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"Ceramics" from the Zaraysk Upper Paleolithic Site*

Zaraysk is one of the best-studied and best-known Russian Upper Paleolithic sites of the Kostenki-Willendorf type. One of the most intriguing finds of excavations at that site concerns an unusual group of artifacts, tentatively interpreted as ceramics. This article gives a detailed description of these, and addresses their spatial distribution. The items have been subjected to firing, but the chemical and mineralogical analysis suggests that they were made of ocher or highly ferruginized clay unsuitable for manufacturing ordinary ceramics. Poor preservation caused by taphonomic processes precludes a reliable reconstruction of the original morphology and function of the items. Their shape, however, is rather standard and is paralleled by the "non-figurative" ceramics of Pavlov and Dolní Věstonice, whose function is not clear either. It appears that the Zaraysk people tried to reproduce the Central European prototypes in terms of form and function, but, intentionally or not, used a raw material suitable for making a red pigment rather than ceramics. Formally, the Zaraysk pieces can barely be described as ceramics proper, possibly evidencing unsuccessful copying. The final answer, then, hinges on the true purposes of the manufacturers.

Keywords: *Upper Paleolithic, Gravettian, ceramics, ocher, Zaraysk, Pavlov, Dolní Věstonice.*

Introduction

The Upper Paleolithic is the most dramatic period in the history of human evolution. Quite a number of new activities, including the onset of ceramic manufacturing, emerged during this period. Study of the most ancient ceramics represents a comparatively new and quite promising field of Paleolithic research.

The earliest ceramics have been found at some Gravettian sites, and primarily at the Moravian sites of Pavlov and Dolní Věstonice (Soffer, Vandiver, 1994, 1997, 2005). In Russia, one of the earliest Paleolithic sites with ceramics is the Zaraysk site (Amirkhanov, 2000; Amirkhanov et al., 2009), which is located within the historical part of Zaraysk in the Moscow Region. This area represents a group of Paleolithic sites that partially

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overlap each other. Zaraysk A is the best-studied stratified site. Currently, its excavation area has reached 270 m^2, and its age is described as in the range of 16–23 thousand years. In 1998–2004, a set of artifacts was found at Zaraysk A that was tentatively interpreted as "ceramics". References to these finds can be found in the literature (Soffer et al., 2000; Garkovic, 2005; Budja, 2006; Kuczyńska-Zonik, 2014), yet no comprehensive study of the artifacts has yet been carried out. The only exception is a comparatively short article about data obtained via binocular microscopic analysis of six samples from the excavation seasons of 1995 and 1998, by Y.B. Tsetlin (2000). That paper states that the samples are products of low-temperature firing of clay that is intermixed with fatty organic materials.

We provide here more detailed analytical data on the materials that were initially studied by Tsetlin. We have analyzed 54 samples that were selected in 1998–2004 during excavations at Zaraysk A, and were preliminarily described as "ceramics", "ceramics with ocher", and "ocher". At the initial stage of analysis, these samples represented lumps of isometric shape, heavily contaminated with soil from the cultural horizon. After cleaning, the samples did not look like typical archaeological ceramic pieces. Rather, they resembled ocher, metallurgical waste, or slag. Therefore, the major task of our research has been to describe the essence of the Zaraysk "ceramics", and to determine if they were indeed ceramics proper.

General description of the samples

All "ceramics" samples were found in a cultural layer as separate objects, and in this respect they didn't differ from other finds. Their color-palette showed a combination of red and gray shades. However, the red was too bright for ceramics, and corresponded rather to the color of the ocher, while the gray demonstrated unusual iron-gray and bluish shades. All samples left on paper vivid traces of grayish-green, and reds of various shades.

The samples have been classified into three groups by size, state of preservation, and some other parameters. "Ceramics" of the first group are either completely bright red, or exhibit a red exterior surface and light gray interior. Their texture is crumb and fissured, as if the raw material was poorly milled and barely kneaded (Fig. 1, *a*, *b*).

The texture of samples of the second group, in contrast, looks well-ground and kneaded. The samples show mostly a combination of red and gray. Their distinct feature is rounded pores-"bubbles" morphologically similar to the pores in keramzit, pumice, or slag (Fig. 1, *c*, *d*). Some samples are completely composed of porous mass (these are mostly dark gray). Other specimens show pores either on some portions, or within rounded inclusions. Still other specimens do not contain any pores at all. Porous samples are naturally lighter than others in weight.

The third group represents mass mixed with sand. The color of all samples is red. The sand is quartz,

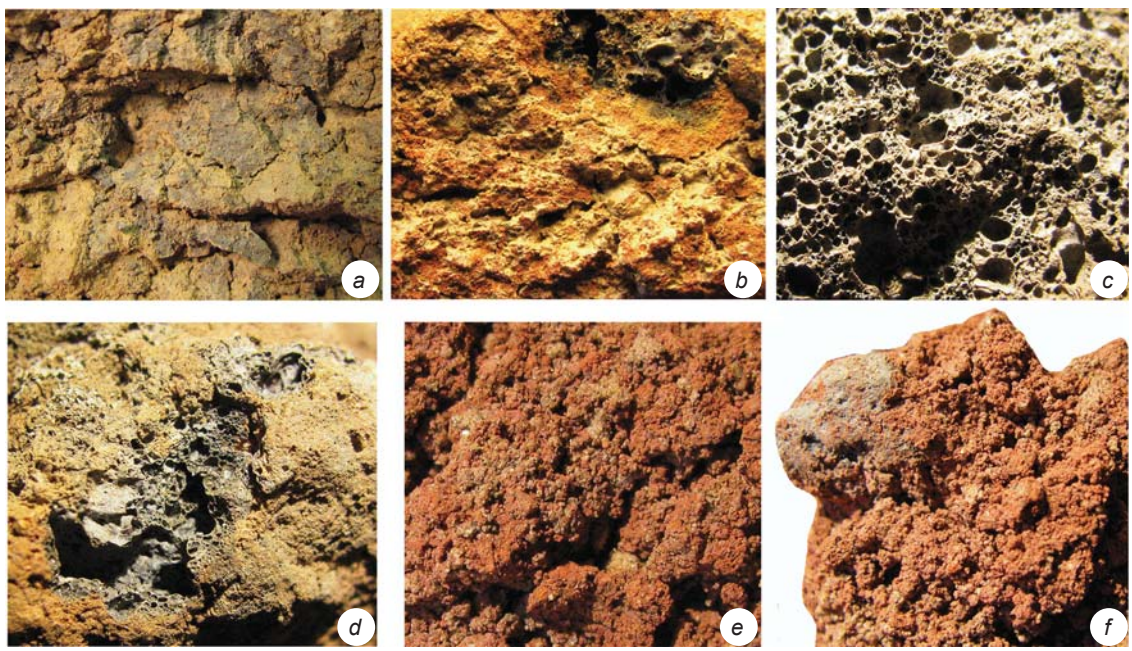

Fig. 1. Samples of "ceramics" of various groups (portions 2 × 2 cm are shown).
a, *b* – first group (sample *b* shows large oolite inclusion with expanded dark gray core); *c*, *d* – second group (expanded areas with pores-"bubbles"); *e*, *f* – third group (sample *f* shows comparatively large inclusion of the light gray mass of the second group).

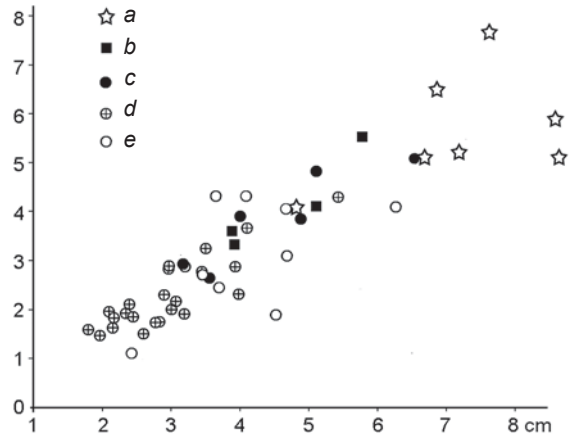

Fig. 2. Correlation of sizes and shapes of samples.
a – lumps; *b* – tablets; *c* – cones; *d* – vague; *e* – vague intact.

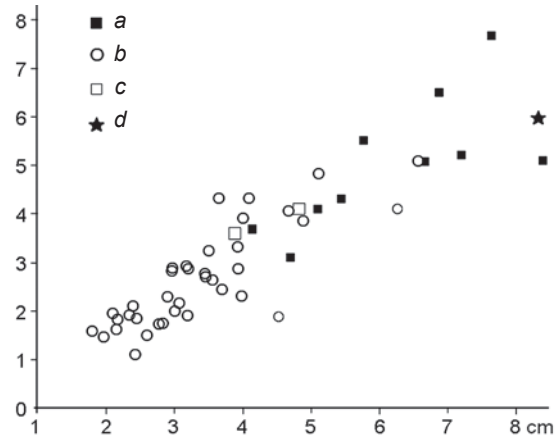

Fig. 3. Correlation of sizes of samples with the group of "ceramics".
a – first group; *b* – second group; *c* – third group; *d* – clay.

fine-grained (the grains are up to 1 mm), well-rounded, and is identical to that from the cultural layer of the site. Aside from the bright color of the binding agent, these samples resemble in their appearance highly tempered and very poorly fired ceramics (Fig. 1, *e*, *f*). Their bodies may include small (up to 1.5 cm) nodules of dense, fine, homogeneous, bright-red mass, which concretions, if found in another context, would resemble incompletely ground lumps of red ocher mixed with sand.

The morphology of the Zaraysk "ceramics" is not clear. The largest samples can be roughly classified into three stable forms, which may be defined as lumps, cones, and tablets (Fig. 2). In contrast, small samples are mostly irregular in shape, therefore can barely be classified (in Fig. 2, they are indicated as vague). This may be a result of their poor preservation. Correlation of sizes and properties of the bulk of samples is provided in Fig. 3.

Lumps are clearly identified in the collection. They are either thick or flattened in cross-section, slightly elongated in plan; one surface is flat, another is slightly convex. Some of them look like simple lumps of raw material (Fig. 4, *2*, *3*), while others resemble artifacts (Fig. 4, *4–6*), and still other specimens show undestroyed areas of smoothed surface and some grooves of unclear morphology (Fig. 4, *1*; 5, *2*).

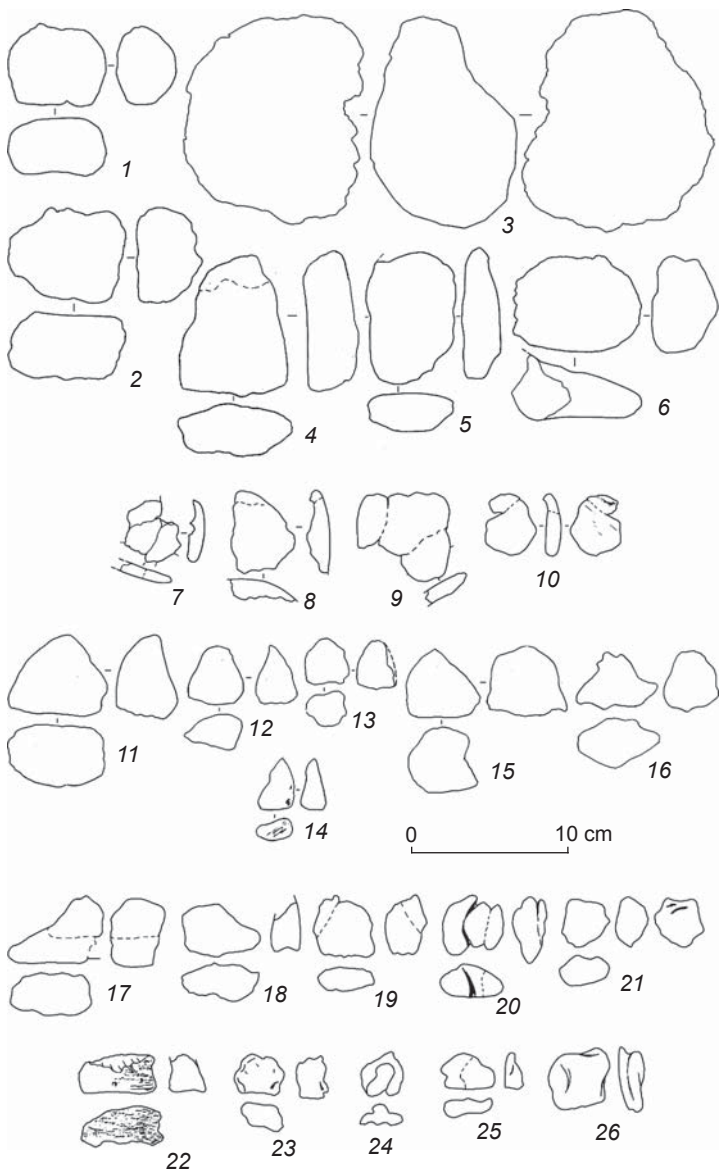

Fig. 4. Shapes of Zaraysk "ceramics".
1–6 – lumps; *7–10* – tablets; *11–16* – cones; *17–26* – intact articles with vague shapes.

Tablets are noteworthy for their apparently artificial shapes (see Fig. 4, *7–10*). They are flat in cross-section and sub-rectangular in plan, with one flat surface and one slightly convex surface. The only intact specimen (see Fig. 4, *10*) shows imprints on its flat surface, resembling those of wood (Fig. 6, *a*). The other two tablets (see Fig. 4, *8*, *9*; 5, *3*) have damaged flat surfaces; however, these surfaces look like fractured interface or fractured surface of contact with unknown materials (see, e.g., (Kostyleva, 2014)).

Cones have flattened bases and narrow tops. Their surfaces usually bear small vague indentations (see Fig. 5, *1*). The uneven bases are irregular in shape. The base of one specimen (see Fig. 4, *15*) looks as if it was damaged as a result of fracture, or like a fractured surface of contact with unknown materials. One cone has a depression in its base, which, after cleaning, revealed subparallel straight grooves (see Fig. 4, *14*; 7, *a*, *b*).

Some samples with irregular shapes are undoubtedly intact or almost intact (see Fig. 4, *17–26*). They are mostly large in size. Two samples in this category deserve special attention. One of them was described as having preserved the imprints of thin leather folds (Tsetlin, 2000) or of creased net with knots of vague shape (Soffer et al., 2000). This sample is subrectangular in plan and subtriangular in cross-section (see Fig. 4, *22*). The imprints occupy one surface completely, and the adjoining surface partially, and represent sub-parallel grooves running along the long edges of the sample, or at slight angle to them (see Fig. 6, *b*). The general outlines of the images are so vague as to make possible many different speculations concerning their origins.

Another specimen in this set is smaller, but generally similar in shape to the former one. The imprints represent sub-parallel grooves on the flat surface, located at a

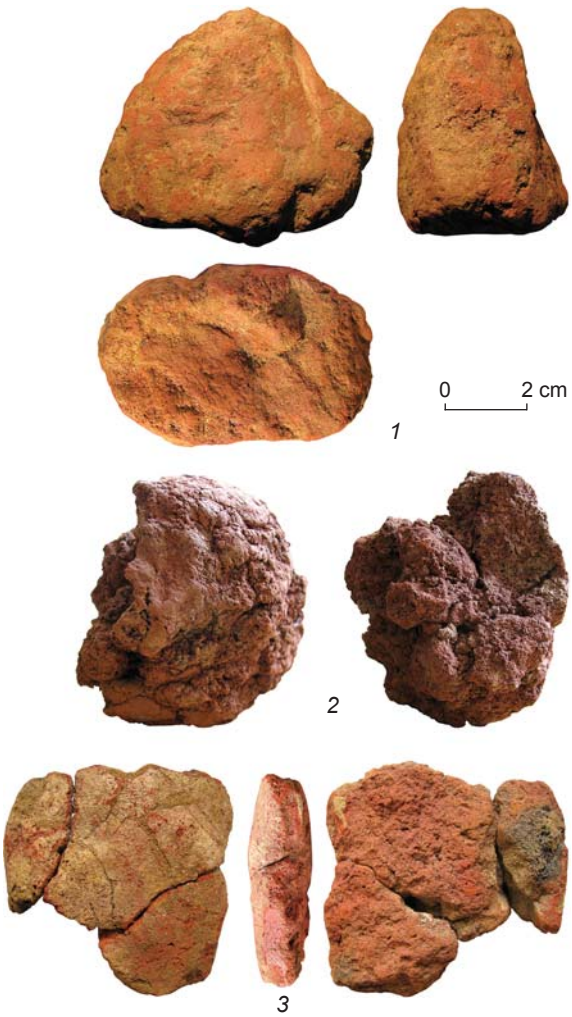

Fig. 5. Zaraysk "ceramics": cone (*1*), lump (*2*), and tablet (*3*).

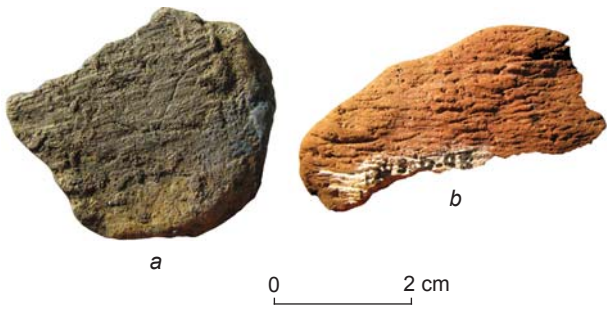

Fig. 6. Imprints of unidentified materials on the Zaraysk "ceramics".

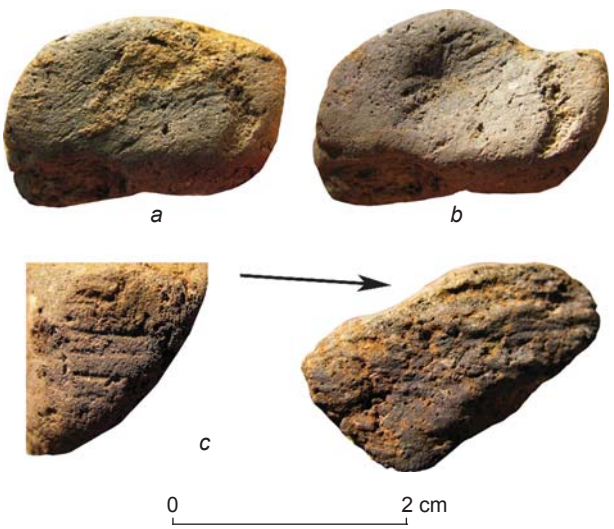

Fig. 7. Linear traces on the Zaraysk "ceramics".
a, *b* – on the base of the cone (view of the surface before (*a*) and after (*b*) cleaning); *c* – on the intact article of vague shape (arrow indicates the surface with grooves).

small angle to its long edges; the relief is smoothed, the general design is indistinct (see Fig. 7, *c*). One of the long lateral surfaces is flattened, and also shows sub-parallel, scratched, thin, and sparse grooves; these are apparently artificial, but their origin is not clear.

To our regret, we did not notice any signs of intentional shaping, either finger imprints or traces of working tools, on the Zaraysk "ceramics" samples.

Spatial distribution

The Zaraysk A site revealed the remains of at least four interstratified habitation layers (Fig. 8). These layers differ from one another in structure, spatial distribution, and types of the objects; yet all belong to a single archaeological culture referred to as the Kostenki-Avdeyevo (Amikhanov et al., 2009: 12). The uppermost cultural layer (the fourth) was related to the buried soil; "ceramics" were absent there. The underlying generally homogeneous lithological horizon of reddish (sometimes brown) sandy soils and sandy loams reached up to 30 cm thick in the areas between pits. By its archaeological and stratigraphic characteristics, this horizon was subdivided into three cultural layers. The youngest layer (the third) in this stratum was dated to a range of 19–17 ka BP. It was separated from the two first layers by a developed system of permafrost cracks.

Deposits of the first cultural layer yielded seven samples* aggregated in pits. These were typical storage-pits containing lenses of ocher. Four additional samples were found in the immediate vicinity of the partially excavated hearth, which continued the line of five hearths overlapped by ocher lenses (Fig. 9, I).

The second layer yielded three samples unassociated with any objects, five samples in different pits, and the remaining 37 samples in small semi-subterranean dwelling constructions (*poluzemlyankas*) surrounding the line of hearths (Fig. 9, II). This is an example of the typical arrangement of living-space at the sites of the Kostenki-Avdeyevo culture. The greatest number of "ceramics" has been collected from the *poluzemlyankas* B and E, and several samples in each of *poluzemlyankas* A and C. The specimens were recovered both *in situ* (in the bottom of pits), and in the middle of the pits' fillings (owing to the cultural layer's being washed off).

Samples from the third layer were associated mostly with three rounded and slightly depressed objects that have been identified as above-ground dwellings (Fig. 9, III). These objects are of the same area and depth. Their area contains numerous clusters of mammoth-bones, whose composition suggests selectiveness of these accumulations. The bottoms and walls of these three dwellings show spots pigmented with ocher (Ibid.: 27–33).

Thus, the second layer yielded the greatest amount of "ceramics". The collections of samples from various layers don't show any clear distinctions in shape, size, preservation state, or properties of the fabric. However, it should be noted that the first layer lacks conical forms and is dominated by samples of the third group, which, in turn, are absent in the third layer.

Of great importance is the association of "ceramics" with dwelling and utility structures, and their remoteness from hearths. This last feature is not so prominent in the first layer, where utility structures are generally located closer to hearths. In contrast, in the second and third layers, this trend is very distinct. Such spatial distribution of finds is very important, because it precludes the possibility of their unintentional firing.

Material composition

The mineral composition of the ten most typical samples of the Zaraysk "ceramics" has been established with XRD, DTG, and petrographic analysis, and showed the presence of quartz, dolomite, hematite, and feldspar. Clay minerals (such as kaolinite, smectite, illite, and illite-smectite) have been traced by the XRD analysis (though their origin is not clear, as these minerals might have been secondary).

The Zaraysk "ceramics" have shown a specific chemical composition (see *Table*). Their iron-content is close to that in ocher, which term in geology means loose, fine-grained, highly ferruginized rocks suitable for production of red pigment. Below, average values are given of proportions (%) of silica and iron oxide in the Zaraysk "ceramics" and in ocher from the best known deposits of Russia (after (Tolstikhina, 1963: 15–134)):

	Fe_2O_3	SiO_2
Zaraysk "ceramics"	13.46–26.61	36.82–49.01
Baranovsky ocher, Primorye	8.14–20.76	37.14–88.0
Zhuravka ocher, Voronezh Region	3.10–29.88	60.80
Clay pigments, Moscow Region	7.02–11.66	28.72–66.48
Iron oxide pigments, Moscow Region	23.48–39.56	23.38–54.32

In addition, the Zaraysk "ceramics" contain a significant proportion of phosphorus (in clays, this value does not exceed several tenths of one percent, see

*During analysis of spatial distribution, not only samples of "ceramics" were taken into account, but also indistinct lumps of cultural layer, which fell to pieces when brought into contact with water, turning into sand, small particles of "ceramic" fabrics, little bones, charcoals, etc.

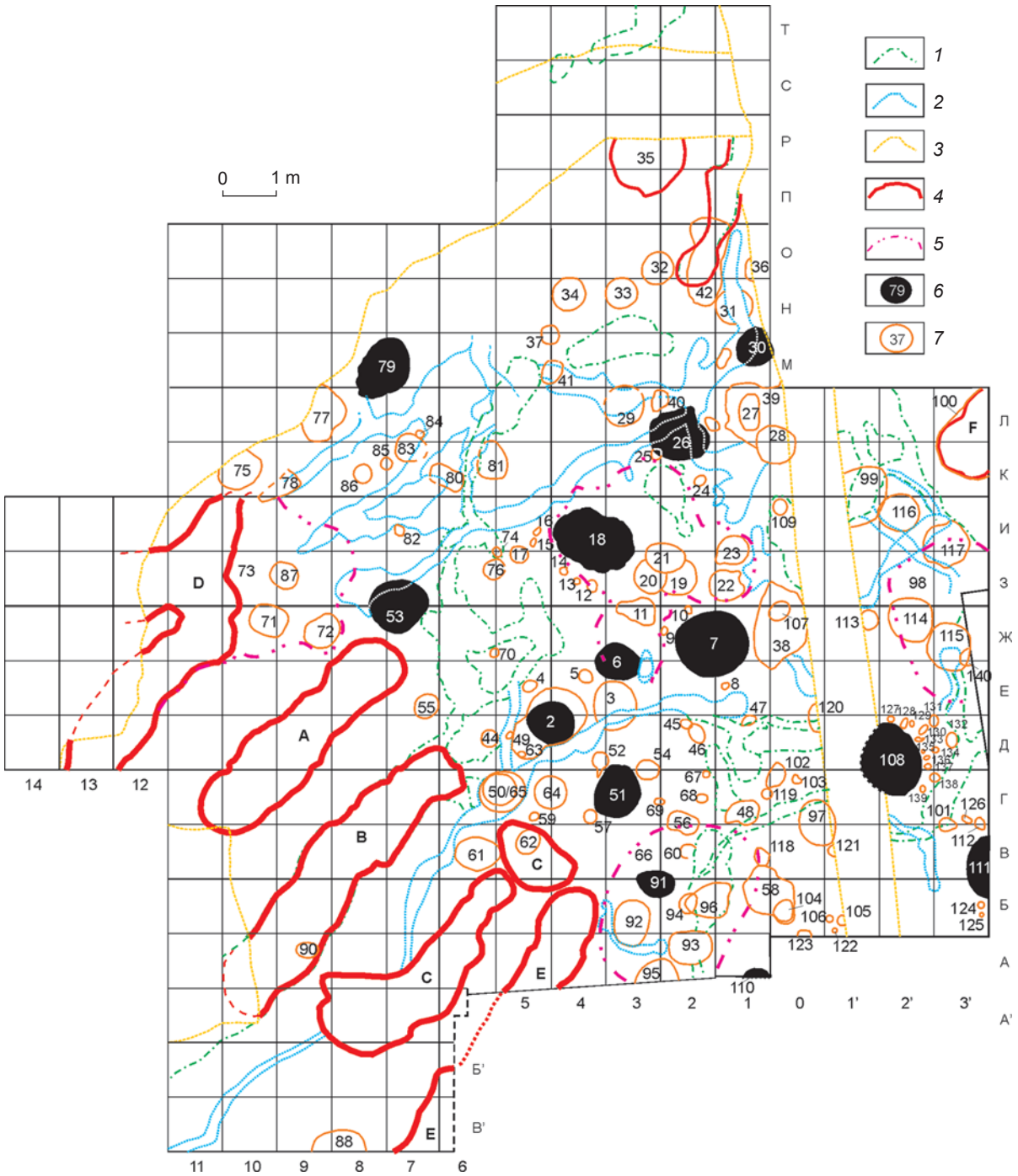

Fig. 8. General map (all layers) of the excavation area at Zaraysk A.
1 – permafrost cracks of the first generation; *2* – permafrost cracks of the second generation; *3* – trenches that damaged the layer; *4* – boundaries of large pits (*poluzemlyanki*) in the second cultural layer; *5* – boundaries of large slightly deepened objects in the third cultural layer; *6* – hearths; *7* – pits.

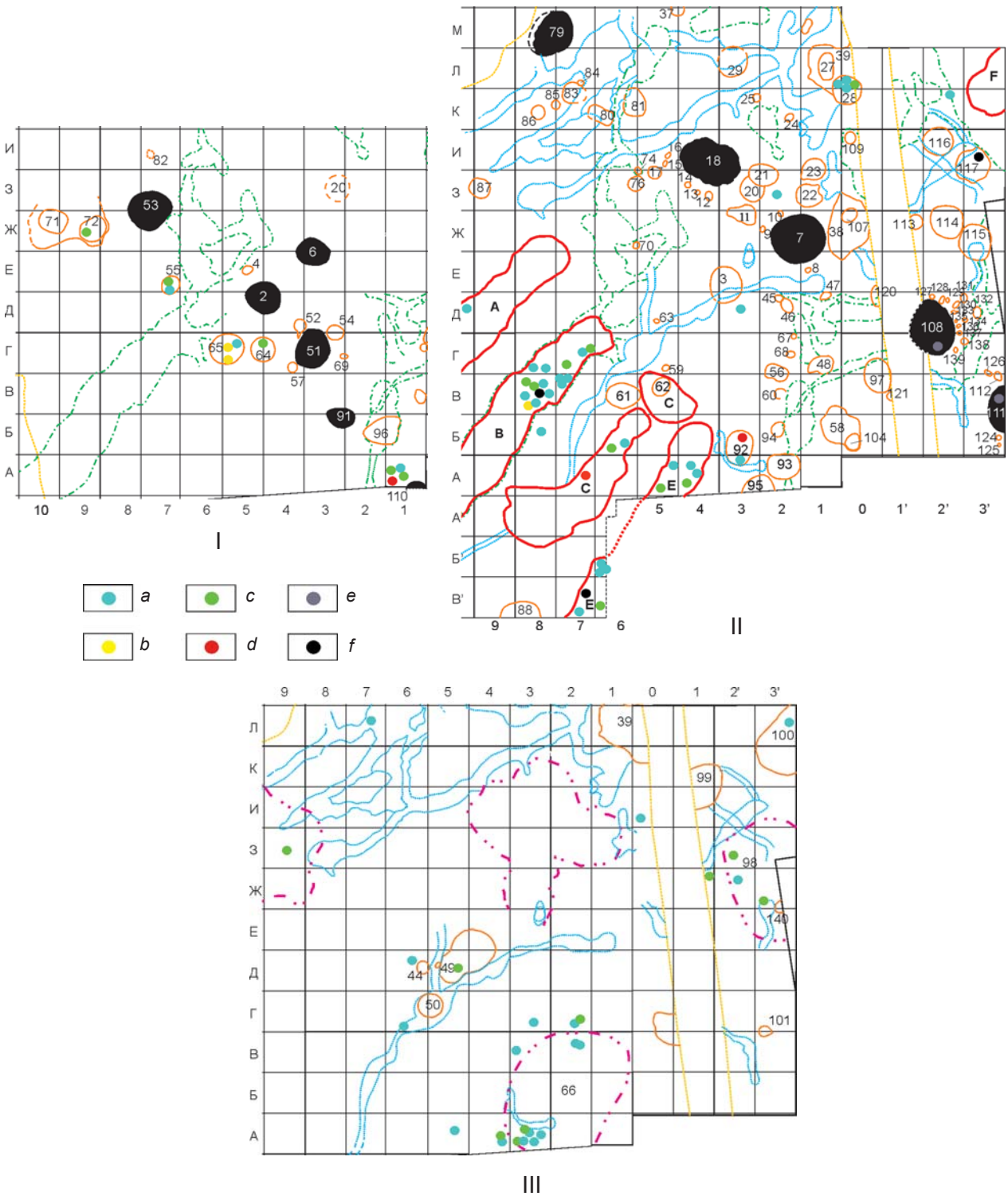

Fig. 9. Excavation areas with "ceramics".
I – first cultural layer; II – second cultural layer; III – third cultural layer.
a – "ceramics", group 1 and 2; *b* – "ceramics", group 3; *c* – vague lumps; *d* – clay; *e* – dolomite; *f* – wood. Other legend same as on Fig. 8.

Chemical composition of samples of various types, % (mean values)

Samples	IL*	Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO	MnO	Fe_2O_3	P_2O_5
Ocher (*n* = 1)	14.69	0.23	0.55	13.91	28.02	1.67	3.16	1.07	0.021	27.94	7.39
"Ceramics"											
Group 1 (*n* = 7)	10.41	0.29	1.78	19.15	36.26	1.83	1.44	0.85	0.03	22.86	4.34
Group 2 (*n* = 5)	8.14	0.26	1.87	18.06	43.29	1.57	1.49	0.94	0.03	20.22	3.86
Group 3 (*n* = 3)	5.6	0.27	1.10	12.92	62.24	1.75	2.14	0.63	0.03	10.55	1.77
Concretion (*n* = 1)	5.07	0.05	0.12	2.91	34.69	0.35	0.44	0.22	0.017	54.39	0.50
Clay (*n* = 2)	5.56	0.18	0.60	12.61	72.6	1.79	1.84	0.90	0.02	2.9	1
Cultural layer (*n* = 3)	3.82	0.22	0.56	7.2	77.3	1.01	2.7	0.43	0.08	4.3	2.3
Loess loam (*n* = 3)	3.96	0.52	1.8	11.62	71.77	2.12	1.11	0.75	0.06	5.82	0.23

Notes. Samples of the cultural layer were taken from the *poluzemlyanka* B: one sample from the area with "ceramics", another from the opposite side of the dwelling without "ceramics". Loess loams samples were collected beyond the Zaraysk site. A dense lump of bright-red mass from a ceramic sample of group 3 was designated as ocher. Clay is from two accumulations in the cultural layer (see Fig. 9).

*Ignition losses.

(Tolstikhina, 1963: 136–166; Samofalova, 2009: 24–47; Golieva, Turova, 2015: 156–162)). Such cases are usually interpreted to be a result of admixture of special additions (bones) to the fabric, or as a result of cooking special types of food in the pottery (Bobrinsky, 1978: 105; Demkin, Demkina, 2000; Fiziko-khimicheskoye issledovaniye…, 2006: 33; Yanshina, Garkovik, 2008). However, these interpretations are not applicable to the Zaraysk "ceramics". Bone admixtures are absolutely excluded, because Zaraysk samples demonstrate very fine-grained fabric; it would clearly show admixtures of foreign particles of the size to which bones could have been ground in the Paleolithic**.**

Pairwise correlation of particular chemical compounds in the composition of the Zaraysk "ceramics" (Fig. 10) demonstrates a nearly direct relation between alumina, phosphorus, and iron, suggesting their common origin. Marsh ores, containing a comparatively small proportion of iron and a high proportion of phosphorus (1–5 to 10–22 %), can be considered the most probable source of these elements. It is also known that marsh ores may contain high proportions of clay components (Tolstikhina, 1963: 15–24; Dyachkov, 2002: 63).

Notably, the chemical composition of the Zaraysk "ceramics" is quite different from that of the samples from the cultural layer, especially in its proportions of alumina, iron, and phosphorus (Fig. 10). Hence, these "ceramics" could not have been formed naturally in the cultural layer's soil. This is supported by the high concentration of alumina in the "ceramics". By way of comparison, in iron concretions, which are typical in the cultural layer at Zaraysk site, the proportion of alumina is six times smaller than that in the "ceramics" (see *Table*).

Firing

Ordinary tests have been carried out in order to identify the features of thermal processing of the Zaraysk "ceramics". Small pieces and fragments were submerged in water for several days, after which, their strength was tested. The "ceramics" samples of the first and the second groups retained their integrity and did not crumble. However, upon retrieving the samples from water, they were easily crushable with a knife, and the wet crumbs could have been modeled into a sausage-shape. Ceramics of the third group diffused in water immediately, while the small lumps of bright-red homogeneous mass from them retained their integrity.

Re-firing (samples were fired in the muffle at temperatures of 400, 500, 600, 700, 800, and 900 ºC, for 30–45 minutes at each temperature) has shown that the samples retained their red color, while the gray color changed into faded grayish-brown shade at a temperature of 500 ºC, and disappeared at 600 ºC. At the end of testing, the originally red and gray spots in the samples became reds of various shades, suggesting differences in the raw material's composition.

