 275–85) has suggested that these pots are classified as textile-decorated ceramics. According to his opinion, similar ceramic products were found only at two archaeological sites in West-

ern Siberia: the Eneolithic settlement of Botai (northern Kazakhstan) and the Bronze Age settlement Bystriy Kulyogan 23 (Khanty-Mansiysk Autonomous District). In both cases, the vessels were decorated with a cord wound around a stick

(Martynyuk 1985; Glushkov 2005). This kind of tool is called a *composite tool with an elastic working edge*. Traces deriving from such tools include shallow oval imprints, rounded imprint bottoms without pronounced reliefs, imprints with slightly rounded edges, sloping/non-vertical walls of imprints, and the lack of excess clay on the perimeter of impressions (Glushkov & Glushkova 1992: 62).

While studying ornamentation technology of the Neolithic pottery of the taiga zone of Western Siberia, decorations exhibiting similar characteristics were noted on ceramics with *comb* designs (Dubovtseva 2006: 13–9). Consequently, a hypothesis about the use of special *cord* stamps for decorating the pottery was formulated, and a program for studying the archaeological ceramics, including experimental archaeology, was developed to test it. The aim was to investigate the traditions of cord ornamentation in Western Siberia during the Neolithic period, and to define the chronology and genesis of this tradition. Specific questions included identifying what kind of tools were used for making the ornaments, defining ornamentation techniques, and determining the diagnostic features of different tools and ways of making decoration. Technological (traceological) investigation of the ornamentation and experimental studies were used to solve these questions. The successive stages of the study included: 1) selecting ceramics with traces of cord ornamentation; 2) studying ornaments on pottery with a microscope and identifying traces of threads/fibres at the bottom of imprints; 3) producing casts in order to obtain information about the shape of tool's working edge (which in some cases improved significantly the understanding of decoration techniques); 4) producing various experimental impressions and comparing the casts of these and the casts of archaeological ceramics by using a microscope; 5) formulating conclusions about the decoration techniques and the types of tools used for making ornamentation based on the results of comparative analysis of imprints on archaeological and experimental samples and their casts.

## SOURCES

The research material consists of fragments of pottery obtained through excavations at 19 ar-

chaeological sites (Fig. 1; Table 1). Seven of the sites were discovered during recent fieldwork and the rest of the material was acquired from collections from the 1970s and 1980s. The sites represent different archaeological cultures and types, and some of them are multi-period sites. The available information of the sites is incomplete as some excavation results have not been published yet. For example, it was not always possible to determine the total amount of pottery with cord ornaments present in the assemblages. Moreover, it was sometimes difficult to associate the ceramics with a cultural phase. In total, c. 70 vessels with cord ornamentation were selected from the studied assemblages – previously such decorations were identified as ‘comb type’ (Chemiakin & Stepanova 2001: 143–4).

Settlements Bystriy Kulyogan 66, Pykhty I, Barsova Gora II/8 (dwelling 3), Barsova Gora II/19 and Barsova Gora II/42 (dwelling 2) belong to the Bystrinka type of sites (Kalieva & Logvin 2006: 53–4; Kosinskaya et al. 2006: 57–67; Dubovtseva 2007: 87–91; Dubovtseva & Yudina 2011: 239–54). Several vessels ornamented with cord stamps were found at these settlement sites. The imprints are usually shallow and numerous traces left by threads/fibres can be distinguished at the bottom of the imprints with a microscope. The length and width of stamps are not standardized. Cord decoration has been done by using a so-called stepping technique, and in some cases incised marks and cord designs are combined on a single vessel: the horizontal and more subtle wavy-lines are applied with a cord (Figs. 2:1, 3; 5:5).

Settlements Barsova Gora II/8 (dwelling 7), Barsova Gora II/10, and Barsova Gora II/42 (dwellings 1c, 6a) belong to the Barsova Gora site group, however, the cultural identification and dating of this group is complicated and debated (Chemiakin 1993: 117–9; Kosinskaya 1993: 78–80; Chemiakin & Stepanova 2001: 140–5; Dubovtseva 2007: 87–91). Apparently, different types of cords were used at these sites. A fragment of a vessel, found in dwelling 7 at Barsova Gora II/8, has two parallel imprints of thin cord (Fig. 3:4) and threads twisted counter-clockwise (Z-twist) are visible both in the imprint and its cast. Archaeological material of this dwelling is related to the poorly investigated cultural phase associated with the so-called

Site	Location	Archaeological dating	Ceramic type(s)	Nr of vessels with cord ornamentation
Bystriy Kulyogan 66	Surgut area, KhMAO; the right bank of River Bystrinka (the River Ob basin)	MN	Bystrinka	15
Pykhty I	Surgut area, KhMAO; the left bank of River Chyornaya (the River Ob basin)	MN	Bystrinka	Several
Barsova Gora II/8	Surgut area, KhMAO; tract Barsova Gora on the right bank of River Ob	MN-LN	Bystrinka (dwelling 3); type of ceramics from dwelling 7 is debated	4
Barsova Gora II/10	Surgut area, KhMAO; tract Barsova Gora on the right bank of River Ob	MN-LN	The second stage of Barsovagora (or Igrekovo type)	1
Barsova Gora II/19	Surgut area, KhMAO; tract Barsova Gora on the right bank of River Ob	MN	Bystrinka	3
Barsova Gora II/42	Surgut area, KhMAO; tract Barsova Gora on the right bank of River Ob	MN	Bystrinka	13 fragments
Enyya 12	Soviet area, KhMAO; the left bank of River Bolshaya Enyya (the River Konda basin)	LN	Nemnyol	2
Sumpanya IV	Konda area, KhMAO; the left bank of River Sumpanya (the River Konda basin)	EN-MN	Sumpanya	3
Leushi VII	Konda area, KhMAO; the south bank of Lake Leushi Tuman	EN-MN	Sumpanya	3
Chilimka V	Konda area, KhMAO; the right bank of River Chilimka (the River Konda basin)	LN	Chilimka	?
Nizhnee Ozero III	Sverdlovsk region; the west bank of Lake Nizhnee, connected with the River Shegultan basin (the left tributary of River Sosva)	LN	Sumpanya	10
Koksharov hill	Verhnesalda area, Sverdlovsk region; the south bank of Lake Yurin	LN	?	3
VIII point on Lake Andreevo	Tyumen area, Tyumen region; the south-east bank of Lake Andreevo (interfluvium of the Rivers Tura and Pyshma)	MN-LN	Sumpanya and Sosnovostrovsk	>20
Bolshelaryak settlement II	Nizhneartovsk area, Tyumen region; the left bank of River Pasol (the River Vakh basin)	LN	Bolshelaryak	3
Igrekovo I	Molchanovsk area, Tomsk region; the River Chulym (the River Ob basin)	LN	Igrekovo?	3
Igrekovo II	Molchanovsk area, Tomsk region; the River Chulym (the River Ob basin)	LN	Igrekovo?	1
Ust-Tara IV	Tara area, Omsk region; the right bank of River Tara (a tributary of the River Irtysh)	LN	Artyn	9
Ust-Tara XXVIII	Tara area, Omsk region; the right bank of River Tara (a tributary of the River Irtysh)	LN	Artyn	4
Avtodrom 2	Vengerovskiy area, Novosibirsk region; the left bank of River Tartas	LN	Artyn	2

Table 1. Archaeological sites with cord-ornamented pottery. Abbreviations: KhMAO – Khanty-Mansiysk Autonomous District (Yugra); EN – Early Neolithic; MN – Middle Neolithic; LN – Late Neolithic.

‘pricked-dragged’ ceramics. The outer surface of a small vessel with a flat bottom from Barsova Gora II/10 is ornamented with S-twisted (i.e. clockwise) thin cord. An incised zigzag is applied over the cord imprint in the bottom part (Figs. 2:2; 4:3). The ornamentation is shallow and in total, there are seven parallel rows of imprints. The top row differs from the others in

width and depth of impressions: most likely, it was pressed with a knot that fastened the cord to the tool. Distinctive grooves are visible at the bottoms of imprints.

Settlements Sumpanya IV and Leushi VII belong to the Sumpanya type of sites (Kovaleva et al. 1984). The ceramic assemblages include some fragments ornamented with cord stamps

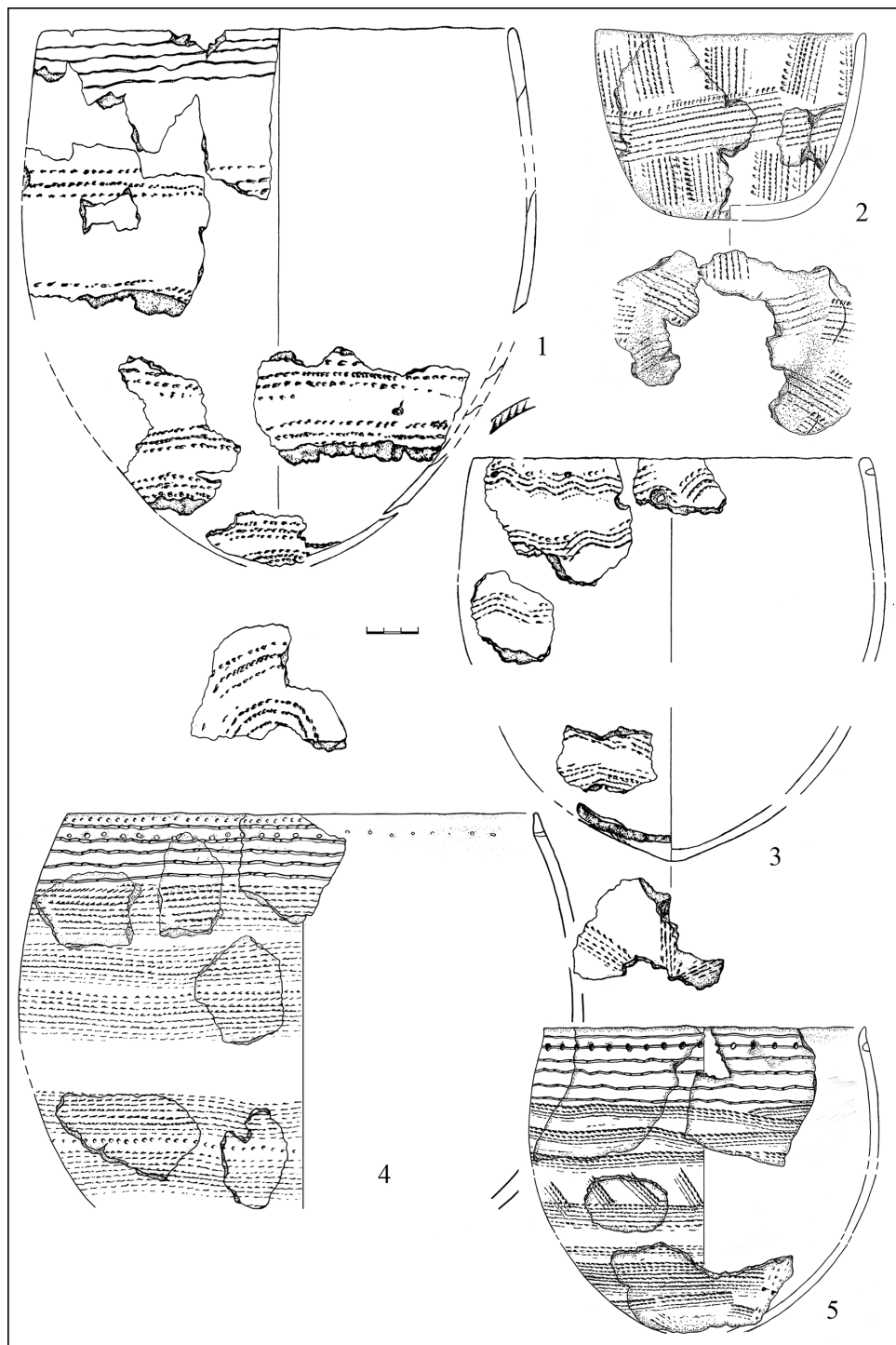


Fig. 2. Ceramics decorated with cord ornaments. 1, 3 – Bystriy Kulyogan 66; 2 – Barsova Gora II/10; 4–5 – Nizhnee Ozero III. After Kosinskaya et al. 2006; Chairkina & Dubovtseva 2014.

(Fig. 5:4). The patterns contain traces from five to seven windings of cord, each winding having a long oval shape. Tangled threads or individual fibres are visible in some rows. The upper and lower rows consist of individual imprints but in the middle they are fused. The patterns were applied in stepping technique and sometimes combine incised and pricked-incised designs. However, the specific traces at the bottoms of imprints may indicate that all motives were made with the same tool, although with different technique.

The vessels from the settlements VIII point on Lake Andreevo (Usacheva 2001: 116–34) and Nizhnee Ozero III demonstrate typological proximity to the Sumpanya type, in addition to which at the former site some cord-ornamented pottery can be included to the Sosnovooostrovsk type. The pottery from Nizhnee Ozero III (more than 10 vessels) is ornamented with a cord stamp (Figs. 2:4, 5; 3:1; 5:1) and the vessels have round bottoms. The upper parts of the vessels are decorated with incised wavy lines, and the bottom parts with the so-called stepping comb imprints (Chairkina & Dubovtseva 2014: 4–13). The cord consists of two weakly twisted threads (S-twist). Currently, this ceramic complex is the second largest characterized with cord decoration. Ceramics with cord ornamentation from VIII point on Lake Andreevo have cord imprints, which vary greatly in size and shape: the cords themselves vary in thickness and the degree of the twist.

Vessels decorated with cord impressions were found also at the settlements Igrekovo I and Igrekovo II (Sinitsyna 2008: 195–7), Bolshelaryak settlement II (Posrednikov 1973: 65–93), and Chilimka V (Glushkov & Sobolnikova 1999: 117; Glushkov 2005: 279), as well as at sites of Artyn type: Ust-Tara IV, Ust-Tara XX-VIII (Ivashchenko & Tolpeko 2005: 83–91), and Avtodrom 2 (Bobrov 2008: 110–3). Original decoration was found at the settlement Enyya 12 (Fig. 3:12): ‘two vessels, ornamented with a stamp, similar to a corded one. Thin twisted cord (?) attached on a solid basis leaving straight thin imprints on the surface’ (Stefanov et al. 2005: 64).

Apart from settlement sites, cord-decorated ceramics were also discovered at the cult site Koksharov hill. Fragments with cord ornamentation

originate in Object 12, whereof also two vessels of Koshkino type were found broken *in situ* (Shorin 2001: 151–69). A stick with wound cord was used as a decorating tool in rolling technique (Fig. 3:3); the cord was made by twisting together two thin threads (S-twist, imprint’s width 1 mm). On one sherd, the cord ornamentation occurred together with a wavy pattern, executed in pricking-incising technique.

Already during the first and second stages of the study it became clear that the analysed ornaments demonstrate several ways of using the cord, different methods of application and ornamentation (rolling, stepping, stamping/impressing) and various types of tools (composite tool with a cord attached to a solid basis, free cord without basis). Numbers of practical experiments were carried out to clarify and specify these observations.

## REPRODUCING DECORATIONS

### *Decorating tools*

One of the problems in the study of cord ornamentation is the identification of the material of the cords. In an analysis of Textile and Pit-Comb pottery from Karelia, S.A. Semenov came to the conclusion that cords were most likely produced of vegetable fibres. According to his observations, imprints of large fibres showed that they were inelastic and the threads intermingled and dislocated. These are characteristic features for plant fibres that absorb moisture (Semenov 1955: 141).