The test results show that the Zaraysk "ceramics" might indeed have been fired. In this case, firing should have been carried out at a temperature of about 500 ºC for over 30 minutes. "Ceramics" of the third group were

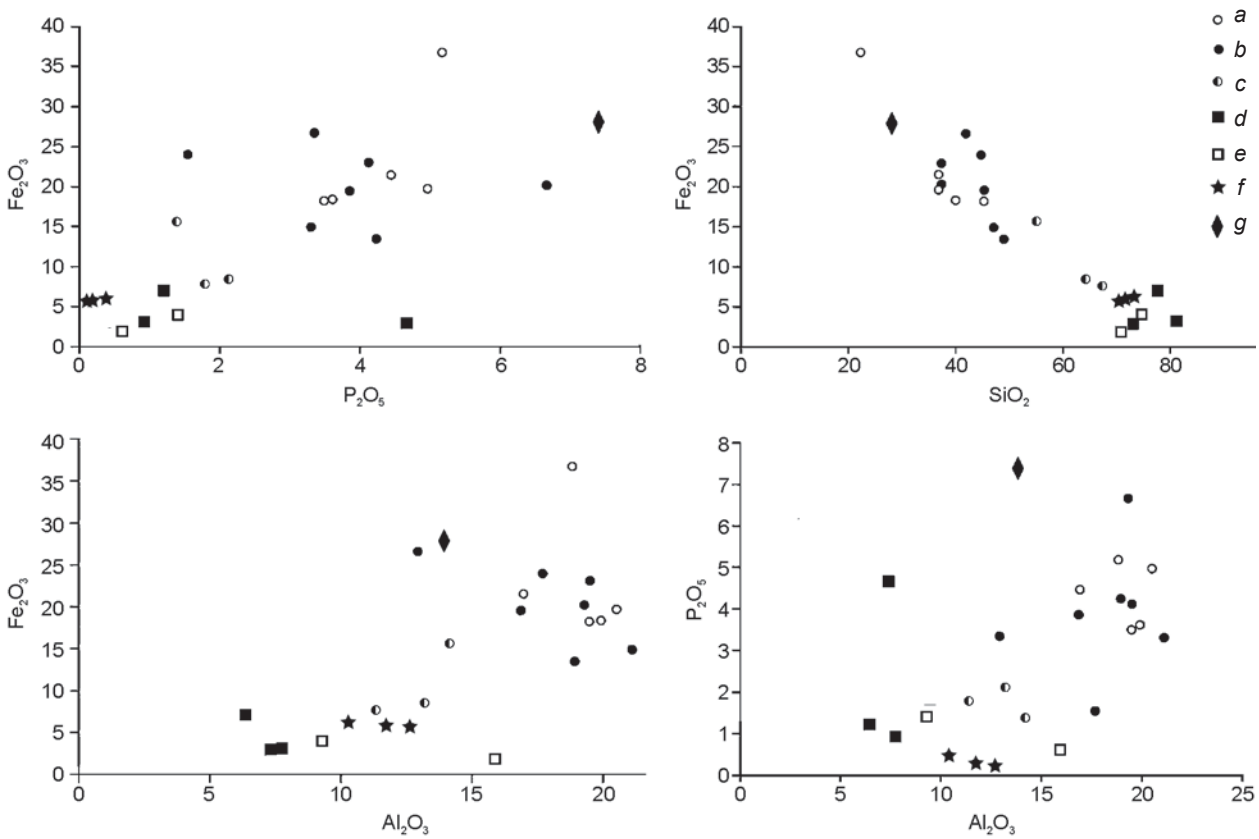

Fig. 10. Diagrams of correlation of chemical compounds in samples of various groups (%).
a – "ceramics" of the first group; *b* – "ceramics" of the second group; *c* – "ceramics" of the third group; *d* – cultural layer; *e* – clay; *f* – loess loams; *g* – ocher (?). Each point at the diagrams corresponds to one sample (locations of taking samples for comparison are provided in the note to the *Table*).

either not fired at all, or required longer firing under higher temperatures to gain the same degree of sintering (understandably, given their coarse texture).

The obtained data would be quite appropriate to ordinary ceramics, but they do not explain some specific features of the Zaraysk specimens. These data are not consistent with the presence of pores ("bubbles") in the texture. Explanation of a mechanism for the formation of "bubbles" presents a considerable problem. The "bubbles" look like the pores that are formed at high temperatures in bloom, slag, volcanic rocks, and keramzit (Fig. 11). Given the established chemical and mineralogical composition of the Zaraysk "ceramics", the "bubbles" seem to have been formed owing to the clay's bloating during firing (Onatsky, 1971: 44–84; Khimicheskaya tekhnologiya…, 1972: 414–418; Worrall, 1975). However, the results of re-firing and tests of residual ductility suggest that the firing of the Zaraysk "ceramics" was carried out under low temperatures, which contradicts the theory that clay cannot bloat under such conditions.

Additional evidence of thermal treatment has been obtained during a more detailed XRD analysis of the "ceramics" samples in the first and the second groups. The obtained data have shown the presence in these of fine-crystalline hercynite—a mineral representing a product of firing of ferruginized clays under the high temperatures (≥ 800–850 ºC), and in one case, mullite. It should be noted that hercynite is formed under such conditions as high iron-content and the reducing environment of firing, which also benefit clay-bloating (Malysheva, 1969: 22–40; Avgustinnik, 1975: 36–37; Maniatis, Simopoulos, Kostikas, 1983: 781).

The results of radiographic analysis suggest two more interesting ideas. Firstly, not only samples of the second group with porous texture were fired, but also ceramics of the first group. Secondly, the semiquantitative analysis of the mineral composition of the samples has shown that in the gray portions of the ceramics, the content of hematite was several times less than in the red portion, while the proportion of quartz was greater. This correlates well with the assumption that "bubbles" were formed owing to the clay's bloating, while their uneven distribution in the fabric may indicate properties of the raw material. Apparently, the used raw material was not homogeneous with respect to its proportions of clay and iron oxides.

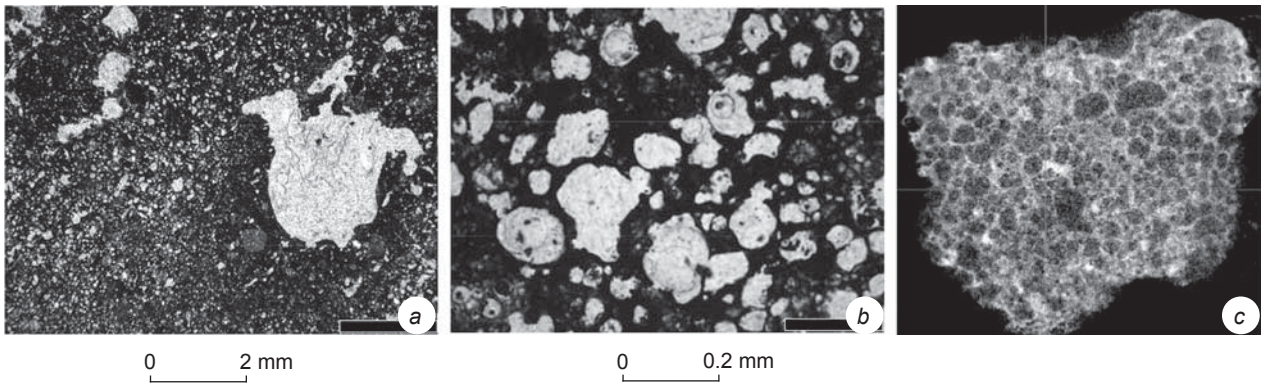

Fig. 11. Heavily expanded dark gray sample of the Zaraysk "ceramics" (pictures were taken in transmitted light without analyzer).
a, *b* – pictures of a slice with various magnification degrees; *c* – picture made using SkyScan 2011 microtomograph.

Thus, the portions with higher clay-content bloated. This is confirmed by the color variations in the samples that have been subjected to re-firing.

So, the Zaraysk "ceramics" seem to have been fired, but the available data are not sufficient to establish the firing temperature. The performed studies also did not explain the reasons for the preservation of residual ductility in the samples. Perhaps the explanation lies in the properties of the raw material: for example, its highly fine structure in combination with the increased iron-content. It is known that ocher mixed with water also produces a ductile substance, which can maintain a fashioned form. The role of post-depositional processes leading to secondary formation of certain minerals, including clay and iron minerals, cannot be excluded either.

Conclusions

The data described in this paper add to our understanding of the nature of the Zaraysk "ceramics". As of present state of knowledge, the origin of these pieces may, with a certain degree of confidence, be regarded as artificial. This hypothesis is supported by their specific material composition, the spatial association of the "ceramic" pieces with dwellings and utility structures, and (to a certain extent) the morphology of the samples. The data on the thermal processing of the Zaraysk ceramics represent an additional reliable argument in favor of the proposed determination; while the fact that the samples were found mainly at a certain distance from fireplaces and hearths excludes the possibility of their unintentional firing.

The question of whether the samples under study really represent ceramics is much more complicated. In their material composition, they are mostly close to ocher and low-ferruginous marsh-ores. In such a case, their firing could have been aimed at the production of red pigment from the rocks containing iron hydroxides. This is particularly true for the southern part of the Moscow Region, since the region is poor in outcrops of high-quality red pigment, while the Zaraysk site demonstrates its broad use. However, it is hard to say if the exclusive purpose of the Zaraysk inhabitants was to obtain the pigment.

Comparisons of the Zaraysk "ceramics" with ocher pigments from other Upper Paleolithic sites in Europe have shown certain distinct features of the former. The European ochers are represented by three groups of finds: 1) raw material (mostly pieces of various rocks that served as sources of pigments); rarely, stocks of ocher powder; 2) painted objects and materials (usually spots of cultural layer, covered with ocher powder; tools and bone artifacts bearing traces of pigment); and 3) ocher "pencils". Among these finds, parallels with the Zaraysk "ceramics" can barely be established, excluding the ocher "pencils". It is believed that the latter served as both the painting tool and the individual stock of pigment, because (unlike the powder) the "pencils" were easily transportable and always ready for production of colorant. "Pencils" were made mostly of solid hematite ores, possibly previously fired (two such "pencils" were found at the Zaraysk site). Deposits of such ore have not been discovered in the southwestern part of the Moscow Region; which might have served as a stimulus for artificial hardening and shaping of the available unconsolidated rocks. However, in this case, it is not clear why the majority of the Zaraysk "ceramics" are not red, but gray. It can be hypothesized that such specimens are by-products of ocher firing. But then, it remains unclear why the Zaraysk "ceramics" were found far from hearths, in dwelling and utility pits, and in a context without any traces of pigmenting. At the least, this means that the "ceramics" played some special role, other than that played by the red paint in the life of the Zaraysk inhabitants.

Comparison of the Zaraysk samples with ceramics from other European Upper Paleolithic sites is not helpful either. It is generally accepted that the Gravettian and post-Gravettian ceramics were primarily used as a basis for zoo- and anthropomorphic images (Soffer, Vandiver, 1994, 1997, 2005; Hachi et al., 2002; Vandiver, Vasil'ev, 2002; Händel et al., 2009; Bougard, 2010; Farbstein et al., 2012), which are either absent or undetectable in the Zaraysk "ceramics". However, archaeological materials from Dolní Věstonice and Pavlov also include a series of ceramic lumps of unclear morphology and function (*non-figurative ceramics*) (Soffer, Vandiver, 1994, 1997, 2005), and these artifacts exhibit certain parallels to the Zaraysk "ceramics", except for their raw material.

Quite few "non-figurative" ceramics samples have been interpreted as fragments of coating, some of which bear images believed to be wickerwork imprints (Adovasio, Hyland, Soffer, 1997; Soffer et al., 2000; Soffer, Vandiver, 2005). All these samples are very small (up to 1.5–2.0 cm), and the imprints are so vague as to provoke uncertainty in the proposed interpretations. The typology and purpose of other finds have not been reliably established. However, exactly in this group of artifacts we see items close to those from Zaraysk. They demonstrate similar morphology; and the Pavlov lumps often show imprints similar to those on the Zaraysk specimens. Noteworthy also is the presence, in the Zaraysk collection, of samples that can be interpreted as fragments of appliqué elements of certain more elaborated objects (see, e.g., Fig. 4, *7–10*, *20*, *24*). In their functionality, these samples are well correlated with the Moravian "non-figurative" ceramics.

Analysis of the Zaraysk "ceramics" has unfortunately not produced any reliable arguments in favor of their interpretation as real ceramics. Such arguments could be based on the signs of intentional shaping, which are not typical for ordinary ocher samples; yet no such traces have been reliably established. The intentional shaping may be evidenced indirectly by the repeated configuration of some samples: abundant cone-shaped specimens and pieces with trihedral cross-section in general, nearly invariable presence of at least one flat surface, etc. Besides, some samples demonstrate clearly artificial shapes that can barely occur among natural objects (see, e.g., Fig. 4, *7–10*, *22*; 5, *1*, *3*).

Analysis of the raw material does not make the situation clear either. It is not known whether the Zaraysk population used ocher or clay as their basic material. If iron was intentionally added to clay, it might have suggested the desire to have red-colored products. It would mean that, when manufacturing the Zaraysk "ceramics", manufacturers relied primarily on clays and wanted to produce articles of particular form and strength through firing. However, according to our observations, the original raw material contained iron. Furthermore, archaeological materials from the site include one typical lump of pure, unfired clay, and two small accumulations of clay that was brought to the site from elsewhere. This means that the inhabitants of the site did recognize clay as a separate raw material.

It is also noteworthy that close association of clay and ocher has been reported from many European Paleolithic sites (Vandiver, 1997; Hradil et al., 2003: 227–231; Gomes et al., 2015; Bougard, 2010: 68–69). The assumption was even made that people might have gained knowledge about clay's properties in the course of production of ocher pigments, because many mineral ores, used for pigment production, naturally contained clay (see, e.g., (Weinstein-Evron, Ilani, 1994: 467)).

Moreover, many Upper Paleolithic European sites contain not only artifacts painted with ocher, but also those manufactured of various colorful raw materials including hematite (Jennett, 2008: 9, 17–25; Lander, 2005: 65–68), which is suggestive of the practice of using such raw materials in the manufacture of articles with special function, but not only to obtain colorants. These materials also include some articles with unclear morphology and function, like the Zaraysk samples (see, e.g., (Bougard, 2010: 68–69)).

Taking into account all these findings, we can put forward a hypothesis that the Zaraysk inhabitants attempted to produce certain articles, whose shape and function are as yet unclear to us, and used, either intentionally or accidentally, raw material combining the properties of clay and ocher. Formally, the Zaraysk samples can barely be referred to as ceramics in the strict sense of this word. However, they may represent the result of an attempt, not very successful from our point of view, to produce articles that are close in their morphology and function to the ceramic artifacts from the sites of Dolní Věstonice and Pavlov in Moravia.

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References

Adovasio J., Hyland D., Soffer O. 1997

Textiles and cordages: A preliminary assessment. In *Pavlov I – Northwest: The Upper Paleolithic Burial and*

Settlement Context. Brno: Inst. of Archaeol., pp. 403–424. (The Dolni Vestonice Studies; vol. 4).

Amirkhanov H.A. 2000

Zarayskaya stoyanka. Moscow: Nauchnyi mir.

Amirkhanov H.A., Akhmetgalieva N.B., Buzhilova A.P., Burova N.D., Lev S.Y., Mashchenko E.N. 2009

Issledovaniya paleolita v Zarayske. 1999–2005, H.A. Amirkhanov (ed.). Moscow: Paleograf.

Avgustinnik A.I. 1975

Keramika. Leningrad: Stroyizdat.

Bobrinsky A.A. 1978

Goncharstvo Vostochnoi Evropy: Istochniki i metody izucheniya. Moscow: Nauka.

Bougard E. 2010

The Use of Clay in the Upper Paleolithic of Europe: Symbolic Applications of a Material. Oxford: BAR. (BAR Intern. Ser.; No. 2069).

Budja M. 2006

The transition to farming and the ceramic trajectories in Western Eurasia: From ceramic figurines to vessels. *Documenta Praehistorica*, No. 33: 183–201.

Demkin V.A., Demkina T.S. 2000

Vozmozhnosti rekonstruktsii pogrebalnoi pishchi v keramicheskikh sosudakh iz kurganov bronzovogo i rannego zheleznogo vekov. *Etnograficheskoye obozreniye*, No 4: 73–81.

Dyachkov I.V. 2002

Prirodnye zhelezooksidnye pigmenty dlya stroitelnykh materialov. Cand. Sc. (Engineering) Dissertation. Kazan: Kazan. Gos. Arhit.-Stroit. Akad.

Farbstein R., Radić D., Brajković D., Miracle P.T. 2012

First Epigravettian ceramic figurines from Europe (Vela Spila, Croatia). *PLoS ONE*, vol. 7 (7). URL: htpp://journals.plos.org/plosone/article?id=10.1371/journal.pone.0041437

Fiziko-khimicheskoye issledovaniye keramiki (na primere izdeliy perekhodnogo vremeni ot bronzovogo k zheleznomu veku). 2006

V.V. Boldyrev, V.I. Molodin (eds.). Novosibirsk: Izd. SO RAN.

Garkovik A.V. 2005

Nekotorye osobennosti perekhodnogo perioda ot paleolita k neolitu. In *Rossiyskiy Dalniy Vostok v drevnosti i srednevekovye: Otkrytiya, problemy, gipotezy*. Vladivostok: Dalnauka, pp. 116–132.

Golieva A.A., Turova I.V. 2015

Fosfor v arkheologicheskikh obyektakh: Formy, kolichestvo, ustoychivost. In *Arkheologia Podmoskovya: Materialy nauch. seminara*, iss. 11. Moscow: Izd. IA RAN, pp. 155–164.

Gomes H., Collando H., Martins A., Nash G., Rosina P., Vaccaro C., Volpe L. 2015

Pigment in Western Iberian schematic rock art: An analytical approach. *Mediterranean Archaeology and Archaeometry*, vol. 15 (1): 163–175.

Hachi S., Fröhlich F., Gendron-Badou A., Lumley H., Roubet C., Abdessadok S. 2002

Upper Palaeolithic cooked clay figurines from Afalou Bou Rhummel (Babors, Algeria): First infra-red absorption spectroscopic analyses. *L'Anthropologie*, No. 106: 57−97.

Händel M., Simon U., Einwögere T., Neugebauer-Maresch C. 2009

New excavations at Krems-Wachtberg – approaching a well-preserved Gravettian settlement site in the middle Danube region. *Quartär*, vol. 56: 187–196.

Hradil D., Grygar T., Hradilova J., Bezdicka P. 2003

Clay and iron oxide pigments in the history of painting. *Applied Clay Science*, No. 22: 223–236.

Jennett K.D. 2008

Female Figurines of the Upper Paleolithic. San Marcos: Texas State Univ.

Khimicheskaya tekhnologiya keramiki i ogneuporov. 1972

P.P. Budnikov, D.N. Poluboyarinov (eds.). Moscow: Stroyizdat.

Kostyleva A.A. 2014

Kompleksnyi analiz glinyanoi obmazki s poseleniya Serteya II, sloi α. In *Kamennyi vek: Ot Atlantiki do Patsifiki: Zamyatninskiy sbornik*, iss. 3. St. Petersburg: Izd. MAE RAN, pp. 340–359.

Kuczyńska-Zonik A. 2014

Gravettian ceramic firing techniques in Central and Eastern Europe. *Analecta Archaeologica Ressoviensia*, vol. 9: 79–88.

Lander M.L. 2005

From Artifact to Icon: An Analysis of the Venus Figurines in Archaeological Literature and Contemporary Culture. Durham: Durham Univ.

Malysheva T.Y. 1969

Petrografiya zhelezorudnogo aglomerata. Moscow: Nauka.

Maniatis Y., Simopoulos A., Kostikas A. 1983

Effect of reducing atmosphere on minerals and iron oxides developed in fired clays: The role of Ca. *Journal of the American Ceramic Society*, vol. 66 (11): 773–781.

Onatsky S.P. 1971

Proizvodstvo keramzita. Moscow: Stroyizdat.

Samofalova I.A. 2009

Khimicheskiy sostav pochv i pochvoobrazuyushchikh porod: Uchebnoye posobiye. Perm: Izd. Perm. Gos. Sel.-Khoz. Akad.

Soffer O., Adavasio J., Ileingworth J., Amirkhanov H., Praslov N., Street V. 2000

Palaeolithic perishables made permanent. *Antiquity*, vol. 74: 812–821.

Soffer O., Vandiver P. 1994

The ceramics. In *Pavlov I: Excavation 1952–1953*. Liege: Univ. of Liege, pp. 163–173. (The Dolni Vestonice Studies; vol. 2).

Soffer O., Vandiver P. 1997

The ceramics from Pavlov I – 1957 excavation. In *Pavlov I – Northwest: The Upper Paleolithic Burial and Settlement Context*. Brno: Inst. of Archaeol., pp. 383–403. (The Dolni Vestonice Studies; vol. 4).

Soffer O., Vandiver P. 2005

Ceramic fragment. In *Pavlov I – Southeast: A Window into the Gravettian Lifestyles*. Brno: Inst. of Archaeol., pp. 415–432. (The Dolni Vestonice Studies; vol. 14).

Tolstikhina K.I. 1963

Prirodnye pigmenty Sovetskogo Soyuza, ikh obogashcheniye i primeneniye. Moscow: Gosgeoltekhizdat.

Tsetlin Y.B. 2000

Zaklyucheniye o nakhodkakh predmetov iz gliny na Zaraiskoi verkhnepaleoliticheskoi stoyanke. In *Amirkhanov H.A. Zarayskaya stoyanka*. Moscow: Nauchnyi mir, pp. 240–243.

Vandiver P. 1997

Pavlov I pigments and their processing. In *Pavlov I – Northwest: The Upper Paleolithic Burial and Settlement Context*. Brno: Inst. of Archaeol., pp. 373–383. (The Dolni Vestonice Studies; vol. 4).

Vandiver P., Vasil'ev S. 2002

A 16,000 year-old ceramic human-figurine from Maina, Russia. In *Materials Issues in Art and Archaeology VI: Symposium Held November 26–30, 2001, Boston, Massachusetts, USA*. Warrendale: Materials Res. Soc., pp. 421–431.

Weinstein-Evron M., Ilani S. 1994

Provenance of ochre in the Natufian layers of El-Wad Cave, Mount Carmel, Israel. *Journal of Archaeological Science*, No. 21: 461–467.

Worrall W.E. 1975

Clays and Ceramic Raw Materials. New York: Wiley.

Yanshina O.V., Garkovik A.V. 2008

O rezultatakh petrograficheskogo issledovaniya drevneishei keramiki Primorya. In *Radlovskiy sbornik: Nauchnye issledovaniya i muzeinye proekty MAE RAN v 2007 g*. St. Petersburg: Izd. MAE RAN, pp. 244–249.

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Koksharovsky Kholm and Chertova Gora, Two Neolithic Sanctuaries in the Urals and in Western Siberia: Similarities and Differences

Two Neolithic sanctuaries are compared: Koksharovsky Kholm in the Middle Urals, and Chertova Gora in Western Siberia. They were apparently established by related but separate populations represented by the Koshkino-Boborykino and Kozlov-Poludenka decorative traditions (respectively), dating to the 7th–5th millennium cal BC. Sanctuaries were arranged on high salient promontories. At Koksharovsky Kholm, the ritual meaning of each place was accentuated by two ditches separating the sacred space from the dwelling area. Another attribute of these sanctuaries was variously sized and shaped structures made of wooden poles or slabs. At Koksharovsky Kholm, remains of much smaller (less than 1 × 1 m) structures resembling chests were found, and at Chertova Gora, birch-bark box-like containers. Stone tools from the two sites differ. Parallels include intact or broken clay vessels, rods with notches, flint arrowheads, etc. Some appear to have been made for ritual purposes, and some were broken intentionally. Offerings of artifacts were accompanied by sacrifices of wild animals, birds, and fishes. At Chertova Gora, an offering of hemp grains was found. Parallels with the Mansi, Khanty, and Udmurts may imply ideological continuity.

Keywords: *Trans-Urals, Western Siberia, Neolithic, sanctuaries, sacred space.*

Introduction

The objects that have received the name of "sacrificial hills" or "rich hillocks" stand out by their external appearance among the Neolithic sites of Northern Eurasia. Ten such sites are known; all of them are located north of 58° N, in relatively confined areas of the Trans-Urals Peneplain and the Konda Lowland, both of which are adjacent to the eastern spurs of the Ural Mountains. The best-known of such hills are the Ust-Vagilsky, Makhtylsky, and Koksharovsky, as well as Chertova Gora (Fig. 1), which have been interpreted as sanctuaries. The sites of Koksharovsky Kholm and Chertova Gora have been most fully excavated, and are described in publications (Shorin, 2007, 2010; Shorin, Shorina, 2011; Sladkova, 2007, 2008). The coinciding time when the sanctuaries functioned at a certain stage of the Neolithic was the second–third quarter of the 6th millennium BC. The objects belonged to related groups of the population, which, however, were not identical in archaeological and cultural terms. This allows us not only to analyze each site on its own, but also to identify specific features of their cult-space by exploring their similarities and differences.

In this article, these ancient sanctuaries will be compared according to topography, main structural elements of sacred space, and cult attributes.

Structure of sacred space and the cult attributes of the sanctuaries

The sanctuary of Koksharovsky Kholm is located in the Verkhnesaldinsky District of the Sverdlovsk Region,

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on a narrow high cape (about 2 m in height) formed by the native shore of the Lake Yuryinskoye, at the point where a small stream flows into the lake. The sanctuary of Chertova Gora is located near the village of Mezhdurechensky in the Kondinsky District of the Khanty-Mansi Autonomous Okrug, on the native terrace of the small taiga river of Zaporskaya (the right tributary of the Konda River), where the river makes a sharp turn and flows on three sides around a 2 m high cape. This place is prominent in the surrounding landscape; from the terrace, the river is visible for a large distance in both directions. While still in the Neolithic, sloping grounds of sanctuaries were repeatedly filled with soil and leveled; thereby both capes, especially in their shore parts, increased by about 2 m in height. Soil was added to Koksharovsky Kholm in the Early Neolithic (from the turn of the 7th–6th millennium BC up to the turn of the 6th–5th millennium BC) by the Koshkino and Koksharovo-Yuryinsk (Kozlov) human groups, and in the Late Neolithic by the Poludenka groups (last quarter of the 6th–third quarter of the 5th millennium BC) and the Basyanovsky groups (early 5th–third quarter of the 5th millennium BC) (Fig. 2). Addition of soil at Chertova Gora was performed in the second–third quarter of the 6th millennium BC (Sladkova, 2007, 2008) by the local groups whose pottery, according to its morphology and decorative design, corresponded to a greater degree to the Koshkino decorative tradition; to a lesser degree to Kozlov and Poludenka tradition; and to an even lesser degree to the Basyanovsky-Boborykino tradition (Fig. 3). L.N. Sladkova has found a similarity between two vessels of the Koshkino culture, decorated in the retreating-pricked technique combined with "smooth rocking stamp", and pottery found at Barsova Gora (2008: 155). It can be concluded that the groups that created the sanctuaries of Koksharovsky Kholm and Chertova Gora had similar archaeological and cultural traditions. It is clear that the dwellers in the Yuryinsk settlement built the sanctuary of Koksharovsky Kholm in the center of their settlement. As far as Chertova Gora

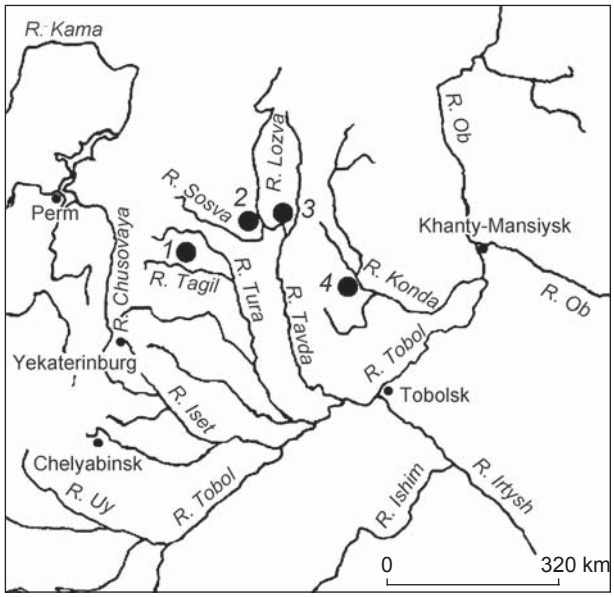

Fig. 1. Location of sacrificial hill-sanctuaries in Northern Eurasia.
1 – Koksharovsky Kholm; *2* – Makhtylsky Kholm; *3* – Ust-Vagilsky Kholm; *4* – Chertova Gora.

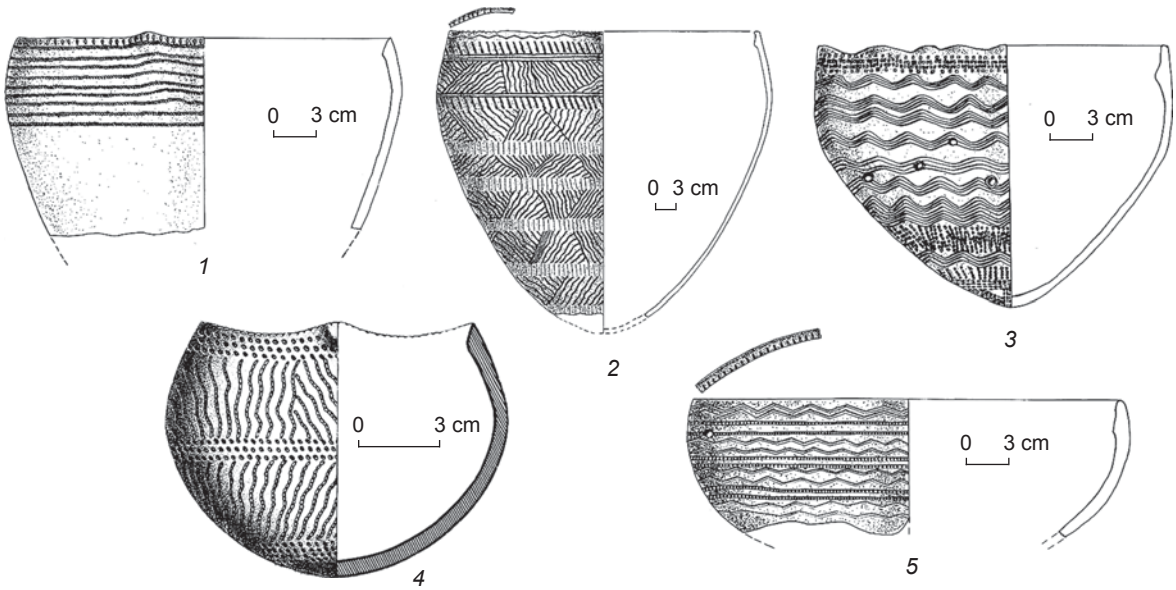

Fig. 2. Vessels of the Koshkino (*1*), Koksharovo-Yuryinsk (*2*, *4*), Poludenka (*3*), and Basyanovsky (*5*) types of the Neolithic period from the sanctuary of Koksharovsky Kholm.

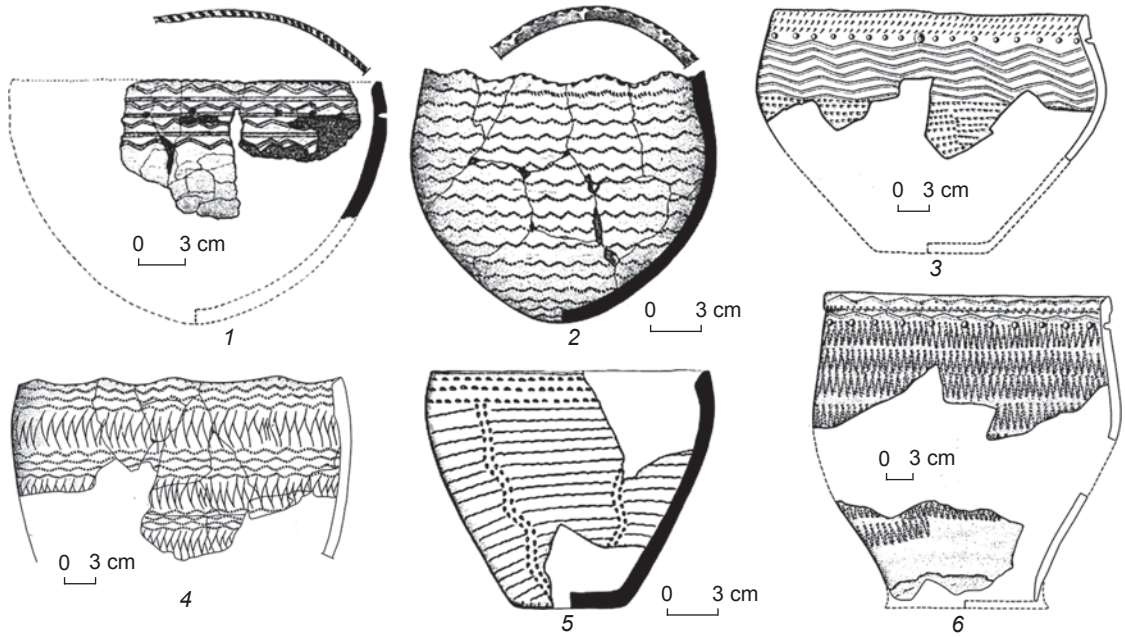

Fig. 3. Neolithic vessels from the sanctuary of Chertova Gora (after: (Sladkova, 2007: Fig. 5, *3*, *5*; 2008: Fig. 2, *1*, *9*; 3, *9*)).

is concerned, Sladkova did not mention the presence of a settlement next to the "mountain", which means either that there was no settlement near the sanctuary, or she simply did not find it, or did not search for it.

Thus, one of the essential features of both sanctuaries is their location on a high place, on a "mountain", to which soil was added during their use. These "mountains" are clearly visible in the terrain, including the view from the river. In addition, the sanctuary of Koksharovsky Kholm stands out in the terrain thanks to two ditches separating the sacred space from the profane space of the inhabited Yuryinsk settlement (Fig. 4). Ditches have not been found around Chertova Gora, but there were no excavations at the foot of the hill (Ibid.: 147).

The main feature of the sacred space in both sanctuaries is the presence in the area of the cape of structures, which differ in size and design but show functional similarities. These are cult buildings of rectangular shape, built of wooden poles or slabs. In some places, narrow and shallow ditches were found along the outer walls of the structures, and also pits where posts (structural elements of the buildings) had probably been dug into the ground. The walls might have been deepened below floor-level, or there might have been drainage ditches along the walls. At Koksharovsky Kholm, the structures were built above-ground; only the ditches surrounding the walls of some buildings were deepened into the subsoil. At Chertova Gora, the buildings were deepened into the subsoil by 0.5–1.5 m. At Koksharovsky Kholm, there are six objects ca 2 × 2 m (1–5, 8) and five objects up to 5 × 5 m (6, 7, 12, 14, and 17) with a height of over 1 m (Fig. 4). The sizes of the objects at Chertova Gora range from 3.2 × 3.5–4.8 × × 3.5 to 6.0 × 4.3 m (Fig. 5). According to Sladkova, large number of charcoal and hearth stains in the layer of this sanctuary can be explained by the lack of roofs in the structures (Ibid.: 156). At Koksharovsky Kholm, given that in the stratigraphic section of object 12 two layers were found containing burned wood (traces of small poles), separated by a layer of sandy loam at least 1 m thick, the buildings probably had roofs (and wooden floors) (Shorin, 2013: 32). Some buildings at this site were built on special banking of thin alternating layers of light native sand and charcoals, or on silvery quartz coarse-grained sand, or on ocher banking of various colors ranging from pale red to crimson, whitish interlayers with fibrous structure, etc. The objects are overlain with such banking. At both sanctuaries, not only individually standing cult objects, but also the structures united in complexes have been found. Two complexes appear in the center of Koksharovsky Kholm: one consists of five interrelated objects (12a–e), while the second combines two objects (3, 4). Sladkova united objects 2–5 into a single complex or a cult Neolithic site (2008: 149–150, 155–156). Taking into account the transverse ditch in the center, she divided this site into two parts: northern part with objects 2 and 3, and southern part with objects 4 and 5 (Fig. 5)*. She also admitted that the southern area covered over the northern

*In her publication, the numbers of the objects are designated with Roman numerals.

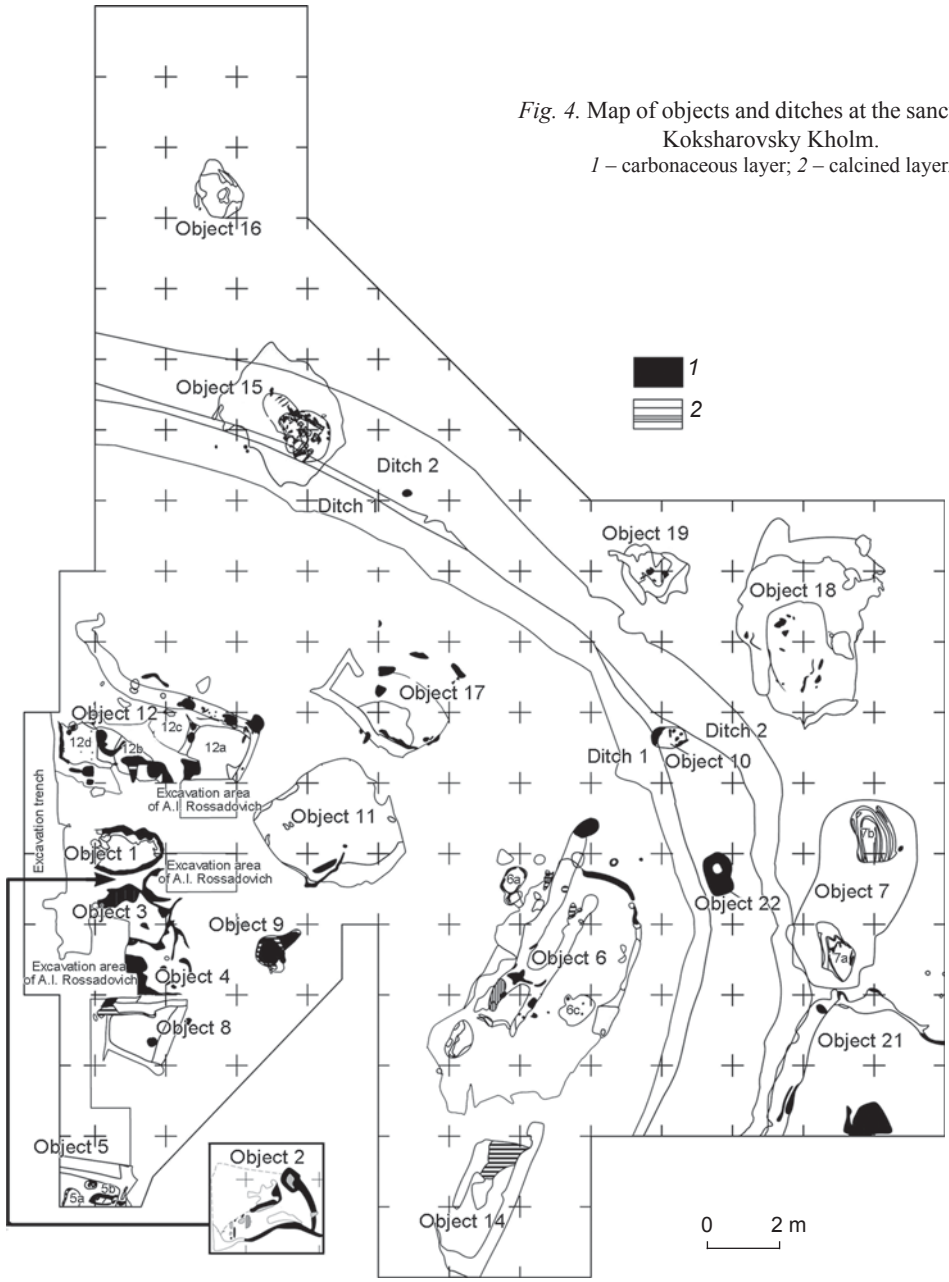

Fig. 4. Map of objects and ditches at the sanctuary of Koksharovsky Kholm.
1 – carbonaceous layer; *2* – calcined layer.

one (the complex of structures); in other words, we either have a complex consisting of four structures, or two complexes each including two structures.