I.G. Glushkov and T.N. Glushkova experimented with nettle and wool plaits. They concluded that the former provide clear imprint with sharply defined edges and a deep imprint due to their low elasticity and roughness of the yarns. The latter, because of their strong deformation, produce a ‘sloppy’ and amorphous impression with blurred edges and a varying form (Glushkov & Glushkova 1992: 73).

In the experimental work, cords made of two twisted threads of wool, hemp and animal sinews were used. Woollen yarns produce more amorphous imprint, not only because of their softness, but also because of wool’s tendency to stretch when exposed to moisture. In addition, woollen threads leave many fibre/hair imprints

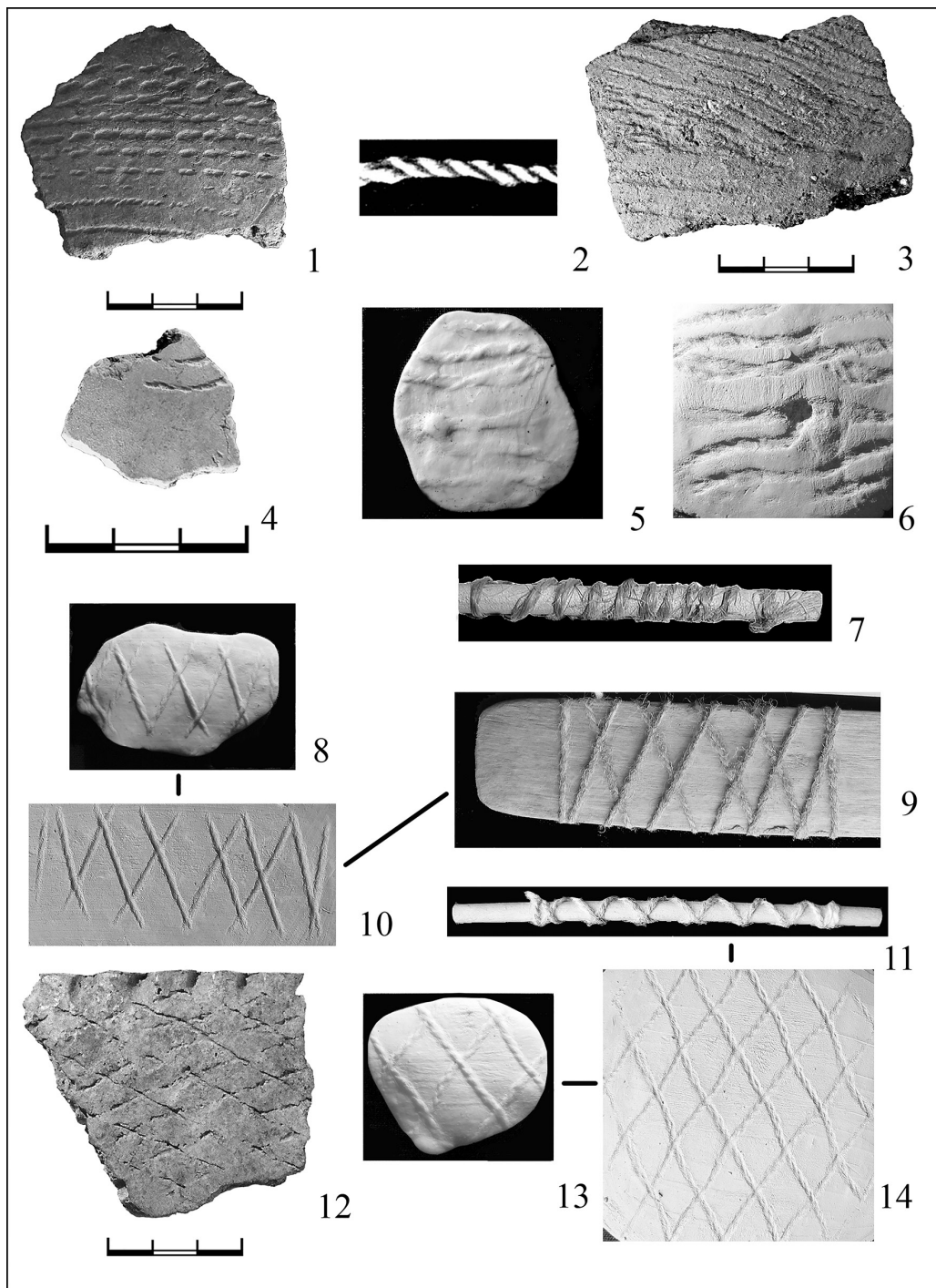


Fig. 3. Cord ornamentation (rolling and stamping/impressing). 1, 3, 4, 12 Neolithic pottery: 1 – Nizhnee Ozero III; 3 – Koksharov hill; 4 – Barsova Gora II/; 12 – Enyya 12; 2, 7, 9, 11 tools for making cord ornaments: 6, 10, 14 – experimental samples: 6, 14 – rolling, 10 – impressing (stamping); 5, 8, 13 – casts of experimental samples. Photos: E.N. Dubovtseva.

on the vessel surface which makes them easy to detect (Figs. 4:4, 5, 6). Plant and sinew threads are more rigid and less prone to stretching; these properties make them more suitable for ornamentation. Clear prints with well-defined edges and readable structure of filaments, as well as the absence of hair imprints on the decorated surfaces, imply that cords made of plant material (nettles) or animal veins were used in decorating the Neolithic pottery (Figs. 4:1, 2).

The second issue is the distinction between the different ornamentation tools. Two main types were distinguished as the result of experiments.

*Type I.* The simplest tool is a piece of cord (Fig. 3:2). Unlike composite tools with an elastic working edge, the cord imprints are characterized by the absence of any traces of an attached basis (overlapping traces on the ornament or a particular relief on the vessel surface), blurred imprints, and imprints varying in depth and clarity within the same cord impression (Figs. 3:1, 4). One variant of this kind of tool is a cord attached on soft basis (Figs. 5:2, 3) – S.A. Semenov (1955: 139, 141) described such an instrument, but its usage was not documented in the analysed ceramics.

It is also possible that these kinds of patterns are a result of ‘wrapping’ the vessel during the production process. The presence of a groove under the rim is a typical feature for the Zavyalovo and Kiprino ceramics of the upper River Ob: it was left by a cord that was wrapped around the vessel (Zakh 2003: 76–9). The same technique is recorded at the settlements Ust-Tara IV and XXVIII (Ivashchenko & Tolpeko 2008: 83–91), where it occurs together with other cord ornamentation. Groove left by a plait is present also on the outer surface of early Bronze Age ceramics; the gird was made when the vessel was still wet (Glushkov et al. 2004). The use of cord imprint for decoration was recorded at five studied sites – Nizhnee Ozero III (Fig. 3:1), dwelling 7 at Barsova Gora II/8 (Fig. 3:4), Avtodrom 2, Ust-Tara IV and XXVIII.

*Type II.* Tools of this type are composite ones with an elastic working edge and a solid basis. To the diagnostic characteristics mentioned above, one can add a relief on the decorated surface and traces of tool’s basis, which are visible as shallow prints overlapping the ornament

or located above and below it. Such traces are usually well-detectable on the pottery surface or its casts (Figs. 4:1; 5:5, 6, 7). Another feature, which distinguishes this tool from a comb stamp, is the varying distance between imprint rows due to cord’s movement on the basis (Figs. 5:4, 6).