Generally, these objects are very close in size, and probably in their structure also, to the *sumyakhs* of the Mansi, the spirits' barns of the Khanty, or the *kualas* of the Udmurts. They served as houses for offerings and sacrifices (Shorin, 2013: 30–32).

The similarity between the sanctuaries is also manifested by the presence of objects of much smaller sizes near some of the structures. At Koksharovsky Kholm, these are the objects 0.7–1.0 × 0.3–0.8 m in size and at least 25–40 cm in height. One such object (6a) is located near structure 6, and the other two (5b and 6c) are inside objects 5 and 6 respectively. Three more small objects (object 9, 1.9 m to the east of structure 3, and objects 10 and 22 between ditches 1 and 2 (see Fig. 4)) are located separately, and not associated with the structures. The objects are of rectangular shape, and resemble wooden boxes or chests. They may possibly be the typological equivalents of sacrificial chests, birch-bark boxes *paips*, or the *Vorshud* boxes* for keeping

*Among the Udmurts, these are the containers for storing cult offerings to the deity Vorshud, the spirit-patron of the family clan.

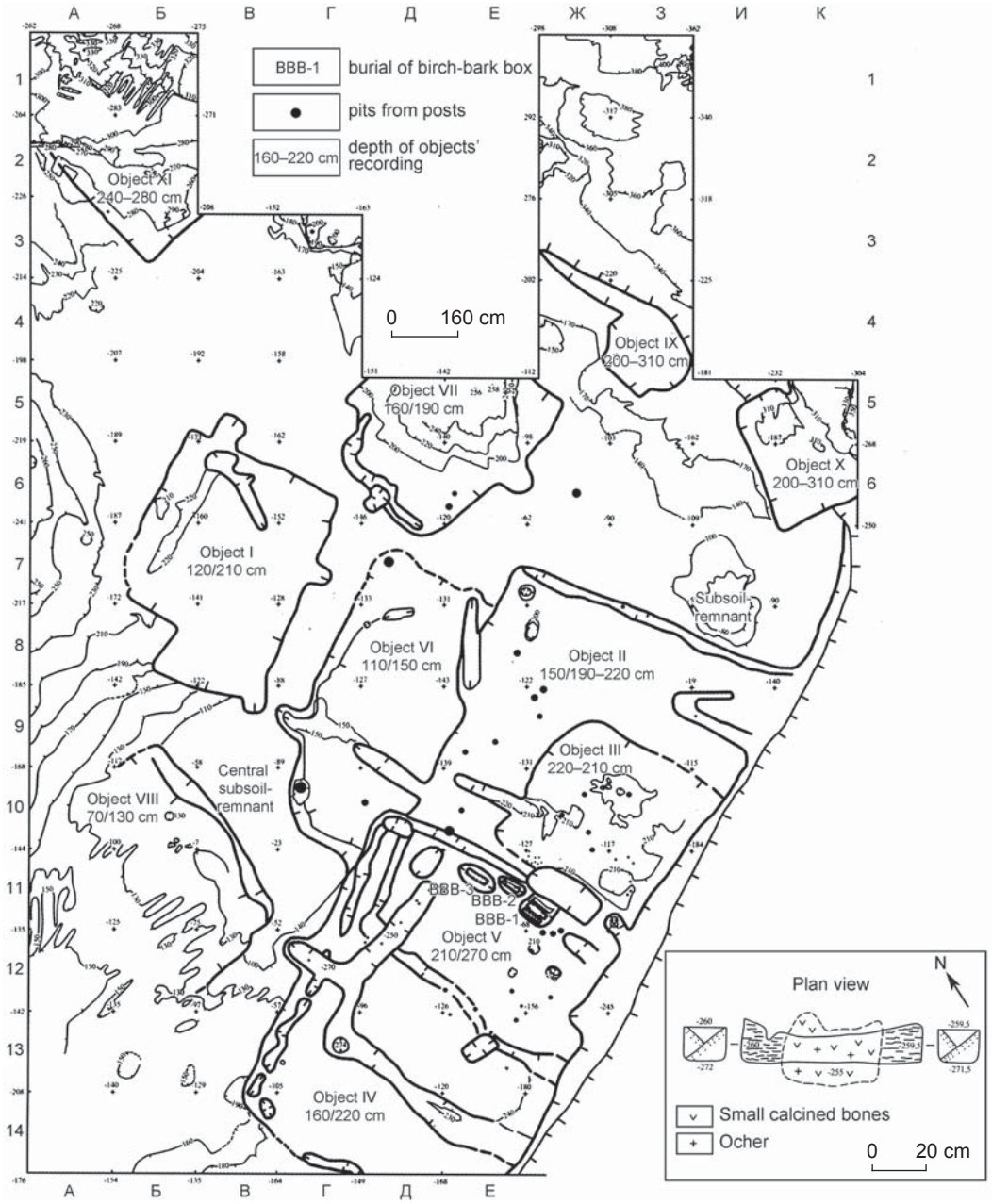

Fig. 5. Map of objects at the sanctuary of Chertova Gora; map of the burial of birch-bark box 3 in the inset (Sladkova, 2008: Fig. 1, *6*).

offerings, which are found everywhere at the sanctuaries of the Mansi, Khanty, and Udmurts. The objects were built of poles or slabs 4–8 cm thick, had planked floors (object 5b), and were covered with something like mats made of sedge or reeds (object 6a). A polished plaque was found on the covering of object 5b, and a stone hammer was discovered in the filling of object 5a. Objects in the form of pits (measuring 1.0–1.6 × 0.5–1.1 m, 20–60 cm deep) were also found at Koksharovsky Kholm. Object 7b was covered with wooden planking; the walls of object 5a were overlain with wood or birch-bark (?). Small wooden structures similar to chests-boxes were found inside pits 7a and 22.

At Chertova Gora, small objects constituted a complex (Sladkova called it "a burial") of birch-bark containers (Fig. 5, inset), which were located at the northern ditch-wall inside object 5, in individual oval pits deepened by 0.4–1.0 m into the subsoil. The first group complex (burial 1) consisted of three long items, placed in a row, which resembled cylindrical containers 48 cm long and 10–12 cm in diameter, decorated with pattern of bands 2–3 cm wide made of ocher pigment. The fourth container

(burial 2) was a cylindrical box without a cover and measuring 47 × 16 × 16 cm, which was found 40 cm to the southwest of the first complex. The fifth container (burial 3) was discovered 20 cm to the south-west of the second container and was partially unearthed. It was similar to the second container, but had a lid; it was a narrow high (up to 60 cm) box measuring 65 × 15 × 14 cm. The box and the containers were sewn, and had holes from the needle. Ocher-covered hemp grains were placed in the first and third containers. According to the head of excavations, the boxes constituted a single complex, most likely, of ritual purpose (Sladkova, 2007: 159, 161; 2008: 155–156).

Two objects (11 and 15) were found at Koksharovsky Kholm, which differed in their design from both the structures of the same site described above, and from the structures at Chertova Gora. These were ground-pits of rectangular shape measuring 3.3 × 3.1 and 3.5 × 3.2 m at their upper parts, and 2.7 × 2.2 and 3.0–3.2 × 1.6–1.9 m at their bottoms, deepened into the subsoil by 1.5 (1.6)–1.35 (1.45) m. One pit (object 11) was discovered on the cult ground of the cape. The other pit (object 15), more expressive in design and richer in artifacts, was found in the flood-plain part of the Yuryinsk settlement (see Fig. 4). This pit was cut through by the ditches of the sanctuary, which implies that it was made at the very beginning of the functioning of the Koksharovsky Kholm–Yuryinsk settlement's complex of sites, or prior to the construction of the sanctuary. This assumption is supported by dates of the late 7th to early 6th millennium BC, obtained for the pottery and charcoal from object 15 (Shorin, Shorina, 2011: Pl. 3, *12*; 4, *1–9*). The pit was covered by a layer of wooden poles 3–5 cm in diameter, and bark, on which two vessels of Koshkino type were placed: one large and decorated only in its upper part, and the other small and decorated over its entire surface. One vessel lay on its side with its neck down. A cluster of over 200 lithic artifacts was found on the same covering. Flakes, some of relatively large sizes, knapped from a large gray-green nodule of silicified loam, dominated among the artifacts. Object 15 can be considered a cult object (Shorin, Vilisov, 2008); however, object 11 did not show traces of cult functioning, and since there were no artifacts inside, it was difficult to determine its age and purpose.

Layers saturated with charcoal and calcined remains, burned wood, etc., have been found in cultural deposits of both Koksharovsky Kholm and Chertova Gora, revealing the use of fire. Researchers of the "hills" agree on the important role of fire-rituals in the cult practices performed at the sanctuaries. In our opinion, cult objects were intentionally burned in the course of the ritual activities (Shorin, 2010: 33). Sladkova identified object 3 as an altar, and offered its reconstruction. She argued that this object resulted from the concentration of a huge amount of fragmented pottery and raw bones of animals and fishes, which were abundantly interspersed with ocher, in the place where the altar was found. First, a purifying hearth was made at the site. It burnt only in the center, so it can be clearly seen that the chunks of wood were stacked as a teepee. Probably, in accordance with the ritual, unburned firewood remained unscattered and not trampled. In the base of the altar, a lens of small calcined bones densely covered with ocher (the subsoil underneath the lens was thoroughly calcined), a sheet of birch-bark, and a groove dug in the mainland and lined with bark were found. The remains of a charred pole 7–8 cm in diameter were in the groove. Apparently, pottery, tools, stones, parts of carcasses and organs of mammals, birds, and fishes, which were interspersed with ocher, would be placed on the altar, and a fire would periodically be made there. The remains of birch-bark sheets were found at different depths of the altar; its layer gradually increased along with the accumulation of sacrifices. Sladkova recorded a cluster of hearths to the north of the altar over an area of about 4–5 m^2. These are also charred firewood stacked as a teepee, with large or small lenses of calcined soil in the center. The hearths were covered with birch-bark sheets. Traces of active use of fire were observed in the first and other objects of Chertova Gora (Sladkova, 2007: 152–157; 2008: 149–155).

Cult attributes involved in the rituals at the sanctuaries under consideration show more differences than similarities. The similarities are manifested in the placement of vessels, which survived intact or in disintegrated form, near the objects (or inside of them) at the cult sites. There were usually one or two vessels, rarely more, near the objects*. In the altar in object 3 of Chertova Gora, two vessels, large and small, similar to the Koshkino type were found (see Fig. 3, *2*, *4*). The bottom of the small vessel was knocked out in the center, possibly by blows from the external side; the outer surface of the vessel was rubbed over with ocher. The use of large and small Koshkino vessels in the ritual was observed in object 15 at the sanctuary of Koksharovsky Kholm; some of the vessels discovered in or near cult objects were placed upside down. Two disintegrated round bottoms of large Neolithic vessels were found at Chertova Gora, near the hearth discovered at the southern border of the southern zone in the cult Neolithic ground, which included objects 4 and 5; the bottoms of the vessels lay with their decorated surface upwards (Ibid.: 154–155, fig. 5, *14*).

While describing altar-object 3 of Chertova Gora, Sladkova drew attention to the fragmentary nature and poor preservation of the pottery found in the object; this pottery could have been made hastily and did not last long (2007: 155). A large number of small undecorated fragments of Koshkino pottery were also found in

*In the western part of Chertova Gora, at the bottom of object 1, four disintegrated Neolithic vessels were found: three large and one very small (Sladkova, 2008: 150–151, fig. 2, *1–3*).

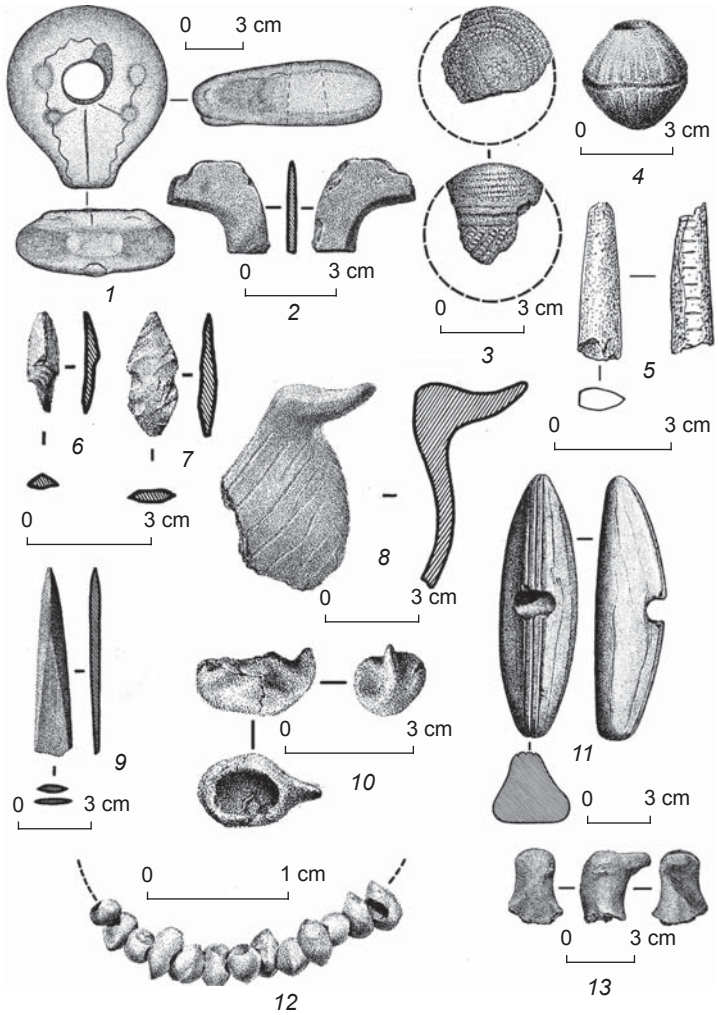

Fig. 6. Cult artifacts from the sanctuary of Koksharovsky Kholm.
1 – mace; *2* – fragment of the butt of the knife; *3* – item of spherical shape; *4* – item of biconical shape; *5* – rod with notches; *6*, *7*, *9* – arrowheads; *8* – fragment of the handle of a vessel in the form of duck's head; *10* – miniature vessel; *11* – small wedge-shaped object; *12* – necklace made of fruits of a plant; *13* – representation of a duck's head.
1, *2*, *5–7*, *9* – stone; *3*, *4*, *8*, *10*, *11*, *13* – clay; *12* – herbaceous plant.

the filling of one of the five objects in complex 12 at Koksharovsky Kholm. This filling of the upper part of the object (possibly, its covering) also contained alternating layers of bright native sand and carbonaceous soil, which included thin lenses of whitish plant-fibers (reeds, sedge?) exposed to fire, as well as thin reddish-crimson lenses—possibly, ocher inclusions.

Such distinctive objects as rods with notches (ornamental decoration) have been found at both sanctuaries, including about a dozen rods at Koksharovsky Kholm, in the area of the ditches. These rods were made of talc; almost all of them were covered with notches and were broken (Fig. 6, *5*). At Chertova Gora, a fragment of a bar-rod of clay slate with crosswise incisions on the opposite facets was taken out of the altar (object 3) (Fig. 7, *4*). Flint arrowheads of various types and polished tools including arrowheads, axe, adze, slick, chisel, and suspension blank (Fig. 7, *5–14*, *16*) were found at this sanctuary—in particular, in the cult zone and in the structures. The cultural layers of Koksharovsky Kholm contained more such objects, especially the arrowheads, by an order of magnitude. There were elegant polished and miniature arrowheads, apparently made for use as offerings (see Fig. 6, *6*, *7*, *9*). On both sanctuaries, there were many knapped stones and pebbles, including flakes. At Koksharovsky Kholm the connection of these finds with ritual practices is not indisputable, while at Chertova Gora it is obvious: the objects were usually found inside an altar or in the cluster of hearths. In one birch-bark box in object 5, two small unworked pebbles with cracks filled with ocher were found (Sladkova, 2007). Two more boxes in the same object contained ocher-covered hemp grains with tiny holes about 1 mm in size, made with a very thin tool. According to Sladkova, it was "as if they used to be strung on a hair" (Ibid.: 161). Similar grains were found at the sanctuary of Koksharovsky Kholm. Here, next to cult object 5, in the filling of the Koshkino vessel turned upside down (aged 6020 ± 90 BP (Ki–16389): 5040–4790 BP (1s), 5250–4650 BP (2s)), a necklace of small fruits (nuts) of a herbaceous plant (European stoneseed, *Lithospermum officinale*) of the Boraginaceae family (see Fig. 6, *12*) was found (Shorin, Chairkina, Shirokov, 2012).

A necklace of the same seeds was found in the grave at the foot of the banked sanctuary Ust-Vagilsky Kholm in the Eastern Urals, although that burial has been dated to the Chalcolithic period (Panina, 2014).

The comparison revealed some differences in the lithic inventories of the sanctuaries of Koksharovsky Kholm and Chertova Gora. The former site contained many cores and blades, including those without any traces of treatment, which means that these products of reduction were not included into the subsequent production process. At the latter site, this feature has not been observed, probably because blade-technology had not been developed in that region in the north of Siberia, owing to the shortage of lithic raw materials. However, the traces of a knapping process as a possible version of ritualistic actions also occurred at Chertova Gora: altar-object 3 contained relatively many knapped stones and pebbles (38 spec.), as well as flakes of flint and quartzite (36 spec.), but few tools made of this raw material (Sladkova, 2007: 155).

The materials from the sanctuaries under consideration reveal even more differences if we compare the artifacts

belonging to other categories. Such objects found at Koksharovsky Kholm exceed the finds from Chertova Gora both in terms of number and variety. These are vessels (including one miniature vessel) and fragments of pottery with relief (see Fig. 2, *4*; 6, *8*, *10*); zoomorphic, and ornithomorphic appliqués (over 90 objects); clay items of spherical and biconical shapes (7 spec., see Fig. 6, *3*, *4*); the butt, made in the form of an ornithomorphic head (see Fig 6, *2*), of a polished knife of broken slate with a crescent shape; a clay head of a duck (Fig. 6, *13*); wedge-shaped objects of clay (one intact (see Fig. 6, *11*) and six fragmented); a drilled stone mace in the form of stylized head of a bear or beaver (see Fig. 6, *1*); and other items. The distinctive artifacts from Chertova Gora, which were probably used in cult practices, along with the above-mentioned, include a polished tile with complex geometric pattern, a fragment of clay ornamented item of unclear function, and a flint plate resembling fish in its shape (see Fig. 7, *1*, *2*, *15*).

In addition, this group of finds includes six objects of birch-bark, two of which were found at the base of the altar. These are a large piece of birch-bark rolled into a tube (a knife-handle?), and a piece of birch-bark resembling a fragment of a recent wicker basket. Four more items were found in the cluster of hearths to the north of the altar: a "bowl" sewn of two birch-bark sheets and measuring 40 × 40 cm, a small birch-bark "bundle" lying on the edge of the "bowl", a piece of limonite wrapped in birch-bark, and a piece of birch-bark with crossed lines.

Offerings were placed on birch-bark in cult objects, and then they were covered over. Ditches inside the structures were laid with birch-bark. The cultural layer of Koksharovsky Kholm contains only a few small pieces of birch-bark; large objects of birch-bark laid over the wooden covering of the pit survived only in object 15 located in the floodplain part.

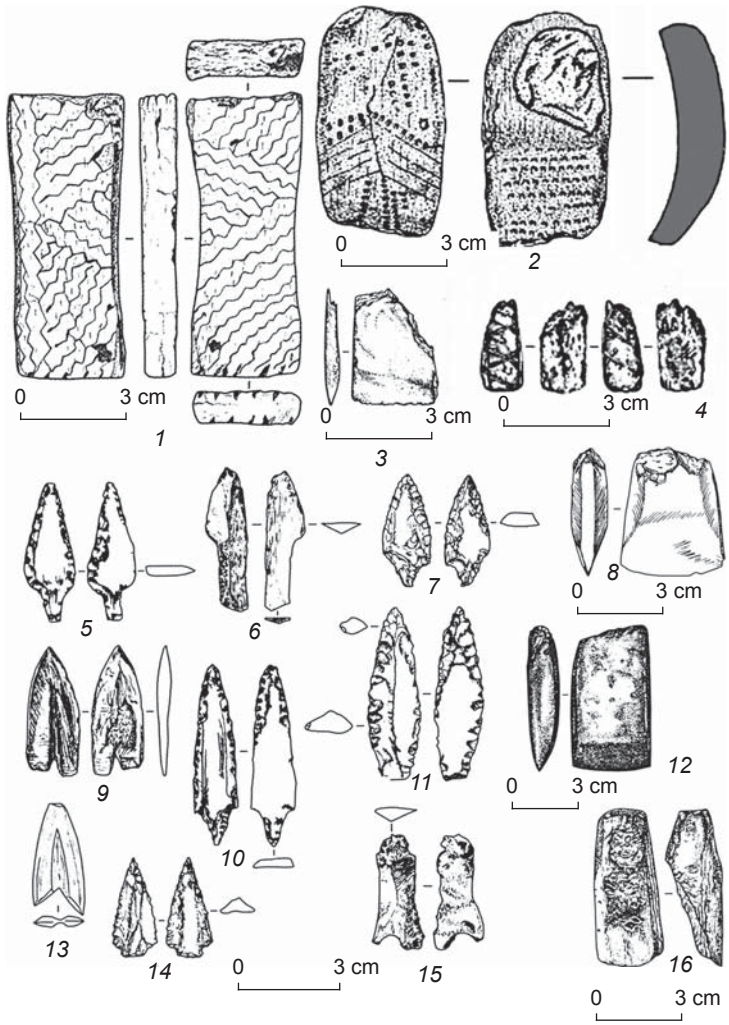

Fig. 7. Cult artifacts from the sanctuary of Chertova Gora (after: (Sladkova, 2007: Fig. 4, *2*, *5*; 2008: Fig. 8, *10–18*, *22–26*)).
1 – tile with pattern; *2* – unidentified object; *3* – chisel; *4* – fragment of a decorated bar-rod; *5–7*, *9–11*, *13*, *14* – arrowheads; *8* – axe; *12* – adze; *15* – plate resembling representation of a fish; *16* – small anvil on the axe.
1, *3–16* – stone; *2* – clay.

Offerings of things and plant sacrifices (hemp grains in two buried boxes in object 5 of Chertova Gora) were accompanied by blood sacrifices. Small calcined bones of wild animals, birds, and fishes have been found everywhere in the cultural layer of Koksharovsky Kholm. These bones belonged mainly to elks and reindeer, less often to beavers, rarely to bears, foxes, wolves, hares, or pikes.

At Chertova Gora, in the altar (object 3), the following bones were found: a metapodium of a bear, and one of a hare; an elk's antler; a lower jaw, a scapula, a humerus, an ulna, and metapodia of a fox; bones of a large bird (capercaillie or black grouse); pike vertebrae; and bones of unidentified fish. They were covered with ocher while in a raw state (Sladkova, 2007: 155, 157). Soil with small calcined bones and ash lay in the form of a lens on the lid of one of the birch-bark boxes (burial 3) covered with ocher; a "bundle" with hearth filling was possibly placed in the box. Biological examination for the presence of human hemoglobin in these buried boxes gave a positive result (Sladkova, 2008: 156).

Comparison of the cult complexes of Koksharovsky Kholm and Chertova Gora with recent sanctuaries of the Mansi, Khanty, and Udmurts revealed some similarities in topography, nature of the sacred space, and cult attributes.

For sanctuaries, especially in the period prior to the Russian colonization and Christianization of the region, people would quite often choose the best-defined landscape elements (hills, mountains, capes, etc.) located near dwellings (Shorin, 2013: 29–30). The center of the

sacred space in archaeological and recent sanctuaries was usually a cult barn built of wooden slabs or logs, most often measuring about 2 × 2 m, sometimes 3 × 3 m or more, about a human's height or slightly lower. It was called 'sumyakh' among the Mansi, 'ura' among the Khanty, and 'kuala' among the Udmurts. The barns of this type used by the first two peoples mentioned had gable roofs; the Udmurts most often made them without roofs. The number of cult barns at each sanctuary was variable, usually amounting to 1–2 or 3–5, but sometimes reached 30 or more. At the sanctuary of Koksharovsky Kholm, objects smaller than 1 × 1 m were inside some religious buildings or next to them. There is reason to view these small objects of wood or birch-bark as typologically equivalent to sacrificial chests or *paips* (birch-bark boxes), and *Vorshud* boxes, commonly found in cult barns (or next to them) at the sanctuaries of the Mansi, the Khanty, and the Udmurts. Similar sacrificial chests have also been observed among other peoples of Eurasia: for example, the Buryats and the Nenets. According to ethnographers, the constructive features of religious buildings among the Mansi, Khanty, and Udmurts are associated with their archaic house-building traditions. A hearth was an obligatory structural element of the sacred space at the sanctuary, and of the cult practices performed at the sanctuary (Shorin, 2013: 30–33).

The cult attribution of the archaeological and recent sanctuaries certainly reveals comparatively more differences. However, the materials found at Koksharovsky Kholm included the items whose decoration employed zoomorphic and ornithomorphic imagery stylistically similar to that of the objects found in the offerings from the sanctuaries of the Uralic peoples of the 19th–20th centuries. This imagery most likely goes back to the totemic symbols and/or hunting cults of the bear, beaver, and owl or to sacred characters (waterfowl), which played an exceptionally important role in the mythological worldview of the Finno-Ugric peoples. Arrowheads, votive axes, adzes, knives, etc., were used at archaeological and recent sanctuaries for ritual purposes. Some ritualistic activities had the form of blood sacrifices. Their objects of sacrifice at the Neolithic site were wild animals, primarily elk and reindeer; while at recent sanctuaries these were replaced by domestic animals and birds, although wild animals were also used (Ibid.: 33–35).

The parallels noted above can be explained by the identical nature of main elements in the mythological worldview among the representatives of the majority of archaic and traditional societies. These principles determined the similarities in the cult practices of the peoples whose traditional way of life was based on a foraging economy. At the same time, genetic continuity of cult traditions among the Neolithic population that left the sanctuaries of Koksharovsky Kholm and Chertova Gora, and the present-day Uralic peoples is also possible (Ibid.: 36).

Conclusions

Two distinctive Neolithic banked sanctuaries (Koksharovsky Kholm and Chertova Gora) belonged to related groups of population, which however were dissimilar in archaeological and cultural terms. These groups were associated with the development of the Koshkino-Boborykino and Kozlov-Poludenka traditions of ornamental decoration in the Trans-Urals and Western Siberian region. The analysis of the sanctuaries revealed more similarities than differences in their main structural components.

1. The most important feature of both sanctuaries was their location on high ground, on a "mountain", to which soil was added during the time of their functioning. These "mountains" are easily visible in the surrounding terrain. Banked cult monuments of this type are known only in relatively small areas in the northern part of the Middle Trans-Urals and the areas of Western Siberia adjacent to the Ural Mountains; and only from the Neolithic. The sanctuary of Koksharovsky Kholm was built in the center of the Yuryinsk settlement by its inhabitants. There is no information about the existence of a settlement near Chertova Gora, just as there were no ditches similar to those that additionally marked the sacred space at Koksharovsky Kholm.

2. The main sign of sacred space at both sanctuaries was the presence of rectangular cult structures made of wooden poles or slabs, which differed in size and structural elements, but had a similar function. At Koksharovsky Kholm, structures built on the ground were found, measuring about 2 × 2 m (less often, up to 5 × 5 m), and covered with roofs, whereas at Chertova Gora structures were deepened into the subsoil, ranged in sizes from 3.2 × 3.5–4.8 × 3.5 to 6.0 × 4.3 m, and did not have roofs. At both sanctuaries, there were both individually standing cult structures and those united in complexes. The similarity was also observed in the presence of objects less than 1 × 1 m in size near some of the structures: at Koksharovsky Kholm, they resembled wooden boxes, chests, or "houses", while at Chertova Gora they had the form of birch-bark containers. Researchers of the "hills" unanimously agree on the important role of fire-rituals in the cult practices performed at the sanctuaries.

3. Cult attributes of the sanctuaries under consideration reveal significant differences. For example, cores and blades were widely represented at Koksharovsky Kholm, but were few in number at Chertova Gora. This may be because blade technology was not well developed in the northern region of Siberia owing to the scarcity of lithic raw materials—although the process of lithic reduction as a possible version of ritualistic activities at this sanctuary was reflected in the assemblage of knapped stones and pebbles, as well as flakes of quartzite and flint. However, there were also some similarities: intact or broken vessels,

including vessels placed upside down, rods with notches (ornamental decoration), flint arrowheads of various types, polished objects, etc., some of which had been intentionally broken, were found in the structures and near the structures on cult grounds.

4. Comparison of the objects belonging to other categories has revealed more differences. Distinctive artifacts appear more widely at Koksharovsky Kholm than at Chertova Gora. However, at Chertova Gora, there were relatively many objects made of birch-bark, which are not often found in mineral soils of archaeological sites. Offerings of things were accompanied by blood sacrifices of various wild animals, birds, and fishes. Offerings in the form of hemp grains in two buried boxes of object 5 were found at Chertova Gora. Sladkova also provided information on the presence of traces of human hemoglobin in the buried boxes of this site.

References

Panina S.N. 2014

Fragment sakralnogo prostranstva epokhi eneolita u podnozhya Ust-Vagilskogo kholma v lesnom Zauralye. In *Trudy IV (XX) Vseros. arkheol. syezda v Kazani. 2014 g*., vol. I. Kazan: Otechestvo, pp. 330–333.

Shorin A.F. 2007

Istoriya i nekotorye itogi izucheniya Koksharovskogo kholma. In *Problemy arkheologii: Ural i Zapadnaya Sibir: (k 70-letiyu T.M. Potemkinoi)*. Kurgan: Izd. Kurgan. Gos. Univ., pp. 30–42.

Shorin A.F. 2010

Svyatilishche Koksharovskiy kholm v Srednem Zauralye: Markery sakralnogo prostranstva. *Uralskiy istoricheskiy vestnik*, No. 1 (26): 32–42.

Shorin A.F. 2013

O parallelyakh mezhdu neoliticheskim svyatilishchem Koksharovskiy kholm i svyatilishchami korennykh narodov Urala XIX–XX vv. *Rossiyskaya arkheologiya*, No. 2: 27–36.

Shorin A.F., Chairkina N.M., Shirokov V.N. 2012

Issledovaniya po proektu "Istoki kulturnogo naslediya drevnego naseleniya Urala". In *Istoriko-kulturnoye naslediye i dukhovnye tsennosti Rossii*. Moscow: ROSSPEN, pp. 118–124.

Shorin A.F., Shorina A.A. 2011

Stratigraphy and relative chronology of the Neolithic assemblages at the Koksharovsky Kholm sanctuary. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 39 (3): 70–77.

Shorin A.F., Vilisov E.V. 2008

Obyekt 15 Koshkinoskoi kultury Koksharovskogo Kholma: Versii ispolzovaniya. In *Voprosy arkheologii Urala*, iss. 25. Yekaterinburg, Surgut: Magellan, pp. 128–136.

Sladkova L.N. 2007

Predvaritelnye itogi polevykh issledovaniy 1988, 2003, 2004 gg. na Chertovoi Gore v Kondinskom raione KhMAO – Yugry. In *Khanty-Mansiyskiy okrug v zerkale proshlogo*, iss. 4. Yekaterinburg, Khanty-Mansiisk: Basko, pp. 152–164.

Sladkova L.N. 2008

Chertova Gora – neoliticheskiy pamyatnik v basseine Kondy. In *Voprosy arkheologii Urala*, iss. 25. Yekaterinburg, Surgut: Magellan, pp. 147–158.

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Technical and Morphological Model of Chalcolithic Chopping Tools of the Russian-Karelian Type from Karelia and the Upper Volga Region*

This article addresses chopping tools (axes and adzes) from the Chalcolithic peatbog sites at Sakhtysh, Karelia, associated with the Volosovo culture. This group was first separated on the basis of technological and typological criteria, and their connection with the Volosovo component of these culturally and temporally heterogeneous sites was later verified with a detailed spatial analysis. The main traits of the Volosovo tools match those of the Russian-Karelian type, found in Russian Karelia at Chalcolithic sites with asbestos and porous ware. The analysis of the blanks suggests that their production followed a certain technological and typological model. The basic type of tool had a trapezoid or triangular cross-section, which was formed at the knapping stage and could then have been transformed into a semi-oval. Knapping was done with the punch technique, also evidenced by axes with a tetrahedral cross-section, widespread in the Neolithic of Northern, Central, and Eastern Europe. The Volosovo chopping tools at the sites with asbestos ware in the Upper Volga region and Karelia follow the same single technological tradition. Its distribution area cannot be delimited as of yet, but it could have extended beyond that of the axes with a tetrahedral cross-section.

Keywords: *Chopping tools, axes, adzes, Volosovo culture, asbestos ware, Upper Volga, Karelia, Sakhtysh sites, Russian-Karelian type.*

Introduction

This study presents the results of the technical and typological analysis of chopping tools from the widely known settlements of the Sakhtysh archaeological microregion in Teykovsky District of the Ivanovo Region (Fig. 1). The analyzed objects belong to the Chalcolithic (Volosovo) component of these sites, which has been established on the basis of technical and typological criteria and the analysis of their stratigraphic and planigraphic position in the cultural layer. These objects were made following a specific technological tradition, previously known only from materials originating from the settlements with asbestos and porous ware on the territory of present-day Karelia, generally synchronous with the Volosovo sites. In Russian archaeological literature, the objects of this tradition are designated as tools of the Russian-Karelian type.

This article introduces the concept of the technical and morphological model of stone chopping tools. One such model is the Russian-Karelian; this designation was proposed in accordance with the name of the type of the tools, which has become established in the literature. The

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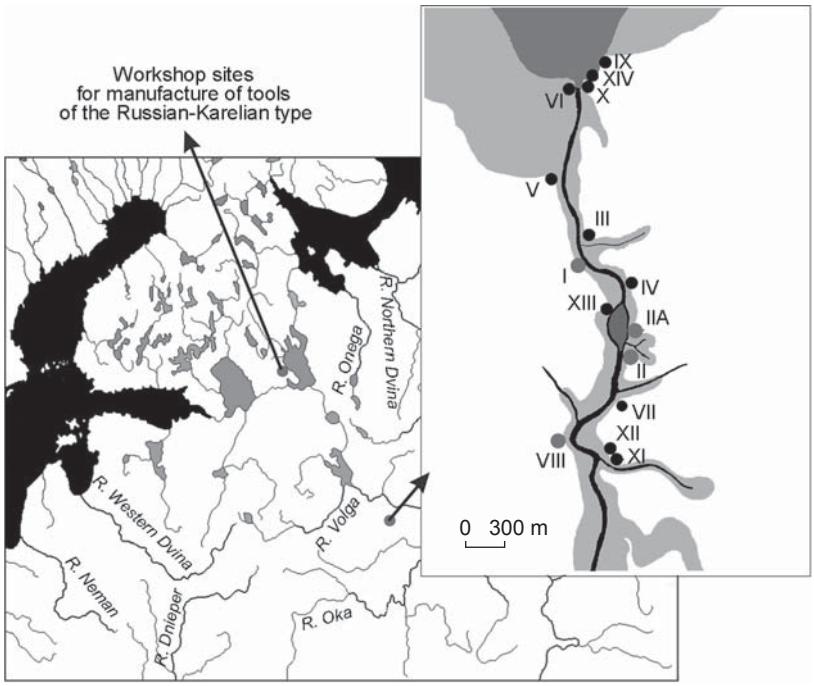

Fig. 1. Location of the Sakhtysh sites and lithic workshop sites of the Chalcolithic on the western shore of Lake Onega (Kostyleva, Utkin, 2010) (Roman numerals denote the sites of Sakhtysh I–XIV).

presence of this model on the territory of Karelia, as well as in the Upper and Middle Volga region, makes it possible to argue that its distribution and role in the set of tools of several cultures in the forest zone of Russia are comparable to the role of the model of tetrahedral axes in the Neolithic of Northern and Central Europe.