Tools of type II have a number of variants (Figs. 3:7, 9, 11; 4:5), which are distinguished by the shape of basis and the method of winding the cord. The analysis of the patterns on the pottery made it possible to reconstruct three such alternatives: Variant 1 – Thin cord twined around a stick with round cross-section. The cord is wound straight and there is only small distance between the windings (2–3 mm). The application of this kind of tool in rolling technique is represented on the ceramics from Koksharov hill; Variant 2 – Cord twined crisscross around a round stick. This tool was used for ornamentation of ceramics at the settlement Enyya 12; Variant 3 – Convex/curved flat plate with 2–3 mm wide working edge (for example a rib of a large animal or a wooden plate) and several rounds of cord. The cord is wound straight, with the distance between the windings being 2–4 mm. This tool can also be used as a mallet for paddling the outer surface of ceramics. Variant 3 is the most commonly used one and present at many studied sites: Bystriy Kulyogan 66, Barsova Gora II/8 (dwelling 3), II/10, II/19, II/42, Pykhty I, Nizhnee Ozero III, Sumpanya IV, Leushi VII, and VIII point on Lake Andreevo.

## *Ornamentation techniques*

### **General**

The simplest way to use a cord for decoration is pressing it on the clay surface. It is interesting, however, that this is not typical for the Neolithic Western-Siberian ceramics and is recorded only at three archaeological sites in the Barabinsk forest-steppe and in the Middle Irtysh region (sites Avtodrom 2, Ust-Tara IV and XXVIII). There are two more sites in the taiga zone with similar ornamentation, although in both cases it occurs with other decoration techniques – rolling and stepping (settlements Nizhnee Ozero III and Barsova Gora II/8). Apparently, this is because one of the characteristic features of the



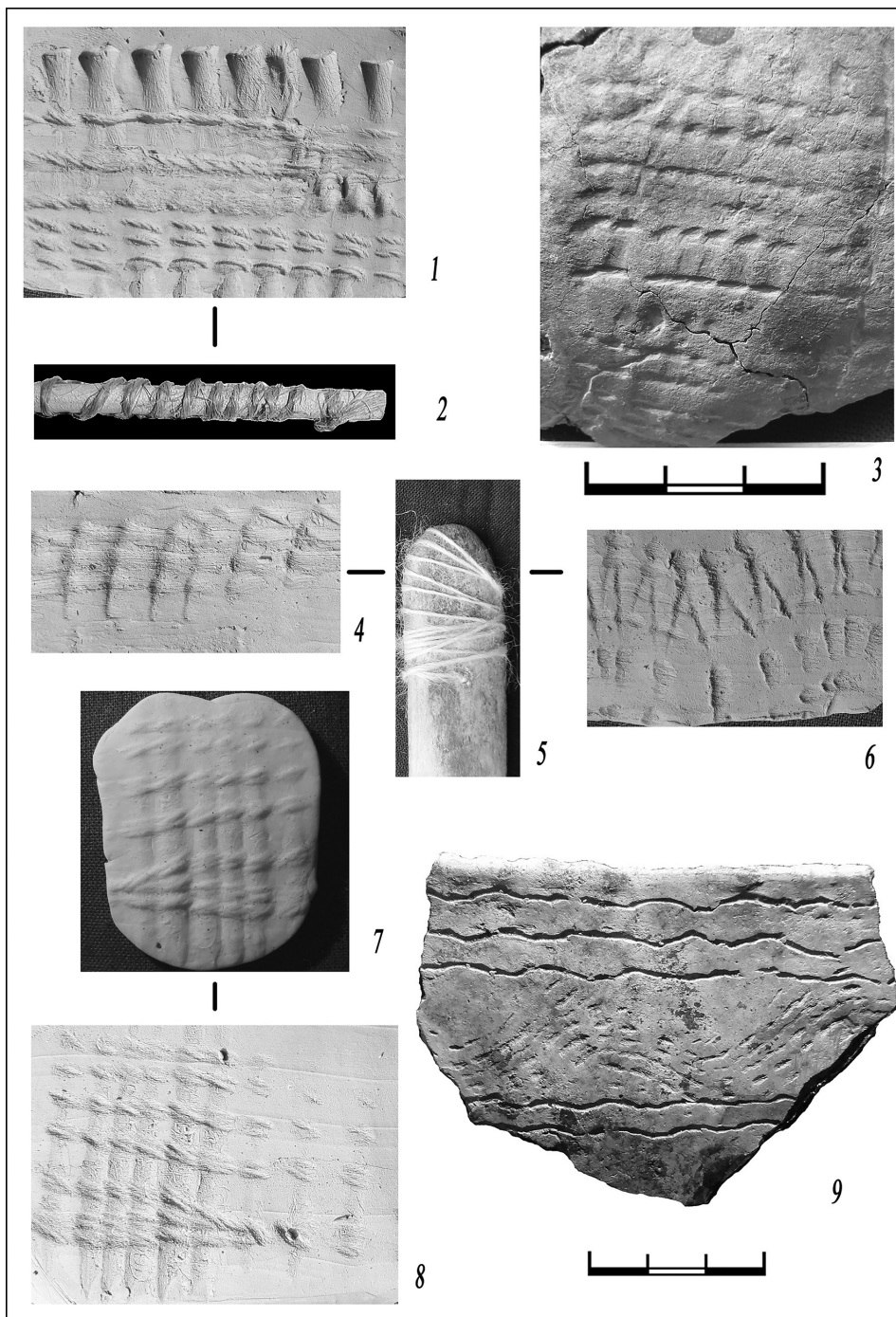


Fig. 4. Cord ornamentation (stepping and pricking-incising). 3, 9 Neolithic pottery: 3 – Barsova Gora II/10; 9 – Barsova Gora II/8; 2, 5 – tools for making cord ornaments: 1, 4, 6, 8 – experimental samples; 1, 6 – stepping; 4, 8 – pricking-incising; 7 – cast of experimental sample. Photos: E.N. Dubovtseva.

Neolithic ceramics in the taiga zone of Western Siberia is the use of dynamic decoration techniques. Therefore, the main attention was paid to producing designs by using the techniques of stepping, pricking-incising and rolling.<sup>1</sup> These techniques are typically used also with comb stamps. It should be noted, however, that they are quite difficult to separate and therefore the techniques are studied in detail in the following.

### Pricking-incising

The ornamentation tool is moved over the surface without raising it, and periodically increasing pressure. Imprints are collinear, the surface gets 'stepped' relief, and cord's structure amalgamates (Figs. 4:4, 8). Only tools of type II can be used. This technique is typical for decoration of ceramics from the sites Bystriy Kulyogan 66 and Pykhty I.

### Stepping

The ends of a tool are alternately raised over the surface and moved over a certain distance (step) in the direction of movement (Fig. 4:6). Difficulties in identifying this technique occur when dense steps (Figs. 5:4, 7) and 'stepping-dragging' are used. In the latter case, the middle part of the stamp is practically not raised over the surface (Figs. 4:1; 5:1, 6). This can be recognized by the shape of imprints: upper and lower rows of the pattern consist of individual impressions whereas in the middle the imprints merge and give the impression of pricking-incising (dragging). The relative positions of opposite ends of impressions are a characteristic feature of stepping: the lower edge of an imprint is located between two upper ones and vice versa (Figs. 4:6; 5:5, 7).

This technique can be executed with both of the ornamentation tool types. However, it is quite inconvenient when using a cord without a basis plate or on elastic basis (Fig. 5:3b). In the studied assemblages the stepping technique was executed only with tools of type II. During experimental research, it became clear that cord stamps with a straight solid basis (variant 1) leave clear traces in clay above and below the decoration, but the impressions of basis were shallow and blurred on the archaeological

samples. In addition, ceramics of Bystrinka type were decorated with wavy motifs in stepping technique (Fig. 4:9), which were not reproducible with such tools. Thus, it is reasonable to assume that plates with a convex working edge (variant 3) were used as basis, not sticks: the experiments showed that they leave less-visible traces and are more suitable for making wavy designs. This technique was probably used for decorating ceramics at most of the studied archaeological sites: Bystriy Kulyogan 66, Barsova Gora II/8 (dwelling 3), II/10, II/19, II/42, Pykhty I, Nizhnee Ozero III, Sumpanya IV, Leushi VII, and VIII point on Lake Andreevo.

### Rolling

The ornamentation tool is gradually pressed around the arc of the working edge. Two types are distinguished: complete (360°) and incomplete rolling (less than 360°). Cord imprints are fairly clear and the distance between the imprint rows may vary, as the cord slides on the basis. Quite often, the basis leaves marks on the surface and overlapping patterns can be seen at places where pressing ornamentation was stopped and resumed. This technique is applicable by both types of the ornamentation tools. The ceramics from the Koksharov hill site were decorated by using a rolling technique, a wound cord around a stick (Fig. 3:3).

Cord patterns on pottery at the settlement Enyya 12 comprise of a net design with lozenges (Fig. 3:12). These kinds of impressions are dispersed quite widely. Sometimes they are located on the inner surfaces and even on the joints of coils (inside the walls) (Novykh 1988). It has been suggested that they represent a framework used for forming the vessel, gasket between mold and clay, or traces left by paddling the vessel with a mallet covered with a woven mesh. Pottery from the settlement Enyya 12 was made by coiling, but no traces of manufacturing vessels on a mold were recorded, i.e. imprints are not connected with a technological stage of the vessel formation, but with decoration application. In addition, traces of bases with attached cords were clearly visible on the outer surfaces of vessels.

There are a few ways of producing such impressions: rolling a stick/rod with round cross-

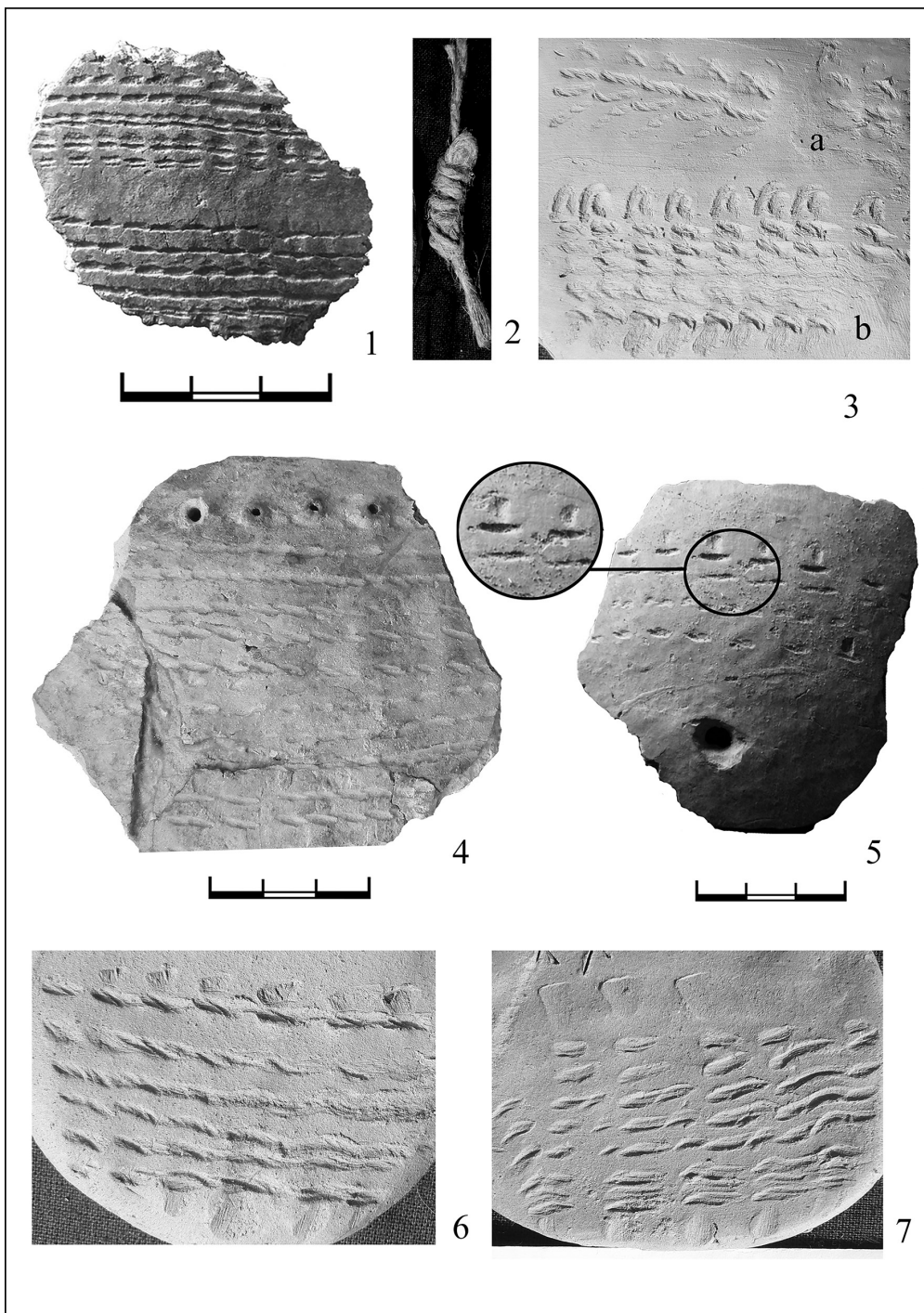


Fig. 5. Cord ornamentation (stepping and pricking-incising). 1, 4, 5 Neolithic pottery: 1 – Nizhnee Ozero III; 4 – Leushi VII; 5 – Bystriy Kulyogan 66; 2 tool for making cord ornaments; 3, 6, 7 experimental samples: 3a – pricking-incising; 3b, 6, 7 – stepping. Photos: E.N. Dubovtseva.

section and a cord wound crosswise around it (Fig. 3:11), or paddling with a flat instrument with a net or cord fixed on it (Fig. 3:9). The experiments showed that ornaments made by these two ways differ for many reasons. Imprints executed with paddling have elongated shape and the bottom has a sharpened form and clear borders. The width and length of imprints remain constant and edges are well-visible and sometimes overlap with each other (Figs. 3:8, 10). Rolling technique produces shallow and wide imprints with oval bottoms. Pressing the basis on the clay surface causes the yarns (twisted to cord) to disperse and results in honeycomb-like imprints in the shape of a chain (Figs. 3:13, 14). Imprints on the edges of pattern are less-deep than in the centre. The width of the pattern remains constant but the length varies. Rows may shift, which can be explained by the sliding of the cord on the basis (Fig. 3:14). All analysed ceramics from the settlement Enyya 12 bear signs of rolling.

## RESULTS AND DISCUSSION

In the light of the studied materials, the use of cord ornamentation on pottery represents a particular cultural tradition, which was widespread over a vast territory stretching at least from the Barabinsk forest-steppe to the Surgut Ob region. In addition to the cord ornamentation, these vessels are similar in shape, usually half-egg-shaped pots with rounded or pointed bottoms (vessels at the settlements Barsova Gora II/10 and Igrekovo II form an exception). The rims are rounded or sharpened and without bulges (settlements of Bystrinka, Sumpanya and Artyn types, settlement Nizhnee Ozero III) or with weakly pronounced V-shaped swell (Koksharov hill, settlements Enyya 12 and VIII point on Lake Andreevo). Quite often ornaments made with cord stamps co-occur with wavy patterns, executed in incising or pricking-incising techniques (Figs. 2:1, 2, 4, 5).

However, also differences in ornamentation should be noted, primarily based on the used tool type and decorating technique. The forest-steppe and southern taiga regions are characterized by the simple impression of a piece of cord on the vessel surface. Perhaps this technique is related to technological procedure of the ves-

sel formation, in which cord is tied under the rim and could serve as a kind of frame for the neck or limiting its diameter. Composite tools with an elastic working edge and convex basis (type II, variant 3) were most often used in the taiga zone. Stepping was the dominant decoration technique. Rolling the cord stamp over the vessel surface is rather rare and likely associated with the end of the Neolithic.