In the process of this study, we reviewed the materials from the sites of Sakhtysh I, II, IIa, and VIII, which have been studied by a number of scholars especially D.A. Krainov, E.L. Kostyleva, and M.G. Zhilin (see (Kostyleva, Utkin, 2010)). The objects from the collections of the Ivanovo State University were analyzed in detail. The materials from the Ivanovo Museum of Local History were also considered but we did not have an opportunity to describe them in the same detail. Some objects have been identified from the descriptions and field journals, but they were not taken into account in the quantitative analysis of features of the objects in question.

Russian-Karelian type of tools in Karelia and beyond: Historiography

Tools of the Russian-Karelian (or Eastern Karelian according to the Finnish tradition) type drew the attention of Finnish scholars in the second half of the 19th century. The Finnish experts located their production center as being on the western shore of Lake Onega and established that some objects were transported from there to very remote regions (Äyräpää, 1944; Heikkurinen, 1980: 5–7; Nordquist, Seitsonen, 2008; Tarasov, Kriiska, Kirs, 2010). Russian archaeologists were aware of the research of their Finnish colleagues, but the interpretation of the Finnish scholars did not become universally accepted in Russia (Bryusov, 1940: 227; 1947; 1952: 104–106; Voss, 1952: 196; Clark, 1952; Filatova, 1971; Gurina, 1974).

In the 1980–1990s, A.M. Zhulnikov investigated a number of Chalcolithic sites with asbestos and porous ware (1999). It was established that the tools of the Russian-Karelian type were typically found at the sites with such pottery and were absent from the archaeological sites with unmixed assemblages of other cultures (Tarasov, 2008). The mapping of such finds was first done by A. Äyräpää in the middle of the 20th century (1944). This work was resumed in 2008, when archaeological collections from Estonia (Tarasov, Kriiska, Kirs, 2010) were analyzed, and continued in 2009 in Latvia (Kriiska, Tarasov, 2011). Collections from a number of museums in Northwestern and Central Russia have also been studied. By now, 3466 objects have been considered, including tools, their fragments, and blanks. The majority of the blanks came from the lower reaches of the Shuya River. Some of the objects were found within the basin of Lake Onega, but not further.

The material of the tools of the Russian-Karelian type was identified in the second decade of the 20th century by the Finnish geologist E. Mäkinen, who established that the tools were made of weakly metamorphosed tuff (metatuff) from the northwestern coast of Lake Onega (see (Äyräpää, 1944)). This material was not quite correctly designated in the archaeological literature as "green Olonets slate" (Tallgren, 1922: 67; Äyräpää, 1944; Heikkurinen, 1980: 5). The petrographic studies were resumed in 2009. An analysis of a series of finds from Estonia has shown that most of them were made of metatuff, absent in this territory and similar to the material of the samples from the western shore of Lake Onega (Tarasov, Kriiska, Kirs, 2010).

There are no studies with a detailed technical and typological analysis of the chopping tools of the Volosovo culture; only a brief description can be found in general studies or publications of the materials from individual sites. There are some references to chisels and adzes

with a high, convex, or "humped" dorsal surface and semi-oval cross section, which have been sometimes referred to as chisels of the "Volosovo" type, as well as fluted chisels with "wide" or "narrow" grooves, chisels with or without grooves with triangular, sub-oval, or trapezoid cross-sections, "chisels with a humped dorsal surface", lenticular or trapezoid adzes in cross-section, etc. (Tsvetkova, 1948: 10; 1953: 28; 1970: 136; Bryusov, 1952: 76; Nikitin, 1991: 31; 1996: 136–137, 142; Zhilin et al., 2002: 55–56; Korolev, Stavitsky, 2006: 65–66, 69; and others). Some studies, specifically focusing on the Volosovo culture, contain only several remarks about the stone tools for woodworking (Krainov, 1987: 18; Tretyakov, 1990: 36, 50).

Tools of the Russian-Karelian type that have been found outside Karelia were mainly interpreted as the evidence of exchange (Ailio, 1922: 24; Clark, 1952; Filatova, 1971; Gurina, 1974: 15; Tarasov, 2008). In agreement with the Finnish scholars of the early 20th century, the authors noted that such tools were produced not only of metatuff in other territories. These facts were regarded as evidence for imitation of Karelian imported objects, leading to the conclusion that the emergence of this type could have been associated with a much larger territory (Ailio, 1922: 24; Tallgren, 1922: 124; Äyräpää, 1944: 66–68; Heikkurinen, 1980: 64–67). Thus, the presence of such tools, which were not made of metatuff, was observed in the collection of merchant V.I. Zausailov from the Middle Volga region, bought by A.M. Talgren for the Finnish National Board of Antiquities (Tallgren, 1916; Heikkurinen, 1980: 28–29).

A.Y. Bryusov, who introduced the term "Russian-Karelian type" of lithic objects and described the "chisels of the Volosovo type", surprisingly did not pay attention to the considerable similarity between them (1952). Other scholars who studied the Volosovo artifacts, but did not work with the Karelian materials, also treated the Volosovo tools without any connection to the chopping tools of the Russian-Karelian type (Tsvetkova, 1948, 1953, 1970; Krainov, 1987; Tretyakov, 1990: 36, 50).

In the Russian literature, the possible association of the Russian-Karelian type not only with objects from Karelian "slate", was proposed by V.F. Filatova (1971), who noted the presence of flint tools with typical morphology of the Russian-Karelian type in Central Russia. Filatova associated this type of tools with the sites of pit-comb pottery, and considered the population who left them to be migrant, coming to the conclusion that this type of stone tools was brought to the territory of Karelia in a fully formed state by migrants from the Volga-Oka interfluve. This conclusion seemed quite reasonable at the time, when unmixed assemblages with asbestos ware had not yet been investigated. Currently, the cultural and chronological attribution of this type of antiquities needs to be revised.

Technical and morphological models for producing chopping tools by knapping

The main feature of the chopping tools of the Russian-Karelian type is their cross-section in the form of a trapezoid or semi-oval. In the course of study of them, it seems that this morphological feature originated from the use of a certain technique, and the type as a static morphological phenomenon is based on a very specific technological tradition.

In the Neolithic and Early Metal Age, stone axes and adzes usually underwent abrasive processing (Semenov, 1968: 75–80). However, an attempt to create an object from a more or less large piece of stone only with the help of grinding would entail enormous efforts and time in the Stone Age. Knapping was much more effective, and thus abrasive treatment was applied at the final stage of production. Two main technological approaches that made it possible to ensure a specific shape even at the stage of knapping can be identified among the variety of methods used for producing stone axes. Their use directly affects the morphology of the finished products, especially the shape of their cross-section. These technological models can be designated as technological and morphological, which emphasizes the relationship between processing techniques and resulting shapes of the objects. The model makes it possible to make a blank of a tool with chopping functions. This blank may have different forms of the working edge and result in a variety of finished products such as axes, adzes, including fluted varieties, and chisels. At the same time, it also preserves a variability of proportions, as well as specific features of butt form and frontal shape of the tool.

The first of these models is based on the bifacial technology. Bifaces have two knapping surfaces, which form a sharp acute rib at the junction (Inizian et al., 1999: 44–49; Andrefsky, 1998: 172), and a cross-section of lenticular form. During their processing, flakes were alternately removed from both knapping surfaces in the direction from the edges towards the center. Negative scars of spalls removed from the opposite edges occur along the central axis of the object. This model was very common. It seems that bifacial techniques for producing chopping tools emerged independently in different parts of the world, since this is the most natural and simple way of creating the form of stone axes and adzes.

The second model was typical for axes with tetrahedral cross-section, which originally appeared in the Funnel-beaker culture in Southern Scandinavia and Central Europe (Hansen, Madsen, 1983; Madsen, 1984; Stafford, 1999: 30, 49; Olausson, 2000: 125; Apel, 2001: 153; Sundström, Apel, 1998; Sundström, 2003: 143; see also more references in these studies). The carriers of the

Corded Ware culture and the Battle Axe culture, which later spread over significant territories of Central and Northern Europe, partially adopted the types of inventory that had been typical for these areas, and the corresponding traditions including the technique of producing flint axes (Malmer, 1962: 150–246, 339–528; Edenmo, 2008: 22). Together with the Fatyanovo culture, axes with tetrahedral cross-section also appeared on the territory of present-day Russia (Krainov, 1972: 62).

This technique is distinguished by removals made by striking with an intermediate tool (punch technique), and a specific processing method of using the lateral wall of the negative scar of the percussion bulb from the previous spall as a platform for removing a new flake from the adjacent knapping surface. Two adjacent surfaces could have been located strictly perpendicular or even at a blunt angle to each other, but the flaking angle of the resulting spalls turns out to be significantly smaller. This method makes it possible produce a right angle between the faces of the product, which results in an object rectangular in cross-section (Fig. 2, *1*). The platforms of flakes, often wide, acquire a number of markedly concave facets with slanting interfacial ribs, which separate them (Fig. 2, *2*, *3*). The most reliable indicator for the use of an intermediate tool is the concave platform located on the lateral surface of the wide facet that remained from the previous flake removal near the interfacial rib. Any other percussion instrument would have inevitably hit the rib instead of the platform (Pelegrin, 2004: 68).

The production technique of the tools of the Russian-Karelian type (Tarasov, 2003; Tarasov, Stafeev, 2014) can be defined as intermediate between bifacial and tetrahedral. As in the bifacial model, the edges of the blank are joined to each other at an acute angle. However, instead of two concave surfaces, they have three or four relatively flat facets. If there are three facets, the object is triangular in cross-section, and all adjacent facets join together at an acute angle, albeit less acute than in bifaces. More often, however, there are four facets, one of which (dorsal) is narrower than the opposite (ventral) facet, while the other two (lateral) facets, opposite to each other, have the same width. The lateral facets join with the ventral facet at an acute angle, and join with the dorsal facet at an obtuse angle, thus the form of the object's cross-section becomes trapezoid (Fig. 2, *4–6*). Blanks and flakes often show signs of using the punch technique (Fig. 2, *2–5*). The knapping sequence is reconstructed as a stage process (Tarasov, Stafeev, 2014).

Tools of the Russian-Karelian type were subjected to very high-quality abrasive processing, which was usually done on at least 2/3 of the entire surface of the product. Very often fine polishing (a smooth mirror-like surface) covers a wide area (Tarasov, 2008). Another feature is

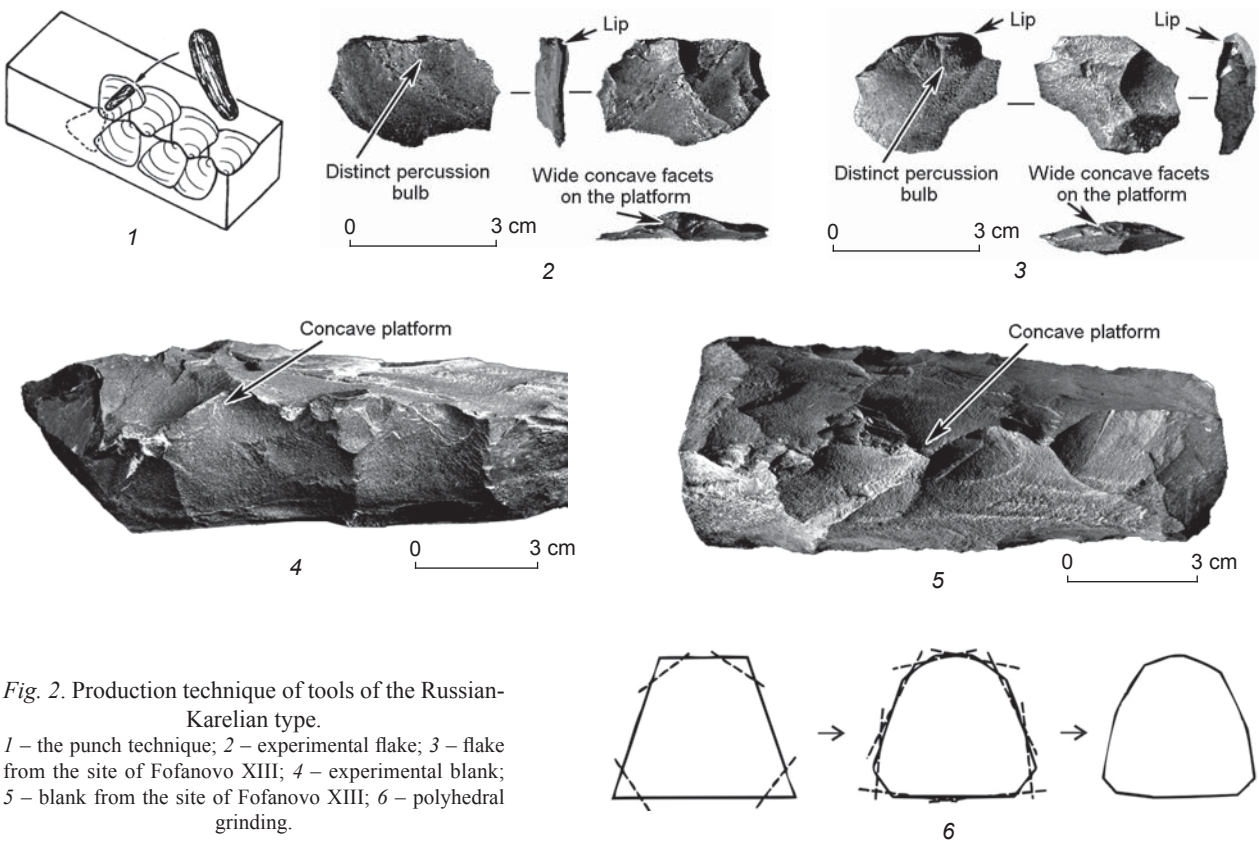

Fig. 2. Production technique of tools of the Russian-Karelian type.
1 – the punch technique; *2* – experimental flake; *3* – flake from the site of Fofanovo XIII; *4* – experimental blank; *5* – blank from the site of Fofanovo XIII; *6* – polyhedral grinding.

polyhedral grinding, when the main facets of the objects consist of a certain number of narrow longitudinal facets, usually extending along its entire length (Fig. 2, *6*).

Most often, the finished tools are trapezoid and in some cases triangular (in the butt part) in cross-section. Fluted adzes typically have a cross-section in the form of a semi-oval, which results from smoothening the ribs on the dorsal surface at the stage of polishing. In rare cases, the cross-section is in the form of a parallelogram. Along with tools made according to the Russian-Karelian technique, bifacial objects with one surface more convex than the other have been found in assemblages with the asbestos ware in Karelia. We have proposed to call such objects offset bifaces (Tarasov, 2003).

Tools from the Volosovo assemblages at the Sakhtysh sites

The Sakhtysh sites do not represent unmixed assemblages. In addition to the Volosovo materials, they contain Mesolithic materials (the Butovo culture), Early and Middle Neolithic materials (the Upper Volga and Lyalovo cultures), as well as Bronze Age and Early Iron Age materials. Different layers are detected lithologically, but are not separated by sterile interlayers. Moreover, they show damage related to economic and construction activities. A significant amount of materials are mixed, and it is difficult to make cultural attribution only from the context of each particular finding (Kostyleva, Utkin, 2010: 10–11).

When inspecting the collections, we selected objects with the signs of the Russian-Karelian model. First, these were the tools of the Russian-Karelian type proper, which traditionally included the objects made of gray-green rock. Secondly, we selected objects made of local materials from the territory of the Upper Volga region (flint and cherty limestone), produced in accordance with this model. After that, we checked their stratigraphic and planigraphic positions.

Karelian import. We determined 17 undeniable tools of the Russian-Karelian type, made of raw material that visually corresponds to metatuff from the territory of Karelia (Fig. 3, *6*, *8*, *9*). Six more objects were identified while viewing collection inventories on the basis of drawings and descriptions, and in this case there was the possibility of erroneous attribution. Seven objects resemble objects of the Russian-Karelian type, but have some significant deviations from its standard parameters. They include two blanks, as well as tools identified by inventory records. These tools show traces of wear, repair, and reshaping into tools with other functions, which indicates their use for production operations. Two objects can be interpreted as Russian-Karelian blanks of the first processing stage; they are made of boulders, the material of which visually resembles Karelian rocks. However, since the most typical signs of using this technology are missing (they manifest themselves at later stages of processing), there is no reason to claim that the objects really belong to the type under consideration. All data indicate that the series of tools described was imported from the territory of Karelia. The technological context of their use, but not production, appears at the Sakhtysh sites.

Tools and blanks made of local materials in accordance with the Russian-Karelian model. 154 objects have been identified. Most of them are finished tools (92 objects). There are significantly less blanks (40 objects), which can be expected for the assemblages from habitation settlements as opposed to workshop sites. There are some blanks (20 objects) made of broken tools and cases of secondary use with complete change in the original function (knife (?), core). Spalls from polished tools have also been found.

Tools. Detailed description of technical and morphological features was made for 87 tools, most of which are fragmented. Fluted adzes prevail (Fig. 3, *1*, *3*). There are many convex adzes with blades formed in the same manner as in fluted adzes by beveling from the broader ventral surface towards the narrower dorsal surface (and not vice versa, as is the case with adzes, chisels, and axes), but with an unpolished longitudinal groove (Fig. 3, *2*). There are rare occurrences of ordinary straight adzes and chisels. Owing to the predominance of fluted varieties, the most common cross-section is semi-oval.

Almost all objects that allow for estimating the size of the surface subjected to abrasive treatment (63 objects in total) have been completely polished. Most of them show very fine polishing (burnishing); the presence of polyhedral grinding has also been observed.

The comparison of metric features (Fig. 4) shows that the samples from the assemblages of the Sakhtysh sites and the finds of the Russian-Karelian type from Karelia are almost identical according to the ratio of width to thickness (about 1.5). This ratio is one of the stable signs of the Russian-Karelian type. Certain differences have been noted in the ratio of length to width (the Sakhtysh tools are narrower), which is probably related to the plastic properties of the Upper Volga raw materials.

Blanks (Fig. 3, *4*, *5*) have all been treated by knapping. The majority (32 objects) correspond to the Russian-Karelian model. One object was identified as an offset biface. Another object (a fragment of a butt) corresponds to the production technique of tetrahedral axes. Most likely, this was a random deviation from the general standard. Most of the blanks can be attributed to the later stages of processing. Their absolute predominance among the blanks from habitation

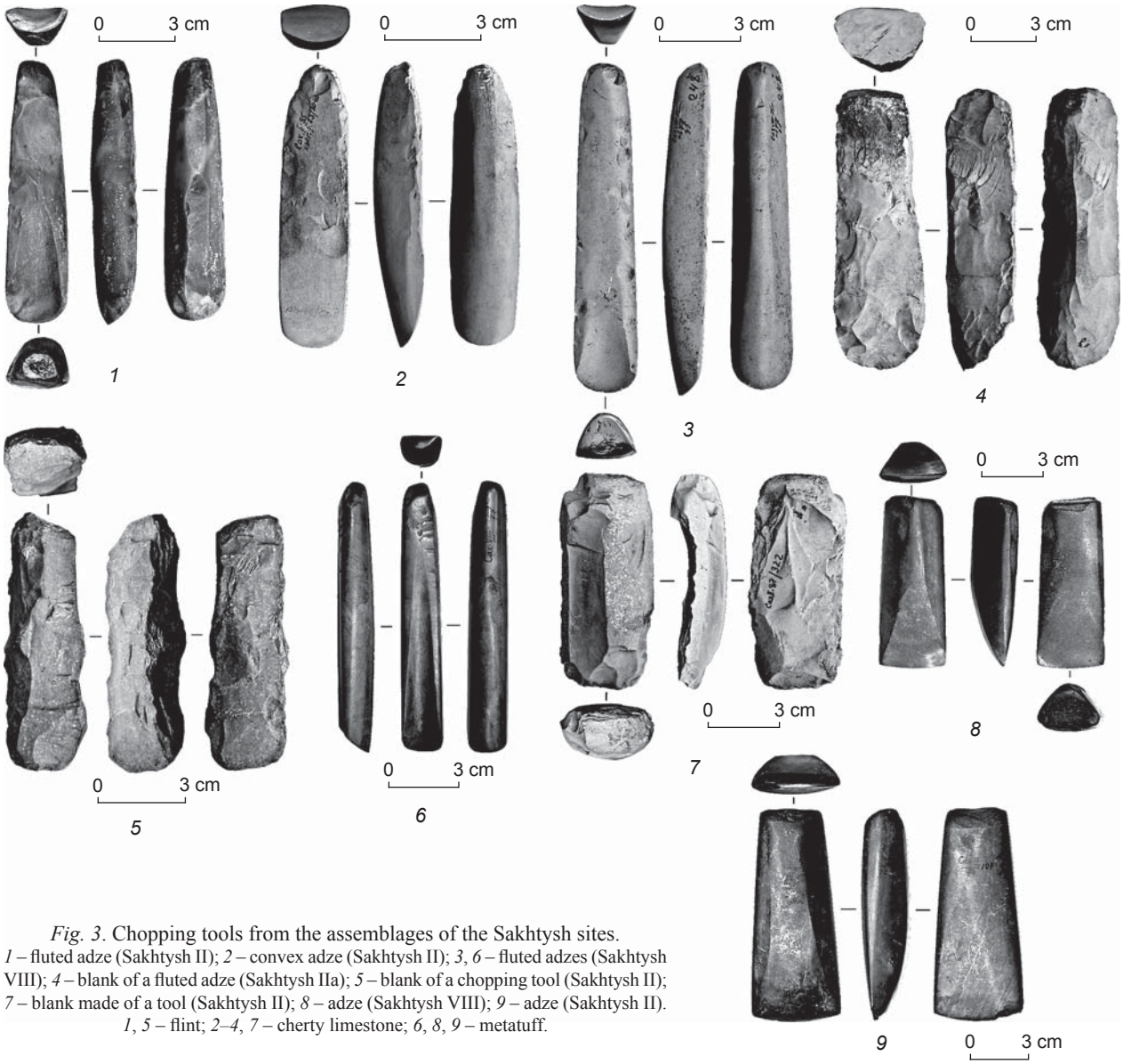

Fig. 3. Chopping tools from the assemblages of the Sakhtysh sites.
1 – fluted adze (Sakhtysh II); *2* – convex adze (Sakhtysh II); *3*, *6* – fluted adzes (Sakhtysh VIII); *4* – blank of a fluted adze (Sakhtysh IIa); *5* – blank of a chopping tool (Sakhtysh II); *7* – blank made of a tool (Sakhtysh II); *8* – adze (Sakhtysh VIII); *9* – adze (Sakhtysh II).
1, *5* – flint; *2*–*4*, *7* – cherty limestone; *6*, *8*, *9* – metatuff.

assemblages is also typical of the synchronous Karelian settlements (Tarasov, 2003, 2008).

Blanks made of tools. In addition to incomplete forms, these objects have areas that were polished before the fragment of the tool was reshaped (Fig. 3, *7*).

Stratigraphic and planigraphic analysis. The analysis made by E.L. Kostyleva has been described in detail (Tarasov, Kostyleva, 2015), thus it is sufficient to provide only a brief summary of the results. The objects with signs of the Russian-Karelian technical and morphological model at all four sites predominantly originate from the Volosovo horizon of the cultural layer, and their connection with the objects associated with this horizon (dwellings, sanctuaries, burial grounds) can be detected. This indicates that these objects must have belonged to the Volosovo culture.

Discussion

A significant part of the chopping tools and blanks from the Sakhtysh sites shows a great similarity to the tools of the Russian-Karelian type from the territory of Karelia both at the level of production technique and at the level of morphology of the finished objects. The analysis of the planigraphic and stratigraphic position makes it possible to associate them with the Volosovo assemblages, which are dated within ca 4800–3800 BP (ca 3550–2300 cal BC) at the Sakhtysh sites (for more details see (Kostyleva, Utkin, 2010: 248–250)). The artifacts made according to the Russian-Karelian model should be dated to the same chronological period. The imported tools made of metatuff are more likely associated with late Volosovo contexts (starting from ca 4100 BP or

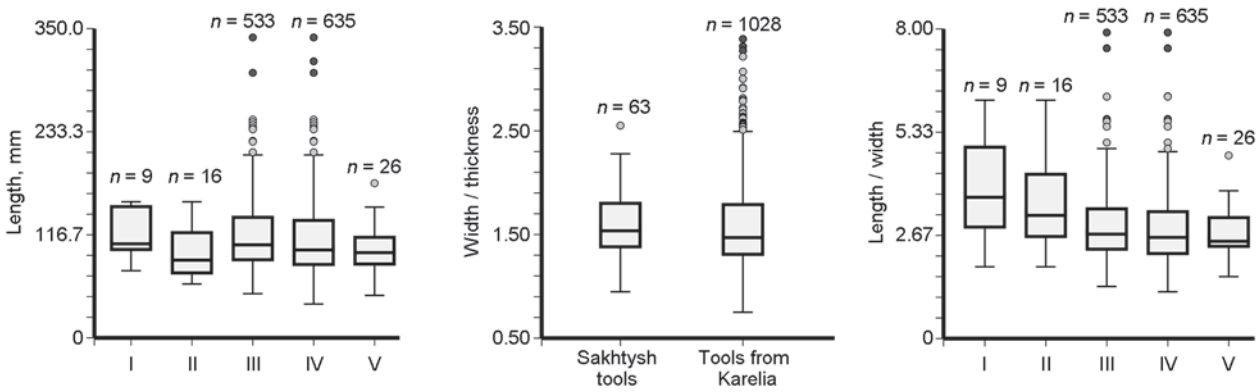

Fig. 4. Comparison of metric properties of the chopping tools, made according to the Russian-Karelian model, from the Sakhtysh sites, and the tools of the Russian-Karelian type from Karelia.

I – intact Sakhtysh tools with no traces of repair; II – intact Sakhtysh tools including those with traces of repair; III – intact tools, without traces of repair, from Karelia; IV – intact tools, including those with traces of repair, from Karelia; V – intact tools from the settlement assemblages of Karelia.

2800 cal BC) (Tarasov, Kostyleva, 2015). The earliest date for the assemblages containing the asbestos ware in Karelia is 4693 ± 35 BP (ca 3500 cal BC) (Zhulnikov, Tarasov, Kriiska, 2012); the latest date is 3150 ± 100 BP (ca 1400 cal BC) (Zhulnikov, 1999: 77). Accordingly, the industries of the tools of the Russian-Karelian type in Karelia and of the chopping tools in the Upper Volga region were synchronous for a long time. The level of their similarity makes it possible to consider them as varieties of a single tradition. This conclusion can likely be extended to the entire Volosovo industry of chopping tools. For a final conclusion, it is necessary to analyze the materials from other settlements. However, the use of the typologically significant features of the Russian-Karelian type for describing the Volosovo chopping tools from the sites that were left out of the scope of the present study (see the section on historiography) makes it possible to state that this tradition was typical of a significant part of the area of the Volosovo culture.

We may speak of a very large territory where not only exchange, but also production of such tools from different raw materials took place. Now it is impossible to determine the exact boundaries of the area where this tradition existed—they may turn out to be very broad. As in the case of tetrahedral axes, the industries based on the Russian-Karelian model could have appeared in different cultures, which were not necessarily genetically related, but maintained close information exchange.

The presence of a single production tradition at the settlements with asbestos ware in Karelia and the Volosovo sites in the Volga region by no means excludes the exchange of finished products. It is evidenced by the presence of imported tools from Karelia among the materials of the Sakhtysh sites, which were typologically identical to the objects of Sakhtysh production. It should be noted that only one object among all the finds in Karelia can be recognized as imported, most likely originating from the territory of the Volosovo culture. This fluted adze, semi-oval in cross section, is a stray find from the village of Nizhnyaya Salma, which became a part of L.V. Pääkkönen's collection of stray finds of 1899, kept in the Finnish National Board of Antiquities (No. KM 3824-6).

The present study did not intend to trace the origin of the technological tradition behind the production of chopping tools of the Russian-Karelian-Volosovo type or map the entire area of their distribution. The conclusions of this study are limited to the affirmation that this indeed was a single tradition despite the difference in raw materials and various names given to this phenomenon in historiography.

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References

Ailio Ju. 1922

Fragen der Russischen Steinzeit. Helsinki: Suomen Muinaismuistoyhdistys. (Suomen Muinaismuistoyhdistyksen Aikakauskirja; vol. XXIX, pt. 1).

Andrefsky W.Jr. 1998

Lithics: Macroscopic Approaches to Analysis. Cambridge: Cambridge University Press.

Apel J. 2001
Daggers, Knowledge and Power: The Social Aspects of Flint-Dagger Technology in Scandinavia, 2350–1500 cal BC. Uppsala: Dep. of Archaeol. and Ancient History, Uppsala Univ.

Äyräpää A. 1944
Itä-Karjala kivikautisen asekaupan keskustan: Tuloksia Kansallismuseon itäkarjalaisten kokoelmien tutkimuksista. In *Muinaista ja vanhaa Itä-Karjalaa: Tutkielmia Itä-Karjalan esihistoria, kulttuurihistorian ja kansankulttuurin alalta*. Helsinki, pp. 53–73. (Toimittanut Suomen muinaismuistoyhdistys. Korrehtuurivedos).

Bryusov A.Y. 1940
Istoriya drevnei Karelii. Moscow: GIM. (Trudy GIM; iss. IX).

Bryusov A.Y. 1947
Arkheologicheskiye pamyatniki III – I tysyacheletiy do nashei ery v Karelo-Finskoi SSR. In *Arkheologicheskiy sbornik*. Petrozavodsk: Gos. Izd. Karelo-Finskoi SSR, pp. 9–34.

Bryusov A.Y. 1952
Ocherki po istorii plemen evropeiskoi chasti SSSR v neoliticheskuyu epokhu. Moscow: Izd. AN SSSR.

Clark J.G.D. 1952
Prehistoric Europe: The Economic Basis. New York: Philosophical Library

Edenmo R. 2008
Prestigeekonomi under yngre stenåldern: Gåvoutbyten och regionala identiteter i den svenska båtyxekulturen. Uppsala: Dep. of Archaeol. and Ancient History, Uppsala Univ. (Occasional Papers in Archaeology; vol. 43).

Filatova V.F. 1971
Russko-karelskiy tip orudiy v neolite Karelii. *Sovetskaya arkheologiya*. No. 2: 32–38.

Gurina N.N. 1974
K voprosu ob obmene v neoliticheskuyu epokhu. *KSIA*. Iss. 138: Torgovlya i obmen v drevnosti: 12–23.

Hansen P.V., Madsen B. 1983
Flint axe manufacture in the Neolithic: An experimental investigation of a flint axe manufacture site at Hastrup Vaenget, East Zealand. *Journal of Danish Archaeology*, vol. 2: 43–59.

Heikkurinen T. 1980
Itäkarjalaiset tasa- ja kourutaltat. Helsinki: Helsingin yliopiston monistuspalvelu. (Helsingin yliopiston arkeologian laitos: moniste; No. 21).

Inizian M.-L., Reduron-Ballinger M., Roche H., Tixier J. 1999
Technology and Terminology of Knapped Stone Followed by a Multilingual Vocabulary (Arabic, English, French, German, Greek, Italian, Portuguese, Spanish). Nanterre: CREP. (Préhistoire de la Pierre Taillée; vol. 5).

Korolev A.I., Stavitsky V.V. 2006
Primokshaniye v epokhu rannego metalla. Penza: Penz. Gos. Ped. Univ.

Kostyleva E.L., Utkin A.V. 2010
Neo-eneoliticheskiye mogilniki Verkhnego Povolzhiya i Volgo-Okskogo mezhdurechiya: Planigraficheskiye i khronologicheskiye struktury. Moscow: Taus.

Krainov D.A. 1972
Drevneishaya istoriya Volgo-Okskogo mezhdurechiya: Fatiyanovskaya kultura. Moscow: Nauka.

Krainov D.A. 1987
Volosovskaya kultura. Epokha bronzy lesnoi polosy SSSR. Moscow: Nauka, pp. 10–27. (Arkheologiya SSSR).

Kriiska A., Tarasov A. 2011
Wood-chopping tools of Russian-Karelian type from Latvia. In *Arheologija un Etnografija*, No. 25. Riga: pp. 57–72.

Madsen B. 1984
Flint axe manufacture in the Neolithic: Experiments with grinding and polishing of thin-butted axes. *Journal of Danish Archaeology*, vol. 3 (3): 47–62.

Malmer M.P. 1962
Jungneolitische Studien. Lund: C.W.K. Gleerup. (Acta archaeologica Lundensia; vol. 8, No. 2).

Nikitin V.V. 1991
Medno-kamennyi vek Mariyskogo kraya (seredina III – nachalo II tysyacheletiya do n.e.). Yoshkar-Ola: Mar. kn. izd.

Nikitin V.V. 1996
Kamennyi vek Mariyskogo kraya. Yoshkar-Ola: MarNIIYALI (Trudy Mar. arkheol. ekspeditsii; vol. IV).

Nordquist K., Seitsonen O. 2008
Finnish archaeological activities in the present-day Karelian Republic until 1944. *Fennoscandia Archaeologica*, vol. XXV: 27–60.

Olausson D. 2000
Talking axes, social daggers. In *Form, Function and Context: Material Culture Studies in Scandinavian Archaeology*. Lund: Inst. of Archaeol., pp. 121–134.

Pelegrin J.P. 2004
Blade-making techniques from the Old World: Insights and applications to Mesoamerican obsidian lithic technology. In *Mesoamerican Lithic Technology: Experimentation and Interpretation*. Salt Lake City: Univ. of Utah Press, pp. 55–71.

Semenov S.A. 1968
Razvitiye tekhniki v kamennom veke. Leningrad: Nauka.

Stafford M. 1999
From Forager to Farmer in Flint: A Lithic Analysis of the Prehistoric Transition to Agriculture in Southern Scandinavia. Aarhus: Aarhus Univ. Press.

Sundström L. 2003
Det hotade kollektivet: Neolitiseringsprocessen ur ett östmellansvenskt perspektiv. Uppsala: Dep. of Archaeol. and Ancient History, Uppsala Univ.

Sundström L., Apel J. 1998
An Early Neolithic axe production and distribution system within a semi-sedentary farming society in eastern central Sweden, c. 3500 BC. In *Third Flint Alternatives Conference at Uppsala*. Uppsala: Dep. of Archaeol. and Ancient History, Uppsala Univ., pp. 155–192. (Occasional Papers in Archaeology; vol. 16).

Tallgren A.M. 1916
Collection Zaoussaïlov au Museée Historique de Finlande à Helsingfors. Helsingfors: Édité par la Commiss. des coll. Antell.

Tallgren A.M. 1922
Zur Archäologie Eestis. Dorpat: Univ. Dorpat. Bd. I: Vom Anfang der Besiedlung bis etwa 500 n. Chr. (Acta et Commentationes Universitatis Tartuensis (Dorpatensis); vol. III; fasc. 6).

Tarasov A.Y. 2003
Tsentr izgotovleniya kamennykh makroorudiy eneoliticheskogo vremeni na territorii Karelii. *Arkheologicheskiye vesti*, iss. 10: 60–74.

Tarasov A.Y. 2008
Eneoliticheskaya industriya kamennykh makroorudiy Karelii v ryadu evropeiskikh industriy pozdnego kamennogo veka. In *Khronologiya, periodizatsiya i kross-kulturnye svyazi v kamennom veke*, iss. 1. St. Petersburg: Nauka, pp. 190–201.

Tarasov A.Y., Kostyleva E.L. 2015
Rubyashchiye orudiya iz volosovskikh kompleksov sakhtyshskikh stoyanok: Tekhniko-tipologicheskiy i planigraficheskiy analiz. In *Tverskoi arkheologicheskiy sbornik*, iss. 10 (1). Tver: Tver. Gos. Obl. Muzei, pp. 375–406.

Tarasov A.Y., Kriiska A., Kirs Y. 2010
Svidetelstva obmena mezhdu naseleniyem Karelii i Estonii v finalnom kamennom veke: Po rezultatam arkheologicheskogo i petrograficheskogo izucheniya rubyashchikh orudiy russko-karelskogo tipa s territorii Estonii. *Trudy KarNTs RAN*, No. 4 (1): 56–65.

Tarasov A., Stafeev S. 2014
Estimating the scale of stone axe production: A case study from Onega Lake, Russian Karelia. *Journal of Lithic Studies*, vol. 1 (1): 239–261.

Tretyakov V.P. 1990
Volosovskiye plemena v evropeiskoi chasti SSSR v III–II tys. do n.e. Leningrad: Nauka.

Tsvetkova I.K. 1948
Stoyanka Volodary: Po materialam raskopok 1946 g. *KSIIMK*, iss. XX: 3–14.

Tsvetkova I.K. 1953
Volosovskiye neoliticheskiye plemena. In *Arkheologicheskiy sbornik*. Moscow: Gos. izd. kulturno-prosvetitalskoi literatury, pp. 19–52. (Trudy GIM; iss. XXII).

Tsvetkova I.K. 1970
Plemena ryazanskoi kultury. In *Okskiy bassein v epokhu kamnya i bronzy*. Moscow: Sovetskaya Rossiya, pp. 97–153.