In addition, the cords used for decoration differ. A cord consisting of two thin and weakly clockwise-twisted (S-twist) threads is typical for the ceramics of Bystrinka and Artyn types. Thicker cords, twisted in the same way, were applied on the pottery of Sumpanya type. Cords at the settlement Enyya 12 and Koksharov hill differ in terms of fineness of cord and density of the twists. Sometimes a single thread was wound around the basis (settlement Bystryi Kulyogan 66).

## DATING OF ARCHAEOLOGICAL SITES WITH CORD ORNAMENTATION

The appearance of ceramics with textile impressions, including cord ornamentation, is traditionally dated only to the Eneolithic in Western Siberia. Cord decorations even became a kind of a chronological 'marker' of this period. However, assemblages analysed in this study date back to different periods of the Neolithic. The settlements Nizhnee Ozero III, Sumpanya IV and Leushi VII are related to the Early Neolithic, to the 7<sup>th</sup> – third quarter of the 6<sup>th</sup> millennium BC. Archaeological sites of Bystrinka type (sites Bystryi Kulyogan 66, Barsova Gora II/8 [dwelling 3], II/19 and Pykhty I), Barsovagora type (sites Barsova Gora II/42 and II/10) and Bolshoylaryak type (site Bolshoy Laryak II), as well as pottery from the settlement Barsova Gora II/8 (dwelling 7) date to the Middle Neolithic, i.e. the last quarter of the 6<sup>th</sup> – the middle of the 5<sup>th</sup> millennium BC. Archaeological sites of Artyn type (sites Avtodrom 2, Ust-Tara IV and XXVIII) and Nemnyol type (site Enyya 12), and pottery at the settlements Igrekovo I and II belong to the Late Neolithic, that is, the second half of the 5<sup>th</sup> – the first third of the 4<sup>th</sup> millennium BC.

Dating of the settlement Chilimka V is complicated. After analysing the ceramic material, the excavators of the site came to the conclu-

Site	Culture/type	Archaeological dating	Material, context	Lab-index	BP	±	Max (2σ)	Min (2σ)
Bystriy Kulyogan 66	Bystrinka	MN	Charcoal, dwelling 2	Le-5335	5930	90	5040	4580
Bystriy Kulyogan 66	Bystrinka	MN	Charcoal, dwelling 2	Le-5336	5910	130	5250	4450
Bystriy Kulyogan 66	Bystrinka	MN	Charcoal, dwelling 2a	Le-5337	5725	70	4730	4370
Bystriy Kulyogan 66	Bystrinka	MN	Charcoal, dwelling 2a	Le-5690	5560	100	4700	4150
Bystriy Kulyogan 66	Bystrinka	MN	Charcoal, ditch	Le-5689	5780	130	4950	4350
Bystriy Kulyogan 66	Bystrinka	MN	Charcoal, ditch	Le-5680	6150	210	5500	4550
Leushi VII	Sumpanya	EN-MN	Charcoal, dwelling1	Le-2726	6890	70	5970	5640
Leushi VII	Sumpanya	EN-MN	Charcoal, dwelling 1	Le-2729	6370	60	5480	5220
Leushi VII	Sumpanya	EN-MN	Charcoal, dwelling 1	Le-2725	6130	40	5210	4960
Leushi VII	Sumpanya	EN-MN	Charcoal, dwelling1	Le-2728	5750	60	4730	4450
Sumpanya IV	Sumpanya	EN-MN	Charcoal, dwelling B/3, hearth	Le-1440	6850	60	5880	5630
Sumpanya IV	Sumpanya	EN-MN	Charcoal, floor of dwelling	Le-1813	6520	70	5620	5340
Sumpanya IV	Sumpanya	EN-MN	Charcoal, floor of dwelling	Le-1814	6590	70	5650	5380
Nizhnee Ozero III	Sumpanya	EN	Charcoal, dwelling 2	SOAN-6198	5520	125	4700	4000
Nizhnee Ozero III	Koshkino and Satygino	EN	Charcoal, dwelling 2	SOAN-6199	7120	140	6350	5700
Nizhnee Ozero III	Koshkino and Satygino	EN	Charcoal, dwelling 3	SOAN-6200	7500	145	6650	6050
Nizhnee Ozero III	Koshkino and Satygino	EN	Charcoal, dwelling 3	SOAN-6201	7695	170	7050	6200
Nizhnee Ozero III	Koshkino and Satygino	EN	Charcoal, dwelling 3, hearth	SOAN-6202	7680	110	6850	6250
Nizhnee Ozero III	Koshkino and Satygino	EN	Charcoal, dwelling 3, hearth	SOAN-6203	7735	90	6830	6420
Nizhnee Ozero III	Koshkino and Satygino	EN	Charcoal, dwelling 1, hearth	SOAN-6944	6645	140	5850	5300
Nizhnee Ozero III	Koshkino and Satygino	EN	Charcoal, dwelling 1	SOAN-6945	5495	125	4600	4000
Nizhnee Ozero III	Koshkino and Satygino	EN	Ceramics with cord ornamentation	Ki-15394	6250	90	5190	5060
Nizhnee Ozero III	Koshkino and Satygino	EN	Ceramics	Ki-14308	5730	80	4730	4440
Igrekovo I	Igrekovo?	MN-LN	Ceramics with punctuated ornamentation	Ki-14310	5510	80	4540	4220
Igrekovo II	Igrekovo?	MN-LN	Ceramics with cord ornamentation	Ki-14309	5355	80	4350	3990
Barsova Gora II/19	Bystrinka	MN	Charcoal, dwelling 3	LE-8594	7500	200	6850	5900
Barsova Gora II/19	Bystrinka	MN	Charcoal, dwelling 2	LE-8547	4400	140	3500	2600
Barsova Gora II/19	Bystrinka	MN	Charcoal, dwelling 2	Ki-16033	6750	90	5800	5480
Barsova Gora II/10	Barsovagora (Igrekovo)	MN-LN	Charcoal, dwelling 1, Δ\3-4, pit 1	LE-4977B	6080	120	5210	4790
Barsova Gora II/10	Barsovagora (Igrekovo)	MN-LN	Charcoal, dwelling 1, B\5, ochre from the floor	LE-4977c	5750	150	5050	4250
Barsova Gora II/8	Bystrinka	MN	Soot on ceramics from dwelling 3	AAR-14836	6321	33	5360	5220

Table 2. Radiocarbon dates of archaeological sites with cord-ornamneted pottery in Western Siberia (after Timofeev & Zaytseva 1996; Kosinskaya et al. 2006; Sinitsyna 2008; Chairkina 2009; Chairkina & Dubovtseva 2014). Dates calibrated using the software OxCal v3.10; Bronk Ramsey (2005), cub r:5 sd:12 prob usp [chron]; Atmospheric data from Reimer et al (2004). Abbreviations: EN – Early Neolithic; MN – Middle Neolithic; LN – Late Neolithic.

sion that the manufacturing technology was advanced, which is not typical for the Early Neolithic. Consequently, they dated the site to the Late–Final Neolithic (Glushkov & Sobolnikova 1999: 118). In their opinion, some similarities between Chilimka and Yekaterina ceramics of the Ishim Basin confirmed this dating. On the other hand, the authors often mention significant similarities between the ceramics of Chilimka V and Middle Neolithic Bystrinka and Sumpanya types, which makes the dating questionable. Fragments with cord ornaments on the Koksharov hill, located in the Middle Trans-Urals, were found inside an object with Early Neolithic Koshkino type pottery; although this is a multi-layer site and the dating needs a separate study. In terms of ornamentation technique and the type of the cord stamp, the fragments are similar to the Late Neolithic Nemnyol type ceramics.

In general, the question of chronology remains an actual one for the Neolithic of Western Siberia. Recently radiocarbon dating has started to play a significant role in this debate, even if the number of radiocarbon dates is still too low. The radiocarbon datings, known to the author, are presented in Table 2. The available dates confirm the appearance of pottery with cord ornamentation in the territory of Western Siberia in the Early Neolithic, not in the Eneolithic. This allows new perspectives on the question of the origins of this tradition.