Voss M.E. 1952
Drevneishaya istoriya Severa evropeiskoi chasti SSSR. Moscow: Izd. AN SSSR. (MIA; No. 29).

Zhilin M.G., Kostyleva E.L., Utkin A.V., Engovatova A.V. 2002
Mezoliticheskiye kultury Verkhnego Povolzhiya: Po materialam stoyanki Ivanovskoye VII. Moscow: Nauka.

Zhulnikov A.M. 1999
Eneolit Karelii: Pamyatniki s poristoi i asbestovoi keramikoi. Petrozavodsk: IYALI KarNTs RAN.

Zhulnikov A., Tarasov A., Kriiska A. 2012
Discrepancies between conventional and AMS dates of complexes with asbestos and porous ware – probable result of "reservoir effect"? *Fennoscandia Archaeologica*, vol. XXIX: 79–86.

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Geochemical Soil Analysis and Environmental Reconstructions at the Neolithic and Chalcolithic Settlement Kochegarovo-1 in the Forest-Steppe Zone of Western Siberia*

This article outlines the results of the analysis of cultural layers and natural soil horizons at the Neolithic and Chalcolithic settlement Kochegarovo-1, and of the modern soil in its vicinity. The distribution of chemical elements and the associated geochemical ratios in the archaeological profile were compared to the background values. Six chemical elements (phosphorus, potassium, calcium, magnesium, manganese, and strontium) form distinct concentration-zones within the Neolithic and Chalcolithic cultural layers, especially within the latter. The most informative geochemical ratios are CIA (Chemical Index of Alteration), Rb/Sr, Ba/Sr, MnO/Al_2O_3, $(CaO+MgO)/Al_2O_3$, and Zr/TiO_2. They allow us to reconstruct environmental conditions and subsistence activities at the site, which evidently emerged in the Neolithic when the hydrological situation of the region had changed. After the channel of the Miass River had migrated, new areas of land with semi-hydromorphic landscapes were exposed. The seasonal Neolithic camp was located on the river bank. In the Chalcolithic, the Miass River had continued to recede, and new areas of land appeared near the settlement. The environment remained semi-hydromorphic. The peak of subsistence activities, evidenced by maximal settlement area and largest estimated population size, coincided with the Chalcolithic, when occupation became permanent. Indicators of anthropogenic impact are present at all stages of occupation, especially at the Chalcolithic stage. The analysis confirmed that Neolithic and Chalcolithic populations of the region subsisted by hunting, gathering, and fishing.

Keywords: *Cultural layer, soil, chemical elements, geochemical ratio, Neolithic, Chalcolithic, forest-steppe, Western Siberia.*

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Introduction

Pedogenesis plays an important part in the formation of landscapes, and affects the life-sustaining activities of people. In various historic periods, pedogenic processes proceeded differently, which was reflected in the formation of certain soil types. Study of soil formation features in time (correlation of pedogenic processes, their history, and distinct manifestation in profile) is one of the high-priority issues of modern paleogeographic science, in particular, paleopedology. Soil is a conservative element of landscape, which is capable of preserving for a long time information about ancient environmental conditions, in the form of properties and indicators in its profile. At the same time, there are soils that were eliminated from soil formation processes as a result of their overlap by natural or artificial fills. Along with other natural paleoarchives (spores and pollen of plants, phytoliths, paleontological materials), buried soils represent a valuable source of information about ancient environmental conditions, their variation, and their influence on ethnocultural processes. In this regard, study of soils under archaeological sites (cultural layers, burial mounds, fortified structures, transport systems) is of particular importance. Comprehensive studies of sites, started in the 1960s, have resulted in the creation of archaeological soil-science, a new area of interdisciplinary research (Demkin, 1997; Dergacheva, 1997). In the last decade, along with classical soil-archaeological studies, geochemical analysis of soils and cultural layers has been performed, which allows reconstruction of the subsistence activities of ancient populations. Noteworthy is the spatial heterogeneity of archaeological sites in terms of level of knowledge about their geochemical condition. The best-studied region is European Russia (Aleksandrovsky, Aleksandrovskaya, 2009; Bronnikova, Murashova, Yakushev, 2007; Golyeva, 2009; Demkin, 2000; Dolgikh, 2010; Druzhinina, 2012; Kalinin, Alekseev, 2008; Tatyanchenko, Alekseeva, Kalinin, 2013). Such studies in Western Siberia started a short time ago, and they have been sporadic so far (Valdayskikh, 2007; Safarova, Yakimov, 2012).

The purpose of our paper is to establish the regularities of chemical elements' distribution in the soil-archaeological profile of a stratified site in the West Siberian forest-steppe; and to reconstruct the types of subsistence-activity of the ancient population, as well as the soil formation and sedimentation conditions (by the example of the Kochegarovo-1 settlement).

Area, objects, and methods of study

The territory under study is located in the southwestern part of the West Siberian depositional plain within the limits of the forest-steppe natural zone (Fig. 1). The regional climate is continental, and is characterized by an average yearly air-temperature of 1.1 °C and by an amount of precipitation of 360 mm (Kuznetsov, Egorov, 2001: 48).

Objects of the article were the cultural layers and natural soil horizons at the settlement of Kochegarovo-1, and of the modern soil in its vicinities. The archaeological site located on fluvial terrace I of the Miass River is at the boundary between the Mishkinsky and Yurgamyshsky districts of the Kurgan Region, 1 km west of the Kochegarovo village (55°36′N; 64°01′E) (Fig. 2).

About 2000 m^2 of the settlement area, including eight Neolithic and Chalcolithic dwelling structures, have been studied by now. The archaeological collection consists of about 20 thousand stone and pottery items. The Neolithic complex is represented by semi-ovoid vessels with pointed bottoms, and straight or inwardly folded upper edges with bulges on the inner sides. Decoration is applied with incised, retreating-pricked, or stepping comb technique. The main ceramic assemblage stays within the Kozlov-Poludenka tradition. There are also Boborykino vessels: flat-bottomed, profiled, undecorated, or with incised or pricked decoration. The stone toolkit is represented mainly by a blade complex containing traditional tools, including retouched blades, angle burins, notched blades, and points. There are also single geometric microliths, end-scrapers on blades, end-scrapers on flakes, and bifacially worked arrowheads. The Chalcolithic assemblage is characterized by comb, pit-comb, coarse-pricked pottery and a flake-and-blade stone toolkit, which is traditional for this region.

The soil-archaeological method (Demkin, 1997: 37) and X-ray fluorescence spectroscopy using a Spectroscan MAKC-GV spectrometer* served as the basic methods of study. Samples for analysis were taken using a continuous column on 3 cm intervals from the cultural layers and soils of settlement, and from the modern soil.

The age of the cultural layers has been determined by the method of radiocarbon dating, primarily from ceramic materials and coal (Vybornov, Mosin, Epimakhov, 2014; Mosin et al., 2014) (see *Table*)**. Pottery from the Neolithic assemblage (cultural layer 4) yielded twelve dates falling within the period of 5200–

*X-ray fluorescence spectroscopy was carried out at the Soil Geochemistry and Mineralogy Laboratory of the Institute of Physicochemical and Biological Problems in Soil Science of the RAS, Pushchino.

**Analysis was conducted at the radiocarbon laboratory of the Institute of Environmental Geochemistry (NAS of Ukraine, Kiev) (index Ki); Isotope Research Laboratory of the Herzen State Pedagogical University of Russia, St. Petersburg (index SPb); Laboratory of Cenozoic Geology, Paleoclimatology and Mineralogical Indicators of Climate, Institute of Geology and Mineralogy of the SB RAS, Novosibirsk (index SOAN).

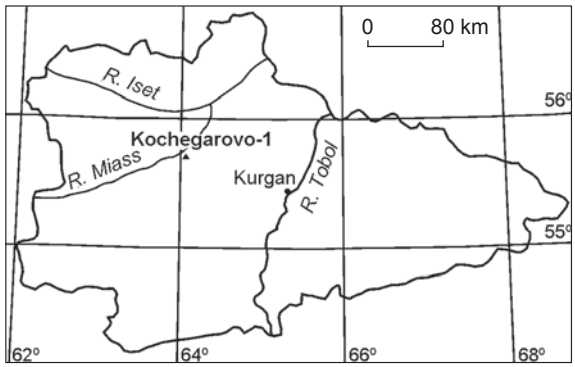

Fig. 1. Location of the Kochegarovo-1 settlement.

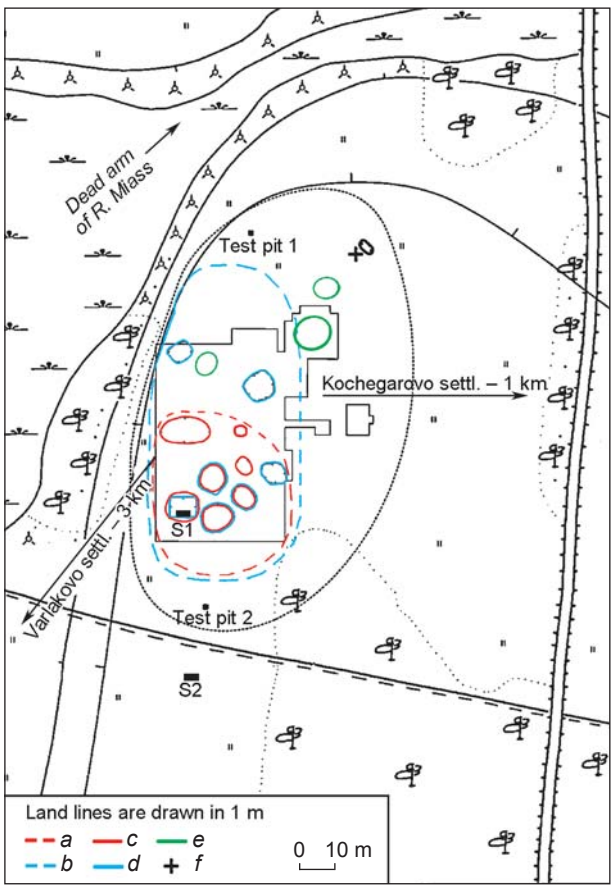

Fig. 2. Diagram of the Kochegarovo-1 settlement.
a – Neolithic settlement boundary; *b* – Chalcolithic settlement boundary; *c* – Neolithic dwelling depressions; *d* – Chalcolithic dwelling depressions; e – two mounds and an above-ground dwelling of the Bronze Age; *f* – zero reference point. S1 – soil-archaeological section; S2 – modern soil section.

3990 BC; Chalcolithic materials (cultural layer 2) gave four dates (three dates from pottery and one (SOAN-7067) from coal from the dwelling floor) within 4350–3350 BC, which is in line with the general chronology of the Neolithic and Chalcolithic of the Urals.

Radiocarbon dates of materials from Kochegarovo-1 settlement

No.	Code	Date	
		^{14}C, BP	Cal. (68.2 %), BC
		Neolithic complex	
		Kozlov tradition	
1	Ki-16646	6050 ± 90	5200–4800
2	Ki-16856	5740 ± 90	4700–4490
3	SPb-1269	5952 ± 100	4964–4723
4	SPb-1272	6073 ± 100	5077–4843
5	SPb-1273	5817 ± 130	4806–4521
6	SPb-1274	5878 ± 120	4856–4591
		Boborykino tradition	
7	Ki-15542	5270 ± 80	4230–3990
8	Ki-16647	5920 ± 90	4940–4700
		Poludenka Comb tradition	
9	Ki-15543	5640 ± 90	4550–4350
10	Ki-15950	5950 ±90	4940–4710
11	Ki-16855	5630 ± 90	4550–4360
12	SPb-1271	5815 ± 150	4841–4494
		Chalcolithic complex	
13	Ki-15544	5220 ± 80	4230–3950
14	Ki-15962	5410 ± 90	4350–4070
15	Ki-16847	4660 ± 90	3630–3350
16	SOAN-7067	5170 ± 95	4230–3800

Morphology of soils and cultural layers

Soil-archaeological section. During the 2012 field season, a soil-archaeological section was established in a wall of a dwelling in the southwestern sector of the excavation area (Fig. 3). Its upper portion is represented by meadow-chernozem soil (Klassifikatsiya…, 1977: 98). The soddy horizon (Asod, 0–20 cm*) is a dark gray sandy clay of fine-crumb structure; friable, moistened; includes grass-roots and insect-holes; the lower boundary is uniform; the transition is noticeable in color. The humus horizon (A1, 20–41 cm) is a dark gray sandy clay of crumb structure; compacted, dry; includes grass-roots and

*Hereinafter, a depth from the present-day surface is specified.

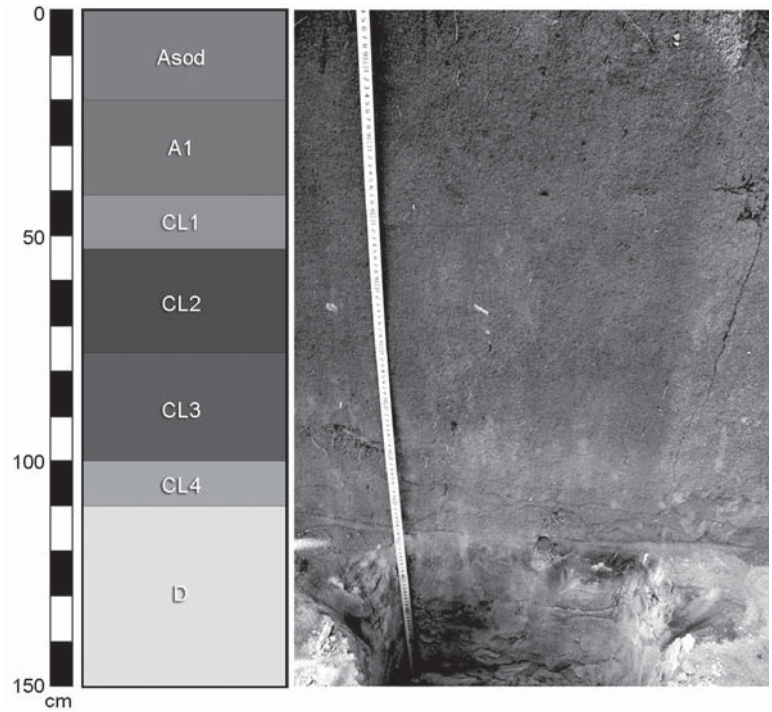

Fig. 3. Structure of soil-archaeological section of the Kochegarovo-1 settlement (see explanations in the text).

insect-holes; the lower boundary is uniform; the transition is noticeable in color and density. A series of cultural layers of various ages lies below. The first cultural layer (CL1, 41–52 cm) is a gray sandy clay of a fine-crumb structure, showing whitishness upon drying; packed, dry; includes grass roots and artifacts (remains of oven, slag); the lower boundary is uniform; the transition is noticeable in color and density; dated back to the Middle Ages. The second cultural layer (CL2, 52–76 cm) is a dark gray sandy clay of a fine-crumb structure, showing whitishness upon drying; very packed, dry; includes grass roots and artifacts (pottery); the lower boundary is uniform; the transition is noticeable in color; attributed to the Chalcolithic. The third cultural layer (CL3, 76–100 cm) is a gray sandy clay with light gray fragments, showing whitishness upon drying; a crumb structure; packed, dry; includes grass roots and burrowing animals' holes; the lower boundary is uniform; the transition is noticeable in color; dated back to the transitional (from the Neolithic to the Chalcolithic) period. The fourth cultural layer (CL4, 100–110 cm) is a gray sandy clay with yellowish-brown fragments; a fine-crumb structure; friable, moistened; the lower boundary is uniform; the transition is clear in color; attributed to the Neolithic period. The underlying layer (D, 110–150 cm) is a yellow-brown coarse-grained alluvial sand; structureless, laminated, friable, moistened. The entire soil-archaeological profile is not reactive with 10 % hydrochloric acid (HCl).

Modern soil. The background section is located 25 m to the south of the archaeological site boundary (see Fig. 2). The modern soil belongs to the meadow-chernozem type (Ibid.) and has the following structure (Fig. 4). The soddy horizon (Asod, 0–18 cm) is a dark gray sandy clay of fine-crumb structure; compacted, dry; includes abundant grass roots; the lower boundary is uniform; the transition is noticeable in color. The humus horizon (A1, 18–70 cm) is a dark gray sandy clay of crumb structure; packed, dry; contains grass roots, burrowing animals' holes, coarse- and medium-grained sand inclusions; the lower boundary is tongued; the transition is clear in color. The humic-illuvial horizon (AB, 70–97 cm) is a light sandy loam of light gray color with dark gray fragments; of blocky structure; packed, moistened; the lower boundary is undulating; the transition is noticeable in color. The illuvial horizon (B, 97–110 cm) is a light sandy loam of yellow-brown color with gray fragments; of blocky structure; compacted, moistened; the lower boundary is uniform; the transition is clear according to reaction with 10 % HCl. The parent rock material (Cca, 110–135 cm) is a yellow-brown coarse-grained alluvial sand; structureless, compacted, moistened; includes carbonate neoformations in the form of white soft and farinaceous spots, grass roots; the lower boundary is uniform; the transition is clear according to extinction of reaction with 10 % HCl. The underlying layer (D, 135–150 cm)

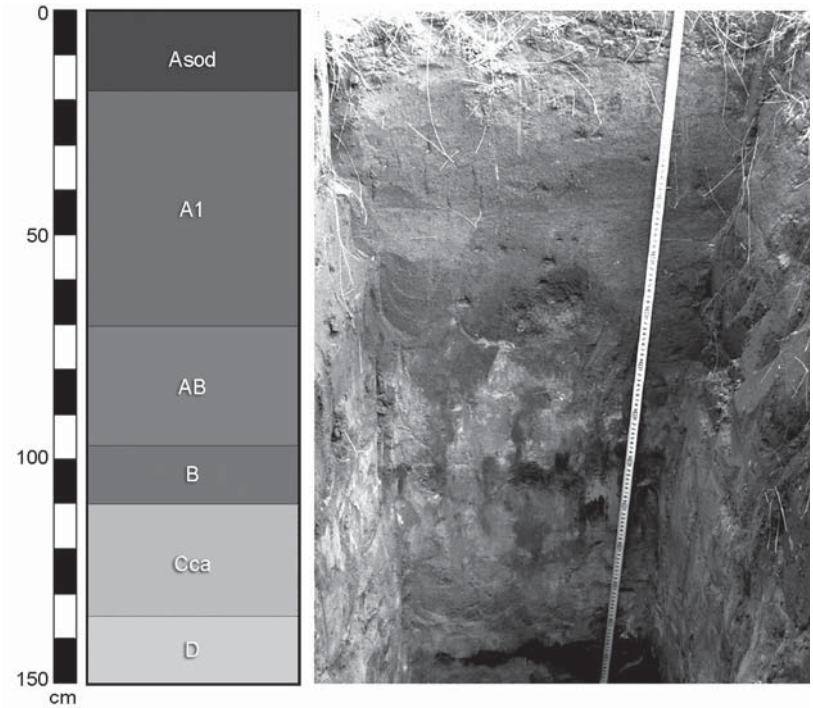

Fig. 4. Structure of modern soil (see explanations in the text).

is a yellow-brown coarse-grained alluvial sand; structureless, laminated, packed, moistened.

A comparative analysis of the morphological structure of soil-archaeological section and modern soil has revealed a number of common features and distinctions that stayed within the range of soil subtype. Soil profiles are characterized by a color-change from dark gray to yellow-brown from top downward, a light texture (sandy loam–light loam), inclusion of plant remains. The studied soils are underlain by sand alluvial deposits. At the same time, the modern soil is distinguished by the existence of reaction with 10 % HCl and by the presence of an independent horizon of carbonate accumulation (Cca) with carbonate neoformations. Besides, this soil is less structured, and its moisture content is recorded starting from a depth of 70 cm, while the moisture content in the soil-archaeological section can be observed starting from 100 cm.

Geochemical condition of soils and cultural layers

Distribution of elements throughout profiles. Data on distribution of 38 elements throughout the studied profiles have been obtained from the results of X-ray fluorescence spectroscopy. A comparative analysis of the phosphorus (P_2O_5), potassium (K_2O), calcium (CaO), magnesium (MgO), manganese (MnO), and strontium (Sr) content in the studied soils and cultural layers has been conducted. These elements are capable of forming stable accumulation zones, i.e. possess a low mobility. Besides, they are predominantly of biogenic origin, which allows them to be used as markers of human subsistence activities.

Phosphorus. This enters soils as animal-droppings, and also with plant remains (Velleste, 1952). Phosphorus is characterized by uniform distribution in the background profile, while its concentration does not exceed 0.2 % (Fig. 5). In the soil-archaeological section, the phosphorus content is 2–2.5 times higher in the cultural layers, where the maximum is recorded in CL3.

Potassium. Its content in the studied soils varies predominantly within 1 % (Fig. 5). The greatest value of approximately 2 % is recorded for the medium portion of the modern soil humus horizon. An insignificant increase in the potassium concentration is noted in the cultural layers.

Calcium. Its distribution in the studied sections is similar (Fig. 5). Notably, at the settlement, the calcium concentration is higher, and areas of its increased content coincide with the cultural layers. A sharp increase in concentration to 2–2.5 times recorded in the carbonated parent rock material of modern soil is related to natural factors.

Magnesium. The dynamics of its distribution are distinguished by a high frequency and amplitude, while the content varies within 1 % (Fig. 6). In general, the magnesium content in the soil-archaeological profile

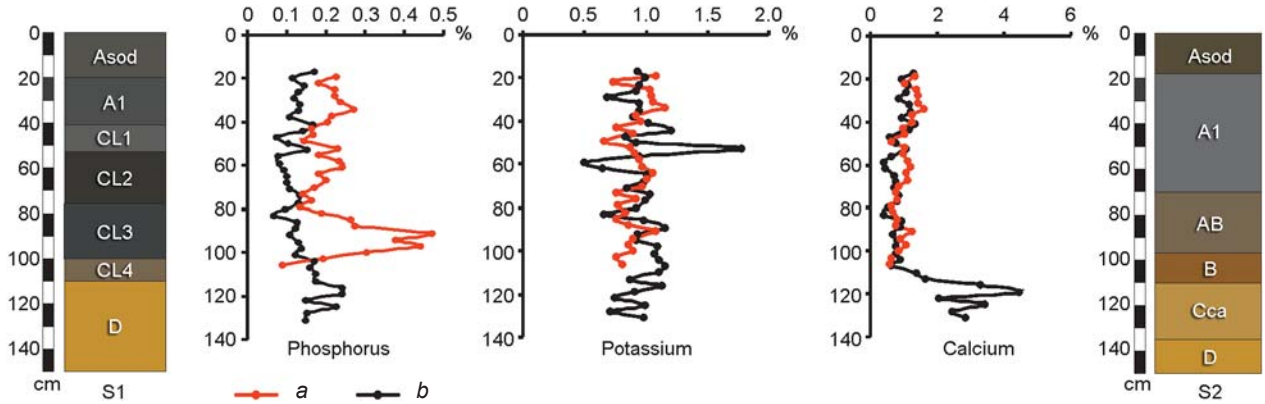

Fig. 5. Distribution of phosphorus, potassium, and calcium in the soil-archaeological *(a)* and background *(b)* profiles (S1 is the soil-archaeological section, S2 is the modern soil section).

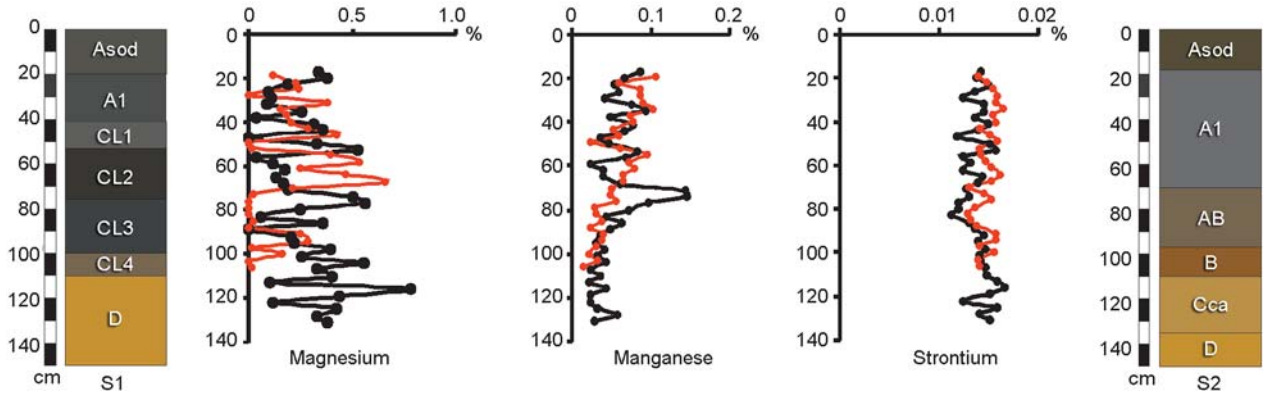

Fig. 6. Distribution of magnesium, manganese, and strontium in the soil-archaeological and background profiles. Legend same as on Fig. 5.

exceeds that in the background soil by 0.1–0.2 %, and the concentration zones are confined to the cultural layers. The greatest content of this element is recorded in the parent rock and makes up about 1 %.

Manganese. The tendency of its distribution in the studied profiles consists in a gradual decrease of its concentration with depth (Fig. 6). In general, the manganese content is somewhat higher at the settlement, and varies within 0.1 %. At the same time, its maximal amount is noted in the background soil humus horizon, where it does not exceed 0.2 %.

Strontium. The cultural layers of settlement tend to have an increased (to 1.5 times) concentration of strontium, as compared to that in the background soil, however, no more than 0.02 % (Fig. 6).

Thus, cultural layers represent the accumulation zones of the described elements, and are able to preserve them for a prolonged time and to maintain their distribution throughout the profile. The data on the structure of cultural layers, the content and the distribution of chemical elements therein are indicative of subsistence activities at the Kochegarovo-1 settlement, which continued throughout all occupation stages, but were most intense in the Chalcolithic.

Geochemical ratios and soil formation conditions. The methodological basis of geochemical ratios allows the reconstruction of soil formation and sedimentation conditions. Such research is novel for the forest-steppe zone of Western Siberia. There are 14 known geochemical ratios that are used in paleogeography (Kalinin, Alekseev, Savko, 2009: 7). Calculations for all indicators have demonstrated that six of them are most promising for paleoecological studies of the Kochegarovo-1 settlement and its vicinities.

$CIA = [Al_2O_3/(Al_2O_3 + CaO + Na_2O + K_2O)] \times 100$. This indicator represents the relationship between primary and secondary minerals (Nesbitt, Young, 1982). In the soil-archaeological section, its dynamics are distinguished by small fluctuations within 65–75 %, and in all cultural layers an increase by 5–10 % as compared to other parts of profile is recorded (Fig. 7). In the modern soil, the CIA values are generally higher (75–80 %), however, there are zones (at a depth of 50–60 and 110–120 cm) with lower values (40–50 %).

Rb/Sr. This ratio demonstrates a varying resistance to weathering of micas and potassium feldspars (PFS) associated with rubidium, and carbonates associated with strontium (Gallet, Bor-ming, Masayuki, 1996). At the settlement, this indicator reduces from 0.7 to 0.2 c.u. with depth (Fig. 7). Also, its sharp decrease to 0.2 c.u. in CL1, and increase to 0.6 c.u. in the underlying CL2 is observed. In the background soil, the pattern of ratio distribution throughout the profile is uniform, but characterizes by greater changes of value (from 0.2 to 0.9 c.u.), and the maximal value is recorded at a depth of 70–80 cm.

Rb/Sr. This indicator characterizes hydrothermal conditions of sedimentation, in particular, the desalination process (Elizarova, 2006; Retallack, 2003). Barium is associated with PFS and is removed from soil weaker than strontium, which is associated with carbonates (Perelman, 1989: 59). The dynamics of the ratio distribution in the soil-archaeological section show high frequency and variations in the range of 1–3 c.u. (Fig. 7). Notably, increased values are observed in cultural layers 2–4 and, conversely, minimization is observed in CL3. The modern soil is characterized by a similar distribution of ratio throughout the profile, where the maximum is recorded at a depth of 50–60 cm, and the minimum is 10 cm lower.

MnO/Al_2O_3. This indicator gives an idea of the level of biological activity and productivity (Vlag, Kruiver, Dekkers, 2004). At the settlement, this indicator gradually reduces with depth (Fig. 8). Its sharp decrease to the minimal value (less than 0.01 c.u.) is recorded in CL1. In other cultural layers, the ratio values are increased. Wide indicator fluctuations (from 0.01 to 0.04 c.u.) are noted in the modern soil profile, wherein the maximum is observed at a depth of 60–80 cm.

$(CaO + MgO)/Al_2O_3$. This ratio represents accumulation of soil calcite and dolomite (Retallack, 2003). The indicator gradually reduces down the soil-archaeological profile (Fig. 8). Its increase and decrease intervals are noted in CL2 and CL3, while a continuous decrease and a continuous increase are recorded in CL1 and CL4, respectively. The ratio value varies within the range of 0.2–0.4 c.u. A drastic change in its dynamics is observed outside of the settlement. The maximal value (1 c.u.) is recorded in the lower profile-part, and above the level of 100 cm, ratio values do not exceed 0.3 c.u.

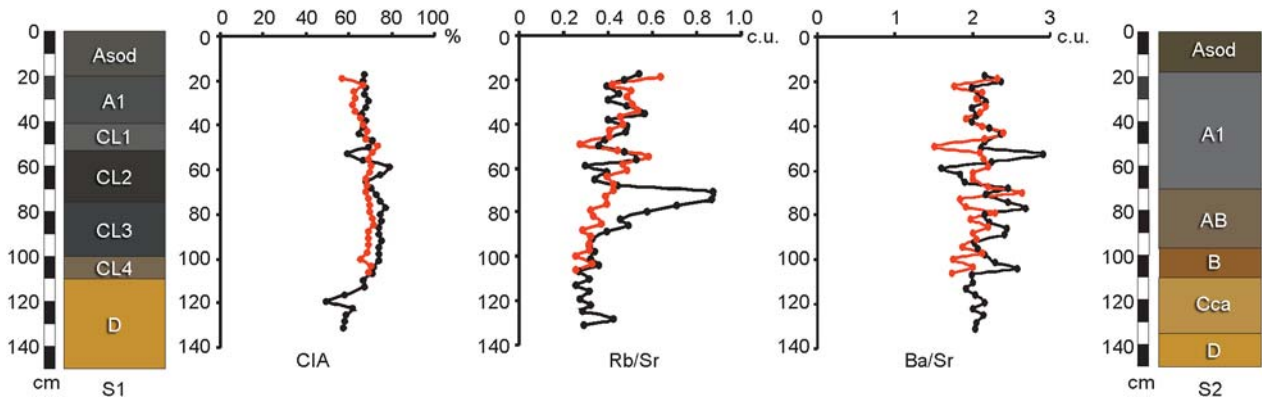

Fig. 7. Dynamics of the CIA, Rb/Sr, Ba/Sr geochemical ratios in the soil-archaeological and background profiles.
Legend same as on Fig. 5.

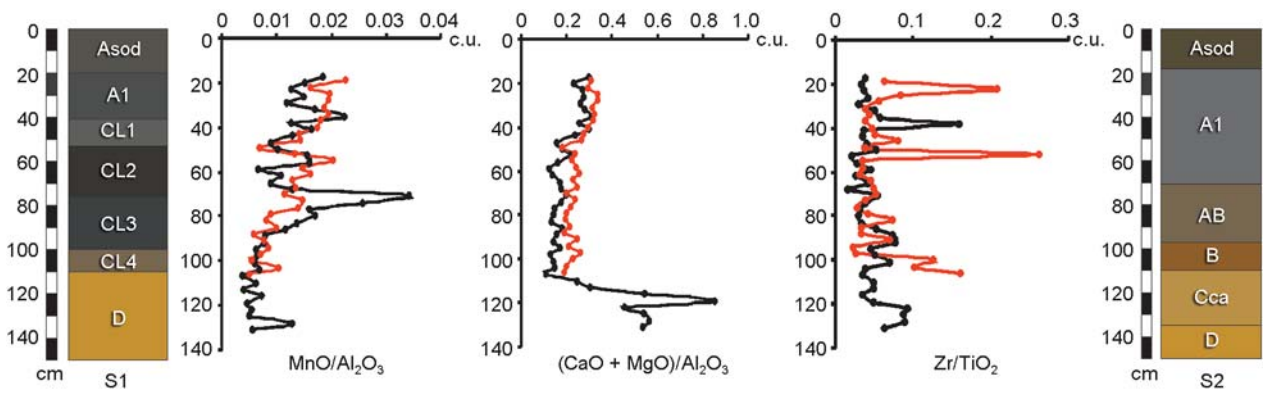

Fig. 8. Dynamics of the MnO/Al_2O_3, $(CaO + MgO)/Al_2O_3$, Zr/TiO_2 geochemical ratios in the soil-archaeological and background profiles.
Legend same as on Fig. 5.

Zr/TiO$_2$. It allows to evaluate the degree of material's uniformity (Bushinsky, 1963; Schilman et al., 2001). At the settlement, this ratio is characterized by a drastic change in values from minimum (0.01 c.u.) to maximum (0.3 c.u.), wherein three peaks are recorded: in CL4, in the upper portion of CL2, and in horizon A1 (Fig. 8). The modern soil is distinguished by a lower variability of this indicator, which does not exceed 0.2 c.u.

Distribution of geochemical ratios in the soil-archaeological section and a comparative analysis with their dynamics in the modern soil enabled a number of features to be established. Increased values of all indicators (especially in CL2) are observed in the Neolithic and Chalcolithic cultural layers. At the same time, in CL2 and CL3, zones of lower ratios are recorded, which may be related to intense subsistence activities of the population in these periods. Of special note is CL1, where low values of indicators are observed. This is probably due to a great human-induced transformation of the cultural layer's material. The modern soil is characterized by high frequency and amplitude of variations in geochemical ratios, and often demonstrates the general trend of their distribution in the soil-archaeological profile.

Reconstruction of the habitat of ancient population

The area of study was first peopled by prehistoric humans at the turn of the Early Neolithic and the Late Neolithic, which coincided with a change in the hydrological situation. During this time, a partial drying of the territory took place, semi-hydromorphic environmental conditions became established, and soil formation processes started. In the Neolithic, the settlement was located on a cape of the Miass River, and probably had a seasonal character, as it was occasionally flooded. Analysis of the cultural layer attributed to this period allows the conclusion that the first people settled down on the river beach (all Early Neolithic artifacts were found in the underlying layer of an alluvial sand), on the bank of the ancient channel of the Miass River (the boundary of iron-rich hydrogenous sands is recorded 5 km away from the settlement, in a northwestern direction). After the territory had dried, the suffosion process showed itself in the formation of kettle depressions, which were used by the ancient population to build several dwellings (this is evidenced by subsidence of the underlying layer (archaeological native soil) with overlying horizons and cultural layers). Anthropogenic impact in the Neolithic was minor, since signs of ancient pedogenesis and sedimentation can be distinctly seen in the cultural layer.

In the Chalcolithic, the Miass River ultimately receded, and new areas of land adjacent to the Neolithic settlement's boundaries dried out. The environmental conditions of that time were characterized by an increase in continentality. Semi-hydromorphic environmental conditions were preserved. The settlement area increased and reached its peak. The thickness of cultural layers and their anthropogenic transformation are indicative of prolonged and intense subsistence activities in this period. The size and density of Chalcolithic population were at their maximum for all the time of settlement occupation. It should be noted that at the turn of the Neolithic and the Chalcolithic, one prolonged interruption in the functioning of the settlement took place, which is evidenced by a drastic difference between contemporaneous cultural layers (CL2 and CL3). By the end of Chalcolithic, the environmental conditions typical of river terraces had been established, which was accompanied by formation of transitional soil types—in particular, meadow-chernozem ones.

The final stage of the settlement's existence is dated back to the Middle Ages. At that time, its occupation was short-term. The cultural layer is severely transformed by the remains of oven and combustion products (slag, coal). After the ancient population had left the settlement, the modern soil formation process of meadow-chernozem type started, and the medieval cultural layer (CL1) took on the role of the parent rock material.

Conclusions

The conducted comprehensive geochemical study of the cultural layers of the Kochegarovo-1 stratified settlement and of modern soil in its vicinity has made it possible to reveal a number of regularities in the intraprofile distribution of elements and calculated geochemical ratios. In addition, paleoecological reconstruction of the subsistence activities and habitat of population in the Neolithic and the Chalcolithic has been performed.

Six chemical elements (phosphorus, potassium, calcium, magnesium, manganese, and strontium) have been identified, which can serve as the markers for reconstruction of the subsistence activities of an ancient population. For the first time in this area, the geochemical ratios were used, allowing reconstruction of soil formation and sedimentation. It has been established that the most informative geochemical ratios are CIA, Rb/Sr, Ba/Sr, MnO/Al_2O_3, $(CaO + MgO)/Al_2O_3$, and Zr/TiO_2.

In the Early Neolithic period, after the Miass River channel had migrated, new areas of land were exposed, and semi-hydromorphic environmental conditions became established. In one of the dried areas, the Kochegarovo-1 settlement emerged, which was located on the river's bank, in the immediate vicinity of the river, and was probably seasonal. According to the results of

geochemical studies and archaeological materials, it has been established that the Neolithic population subsisted mainly by hunting, fishing, and gathering.

Anthropogenic impact was low, as evidenced by the structure of the cultural layer and its chemical composition. At the turn of the Neolithic and the Chalcolithic, at least one prolonged interruption took place in the functioning of the settlement.

In the Chalcolithic, owing to the further recession of the Miass River, the territory adjacent to the settlement dried. The environment remained semi-hydromorphic; however, by the end of the period, it changed to conditions typical of river terraces. The second stage of functioning of the settlement pertains to this period. It was inhabited during the longest season of the year, or throughout the year. The main subsistence activities of the population remained hunting and fishing, as evidenced by the recovered bones of such animals as bear, horse, elk, red deer, roe deer, badger, marten, and otter*, as well as by fish bones found on the floor of a Chalcolithic half-dugout dwelling. In addition, this is evidenced by analysis of the distribution of biogenic chemical elements in the soil-archaeological profile. Anthropogenic impact on the cultural layers was at its maximum in this period, as the layers are severely transformed, and their material is reworked.

The concluding stage of the settlement's functioning is attributed to the Middle Ages. It is characterized by short duration and severe transformation of the cultural layer.

It should be specially noted that the studied objects were distinguished by a light texture. They show high responsiveness to varying environmental and anthropogenic conditions, and also poor preservation of materials. Nevertheless, the distribution and content of chemical elements, as well as the geochemical ratios in the cultural layers of various ages, have demonstrated the high potential of this method for paleoecological reconstructions at archaeological sites of the forest-steppe zone of Western Siberia.

References

Aleksandrovsky A.L., Aleksandrovskaya E.I. 2009
Rezultaty pochvenno-geokhimicheskikh issledovaniy na raskopkakh Romanova Dvora. In *Arkheologiya Romanova dvora: Predystoriya i istoriya tsentra Moskvy v XII–XIX vekakh: Materialy okhrannykh arkheologicheskikh issledovaniy*, vol. 12. Moscow: IA RAN, pp. 176–195.

Bronnikova M.A., Murasheva V.V., Yakushev A.I. 2007
Pervye dannye po prostranstvennoi neodnorodnosti elementnogo sostava kulturnogo sloya Gnezdovskogo poseleniya. In *Gnezdovo: Rezultaty kompleksnykh issledovaniy pamyatnika*. Moscow: Alfaret, pp. 145–149.

Bushinsky G.I. 1963
Titan v osadochnom protsesse. *Litologiya i poleznye iskopaemye*, No. 2: 7–14.

Demkin V.A. 1997
Paleopochvovedeniye i arkheologiya: Integratsiya v izuchenii istorii prirody i obshchestva. Pushchino: ONTI PNC RAN.

Demkin V.A. 2000
Ispolzovaniye fosfatnogo metoda dlya rekonstruktsii zaupokoinoi pishchi v glinyanykh sosudakh iz kurgannykh zakhoroneniy stepnoi zony. In *Sezonnyi ekonomicheskiy tsikl naseleniya Severo-Zapadnogo Prikaspiya v bronzovom veke*. Moscow: GIM, pp. 100–107. (Trudy GIM; iss. 120).

Dergacheva M.I. 1997
Arkheologicheskoye pochvovedeniye. Novosibirsk: Izd. SO RAN.

Dolgikh A.V. 2010
Formirovaniye pedolitosedimentov pochvenno-geokhimicheskoi sredy drevnikh gorodov Evropeiskoi Rossii. Cand. Sc. (Geography) Dissertation. Moscow.

Druzhinina O.A. 2012
Rezultaty geokhimicheskikh issledovaniy kulturnogo sloya arkheologicheskogo pamyatnika Ryadino-5. *Vestnik Baltiyskogo federalnogo universiteta im. I. Kanta*, iss. 1: 29–33.

Elizarova T.N. 2006
Vliyaniye smeny usloviy lito- i pedogeneza v verkhnem pleistotsene i golotsene na svoistva i evolyutsiyu osnovnykh tipov pochv i pochvoobrazuyushchikh porod ravnin yuga Sibiri. In *Pochva kak svyazuyushcheye zveno funktsionirovaniya prirodnykh i antropogenno-preobrazovannykh ekosistem: Materialy II Mezhdunar. nauch.-prakt. konf.* Irkutsk: pp. 85–87.

Gallet S., Bor-ming J., Masayuki T. 1996
Geochemical characterization of the Luochuan loess-paleosol sequence, China, and paleoclimatic implications. *Chemical Geology*, vol. 133: 67–88.

Golyeva A.A. 2009
Valovyi fosfor kak indikator hozyaistvennoi deyatelnosti drevnkih i srednevekovykh obshchestv. In *Rol estestvennonauchnykh metodov v arkheologicheskikh issledovaniyakh*. Barnaul: Izd. Alt. Gos. Univ., pp. 56–59.

Kalinin P.I., Alekseev A.O. 2008
Geokhimicheskiye kharakteristiki pogrebennykh golotsenovykh pochv stepei Privolzhskoi vozvyshennosti. *Vestnik Voronezhskogo gosudarstvennogo universiteta*. Ser.: Geografiya. Geoekologiya, iss. 1: 9–15.

Kalinin P.I., Alekseev A.O., Savko A.D. 2009
Lessy, paleopochvy i paleogeografiya kvartera yugo-vostoka Russkoi ravniny. Voronezh: Voronezh. Gos. Univ. (Trudy Nauchno-issledovatelskogo instituta geologii Voronezhskogo gosudarstvennogo universiteta; iss. 56).

Klassifikatsiya i diagnostika pochv SSSR. 1977
Moscow: Kolos.

Kuznetsov P.I., Egorov V.P. 2001
Nauchnye osnovy ekologizatsii zemledeliya Kurganskoi oblasti: Uchebnoye posobiye. Kurgan: Zauralye.

Mosin V.S., Epimakhov A.V., Vybornov A.A., Korolev A.I. 2014
Chronology of the Chalcolithic and the Early Bronze Age in the Urals. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 42 (4): 30–42.

*Determination of the animal bones has been made at the Laboratory of Paleoecology of the Institute of Plant and Animal Ecology, Ural Branch of RAS, Yekaterinburg.

Nesbitt H.W., Young G.M. 1982
Early Proterozoic climates and plate motions inferred from major element chemistry of lutites. *Nature*, vol. 299: 1523–1534.

Perelman A.I. 1989
Geokhimiya. Moscow: Vyssh. shk.

Retallack G.J. 2003
Soils and global change in the carbon cycle over geological time. *Treatise on Geochemistry*, vol. 5: 581–605.

Safarova L.R., Yakimov A.S. 2012
Raspredeleniye mikroelementov po profilyam sovremennykh i pogrebennykh pochv arkheologicheskikh pamyatnikov yuga Zapadnoi Sibiri (na primere poseleniya Mergen 6). In *Geokhimiya landshaftov i geografiya pochv (k 100-letiyu M.A. Glazovskoi): Dokl. Vseros. nauch. konf*. Moscow: Izd. geogr. fak. Mosk. Gos. Univ., pp. 276–278.

Schilman B., Bar-Matthews M., Almogi-Labin A., Luz B. 2001
Global climate instability reflected by Eastern Mediterranen marine records during the late Holocene. *Palaeogeography, Palaeoclimatology, Palaeoecology*, vol. 176: 157–176.

Tatyanchenko T.V., Alekseeva T.V., Kalinin P.I. 2013
Mineralogicheskiy i khimicheskiy sostavy raznovozrastnykh podkurgannykh paleopochv Yuzhnykh Ergenei i ikh paleoklimaticheskaya interpretatsiya. *Pochvovedeniye*, No. 4: 379–392.

Valdayskikh V.V. 2007
Ekologicheskiye osobennosti formirovaniya pochv na mestakh drevnikh antropogennykh narushenii (na primere lesostepnoi zony Zapadnoi Sibiri). Cand. Sc. (Biology) Dissertation. Yekaterinburg.

Velleste P. 1952
Analiz fosfatnykh soedineniy pochvy dlya ustanovleniya mest drevnikh poseleniy. *KSIIMK*, iss. 42: 135–140.

Vlag P.A., Kruiver P.P., Dekkers M.J. 2004
Evaluating climate change by multivariate statistical techniques on magnetic and chemical properties of marine sediments (Azores region). *Palaeogeography, Palaeoclimatology, Palaeoecology*, vol. 212: 23–44.

Vybornov A.A., Mosin V.S., Epimakhov A.V. 2014
Chronology of the Uralian Neolithic. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 42 (1): 33–48.

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Issues in the Calendar Chronology of the Seima-Turbino Transcultural Phenomenon

The Seima-Turbino (ST) transcultural phenomenon was unique in the Eurasian Bronze Age. Its very rare but highly specific memorial sanctuaries and randomly found bronze artifacts are scattered across a gently sloping arc spanning territories from northern China to the Baltic and the Lower Dniester—nearly 4 mln km^2. However, until recently, no reliable radiocarbon database relating to ST has been available. The situation changed after the discovery of the Shaytanka memorial sanctuary in the Middle Urals, and its detailed excavation. As a result, a considerable series of radiocarbon dates has appeared, enabling us to arrive at a more reliable pattern of absolute chronology for ST in a vast territory from western Siberia (Sopka, Tartas) to the Upper Volga basin (Yurino). The earlier dates in the eastern part of the ST distribution area uphold the theory concerning the ultimate source of a long-range east-to-west migration. Important new features in the overall pattern of dates on the vast territories of the Eurasian forest and forest-steppe zones make it possible to reconstruct the nature of the contacts between the ST people and representatives of other cultures—especially those of the Abashevo-Sintashta-Petrovka community advancing in a west-to-east direction.

Keywords: *Seima-Turbino transcultural phenomenon, Eurasia, Bronze Age, radiocarbon chronology.*

Introduction

For over a century, archaeologists (experts in the Bronze Age) have been trying to learn the secrets of the Seima-Turbino (ST) transcultural phenomenon, unique in Eurasia. A start was made in 1912 when a set of relics was found at Seima dune at the confluence of the Oka and Volga rivers; and at approximately the same time, 1500 kilometers to the southwest of Seima, the Borodino hoard was discovered, immediately becoming famous. Soon these discoveries attracted the attention of V.A. Gorodtsov (1914, 1915) and A.M. Tallgren (1915); and the works of these researchers provided a good basis for the debates, lasting several decades, about this interesting phenomenon. At that time, this phenomenon was referred to as the Seima culture, following Gorodtsov's terminology.

Initially, research focused on three main topics: 1) the origins of the Seima-Turbino artifacts; 2) the interrelations of ST with other Eurasian cultures; and 3) ST's relative and absolute chronology. However, the boundaries between these topics were not particularly strict. They concerned mostly the issues of the interactions between ST and other Eurasian cultures, and the former's relative and absolute chronology. Since the initial stages of research, scholars had been faced with the necessity of

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explaining the existence of the vast areas separating Seima and Borodino that lacked any similar archaeological evidence. In 1924–1927, A.V. Schmidt (1927) excavated the Turbino site, the discovery of which expanded considerably the area of distribution of this archaeological trend in the northeastern direction. Since that time, this phenomenon has acquired the name, common nowadays, of Seima-Turbino.

The situation became more complicated after the findings by V.I. Matyushchenko. In 1954–1958, he excavated the remarkable site of Samus IV, where he found numerous clay molds for casting celts and spearheads similar to the Seima-Turbino artifacts (Matyushchenko, 1973: 24–30). In 1966–1969, he investigated a site in the vicinity of the village of Rostovka, on the Om River, close to its confluence with the Irtysh (Matyushchenko, 1975; Matyushchenko, Sinitsyna, 1988: 3). Seima, Turbino, and Rostovka were generally referred to as cemeteries. In those decades, it was usually required, at least in the Soviet archaeology, to establish a local reference culture for each such cemetery. The list of reference cultures, which was compiled at the initial stage of studies, is of considerable interest, owing to the great diversity of its components. We shall provide only a short list of randomly selected reference cultures: Fatyanovo culture (Tallgren, 1920: 1–23), established as reference for Seima; the Neolithic cultural community of the Kama basin (like the Astrakhantsevsky burial ground), which was attributed by O.N. Bader to Turbino (1961, 1964); the Chirki-Seima culture (Khalikov, 1969: 200– 201); the Samus cultural community (Kosarev, 1981: 86–105); and the whole unit of the Ural-Siberian cultural-historical province (Matyushchenko, 1973: 120–125), etc.

Traditional sources of chronological attribution: Marija Gimbutas and her followers

The issue of the ST chronology was initially raised by Gorodtsov, who contended that the Seima culture should be attributed to the 14th–13th century BC, though he did not provide any reliable grounds for this. There were many attempts to establish absolute dates for ST, both well-based and baseless, which are not important enough to be listed here. We shall focus on two particular viewpoints on this issue. Firstly, there is a paper by Marija Gimbutas (1957), wherein she proposed three possible connections providing grounds for assessing the absolute age of the Seima-Turbino relics. The first is the Balkan connection based on the parallels in metal ornamentation from Mycenaean shaft graves; the second is the Caucasian connection; and the third is the Chinese connection based mostly on the materials from Anyang cemetery. Gimbutas regarded the Borodino hoard as a reference collection for estimating the age of the whole ST unit, having attributed it to 1450–1350 BC. Seima bronze ware was assigned by her to the 15th–13th centuries BC, but not later than the 13th century, which was the period of abrupt changes in the ST area, to which it was already known that the Seima ware could not have pertained.

Another attempt to assess the ST calendar's age may be summarized briefly as follows. In 1968, V.A. Safronov (1968) and V.S. Bochkarev (1968) published a paper in the collection of articles on the issues of archaeology edited by L.S. Klein. The two authors attempted, although contradicting each other, to establish a well-grounded absolute date for the Borodino hoard; yet in reality they referred to the chronology of the whole ST unit. They followed the methodological constructions proposed by Gimbutas; radiocarbon dates were not mentioned in the articles (notably, at that time, no ^{14}C-dates for Seima-Turbino relics were yet available). It is also noteworthy that Bochkarev has completely changed his article, initially prepared for publication, because of his disagreement with Safronov's viewpoint. However, new arguments did not ensure the success of the paper. But neither was Safronov's paper convincing. This author followed practically all recommendations proposed by Gimbutas a decade before, yet he attributed the Borodino hoard to the 13th century BC.

The chronological intervals of ST proposed by various researchers varied over a range of a thousand years: from the 17th to the 8th century BC. This diversity of age estimates is striking, not only because of the astonishing range and difference of dates, but especially because of the unreliability of the grounds supporting the attempts to identify the indicators of the absolute age of the Seima-Turbino relics, ranging from the Balkan-Mycenaean or Caucasian to the ancient Chinese parallels. The Borodino hoard was often claimed as a reference point in these determinations. Anyway, the approach to correlating some ornamental motifs on the Borodino hoard artifacts with those on the objects from the Mycenaeaen shaft graves, and to basing thereon some far-reaching estimations of the absolute chronology of the whole enormous corpus of ST relics, seems rather strange today—all the more so as the hoard was recovered in the extreme southwestern point of the vast area of Seima-Turbino distribution (Fig. 1).

ST prior to radiocarbon dates: the most important findings

In the late 1980s and early 1990s, two important works were published, summarizing the results of research carried out during the previous seven decades. These include a book on the ancient metallurgy of Northern Eurasia (the Seima-Turbino phenomenon) (Chernykh, Kuzminykh, 1989), focusing on the most important

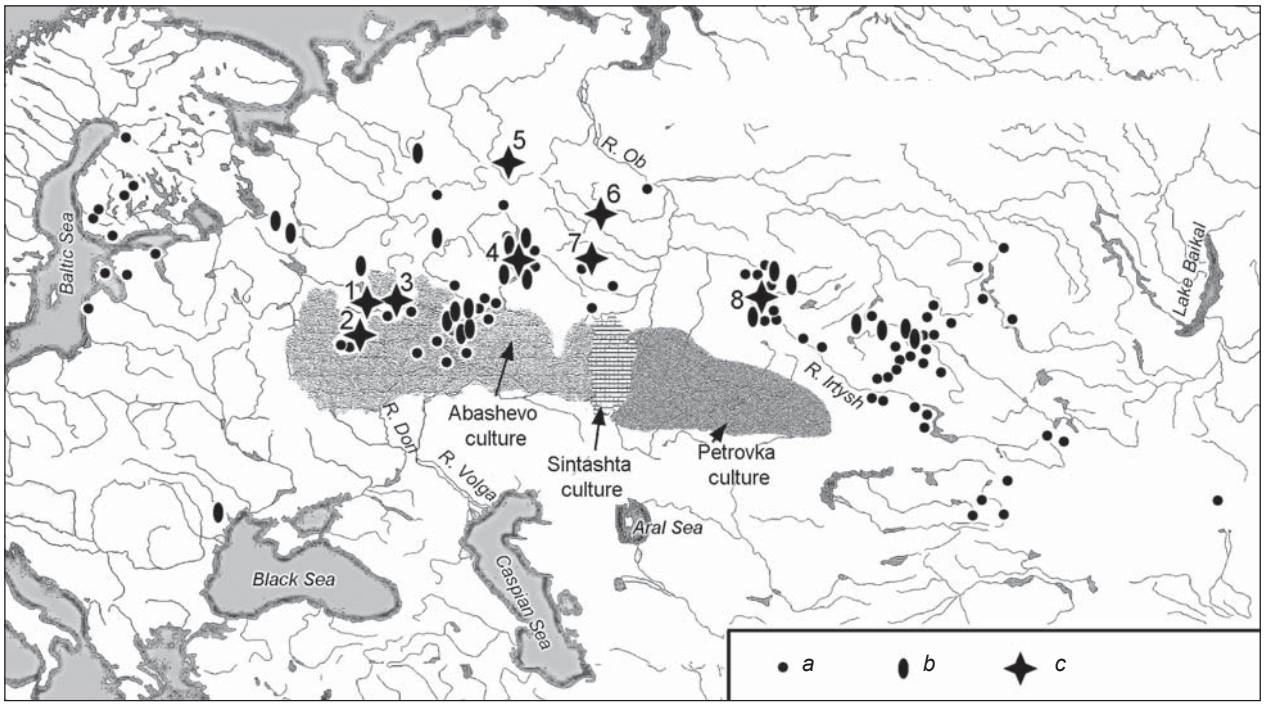

Fig. 1. Map showing the locations of the most important sites and solitary copper/bronze artifacts of the Seima-Turbino transcultural phenomenon, as well as the areas of the Abashevo, Sintashta, and Petrovka cultures.
a – isolated accidental finds; *b* – isolated finds in foreign cultural contexts; *c* – memorial sanctuaries and cemeteries:
1 – Seima, 2 – Reshnoye, 3 – Yurino, 4 – Tubrino, 5 – Kaninskaya Cave, 6 – Satyga, 7 – Shaytanka, 8 – Rostovka.

issues of formation and history of this transcultural phenomenon; and three years later, a monograph entitled *Ancient Metallurgy in the USSR: The Early Metal Age*, published by Cambridge University Press. The latter book focused on more general topics, though it included a separate chapter dedicated to ST (Chernykh, 1992: 215–234).

The novelty of the Russian version of this book was represented by a comprehensive database describing practically all metal and non-metal artifacts available at that time. The book provided the fullest possible information on the morphological-typological features and chemical composition of copper and bronze artifacts. It also included a set of maps showing the distribution of the ST metal ware. References were made to stone tools, ceramics, and jade artifacts. The main area of distribution of ST materials was rather well established. The spatial distribution area of ST was really huge, and occupied not less than 4 mln km^2 in Eurasia (Chernykh, 2013: 267–287, fig. 15.1) (Fig. 1).

The authors of the book did not agree with the various previously published hypotheses correlating the so-called cemeteries with one or another archaeological culture/community. They admitted only the evidence of possible contacts, both long- and short-term, of the Seima-Turbino migrants with representatives of numerous cultures in their 1000-km long journey from the east to the west. Exactly because of this, the term of Seima-Turbino transcultural phenomenon was proposed. This rather vague cultural context contrasted with the specific but undoubtedly close (though hardly friendly) contacts of the Seima-Turbino migrants with the tribes of Abashevo (Abashevo-Sintashta) community advancing in the west-east direction. Nearly every large Seima-Turbino site has revealed quite obvious inclusions of the typical Abashevo-Sintashta materials. The assessments of the absolute chronology showed no significant changes. For instance, the authors of the book dated the Borodino hoard to the 16th, or no younger than the 15th, century BC, like other more eastern archaeological materials of this kind (Chernykh, Kuzminykh, 1989: 259–261).

Notably, during the two decades after the publication of the book on the ancient metallurgy of Northern Eurasia in 1989*, the topic of the Seima-Turbino phenomenon became less popular, and the abovementioned issues were no longer debated in the literature. The reason for decreasing interest in ST apparently lay in the facts that, firstly, no new spectacular Seima-Turbino sites had been discovered; and secondly, traditional methods of interpretation of archaeological materials had been

*In 2010, the book was translated into Chinese and published in China in the series "Turfan Studies".

exhausted, and their effects had become negligible. The latter reason especially concerned the chronological aspect of research.

Shaytanka: discovery of the site, and new developments in the study of the Seima-Turbino phenomenon

At last, the long-awaited discovery has been made; in 2009, there appeared a publication announcing the new important site of Shaytanskoye Ozero II in the Middle Urals, with clear Seima-Turbino features (Serikov et al., 2009). Shaytanka (the name of the site was shortened for convenience) has immediately attracted the attention of archaeologists because of its specific features (Fig. 2). The geographical position of Shaytanka is in the center of the vast ST distribution area; and it is located very close to the nominal border between Asia and Europe (see Fig. 1). Also, there is one more important feature in the location of the site. It is situated in the area where the upper reaches of the Neiva and Revda rivers come very close to one another. These rivers belong to different drainage areas: the Neiva runs eastwards, joining the Tura and further the Ob, while the Revda runs westwards to the Kama. The distance from the confluence of the Revda with the Chusovaya to the Chusovaya's joining the Kama does not exceed 500 km. Exactly in front of the confluence of the Chusovaya and the Kama rivers was the location of Turbino, one of the most important ST sites. This means that Shaytanka marks an impressive point in the migration route of the Seima-Turbino tribes moving from east to west along the rivers, from the Ob basin to the Volga-Kama region.

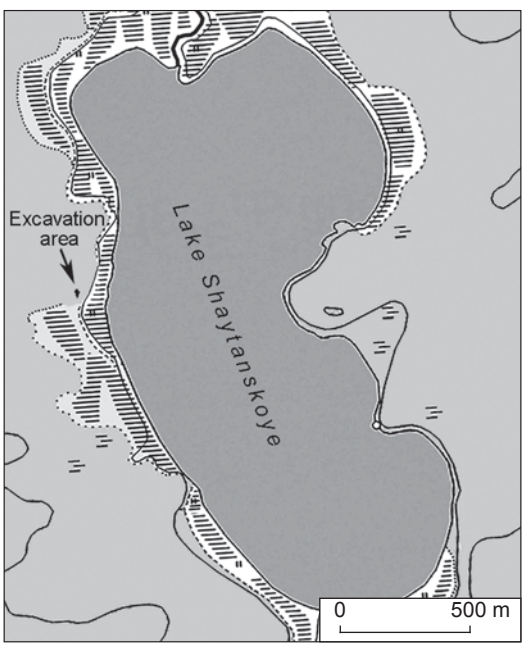

Fig. 2. Map showing the location of the studied area of the memorial sanctuary at Lake Shaytanskoye.

Another important feature is the apparent similarity of Shaytanka's structure and composition with other important ST sites. This conclusion is based on the results of thorough studies at this site, as compared with insufficient data from excavations at the earlier discovered monuments. It has become obvious that the site represented not burial grounds, but ST sacral and memorial sanctuaries (Chernykh, 2009: 265–268). The former interpretation of practically all major ST sites as cemeteries lacked strong arguments. The considerable distinctions between ST sites and real necropolises of various Eurasian cultures were noted long ago; but the long-term tradition of defining such sites as cemeteries had survived since the early works by Gorodtsov, Tallgren, and others*.

The Shaytanka excavation area of 1109 m^2 (Fig. 3) revealed materials and features of practically all periods, from the Mesolithic to the Middle Ages, and also remains of charcoal-burning structures dating to the 18th–19th centuries. Deep in the terrace, at some distance from the lake shore bank, a Bronze Age sanctuary was located. Exactly in this area, the main categories of metal (both bronze and copper) artifacts were accumulated: 94 intact tools, 50 fragmented tools, and over 35 personal ornaments, as well as metal-working waste in the form of copper and bronze drops and splashes. The same excavation grids revealed scattered stone arrowheads and ceramic fragments, which were attributed to the local Koptyaki culture (Korochkova, Stefanov, 2010: 120–125; 2013: 87–93).

Stratigraphic observations suggest that during rituals the majority of metal pieces at Shaytanka were deliberately placed under the sod, while lithic artifacts and ceramic ware might have been left on the daylight surface. Close to the lake shore, several pits were disclosed, which resembled graves, although they were empty. Additionally, traces of four cremation graves were noted. One of them (grave 3) was associated with the sanctuary on the basis of an accompanying bronze knife-dagger with an ornamented haft.

The greatest concentration of objects diagnostic of the ST (primarily metal ones) has been recorded in the western part of the excavation area, which is comparatively far from the bank of the shore (Fig. 3). Notably, exactly this portion of the site showed a drastic decrease in the amount of artifacts associated with other periods.

*Notably, when the Seima site was uncovered by a military detachment in 1912–1914, even the poorly informed but high-ranking Nizhny Novgorod officials were in doubt: "Is this really a cemetery? If yes, than surely a catastrophic one" (Chernykh, 1972: 38).

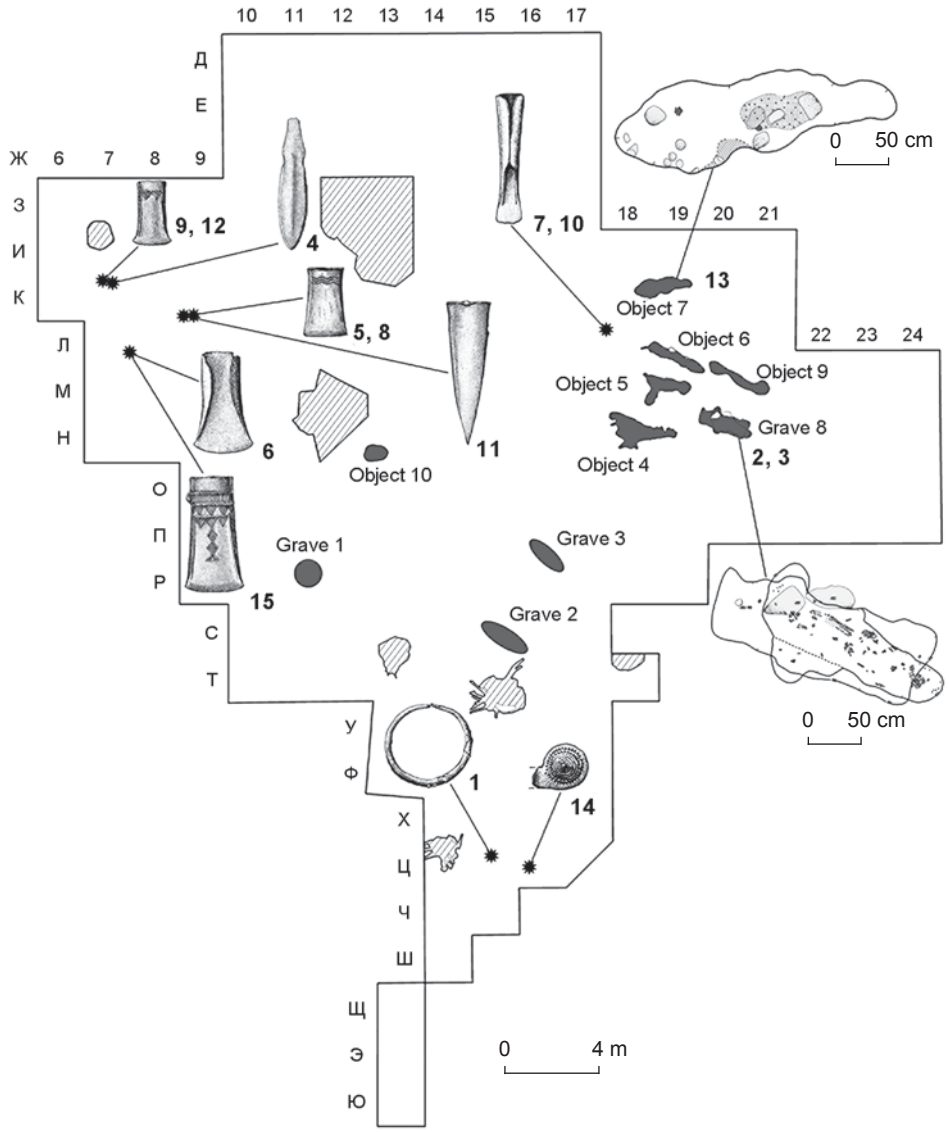

Fig. 3. Spatial distribution of the dated samples over the excavation area at Shaytanka (numbers are given in accordance with Table 1).

Series of radiocarbon dates for ST sites

An important new impact on the situation with the ST's absolute chronology was determined by the real boom in the use of radiocarbon dating methods, which added considerably to our understanding of the chronological succession of cultures and communities in Northern Eurasia. However, eventually, these innovations affected only our idea of the age of ST sites, and even then primarily owing to their parallels with the Abashevo-Sintashta materials (Fig. 4). And when radiocarbon dating technique was applied to the Seima-Turbino relics, the majority of dates have again been generated for the Shaytanka materials.

Currently, only 22 radiocarbon dates for the entire ST phenomenon are available—an extremely small number for this vast area*. The majority of dates (n=15) in the

*The extremely small number of dates for the giant ST area of 4 mln km^2 looks especially striking when compared to other social systems. Let us give only two examples. The Balkan-Carpathian Metallurgical Province represents the strongest example. Here, on an area of 1.6–1.7 mln km^2, a total of 1230 dates associated with 281 sites have been recorded and systematized. Another example relates to the community of Abashevo-Sintashta-Petrovka with 112 dates for 27 sites on the total area of 1.0–1.2 mln km^2 (see Fig. 4) (Chernykh, Orlovskaya, 2015).

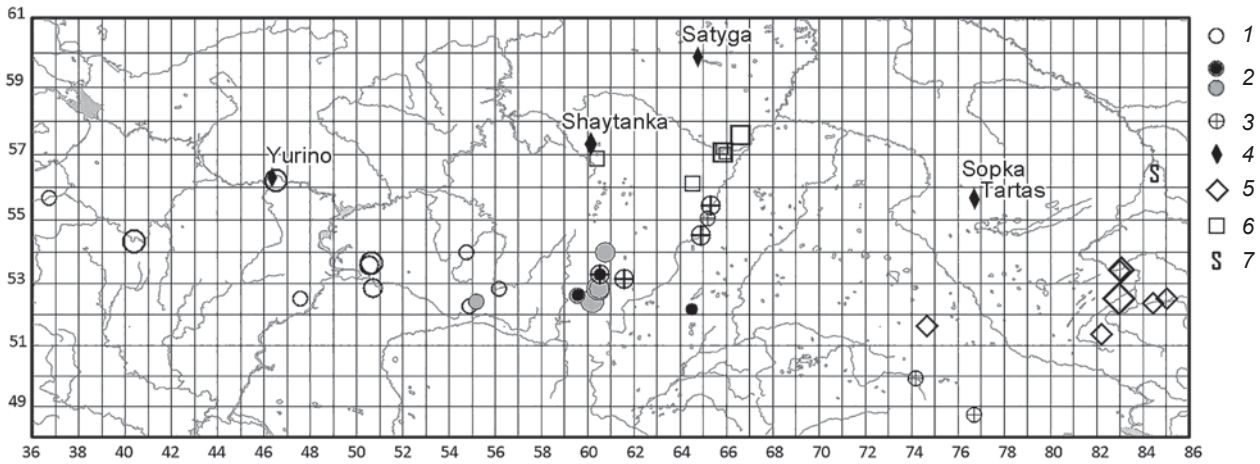

Fig. 4. Spatial distribution of ^{14}C-dated samples at the sites representing various cultures.
1 – Abashevo; *2* – Sintashta; *3* – Petrovka; *4* – Seima-Turbino; *5* – Elunino; *6* – Tashkovo-Koptyaki; *7* – Samus IV settlement.

series refer to Shaytanka (Table 1). However, only 12 of these can be somehow correlated with the ST materials. Two dates definitely belong to considerably younger sediments, while another one (OxA-X-2485-57) has been considered unreliable by researchers from the Oxford Laboratory (Table 1, No. 13–15).

Apart from Shaytanka, three dates were recorded for the site of Yurino, located at the confluence of the Vetluga and Volga rivers (Soloviev, 2005: 111; Yungner, Karpelan, 2005: 112), and also one for the cemetery of Satyga XVI in the Konda basin (the lower Irtysh tributary) (Epimakhov, Hanks, Renfrew, 2005: 97;

Table 1. **Shaytanka radiocarbon dates**

No.	Laboratory code	Material	^{14}C date, BP	Calendar date, BC		Site
				±1σ (68.2 %)	±2σ (95.4 %)	
1	MAMS-23963	Wood coated with bronze foil	3707 ± 27	2140–2037	2198–2026	Sq. 3/6, depth 0.65 m
2	MAMS-23961	Charcoal	3575 ± 29	1956–1886	2024–1784	Sq. H/20, 21, grave 8, depth 0.90–0.95 m
3	Poz-7112	"	3575 ± 30	1961–1886	2026–1782	Same
4	Poz-7113	Birch-bark	3560 ± 35	1959–1785	2020–1773	Sq. K/7
5	OxA-26482	Birch	3452 ± 32	1871–1694	1880–1688	Sq. K/9
6	OxA-26596	"	3535 ± 26	1919–1781	1944–1771	Sq. Л/7
7	OxA-26595	Pine	3521 ± 28	1895–1775	1926–1756	Sq. Л/7, depth 86–97 m
8	OxA-26481	Birch	3483 ± 34	1878–1752	1893–1695	Sq. K/9
9	MAMS-22662	"	3480 ± 20	1876–1752	1882–1744	Sq. K/9, depth 0.71–0.74 m
10	MAMS-22665	"	3419 ± 20	1743–1690	1860–1658	Sq. Л/17, depth 0.39 m
11	MAMS-22663	Larch	3311 ± 19	1622–1532	1636–1528	Sq. K/9, depth 0.62 m
12	MAMS-22664	Birch	3097 ± 19	1411–1308	1421–1298	Sq. K/7, depth 0.75–0.78 m
13	Poz-7114	Charcoal	1810 ± 30	140–242 AD	128–322 AD	Object 7, pit filling
14	MAMS-23962	Wood coated with bronze foil	1921 ± 25	57–123 AD	24–130 AD	Sq. 3/6, depth 0.65 m
15	OxA-X-2485-57	Birch	2797 ± 28	994–911	1016–849	Sq. Л/7, depth 83–87 m

Note: No. 5–8, 15 – after: (Bronk Ramsey et al., 2015: 205).

Table 2. **Radiocarbon dates from several ST sites**

Site	Laboratory code	Material	^{14}C date, BP	Calendar date, BC		Reference
				1σ (68.2 %)	2σ (95.4 %)	
Tartas-1, grave 487	SOAN-8703	Human bone	3935 ± 85	2566–2296	2836–2144	(Marchenko et al., 2014: 466)
Sopka-2/4C, grave 282	SOAN-7725	Same	3805 ± 75	2431–2138	2466–2036	(Molodin et al., 2010: 242)
Sopka-2/4B, grave 427	UBA-25027	"	3787 ± 31	2282–2146	2334–2062	(Marchenko et al., 2014: 466)
Satyga XVI, grave 39	OxA-12529	"	3655 ± 29	2122–1972	2135–1944	(Epimakhov, Hanks, Renfrew, 2005: 97)
Yurino, grave 8	Hela-929	Wood	3545 ± 50	1950–1776	2023–1746	(Soloviev, 2005: 111; Yungner, Karpelan, 2005: 112)
Same, grave 12	Hela-928	"	3400 ± 50	1750–1628	1879–1540	(Ibid.)
Same, grave 9	Hela-930	"	3395 ± 35	1740–1642	1862–1614	"

Korochkova, Stefanov, 2011: 74). Three more dates are available for the easternmost Seima-Turbino graves at the cemeteries of Sopka-2/4B, -2/4C, and Tartas-1 in the Baraba steppe (Molodin et al., 2010: 242; Marchenko et al., 2014: 466), which have been correlated primarily with the Krotovo culture (Molodin, Epimakhov, Marchenko, 2014: 151–153) (Table 2). The spatial distribution of the ^{14}C-dated materials belonging to the Seima-Turbino and other cultures that have been contacted by ST people is shown in Fig. 4.

Despite the comparatively small number of dates in the series, it cannot go unmentioned that the ages of the sites in the eastern periphery of the ST area are apparently greater. This trend is obviously illustrated by both individual diagrams (Fig. 5) and by probability sums for the four sites or their groups, Tartas-Sopka (Fig. 6)*. The identified trend should not be surprising, since it has been generally accepted until now that ST tribes migrated mainly from east to west.