## GENESIS OF CERAMICS WITH CORD ORNAMENTATION

Traditionally, the question of genesis has been solved by searching Neolithic pottery with cord ornamentation in the neighbouring territories. As a result, it has been suggested that this kind of ceramics originated in the territory of east European forest zone and that cord ornamentation spread from there to the area of Trans-Urals and northern Kazakhstan in connection with the resettlement of Pit-Comb-pottery-using tribes (Zakharov 2004: 77–84). However, the identification of Early Neolithic complexes with cord ornamentation in the territory of Western Siberia makes it possible to suggest also other hypotheses.

Cords were widely used in the ceramic manufacture and ornamentation in Eastern Siberia and

the Far East since the Early Neolithic. Therefore, it is possible that the tradition originates in the East. This pottery is often connected to the group of comb ceramics due to their morphological features, and has been associated with autochthonous (Palaeoasiatic) population of this region since the days of V.N. Chernetsov (1968). However, there are some valid counter-arguments. Firstly, cord decoration in Western and Eastern Siberia varies significantly in terms of types of ornamentation tools and methods of their usage (for comparison, see Fukuda 2003). Secondly, there is no reliable data proving that cord ornamentation in the eastern part of the area is more ancient than cord ornamentation in the western part. The poorly-studied eastern regions of Western Siberia prevent the clarification of connections between these areas in the Neolithic period.

The third option is the convergent origin of the cord ornamentation traditions. Unique cord designs in comparison with the neighbouring areas, both western and eastern, may be seen as evidence in favour of this hypothesis. In the territory of Western Siberia, four manufacturing traditions of Neolithic pottery have been distinguished based on morphology, technology and ornamentation (Dubovtseva 2015: 208–12). Cord ornaments appear only with two of the traditions. The first tradition includes the Bystrinka, Chilimka and, perhaps, Artyn types. It is associated with the immigration of new populations to the territory of the North of Western Siberia along the major waterways – the Rivers Ob and Irtysh. The ceramics of these types exhibit southern traits, evident in morphology, manufacturing technologies (use of molds, thin walls, burnished, ochre-coloured surfaces) and ornamentation (motifs and compositions are similar to the Kelteminar ceramics). The second tradition is local in origin and widespread in the taiga region. It is associated with the spread of the cord ornamentation practice and characterized by a combination of different forms and techniques in morphology, technology and ornamentation of the pottery. All the remaining investigated assemblages belong to this tradition.

Each of the three hypotheses has its advantages and disadvantages, but the poor source base does not allow the validation of any of them at this point.

## CONCLUSIONS

The tradition of decorating ceramics with cord ornaments was widespread during the Neolithic period in the vast territory of Eurasian forest zone, including Western Siberia. Some local traditions can be distinguished within this territory. In eastern Europe, decorations were made by pressing with a cord or a stick with wound cord (Semenov 1955). In Western Siberia, the dominant ornamentation technique was stepping with cord stamps. In the Far East, the decoration was made by rolling a cord or a stick with wound cord, as well as making imprints with the same tools (Fukuda 2003).

At present, work aimed at identifying pottery decorated with cord stamps has just begun in the territory of Western Siberia. It is expected that the list of archaeological sites with similar materials will expand in the future. Vessels decorated with cord ornaments have not been found yet, and these ceramics apparently occur together with pottery decorated with comb stamp and pricking-and-incising ornamentation. Moreover, incised and cord patterns are often combined on the same vessels. As already mentioned, the Neolithic cord stamps of Western Siberia are similar to the comb stamp tradition in terms of general appearance of decoration and application techniques – therefore, an individual study of assemblages with comb ornamentation is required to further clarify their distribution areas and chronologies.

## ACKNOWLEDGEMENTS

The author wants to express her best thanks to E.M. Besprozvanniy, S.S. Kalieva, V.N. Logvin, I.V. Usacheva, N.M. Chairkina, A.F. Shorin, G.V. Sinitsyna, E.A. Vasilev and Y.I. Ozheredov for the opportunity to work with unpublished archaeological materials.

## NOTES

<sup>1</sup> The classification criteria for Neolithic pottery decorations of Trans-Urals and Western Siberia were developed by I.V. Kalinina and E.A. Ustinova (1990).

## REFERENCES

### *Literature*

- Bobrov, V.V. 2008. K probleme kulturnoi pri-nadlezhnosti pozdneneoliticheskogo kompleksa poseleniia Avtodrom 2. In A.P. Derevyanko & V.E. Medvedev (eds.) *Okno v nevedomiy mir: Sbornik statey k 100-letiyu so dnya rozhdeniya akademika Aleksey Pavlovicha Okladnikova*: 110–3. Novosibirsk: Izdatelstvo Instituta arkheologii i etnografii SO RAN.
- Chairkina, N.M. 2009. Kulturno-khronologicheskaya spetsifika neoliticheskikh kompleksov severnogo Zauralya. In S.A. Vasilev (ed.) *Vzaimodeystvie i khronologiya kultur mezolita i neolita Vostochnoy Evropy: Materialy mezhdunarodnoy nauchnoy konferentsii, posvyashchennoy 100-letiyu N.N. Gurinoy (20–25 oktyabrya 2008)*: 179–81. Sankt-Peterburg: IIMK RAN/MAE RAN.
- Chairkina, N.M. & Dubovtseva, E.N. 2014. Keramicheskie komplekсы epokhi neolita poseleniya Nizhnee ozero III. *Vestnik arkheologii, antropologii i etnografii* 2014 (1) (24): 4–13.
- Chemiakin, Yu.P. 1993. K periodizatsii pamyatnikov kamennogo veka v Surgutskom Priobe. In L.M. Pletneva (ed.) *Kulturnogeneticheskie protsessy v Zapadnoy Sibiri*: 117–9. Tomsk: Izdatelstvo TGU.
- Chemiakin, Yu.P. & Stepanova, G.A. 2001. Neoliticheskoe zhilishche na gorodishche Barsov Gorodok II/10. In V.A. Zakh (ed.) *Problemy izucheniya neolita Zapadnoy Sibiri*: 140–5. Tyumen: Institut problem osvoeniya Severa SO RAN.
- Chernetsov, V.N. 1968. K voprosu o slozhenii uralskogo neolita. In A.V. Vinogradov (ed.) *Istoriya, arkheologiya i etnografiya sredney Azii*: 41–53. Moskva.
- Dubovtseva, E.N. 2006. Keramika. In L.L. Kosinskaya & A.Ya. Trufanov (eds.) *Poselenie Bystriy Kulyogan 66: Pamyatnik epokhi neolita Surgutskogo Priobya*: 13–9. Yekaterinburg & Surgut: Uralskoe izdatelstvo.
- Dubovtseva, E.N. 2007. Procherchennaya i nakolchataya keramika pos. Barsova Gora II/8. In V.T. Kovaleva & A.Ya. Trufanov (eds.) *XVII Uralskoe arkheologicheskoe so-*