One more interesting result from the radiocarbon dating may be important for 12 samples from Shaytanka. Ten early dates (Fig. 5, No. 1–10) form a compact group; while the two youngest dates (Fig. 5, No. 11, 12) fall out of strict chronological sequence. This discrepancy is especially vivid on the diagram, where the pattern of probability sums at ± 1σ (68.2 %) is discontinuous, while

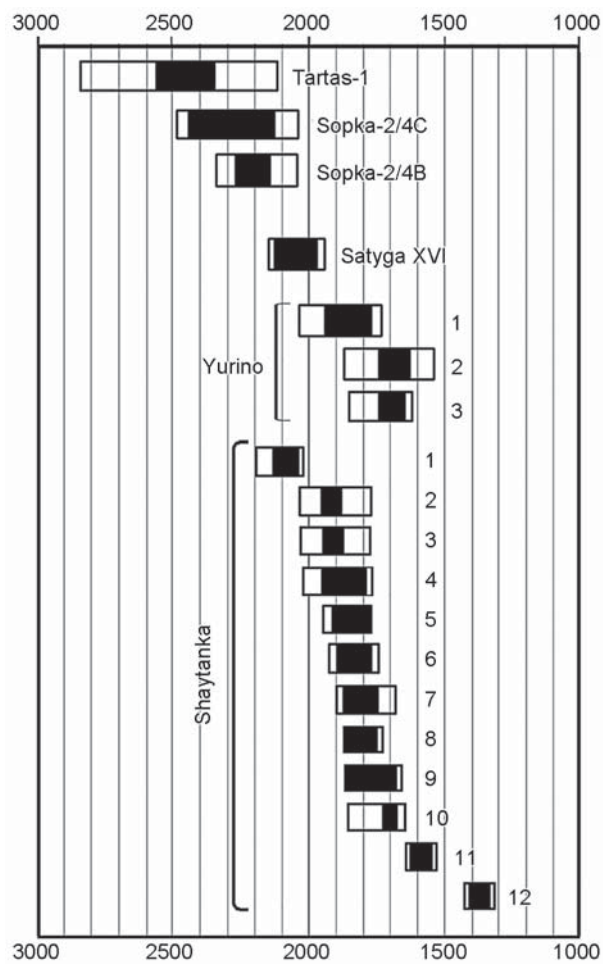

Fig. 5. Chronological ranges of each of the analyzed samples from ST sites.
Contour rectangles show the range at ± 2σ (95.4 %), black rectangles at ± 1σ (68.2 %).

*Calibration of the conventional radiocarbon dates has been carried out by the Oxford Laboratory methods: OxCal vers. 4.2 for individual assessments, and OxCal vers. 3.10 for probability sums, which was proposed by the authors as the most reliable for such calculations (see (Bronk Ramsey, 2001; Bronk Ramsey, Buck, Manning et al., 2006; Bronk Ramsey, Dee, Lee et al., 2010; Bronk Ramsey, Higham, Brock et al., 2015)).

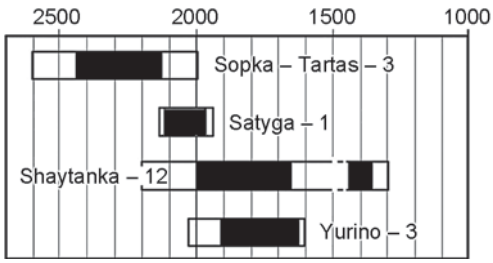

Fig. 6. Cumulative chronological ranges of the samples from ST sites.
Figures after the site names designate the numbers of available dates. Legend same as on Fig. 5.

at ± 2σ (95.4 %) it is very expanded (see Fig. 6). From this, the question arises whether these two samples really belong to ST complexes. However, they were located in the central cluster of finds, where Seima-Turbino materials predominated (Table 1; Fig. 3). These wood pieces were taken from the sockets of bronze weapons: a typical Seima-Turbino celt (Table 1, No. 12; Fig. 3) and a socketed, pointed, wedge-shaped hammer, which was relatively far from the Seima-Turbino morphological standards though (Table 1, No. 11; Fig. 3). Therefore, there were no grounds for any doubts concerning their association with the ST complexes. The situation might become more clear only with an increase of the series of dates for this site. Anyway, on the basis of the available systematized data, we consider it most reasonable to estimate the probability of the Shaytanka chronological range at ± 1σ as 2000–1650 BC, without commenting on the two-hundred-year-long gap between the main corpus of ^{14}C-dates and the two comparatively younger dates No. 11 and 12 (see Fig. 5).

Seima-Turbino – Samus – Abashevo-Sintashta

The ST people, rapidly moving to the west from their ultimate source, came into various contacts with representatives of multiple cultures. However, two communication channels have attracted most attention from researchers: firstly, with the Abashevo-Sintashta-Petrovka community (formerly referred to as Abashevo-Andronovo or Petrovka); and secondly, with the Samus-Kizhirovo culture.

Clear traces of Abashevo-Sintashta representatives at the ST sites have led to the conclusion that these two counter-flows of migration were roughly contemporaneous. Interactions with the tribes of the Samus-Kizhirovo cultural community, inhabiting the northern forest zone, appear to have been very different, and are not quite clear. Layers of the famous Samus IV site (Tom River basin) yielded over 400 fragments of casting molds (Matyushchenko, 1973: 24–30), many of which represented clear features of the ST morphological standards. It was believed that these materials demonstrated the development of the types of molds; but this was not a trend towards refinement of their morphology or technology. They rather showed the opposite tendency: degradation of the proposed metal casts and of their main varieties. The proportions between the clay molds and the metal artifacts were also surprising: at ST sites, 15 copper and bronze artifacts accounted for one mold, while in the Samus-Kizhirovo complexes, only one metal object accounted for three molds (Chernykh, Kuzminykh, 1989: 145). All these observations suggested attribution of the Samus-Kizhirovo relics to the younger, post-Seima period.

Unfortunately, we have very few radiocarbon dates, not only for ST sites, but also for the Samus IV settlement, which hampers the reconsideration of previous hypotheses concerning chronological relationships between the Seima-Turbino phenomenon and the said communities. This is especially evident as compared to the rich series of dates available for the Abashevo and Sintashta cultures. However, the results of the comparisons made are noteworthy. In our comparative analysis, we used the probability sum of all 19 dates available for Seima-Turbino (Fig. 7).

A quite unexpected gap of nearly one thousand years between the main body of ST radiocarbon dates (Fig. 7) and the five Samus IV radiocarbon dates* is even more surprising, taking into account that the shift was towards a much earlier age than was anticipated. Apparently, the obtained results require additional comprehensive research. For instance, what is the link between the ceramics and the rich set of casting molds at this site? It might be that the issue is not only about the small number of analyzed samples. Analysis was performed on the soot deposits from ceramics, but this material does not always provide reliable results. Thus, the results of radiocarbon analysis of soot on clay vessels from the Volga-Ural region significantly overestimated the large series of dates for the so-called Repin culture belonging to the Pit Grave community (Chernykh, Orlovskaya, 2011). The major reason for this might have been the inclusion of abundant tiny particles from the fossilized river-shells in the samples under study. This would have indicated an older age for the samples, owing to the so-called reservoir effect.

Comparison of the ST and the Abashevo-Sintashta dates has shown an absolutely different result. Despite the mentioned scarcity of the ST dates, the diagrams (Fig. 7) attest to the approximate contemporaneity of

*The results of the Samus IV materials dating (HELA-1776–1780) have not yet been published (personal message from the laboratory in Helsinki).

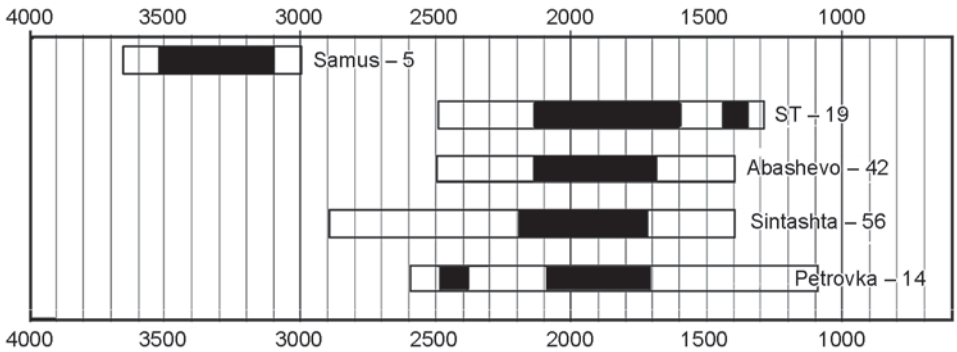

Fig. 7. Cumulative chronological ranges of the samples from the sites of ST, Abashevo, Sintashta, Petrovka cultures, and Samus IV settlement.
Figures after the names of sites or cultures designate the numbers of available dates. Legend same as on Fig. 5.

the two migrant flows moving in the counter directions. Apparently, before the new dates are obtained, it can be assumed that the ST chronological range is 2150–1600 BC at ± 1σ (68.2 %), and 2500–1300 BC at ± 2σ (95.4 %); however, researchers almost always prefer to use a ± 1σ version.

Finally, in addition to the established contemporaneity of Seima-Turbino and Abashevo cultures, let us compare the calendar ranges of the two adjacent sites (located about 15 km from each other): the Yurino site and the famous Abashevo kurgan near the settlement of Pepkino in the upper Volga basin (Khalikov, Lebedinskaya, Gerasimova, 1966). The kurgan revealed a burial pit containing the remains of 27 or 28 cruelly murdered young men. On the basis of 9 dates*, at ± 1σ, the Pepkino is dated to 2140–1930 BC. The results of dating the three samples from Yurino suggest a rather vague range of 1910–1620 BC (see Fig. 5, 6). While the Pepkino dates fit well with the Abashevo chronological range, Yurino represents the youngest of the five ST sites studied. It cannot be excluded that it was the Seima-Turbino warriors who won the battle; but we do not have any direct archaeological evidence supporting this hypothesis. The only reliable assumption is the construction of the foreign memorial site on the territory of previous (?) domination by the Abashevo culture.

Conclusions

The Seima-Turbino transcultural phenomenon has long been excluded from the development of calendar chronology based on systematization of the available radiocarbon dates. The situation has now changed radically with the discovery and comprehensive study (which included obtaining a series of radiocarbon dates) of the important memorial sanctuary of Shaytanka (Shaytanskoye Ozero II). The site is located close to the generally recognized Middle Urals segment of the borderline between Europe and Asia, which lies in the middle of the vast ST distribution area. Currently, the systematic analysis of the comparatively small series of 19 ^{14}C-dates has been carried out, and tentative ST chronological boundaries in the range of 2150–1600 (± 1σ) / 2500–1300 (± 2σ) BC have been established. The obtained results are very close to the corresponding intervals of existence of the Abashevo-Sintashta community, which were identified on the basis of a considerably greater number of radiocarbon dates. The established coincidence is important because it supports the previously assumed contemporaneity of the Abashevo-Sintashta cultures with the Seima-Turbino records. At the same time, the five radiocarbon dates obtained from samples of soot deposits on ceramics from the Samus IV settlement showed a crucial difference from the generally accepted ideas: the cumulative chronological range of the Samus IV turned to be one thousand years older than the ST range. This finding will definitely require additional archaeological research aimed at addressing the issue of interactions between the ST and the related Samus-Kizhirovo cultural community.

*Codes/reference numbers of the Pepkino kurgan dates: MAMS-11195–11198 (personal message from the laboratory in Mannheim). See also (Kuznetsov, 2001; Dobrovolskaya, Mednikova, 2011).

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References

Bader O.N. 1961
Poseleniya turbinskogo tipa v srednem Prikamye. Moscow, Leningrad: Izd. AN SSSR.

Bader O.N. 1964
Drevneishiye metallurgi Priuralya. Moscow: Nauka.

Bochkarev V.S. 1968
Problema Borodinskogo klada. In *Problemy arkheologii*. Iss. I: Absolyutnaya khronologiya eneolita i bronzovogo veka Vostochnoi Evropy (Yugo-Zapad SSSR). Leningrad: Izd. Leningr. Gos. Univ., pp. 129–154.

Bronk Ramsey C. 2001
Development of the radiocarbon calibration program OxCal. *Radiocarbon*, vol. 43 (2A): 355–363.

Bronk Ramsey C., Buck C.E., Manning S.W., Reimer P., van der Plicht H. 2006
Developments in radiocarbon calibration for archaeology. *Antiquity*, vol. 80 (310): 783–798.

Bronk Ramsey C., Dee M., Lee S., Nakagawa T., Staff R. 2010
Developments in the calibration and modelling of radiocarbon dates. *Radiocarbon*, vol. 52 (3): 953–961.

Bronk Ramsey C., Higham T.F.G., Brock F., Baker D., Ditchfield P., Staff R.A. 2015
Radiocarbon dates from the Oxford AMS System: *Archaeometry* Datelist 35. *Archaeometry*, vol. 57 (1): 177–216.

Chernykh E.N. 1972
Metall – chelovek – vremya. Moscow: Nauka.

Chernykh E.N. 1992
Ancient Metallurgy in the USSR: The Early Metal Age. Cambridge: Cambridge Univ. Press.

Chernykh E.N. 2009
Stepnoi poyas Evrazii: Fenomen kochevykh kultur. Moscow: Rukopisnye pamyatniki Drevnei Rusi.

Chernykh E.N. 2013
Kultury nomadov v megastrukture Evraziyskogo mira, vol. 1. Moscow: Yazyki slavyan. kultury.

Chernykh E.N., Kuzminykh S.V. 1989
Drevnyaya metallurgiya Severnoi Evrazii (seiminsko-turbinskiy fenomen). Moscow: Nauka.

Chernykh E.N., Orlovskaya L.B. 2011
Keramika i radiouglerodnoye datirovaniye v ramkakh yamnoi aryheologicheskoi obshchnosti: Problemy interpretatsii. In *Analiticheskiye issledovaniya laboratorii estestvenno-nauchnykh metodov*, iss. 2. Moscow: IA RAN, pp. 63–78.

Chernykh E.N., Orlovskaya L.B. 2015
Radiouglerodnaya khronologiya kultur Zapadnoi Evrazii v epokhu rannego metalla. In *Estestvennonauchnye metody issledovaniy i paradigma sovremennoi arkheologii*. Moscow: Yazyki slavian. kultury, pp. 10–15.

Dobrovolskaya M.V., Mednikova M.B. 2011
"Copper people" of the Bronze Age: The reconstruction of their health and social status. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 39 (2): 143–156.

Epimakhov A.V., Hanks B.K., Renfrew A.C. 2005
Radiouglerodnaya khronologiya pamyatnikov bronzovogo veka Zauralya. *Rossiyskaya arkheologiya*, No. 4: 92–102.

Gimbutas M. 1957
Borodino, Seima and their contemporaries. *Proceedings of the Prehistoric Society*, vol. 22: 143–172.

Gorodtsov V.A. 1914
O nakhodke bliz stantsii Seima Moskovsko-Nizhegorodskoi zheleznoi dorogi. *Drevnosti*, vol. 24: 360–361.

Gorodtsov V.A. 1915
Kultury bronzovoi epokhi v Srednei Rossii. In *Otchet Imperatorskogo Rossiyskogo Istoricheskogo muzeya v Moskve za 1914 g*. Moscow: [Sinod. tip.], pp. 59–104.

Khalikov A.K. 1969
Drevnyaya istoriya Srednego Povolzhya. Moscow: Nauka.

Khalikov A.K., Lebedinskaya G.V., Gerasimova M.M. 1966
Pepkinskiy kurgan (abashevskiy chelovek). Yoshkar-Ola: Marknigoizdat.

Korochkova O.N., Stefanov V.I. 2010
Kultovyi pamyatnik epokhi bronzy na Shaitanskom ozere pod Ekaterinburgom (po materialam raskopok 2008 g.). *Rossiyskaya arkheologiya*, No. 4: 120–129.

Korochkova O.N., Stefanov V.I. 2011
Satyga XVI v sisteme kultur epokhi bronzy Zauralya i Zapadnoi Sibiri. In *Satyga XVI: Seiminsko-turbinskiy mogilnik v taezhnoi zone Zapadnoi Sibiri*, ch. 5. Yekaterinburg: Ural. rabochiy, pp. 60–85.

Korochkova O.N., Stefanov V.I. 2013
Kultovyi pamyatnik epokhi bronzy na Shaitanskom ozere pod Ekaterinburgom (po materialam raskopok 2009–2010 gg.). *Rossiyskaya arkheologiya*, No. 1: 87–96.

Kosarev M.F. 1981
Bronzovyi vek Zapadnoi Sibiri. Moscow: Nauka.

Kuznetsov P.F. 2001
Territorialnye osobennosti i vremennye ramki perekhodnogo perioda k epokhe pozdnei bronzy Vostochnoi Evropy. In *Bronzovyi vek Vostochnoi Evropy: Kharakteristika kultur, khronologiya i periodizatsiya: Materialy Mezhdunar. nauch. konf. "K 100-letiyu periodizatsii V.A. Gorodtsova bronzovogo veka Vostochnoi Evropy"*. Samara: pp. 178–182.

Marchenko Z.V., Molodin V.I., Grishin A.E., Orlova L.A. 2014
Pogrebalnye kompleksy s predmetami seiminsko-turbinskogo i kenkolskogo tipov v Barabinskoi lesostepi (Zapadnaya Sibir) i ikh radiouglerodnaya khronologiya. In *Trudy IV (XX) Vseros. arkheol. syezda v Kazani*, vol. I. Kazan: Otechestvo, pp. 463–468.

Matyushchenko V.I. 1973
Drevnyaya istoriya naseleniya lesnogo i lesostepnogo Priobya (neolit i bronzovyi vek). Pt. 2: Samusskaya kultura. Tomsk: Izd. Tom. Gos. Univ. (Iz istorii Sibiri; iss. 10).

Matyushchenko V.I. 1975
Mogilnik u der. Rostovka. In *Arkheologia Severnoi i Tsentralnoi Azii*. Novosibirsk: Nauka, pp. 129–137.

Matyushchenko V.I., Sinitsyna G.V. 1988
Mogilnik u d. Rostovka vblizi Omska. Tomsk: Izd. Tom. Gos. Univ.

Molodin V.I., Epimakhov A.V., Marchenko Z.V. 2014
Radiouglerodnaya khronologiya kultur epokhi bronzy Urala i yuga Zapadnoi Sibiri: Printsipy i podkhody, dostizheniya. *Vestnik Novosib. Gos. Univ.* Ser.: Istoriya, filologiya, vol. 13. Iss. 3: Arkheologiya i etnografiya: 136–167.

Molodin V.I., Marchenko Z.V., Grishin A.E., Orlova L.A. 2010
Novye dannye po radiouglerodnoi khronologii pogrebalnykh kompleksov mogilnika Sopka-2 epokhi rannei – razvitoi bronzy.

In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnyh territorii*, vol. XVI. Novosibirsk: Izd. IAE SO RAN, pp. 240–246.

Safronov V.A. 1968

Datirovka Borodinskogo klada. In *Problemy arkheologii*. Iss. I: Absolyutnaya khronologiya eneolita i bronzovogo veka Vostochnoi Evropy (Yugo-Zapad SSSR). Leningrad: Izd. Leningr. Gos. Univ., pp. 75–128.

Schmidt A. 1927

Die Ausgrabungen bei dem Dorf Turbina an der Kama. In *Finnisch-Ugrische Forschungen: Anz*., Bd. 18, Hf. 1–3. Helsinki: pp. 1–14.

Serikov Y.B., Korochkova O.N., Kuzminykh S.V., Stefanov V.I. 2009

Shaitanskoye Ozero II: New aspects of the Uralian Bronze Age. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 37 (2): 67–78.

Soloviev B.S. 2005

Yurinskiy (Ust-Vetluzhskiy) mogilnik (itogi raskopok 2001–2004 gg.). *Rossiyskaya arkheologiya*, No. 4: 103–111.

Tallgren A.M. 1915

Ett viktigt fornfund fren mellersta Russland. *Suomen Museo*, vol. 22: 73–86.

Tallgren A.M. 1920

L'âge du cuivre dans la Russie Centrale. Helsinki: K.F. Puromies. (Suomen Muinaismuistoyhdistyksen Aikakauaskirja; t. 32, No. 2).

Yungner K., Karpelan K. 2005

O radiouglerodnykh datakh Ust-Vetluzhskogo mogilnika. *Rossiyskaya arkheologiya*, No. 4: 112. Appendix to: Soloviev B.S. Yurinskii (Ust-Vetluzhskii) mogilnik (itogi raskopok 2001–2004 gg.), pp. 103–111.

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Beads in the Finno-Ugric Women's Costume: The Evidence of Tarasovo Cemetery on the Middle Kama (0–500 AD)

Beads are the most frequent finds in 1st–5th century AD female burials at Tarasovo on the Middle Kama, the largest Finno-Ugric cemetery, dating to the Great Barbarian Migration era. Larger beads are common in burials of women aged 17–45, whereas seed beads were typically worn by girls and young women aged 13–29. This was probably because unmarried girls wore beanies embroidered with beads and bronze ornaments. Also, variously sized beads were attached to bands of the headdress, framing its bottom edges in one or more lines. Single beads found near the crania suggest that they were amulets. In one- and several-strand necklaces, beads alternated with bronze ornaments. Necklaces were often parts of gift sets, some of which are completely preserved, including the organic base. Larger beads were used as pendants. Some of them decorated strips, used for appending knives and other utensils to belts. All these ways of using beads are still practiced by Finno-Ugric women in the Ural area.

Keywords: *Middle Kama, beads, female costume, headdress, necklace, pendants.*

Introduction

Beads are abundant among the finds in Middle Kama cemeteries of the first half of the 1st millennium AD, including Tarasovo cemetery. The site is located in the vicinity of the village of Tarasovo, on the right bank of the Kama River, in Sarapulsky District, Udmurt Republic (Fig. 1). The site was studied for 18 years (1980–1997) by the Kama-Vyatka Archaeological Expedition of Udmurt State University, headed by R.D. Goldina. This is one of the largest Finno-Ugric cemeteries in Russia (1880 graves). The cemetery was used during the first half of the 1st millennium AD, and belonged to the Cheganda culture of the Pyany Bor cultural entity (Goldina, 2004: 3, 301, 306, 307). About one third of the total number of Tarasovo graves (611 graves; 32.5 %) yielded beads of various sizes (18,512 spec.). The beads were classified by their size into seed beads with diameter not exceeding 5 mm, and beads with larger diameters.

A.A. Krasnoperov proposed a reconstruction of the traditional costume of the Cheganda population in the Kama basin, on the basis of typical finds related to clothes from 80 cemeteries. He classified pieces of clothing by major construction elements differing by location on the body and in the grave: 1) headdress; 2) neck-chest and hand ornaments; 3) waist belt; 4) shoe ornaments; 5) details forming the appearance and cut of clothing (Krasnoperov, 2006: 11, 12, 44).

The present study addresses the bead-dispersion patterns in female burials at Tarasovo cemetery. The results of the study have been correlated with Krasnoperov's inferences, which makes it possible to establish the method of use of these ornaments in the traditional clothing of the Middle Kama population in the 1st millennium AD.

Beads were mostly recovered from graves of women belonging to two age groups: 17–29 (17.4 %) and 30–45 (6.5 %) years old (Fig. 2, *1*). They were also frequently

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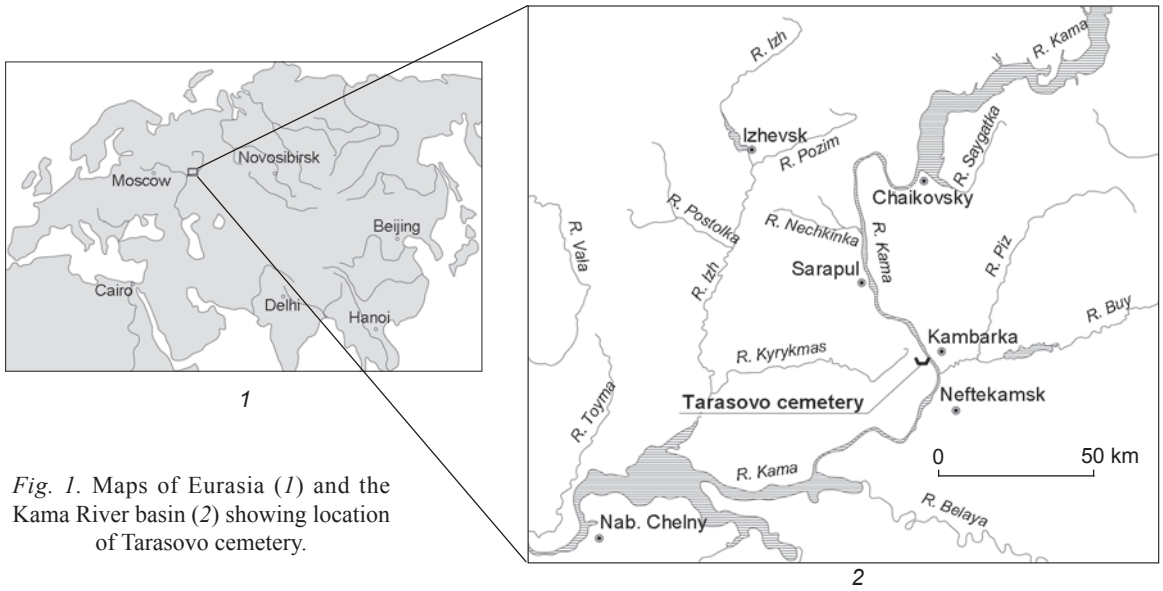

Fig. 1. Maps of Eurasia (*1*) and the Kama River basin (*2*) showing location of Tarasovo cemetery.

found in graves of men of the same age groups (6.5 and 4.2 % respectively). Seed beads were found predominantly in graves of women of 17–29 (25.5 %) and 13–16 (8 %) years old (Fig. 2, *2*). The sex of one half of the total number of buried individuals has not been determined (314 graves, 51.4 %).

Use of beads in female costume

Beads were found in 253 women's graves (37.43 % of the total number of finds in this category), while seed beads were in 145 (49.15 %). Beads were mostly included in the gift set* (78 cases, 35.95 %). They were also found close to the head (48 cases, 22.13 %), sometimes both in the head area and in the gift set (10 cases, 4.62 %), and also at the hips (10 cases, 4.62 %) and chest (6 cases, 2.77 %). Three burials contained beads in the head, shoulder, and chest areas. Beads were also noted in the shoulder, hand, pelvis, knee, and feet areas; each location in three graves. Other locations are infrequent.

The most typical number of beads found in the head area did not exceed 17 (57 cases, 72.9 %); while in 24 graves, only 1 or 2 beads were discovered (30.8 %). Eight burials (10.3 %) yielded from 22 to 45 beads.

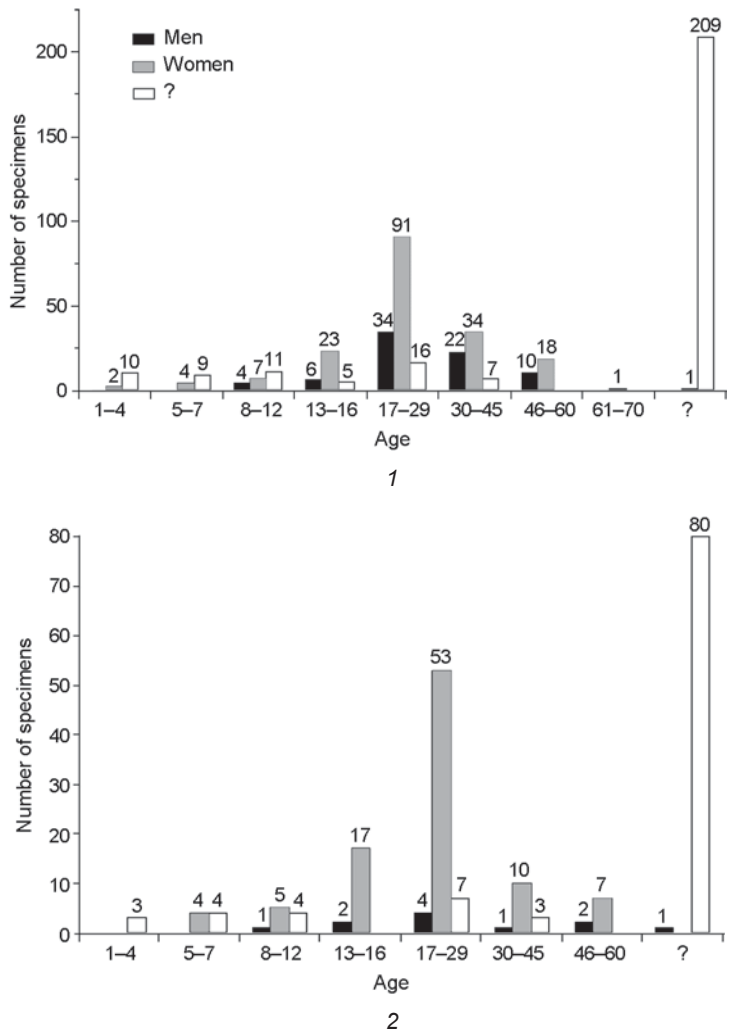

Fig. 2. Sex and age distribution of graves of Tarasovo cemetery containing larger beads (*1*) and seed beads (*2*) (Sabirov, 2011: Pl. 59, 68).

*The set of ornaments and utensils in a birch-bark box that was placed in the grave as a gift to the deceased.

It should be noted that the few graves with a large number of finds in the head area contained both larger beads and seed beads: three graves yielded 65 specimens each, six graves from 64 to 99 specimens (11.6 %), four female graves (5.2 %) yielded over 100 specimens. One grave revealed 283 seed beads located around the skull of the buried woman (grave 886b). Large sets usually consist of seed beads.

Larger beads and seed beads in the head area of deceased individuals suggest that they were used in headdress ornamentation. Krasnoperov argued that bands and beanies were the main types of women's headgear (2006: 66, 76, 81). The band represented a leather strip about 3 cm wide decorated with the sewn-on bronze onlays (grave 1762), framed in some cases with seed beads or small beads in one (e.g., graves 497, 687, 1783) or several lines (graves 1278, 1691).

The beanie consisted of a crown and a band about 3 cm wide attached to it. The remains of such headdress in grave 886b suggest that it might have been embroidered with seed beads. In most cases, seed beads were used as additional decorations to bronze onlays and pendants (e.g., graves 687, 1215, 1526, and others). Grave 1027 (a 14-year old girl) yielded remains of a beanie which base consisted of a leather band. The face part of the band was ornamented with bronze frames; the back part showed bronze pendants and pipe-shaped beads; the lower edge was framed with complex beads. Two pendants decorated the temple parts of the band. The beanie's crown was embroidered with bronze pipe-shaped beads (Fig. 3) (Goldina, 2004: 174; Krasnoperov, 2006: 78, 81).

In some cases, the headdress type was hardly discernible, yet it was clear that it was decorated with various bronze ornaments (onlays, pendants, and pipe-shaped beads), larger beads, and/or seed beads (graves 532, 845, 1100, 1108, and others). Another category of graves revealed accumulations of beads close to the head, which purpose is not clear (graves 130, 136, 594, and others).

Beads were also used in neck-chest ornaments of women's costume: necklaces, pectorals, and torques. Necklaces were mostly represented by leather strings (less frequently, threads or thin wire), on which bronze spiral-twisted (more rarely, other types, e.g., grave 1377) pipe-shaped beads alternated with beads and sometimes with bronze pendants (e.g., grave 1189) or shell pendants (grave 1762) were drawn. There are also necklaces of this type consisting only of larger and/or seed beads; however owing to the displacement of items they are often barely identifiable (graves 136?, 1061). Only few necklaces were found on the necks of the deceased. Most often, they occur within the gift sets where they were completely preserved including the organic base (e.g., grave 1696). Necklaces were made using beads of semi-transparent light-colored glass, both larger (e.g., graves 555, 1721, 1762, 1822) and parallelepiped-shaped with truncated tops (grave 1696), or crystal beads (grave 132). Necklaces made of alternating spiral-twisted pipe-shaped beads and glass beads may be regarded as a particular feature of the Mazunino culture (Ostanina, 1997: 38; Krasnoperov, 2006: 106; Goldina, Bernts, 2010: 68). Pectorals are few at the Tarasovo cemetery. Grave 1762 yielded an oval-shaped accumulation of 2086 larger and seed beads occupying the area from cervical vertebra to lower ribs. It is possible that beads were sewn on an oval-shaped piece of textile. Over the accumulation of beads, a necklace was located (Fig. 4) (Krasnoperov, 2006: 120).

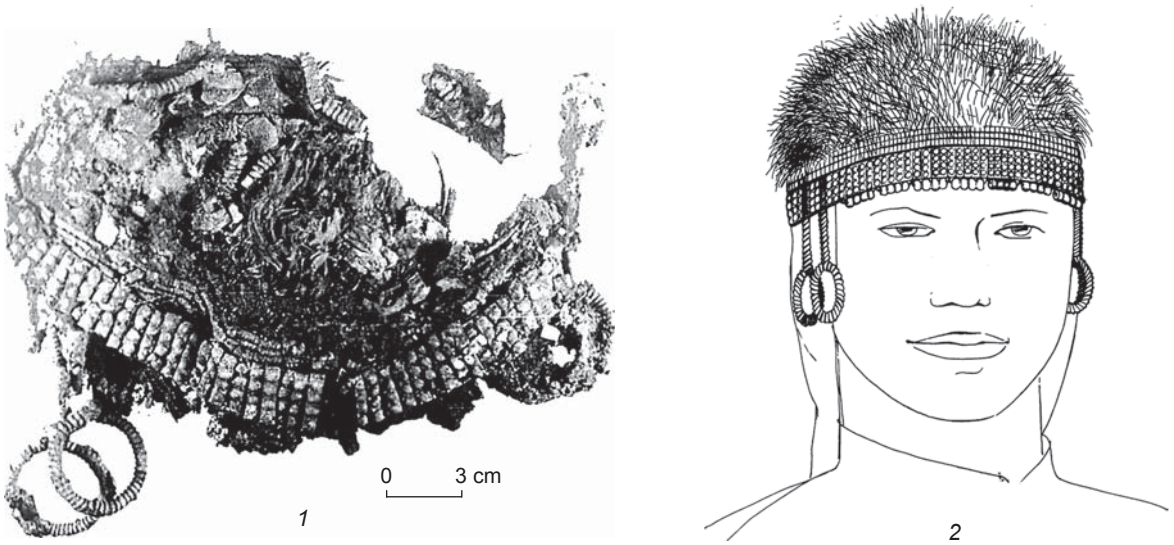

Fig. 3. Beanie from grave 1027 at Tarasovo cemetery (*1*) and its reconstruction by L.I. Lipina (*2*).

Among Mazunino materials, T.I. Ostanina mentioned finds where 1–3 large beads were strung on a torque (1992: 7, fig. 12, *1*, 13, *4*, 30, *4*; 1997: 55). Tarasovo cemetery yielded two such artifacts: an iron torque with a bronze bead (grave 1010) and a bronze torque with a cornelian bead (grave 1028).

Beads were strung on temple pendants representing typical women's ornaments of the Cheganda culture (Gening, 1970: 142–143, pl. I; Ostanina, 1997: 33–34, pl. 11; Krasnoperov, 2006: 59; Goldina, Bernts, 2010: 66–67). Temple pendants could be attached to headgear symmetrically at the temples, or be included into the set of plait ornaments (Krasonperov, 2006: 59), or hung on the auricle with a hanging loop (Goldina, 2004: 306). The Tarasovo cemetery yielded 827 temple pendants (Perevozchikova, 2005: 59). These ornaments were found in association with 398 buried individuals (19 % of the total number). Age- and sex-analysis was not possible for 146 of them (36.7 %). The majority of the remainder (197; 49.5 %) were mostly women of 17 to 45 years of age. Separate graves yielded from 1 to 12 temple pendants. Owing to the wearing mode, temple pendants are mostly found in pairs (159 cases) (Sabirov, 2011: 60–61, pl. 60, 62, diagr. 48–50). Temple pendants with beads were discovered in 84 graves of 398 (21 %) including 48 (57 %) women's graves, 4 (5 %) men's graves, and 32 (38 %) graves where sex was not identified. In total, 227 temple pendants were recovered, including 148 pendants with beads. The distribution of graves, containing such pendants with and without beads, by sex and age is proportional. 50 graves yielded only temple pendants with beads, while 34 graves contained such pendants with and without beads. One pendant might contain from 1 to 11 beads. Most frequently, these were small glass beads without decoration (182 cases); only six beads showed surface ornamentation. Notably, imported beads were regarded as prestigious items, and were used by local jewelers to decorate torques and temple pendants of the typical local shapes (with hollow tubes, leaf-shaped, etc.).

Seed beads were often sewn on pieces of clothing. For instance, strings of glass seed beads (125 spec.), found in grave 865 at the right and left sides of the cranium, in the chest and left shoulder areas, were possibly used as shirt embroidery, framing the shoulders and continuing over the left sleeve (Krasnoperov, 2006: 182).