- veshchanie: Materialy nauchnoy konferentsii (Yekaterinburg, 19–22 noyabrya 2007): 87–91. Yekaterinburg & Surgut: Magellan.*
- Dubovtseva, E.N. 2011. Ispolzovanie verevki dlya ornamentatsii neoliticheskoy keramiki severa Zapadnoy Sibiri. *Rossiyskaya arkhologiya* 2011 (2): 16–26.
- Dubovtseva, E.N. 2015. Traditsii keramicheskogo proizvodstva na severe Zapadnoy Sibiri. In V.M. Lozovskiy, O.V. Lozovskaya & A.A. Vybornov (eds.) *Neoliticheskie kultury Vostochnoy Evropy: Khronologiya, paleoekologiya, traditsii: Materialy mezhdunarodnoy nauchnoy konferentsii, posvyashchennoy 75-letiyu V.P. Tretyakova*: 208–12. Sankt-Peterburg: IIMK RAN.
- Dubovtseva, E.N. & Yudina, E.A. 2011. Neoliticheskie komplekxy selishcha Barsova Gora II/19. In Ya.A. Yakovlev (ed.) *Khanty-Mansiyskiy avtonomniy okrug v zerkale proshlogo* 9: 239–54.
- Fukuda, M. 2003. Obraztsy keramiki so shnurvoy ornamentatsiyey s poseleniya Aeroport v uste Amura (k probleme vydeleniya shnurvoy keramiki v keramicheskikh kompleksakh Dalnego Vostoka Rossii). In V.A. Deryugin (ed.) *Amuro-Okhotomorskiy region v epokhu paleometalla i srednevekovya*: 67–76. Khabarovsk: Khabarovskiy kraevedcheskiy muzey.
- Glushkov, I.G. 2005. Problema tekstilno-dekorativnoy keramiki Ob-Irtyshya. *Problemy arkhologii, etnografii, antropologii Sibiri i sopedelnykh territorii* XI (1): 275–85.
- Glushkov, I.G. & Glushkova, T.N. 1992. *Tekstilnaya keramika kak istoricheskiy istochnik*. Tobolsk: Izdatelstvo Tobol. ped. instituta.
- Glushkov, I.G., Kiryushin, Yu.F., Kiryushin, K.Yu. 2004. Spetsifika formovochnykh operatsiy v goncharnoy traditsii neoliticheskikh kompleksov poseleniya Tytkesken 2. *Drevnosti Altaya* 12: 3–6.
- Glushkov, I.G. & Sobolnikova, T.N. 1999. Goncharnye traditsii nizoviy Kondy v epokhu neolita. In V.V. Bobrov (ed.) *Problemy neolita-eneolita yuga Zapadnoy Sibiri: Materialy soveshchaniya 28–30 oktyabrya 1999 g*: 108–22. Kemerovo: Kuzbassuzizdat.
- Ivashchenko, S.P. & Tolpeko, I.V. 2005. Kulturno-khronologicheskaya atributsiya rannikh pamyatnikov Ust-Tarkskogo arkheologicheskogo mikrorayone. *Istoricheskiy ezhegodnik* 2005: 83–91.
- Kalieva, S.S. & Logvin, V.N. 2006. Issledovanie poseleniya Pykhty I v 2001–2005 gg. In *Vtoroy severniy arkheologicheskiy kongress: Tezisy dokladov*: 53–4. Yekaterinburg & Khanty-Mansiysk: Charoid.
- Kalinina, I.V. & Ustinova, E.A. 1990. Tekhnologicheskaya klassifikatsiya ornamentov neoliticheskoy keramiki Uralskogo regiona. *Arkheologicheskiy sbornik gosudarstvennogo Ermitazha* 30: 7–19.
- Kosinskaya, L.L. 1993. Poselenie Barsova Gora II/8 i problema vydeleniya neoliticheskikh kultur taezhnogo Priobya. In L.M. Pletneva (ed.) *Kulturno-geneticheskie protsessy v Zapadnoy Sibiri*: 78–80. Tomsk: Tomsk: Izdatelstvo TGU.
- Kosinskaya, L.L., Dubovtseva, E.N. & Yudina, E.A. 2006. Poselenie Bystriy Kulyogan 66 i bystrinskaya arkheologicheskaya kultura. In L.L. Kosinskaya & A.Ya. Trufanov (eds.) *Poselenie Bystriy Kulyogan 66: Pamyatnik epokhi neolita Surgutskogo Priobya*: 57–67. Yekaterinburg & Surgut: Uralskoe izdatelstvo.
- Kovaleva, V.T., Ustinova, E.A. & Khlobystin, L.P. 1984. Neoliticheskoe poselenie Sumpanya IV v basseyne r. Kondy. In V.I. Matyushchenko & V.E. Stoyanov (eds.) *Drevnie poseleniya Urala i Zapadnoy Sibiri*: 32–44. Voprosy arkhologii Urala 17.
- Martynyuk, O.I. 1985. Keramika poseleniya Botai. In S.Ya. Zdanovich (ed.) *Eneolit i bronzoviy vek Uralo-Irtyshskogo mezhdurechya*: 59–72. Chelyabinsk: Izdatelstvo Bashkirskogo universiteta.
- Novykh, L.V. 1988. Ranneneoliticheskaya keramika stoyanki Nevonka. *Istoriografiya i istochniki izucheniya istoricheskogo opyta osvoeniya Sibiri: Dosovetskiy period*: 15–9. Novosibirsk: IIFiF SO AN.
- Posrednikov, V.A. 1973. Bolshelaryakskoe poselenie II: Arkheologicheskiy pamyatnik Surgutskogo Priobya. *Iz istorii Sibiri* 5: 65–93.
- Salnikov, K.F. 1951. *Bronzoviy vek Yuzhnogo Zauralya*. Materialy i issledovaniya po arkheologii SSSR 21.
- Semenov, S.A. 1955. K izucheniyu tekhniki naneseniya ornamenta na glinyanye sosudy.



- Kratkie soobshcheniya instituta arkheologii XLVII*: 137–44.
- Shorin, A.F. 2001. Pervye predvaritelnye itogi izucheniya Koksharovskogo kholma (po materialam raskopok v 1995, 1997–1999 gg.). In V.A. Zakh (ed.) *Problemy izucheniya neolita Zapadnoy Sibiri*: 151–69. Tyumen: Institut problem osvoeniya Severa SO RAN.
- Sinitsyna, G.V. 2008. O khronologii stoyanok Igrekovo I i Igrekovo II v Srednem Priobe. In M.P. Chernaya (ed.) *Vremya i kultura v arkheologo-etnograficheskikh issledovaniyakh drevnykh i sovremennykh obshchestv Zapadnoy Sibiri i sopredelnykh territorii: Problemy interpretatsii i rekonstruktsii: Materialy XIV Zapadno-Sibirskoy arkheologo-etnograficheskoy konferentsii*: 193–7. Tomsk: Agraf-Press.
- Stefanov, V.I., Kosinskaya, L.L., Pogodin, A.A., Dubovtseva, E.N. & Besprozvanniy E.M. 2005. Poselenie Enyya 12 (k voprosu o kulturno-khronologicheskoy stratigrafii neolita-eneolita verkhovev Kondy). In V.A. Borzunov (ed.) *Arkheologiya Urala i Zapadnoy Sibiri*: 48–86. Yekaterinburg: Izdatelstvo Uralskogo universiteta.
- Timofeev, V.I. & Zaytseva, G.I. 1996. Spisok radiouglerodnykh datirovok neolita. In S.V. Oshibkina (ed.) *Neolit Severnoi Evrazii*: 337–348. Moskva: Nauka.
- Usacheva, I.V. 2001. Stratigraficheskie pozitsii neoliticheskikh tipov keramiki poseleniya 8 punkt na Andreevskom ozere i nekotorye obshchie voprosy neolita Zauralya. In V.A. Zakh (ed.) *Problemy izucheniya neolita Zapadnoy Sibiri*: 116–34. Tyumen: Institut problem osvoeniya Severa SO RAN.
- Zakh, V.A. 2003. *Epokha neolita i rannego metallalozheniya Prisaialyrya i Priobyay*. Tyumen: Institut problem osvoeniya Severa SO RAN.
- Zakharov, S.V. 2004. K voprosu o proiskhozhdenii verevochnoy tekhniki ornamentatsii pozdneoliticheskoy keramiki Severnogo Kazakhstana. In *Osvoenie tselinnykh zemel i sovremennoe razvitie regionov Kazakhstana i Rossii: Materialy mezhdunarodnoy nauchno-prakticheskoy konferentsii: 15–16 oktyabrya 2004*: 77–84. Petropavlovsk: SKGU.