Larger and seed beads are the most common items in the grave gift set. A.K. Pshenichnyuk argued that this ritual emerged among the Kara-Abyz tribes as early as in the 3rd–2nd centuries BC and developed in full by the beginning of the new era (1973: 178). T.V. Istomina believed that these sacrificial goods sets (gift sets) were typical of the Finnish cultures of the Europe forest zone (1982). Gift sets often included costume-ornaments. Such sets were reported in association with 334 buried

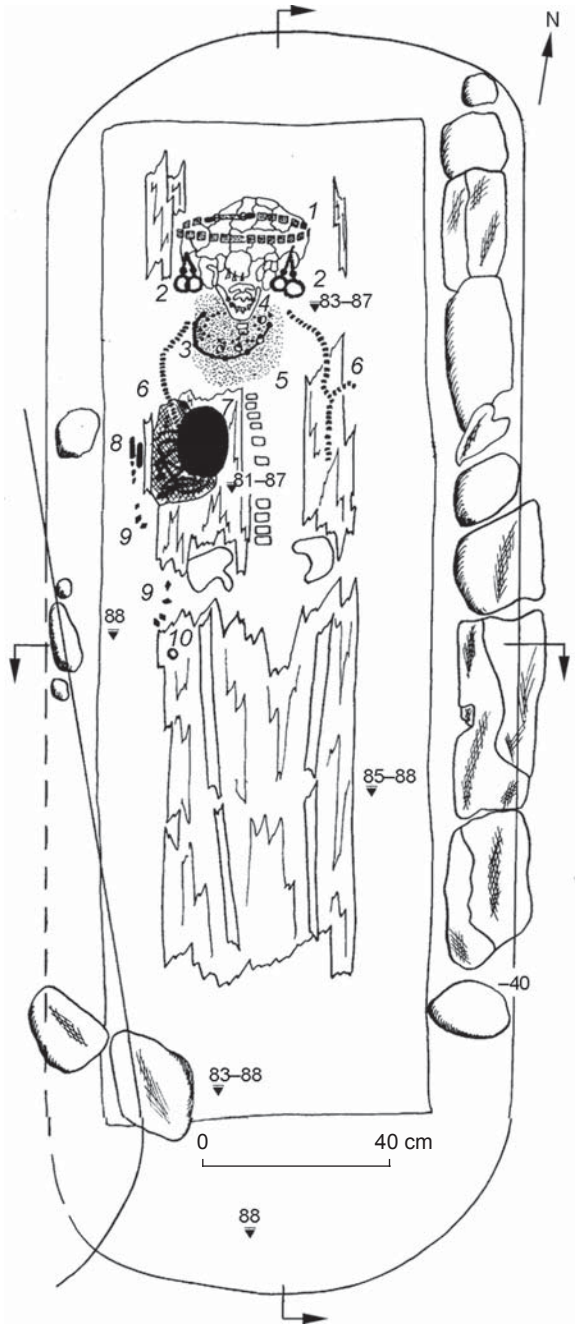

Fig. 4. Map of grave 1762 at Tarasovo cemetery.
1 – bronze onlays and buckles of the headdress; *2* – bronze temple pendants (4 spec.); *3* – a bronze pipe-shaped bead with bronze beads (13 spec.); *4* – shell pendants (4 spec.); *5* – seed beads (2056 spec.) and larger beads (30 spec.); *6* – bronze pipe-shaped beads ornamenting sleeves; *7* – a fibula with bronze pendants; *8* – a bronze buckle and a belt tip; *9* – a bronze belt onlay; *10* – a bronze ring.

individuals from 326 graves (17.3 % of the total number of graves): 145 women, 18 men; in 171 cases, their sex was not identified (Sabirov, 2011: Pl. 42–44). Larger and seed beads were included into 245 gift sets (73 %), the occurrence of them in female burials being more

frequent as compared to male ones (7.5 times and 11.5 times oftener, respectively). The women's gift sets might contain from 1 to 598 beads. More than one half of the total number of gift sets included from 1 to 12 beads (53 graves, 50.9 %) or from 13 to 21 beads (14 graves, 13.6 %). 26 graves, or 25.6 %, contained from 22 to 82 beads. Such concentrations likely represent necklaces made of one to several strands. Sometimes, gift sets also contained collections of beads numbering more than 100 specimens (10 graves, 10 %). In such cases, apparently, either headdressess decorated with glass beads or pectorals were put into birch-bark boxes. For instance, an accumulation of 494 seed beads, identified as a grave gift, located to the left of the cranium in grave 136, might have represented a decoration of a beanie (Goldina, 2003: Pl. 52).

From 1 to 4 beads located in the pelvis and femur areas were noted mostly in association with knives (graves 416, 458, 763, and others) and other utensils (e.g., with an iron hook in grave 743). Such cases were reported both from women's and men's burials and might have represented bead-decorated knife-knots and hanging strips or other utensils appended to the belt. Beads might have also been used as pendants on leather belts (graves 720, 939). Grave 102 yielded glass beads located near the feet bones, between and below them. These beads possibly represented shoe-buckle decorations. It is likely that beads were attached to the boots in the shin area (graves 113, 917).

Often, from 1 to 3 isolated beads were found at the bottom of graves without any order: in the area of pelvis (graves 551a, 939), femur (graves 143, 1188b), knees (graves 781, 788), shins (graves 625, 633, 1179), at the feet (grave 829), etc. These solitary beads were likely gifted to the deceased individual by the participants of the burial rite.

Conclusions

Larger and seed beads represent the most ample category of finds at the Tarasovo cemetery of the 1st–5th centuries AD in the Middle Kama. The number of beads in one grave varies from 1 to 2087. Larger beads were mostly found in graves of women from 17 to 45 years of age, seed beads in graves of girls and women of 13 to 29 years of age. This was probably because unmarried girls wore beanies embroidered with seed beads and bronze ornaments. The beanie apparently resembled a well-known Finno-Ugric girl's hat *takya*, which has also been reconstructed via available archaeological evidence. Beads framed the lower edge of the beanie band in one or several lines. Usually they served as additional decoration to the bronze elements forming the main motif of the headdress. Isolated beads located in burials near the head (about one third of all finds located close to the cranium) suggest that beads were used as amulets. Also, larger and seed beads alternating with bronze ornaments were used for making one- or several-strand necklaces. Some scholars suppose that such ornaments of spiral-twisted pipe-shaped beads and glass beads were typical for the Mazunino population. Necklaces were seldom found on the necks of the buried individuals. Most often, necklaces were included in the gift sets, where they were completely preserved. The gift sets in women's graves also included headgear and/or pectorals embroidered with larger and/or seed beads. Local jewelers often used larger and seed beads as additional decorations of temple pendants and (more rarely) torques.

Few beads were found in the waist area, either in women's and men's graves suggesting that they decorated knife-knots and hanging strips attaching knives and other utensils to the belt.

Beads were also used in shoe-embroidery and were strung on straps wrapping the ankles. Sometimes isolated beads were found in various places at the bottom of graves. These were possibly gifts from the participants in the burial rite to the buried individual. The noted ways of using beads are still practiced by Finno-Ugric women in the Ural area for decoration of costumes, most typically in the Udmurt tradition*.

References

Gening V.F. 1970
Istoriya naseleniya Udmurtskogo Prikamya v pyanoborskuyu epokhu. Pt. I: Chegandinskaya kultura III v. do n.e. – II v. n.e. Sverdlovsk, Izhevsk: n.p. (Voprosy arkheologii Urala; iss. 10).

Goldina R.D. 2003
Tarasovskiy mogilnik I–V vv. na Srednei Kame, pt. II. Izhevsk: Udmurtia. (MIKVAE; vol. 11).

Goldina R.D. 2004
Tarasovskiy mogilnik I–V vv. na Srednei Kame, pt. I. Izhevsk: Udmurtia. (MIKVAE; vol. 10).

Goldina R.D., Bernts V.A. 2010
Turaevskiy I mogilnik – unikalnyi pamyatnik epokhi velikogo pereseleniya narodov v Srednem Prikamye (beskurgannaya chast). Izhevsk: Udmurt. Gos. Univ. (MIKVAE; vol. 17).

Istomina T.V. 1982
Zhertvennye kompleksy srednevekovykh mogilnikov Priuralya kak etnicheskiy opredelitel. In *Problemy etnogeneticheskikh issledovaniy Evropeiskogo Severo-Vostoka*. Perm: Perm. Gos. Univ., pp. 78–87.

Krasnoperov A.A. 2006
Kostyum naseleniya chegandinskoi kultury v Prikamye (II v. do n.e. – V v. n.e.). Cand. Sc. (History) Dissertation.

*The ethnographic parallels of the traditional costume of the Kama peoples of the first half of the 1st millennium AD will be discussed in a special article.

Izhevsk. (Arkhiv Instituta istorii i kultury narodov Prikamya; F. 4/1, D. 86, 86a).

Ostanina T.I. 1992

Pokrovskiy mogilnik: Katalog arkheol. kollektsii. Izhevsk: Alfavit.

Ostanina T.I. 1997

Naseleniye Srednego Prikamya v III–V vv. Izhevsk: UIIYAL UrO RAN.

Perevozchikova S.A. 2005

Visochnye ukrasheniya Tarasovskogo mogilnika. In *Udmurtiya: Istoriya i sovremennost: Materialy Mezhdunar. nauch.-praktich. konf. "Problemy i perspektivy funktsionirovaniya rodnykh yazykov"*. Izhevsk: Udmurt. Gos. Univ., pp. 59–63.

Pshenichnyuk A.K. 1973

Kara-abyzskaya kultura (naseleniye Tsentralnoi Bashkirii na rubezhe nashei ery). *Arkheologiya i etnografiya Bashkirii*, vol. V: 162–243.

Sabirov T.R. 2011

Pogrebalnyi obryad Tarasovskogo mogilnika I–V vv. na Srednei Kame. Cand. Sc. (History) Dissertation. Izhevsk. (Arkhiv Instituta istorii i kultury narodov Prikamya; F. 4/1, D. 173).

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Comprehensive Geophysical Studies at the Suzdal Opolye Settlements

Rural landscapes, especially those affected by plowing, mostly reveal no outward signs of archaeological sites. Best-preserved parts of buildings are cellars, utility pits, and other underground objects not visually observable on the surface. A new strategy is proposed for gaining preliminary information about the outlines and inner structures of medieval settlements of that type. It is based on a comparison of geophysical findings with those of drilling, pilot excavations, and tendencies in the distribution of surface finds. The application of this strategy to the study of various types of medieval unfortified sites in the Suzdal Opolye, central Russia, including large settlements (Kibol-5, Shekshovo-2, and Bolshoye Davydovskoye-2), a stratified site (Ves-5), and small unstratified sites (Vishenki-3 and Kistysh-3), demonstrates its efficiency. Specifically, magnetic survey has allowed us to delineate the borders of the settlements, locate densely inhabited areas, production complexes, and sometimes pits. Electrical survey proves more efficient for assessing spatial characteristics (size and shape) of sites. The excavation area, however, is selected according to the magnetic prospecting data.

Keywords: *Suzdal Opolye, Middle Ages, rural settlements, magnetic prospecting, electrical prospecting, ground-penetrating radar, research methods.*

Introduction

Excavations carried out in recent decades at open settlements in various regions of medieval Rus have provided an explosion of information about the peculiarities of settlement organization during the Middle Ages. As a result of a series of scientific projects aimed at reconstruction of the cultural and historical situation in the Vladimir-Yuryev Opolye (a special woodless landscape dominated by black earths), the rural district of Suzdal has become one such region. More than 200 medieval settlements have been found here within a relatively small area (about 250 km^2) (Makarov, 2008). The most common type of site is an open unfortified rural settlement. The cultural layers at the majority of sites are heavily damaged by plowing. The best-preserved parts of buildings are cellars, utility pits, and other underground objects not visible on the surface. Taking into consideration the sizes of the settlements and the absence of outward signs of archaeological sites, geophysical exploration is the most efficient method for studying the layout and structure of the Suzdal Opolye settlements.

Comprehensive geophysical studies involved three methods: magnetic prospecting, ground-penetrating radar (Institute of Geosciences, University of Kiel), and electrical prospecting (Physico-Technical Institute, Ural Branch of RAS). Geophysical measurements in Opolye were conducted at 16 sites. Magnetic

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Suzdal Opolye sites where geophysical exploration was performed

Site	Date	Site area, ha	Surface finds, number of items	Excavation area, m^2	Drilling, number	Magnetic prospecting, ha	Electric prospecting, ha	Ground-penetrating radar, ha
Ves-5	9th–13th (14th?) century	2.50	348	283	34	4.75	0.39	0.27
Vishenki-3	Late 11th(?)–13th century	0.49	23	100	15	1.4	0.06	–
Kibol-5	9th–19th century	11.52	50	380	–	–	0.05	0.03
Kistysh-3 (northern section)	12th–14th century	0.96	31	109	–	1.85	0.28	–
Bolshoye Davydovskoye-2	Late 10th – 13th (14th?) century	10.89	59	908	17	12.46	0.14	0.05
Shekshovo-2	Late 9th(?)–13th century	29.60	50	202	59	23.09	0.21	–

prospecting covered 15 survey loops with a total area of 89.76 ha, while electrical prospecting included seven survey loops (1.13 ha), and small areas at three rural settlements were studied with the ground-penetrating radar. This article discloses materials of the six best explored sites (see *Table*). These are large medieval settlements, such as Kibol-5, the Shekshovo archaeological complex (Shekshovo-2 and Bolshoye Davydovskoye-2 settlements), which consistently existed during at least three centuries; and the Ves-5 stratified site, where remains have been identified of structures attributed to the 9th–10th centuries and the late 12th–13th centuries, as well as a flat burial attributed to the 11th century. Since the spatial overlap between non-contemporaneous objects made interpretation of the results of geophysical measurements of such long-term and complex sites difficult, the second line of research was aimed at studying the materials from small rural settlements with, probably, shorter durations of existence: Vishenki-3 and Kistysh-3.

The degree of archaeological certainty of the sites covered by geophysical studies was rather high. Systematic collection of items and ceramic materials, drilling of magnetic anomalies*, pitting, and excavations of certain cultural layer areas were carried out at the settlements. Geophysical methods used made it possible to specify the site outlines, to identify archaeological objects, to assess their shapes and the structural features of the cultural layer, and to reconstruct the spatial characteristics of the identified objects.

*A boring-bit 3 cm in diameter was employed for probing, which was compatible with natural disturbances of the cultural layer (tree roots, rodent holes, etc.). During recent years, drilling has frequently been used for archaeological field studies (Zakharov, Zozulya, 2015: 158; Ibsen, 2013: 234).

Delineation of the site borders and search for archaeological objects

Magnetic prospecting was used to assess the sizes of settlements, and the main trends in their layout. Comparing the results obtained at 15 Suzdal Opolye settlements enabled identification of five main types of anomalies: linear anomalies with high intensity of magnetization; local contrast anomalies with high gradient of attenuation; highly-dispersed zones of magnetic field; dipolar anomalies; and large zones with a relatively high value of magnetic field, without the pronounced adjacent "negative" anomaly.

Linear anomalies with high magnetization intensity, which are observed actually throughout the entire area of studies, reflect cryogenic polygonal topography formed as a result of frost fracturing in the uppermost portions of earth's crust. In particular, such structures are distinctly visible on the map of the Vishenki-3 settlement (Fig. 1). Local contrast anomalies with high gradient of attenuation can be caused by present-day metal objects: for example, by a metal pipe fragment marking the corner of the excavation area at this site (Fig. 1). These anomalies are considered as confounders in interpretation of the magnetic field distribution "map".

Highly-dispersed zones of magnetic field (areas with randomly scattered local anomalies of relatively small amplitude) can correspond to the areas of cultural layer rich in pottery fragments, slags, oven stones, and other inclusions with an increased magnetization. A number of magnetic anomalies were explored in such zones at the Bolshoye Davydovskoye-2 settlement*. In ten such

*All obtained cores have been recorded in the field reports, according to the "Regulations on Procedure of Archaeological Field Works and Preparation of Scientific Reports"; photo- and

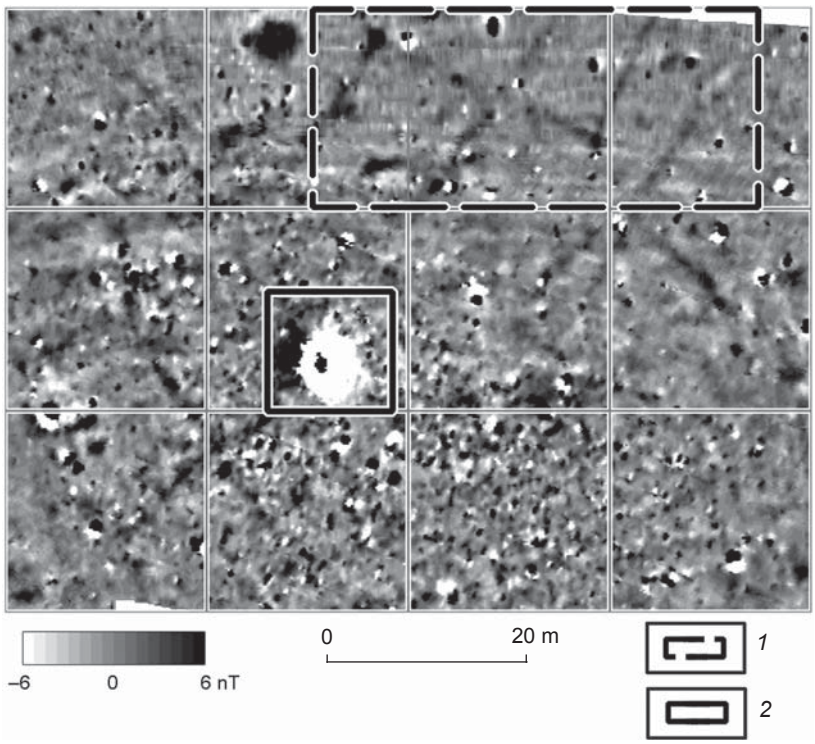

Fig. 1. Fragment of magnetogram from the Vishenki-3 settlement.
1 – area of contrasting evidence of cryogenic polygonal topography; *2* – anomaly caused by a present-day iron object.

zones, cultural strata with a thickness from 0.75 to 1.90 m have been recorded; fragments of burnt clay, sometimes interlayers of weakly fired clay, considerable inclusions of coal or, more rarely, ashes, and small oven stones are clearly visible. Judging by the character of the filling, the studied objects can be considered underground parts of utility, or dwelling, structures. In two instances, natural topographic lows filled with cultural layer are recorded in magnetograms. The filling of five anomalies does not show any considerable thickness (no more than 0.5 m with the average layer thickness of 0.30–0.45 m at the contrast points); however, it is characterized by high humification of the layer and high contents of coals and burnt clay, which allows the preliminary interpretation of identified objects as traces of above-ground or slightly underground utility structures. In general, the configuration of the highly-dispersed zone of magnetic field provides a provisional estimate of the settlement's outlines (Frantov, Pinkevich, 1966: 140). This is indirectly proved by a stable correlation between the borders of the accumulations of magnetic anomalies and the distribution of surface archaeological finds (Fedorina, 2012).

graphic recording of strata were performed; accurate survey tie-ins for the site plan have been provided.

The most impressive are anomalies of dipolar type (a "positive" anomaly combined with a less intense "negative" one), which are usually caused by thermoremanent magnetization objects such as remains of hearths, forges, furnaces or accumulations of slags. They have been studied at two settlements, Ves-5 (Fig. 2) and Shekshovo-2. In the area of anomaly A34 (hereinafter, the designations of anomalies correspond to the materials of studies conducted at Suzdal Opolye settlements) at Ves-5 (Fig. 2, *a*, *b*), a suboval subsoil pit of 1.7 × 2.2 m in size was found, covered by a plowed cultural layer 0.2–0.3 m thick (Fig. 2, *c*). The thickness of cultural deposits in the pit reached 1.1–1.2 m (Fedorina, Krasnikova, Mesnyankina, 2008). Large pieces of smelter slag, forming several separated interlayers, were the most prominent characteristic of the pit-filling. Therewith, small fragments of slag were contained in all observed strata. The weight of slag recovered from the pit totaled 236 kg. In addition, several carbonaceous interlayers were observed in the filling. Thus, the identified object represents an accumulation of waste from medieval metallurgical production. On the basis of the associated ceramic materials, the time when these cultural deposits were formed may be attributed to the 12th–13th centuries. Also, two other magnetic anomalies showing similar characteristics were studied: anomaly A35 at Ves-5 (Ibid.) and anomaly A1 at Shekshovo-2 (see below).

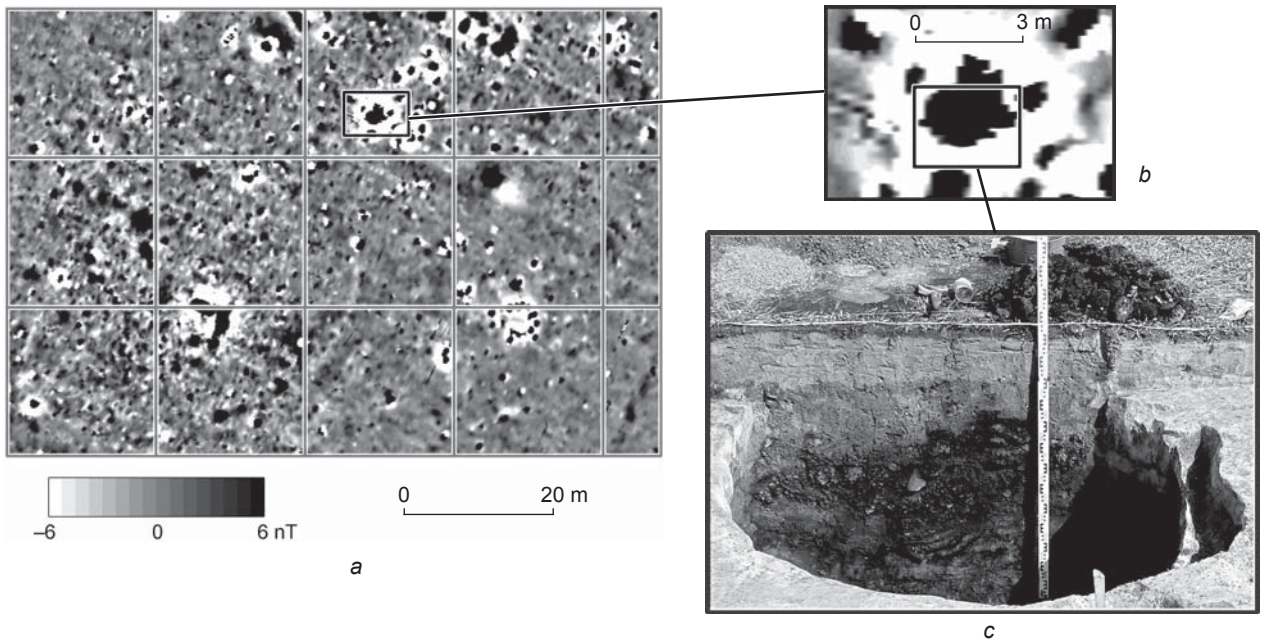

Fig. 2. Results of studies at the Ves-5 settlement.
a – fragment of production zone magnetogram, an area of anomaly A34 (the border is shown in red); *b* – anomaly A34, location of t he excavation area (the border is shown in blue); *c* – photo-recording of the pit's northern outline (view from the south).

The last type of anomaly revealed by magnetic survey at Suzdal Opolye settlements embraces large zones showing relatively high values of magnetic field without pronounced adjacent "negative" anomaly. These can be caused by various subsoil pits filled with humus layer. As an example, let us consider two objects on the periphery of the Bolshoye Davydovskoye-2 settlement. Anomalies have similar magnetization parameters, as well as shape and linear dimensions (Fig. 3, *a*). Similar stratigraphy is observed in the probe trenches: a cultural layer 0.3–0.4 m thick is fully mixed by recent plowing; below is subsoil represented by packed yellow loam. Objects corresponding in size and shape to magnetic anomalies are buried in the subsoil. Anomaly A35 (Fig. 3, *b*) is caused by a suboval pit 2.0 × 0.9 to 1.2 m in size, filled with dark-colored humus loam with a considerable coal admixture. In the lower portion of the filling, ash interlayers, blocks of calcined packed red loam, and large fragments of wheel-thrown ware were found. The maximum depth of the pit is 0.37 m. Taking into account the peculiarities of the filling, this object may be interpreted as the remains of an open summer oven or a hearth. The pit related to anomaly A46 (Fig. 3, *c*) has a rounded shape (1.5 m in diameter, maximum depth of 0.28 m). Its filling shows an increased humification and a high contents of ashes, coal, and burnt clay fragments. The identified object is slightly buried in the subsoil.

Thus, the use of magnetic prospecting at settlements of Suzdal Opolye allows us to predict the outlines of the cultural layer's distribution, and to locate the densely inhabited areas, remains of production complexes, and sometimes pits. Restrictions are determined by external circumstances, since stable selection of grounds for settlements, along with high variability of their internal layout structure, causes "overlapping" of objects with similar magnetic characteristics. Combined with a high degree of destruction of cultural layers by centuries-old plowing, this results in noticeable blurring of magnetic-field distribution. In Suzdal Opolye, magnetic prospecting allows assessment of the structure and layout of settlements in the broadest strokes, and cannot provide the required level of detail. Its main advantages are the speed of the studies, and the possibility of identifying areas for further geophysical measurements.

Assessing the spatial characteristics of sites and the features of layer structure

Electrical prospecting (areal electrical profiling with sequential change in the probing depth) was applied to reconstruct the layout of separate areas of the settlements. Unlike magnetic prospecting, this approach allows assessing the relative distribution of archaeological objects within a cultural layer. Specifically, at Shekshovo-2, electrical profiling was conducted in the central part of the site, in a zone with

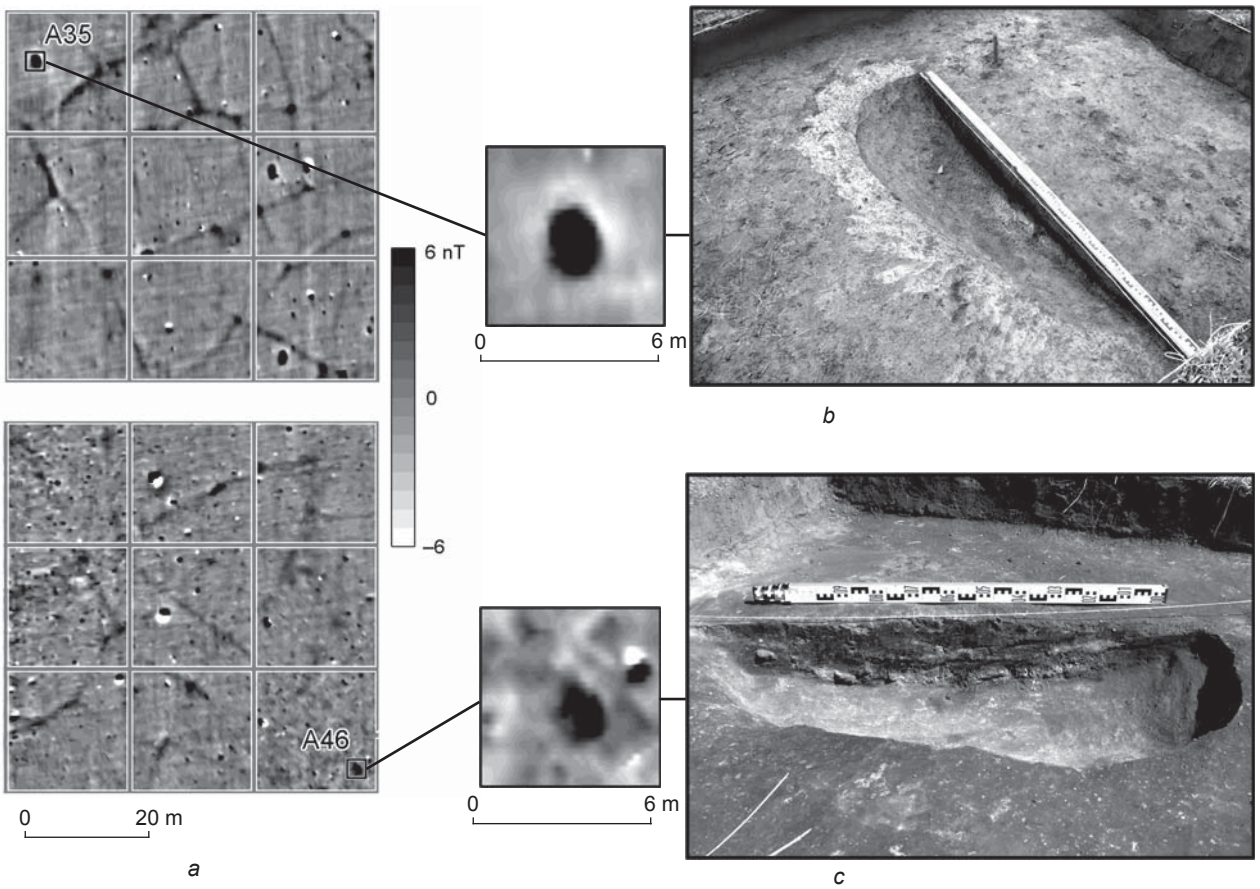

Fig. 3. Results of studies at the Bolshoye Davydovskoye-2 settlement.
a – fragments of magnetogram on settlement's periphery (borders of anomaly areas are shown in red); *b* – anomaly A35 and photo-recording of the object (view from the north-east); *c* – anomaly A46 and photo-recording of the object (view from the south-west).

high density of local magnetic anomalies. A dipolar anomaly was recorded here, which was interpreted as the remains of an object related to metallurgical production (Fig. 4, *a*). Electrical profiling of the area has revealed a series of local high-resistance objects (Fig. 4, *b*). In general, similarity is observed in both geophysical maps, which demonstrate reduction in both the thickness and the richness of cultural strata in the southeastern corner of the survey-loop of electrical profiling. However, the presence of magnetic anomaly A1 prevents only the reconstruction of the area's development structure that is based on the magnetic prospecting data; whereas the electrical profiling results have revealed local objects in the immediate vicinity of this anomaly.

A rounded pit 3.0 × 2.1 m in size corresponds to anomaly A1, which is in agreement with the geometrical parameters of anomalous resistivity. Even in the upper layers of measurements, this object was unambiguously identified as a local region of high resistance with clearly defined borders (Fig. 5, *a*). This corresponds to archaeological data: the pit is clearly identified at a depth of 0.35 m from the present-day surface. Adjacent pits observable starting from the level of subsoil were identified against the background of the surrounding low-resistance region only in the deeper measurement layers (cf. Fig. 5, *a*, *c*).

Similar changes in the borders and structure of anomalies within the cultural layer have been detected when studying the subsoil pits in the central part of Kistysh-3 settlement. The excavations have demonstrated that pits 16 and 19, determining one of the anomalies, represent the remains of cellars, separated by a subsoil partition, which sequentially changed one another (Krasnikova, Fedorina, 2008). They are recorded as a local high-resistance region of suboval shape. In this case, it is characteristic that the anomaly reveals itself ambiguously in the upper layers (Fig. 6, *a*); however, as the depth of probing increases, its borders are clearly defined against the background of the surrounding low-resistance region (Fig. 6, *b*, *c*). Such dynamics suggests that the archaeological object is a set of subsoil pits with strongly humic filling. The excavations have shown a

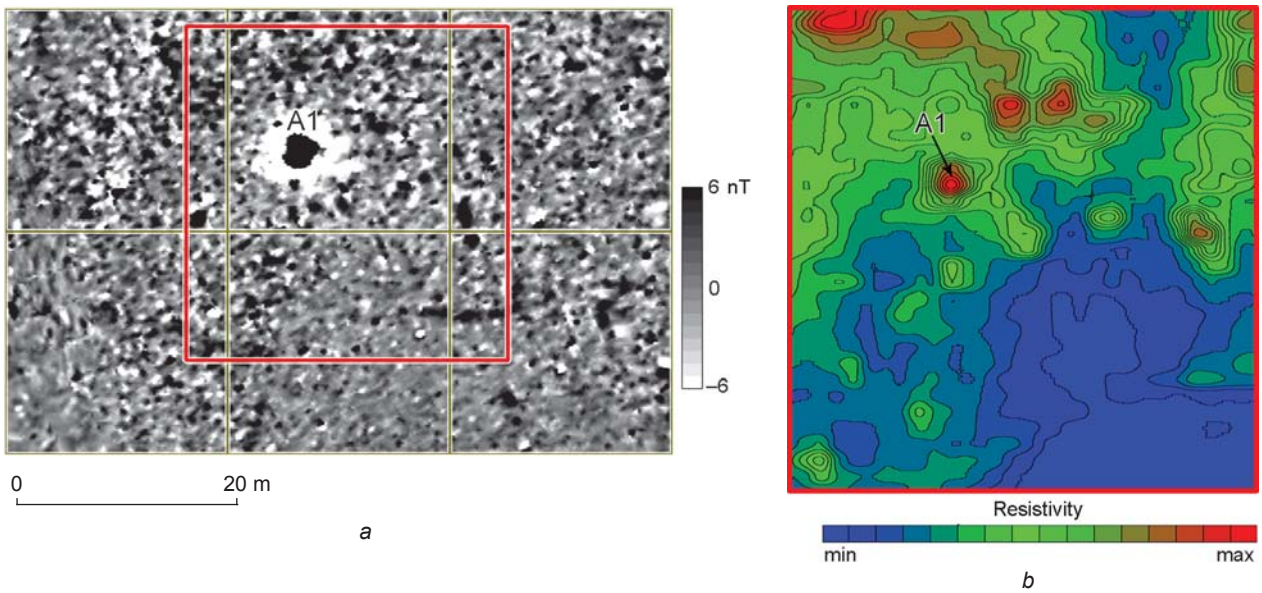

Fig. 4. Relation between magnetic prospecting and electrical prospecting at the Shekshovo-2 settlement.
a – fragment of magnetogram, border of the electrical profiling area (shown in red); *b* – results of electrical profiling.

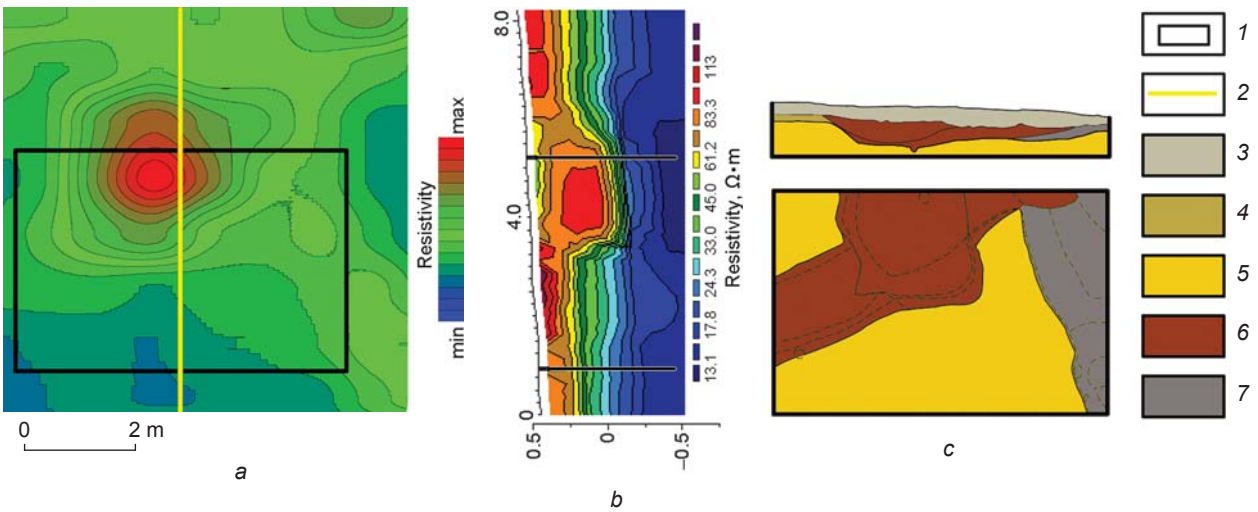

Fig. 5. Results of studies at the Shekshovo-2 settlement.
a – results of electrical profiling in the area of anomaly A1; *b* – geoelectrical section in this area; *c* – generalized drawing of the northern outline of the excavation area and the cleaning plan.
1 – border of the excavation area; *2* – location of the geoelectrical profile; *3* – plowing horizon; *4* – pre-subsoil; *5* – subsoil; *6* – cultural layer with inclusions of burnt clay, coals, and slags; *7* – cultural layer with inclusions of ceramics, animal bones, and oven stones.

good agreement between configuration of pit and shape of anomaly (Fig. 6, *d*). It should be noted that only the deeper northern pit 19 has been unambiguously revealed by electrical profiling results. This is explained by the low contrast of electrical properties in the southern pit 16 with weakly humic filling with a relatively small depth (no more than 0.3 m from the subsoil surface) and a commensurable thickness of the overlying cultural layer (0.4 m). Consequently, subsoil pits filled with cultural deposits are identified as local high-resistance objects with clearly defined borders in the lower measurement "layers". At the same time, deeper pits with filling of greater contrast can be clearly located.

In order to assess the shapes of layout objects, an effort was made to use ground-penetrating radar. This method is effective at Suzdal Opolye settlements when

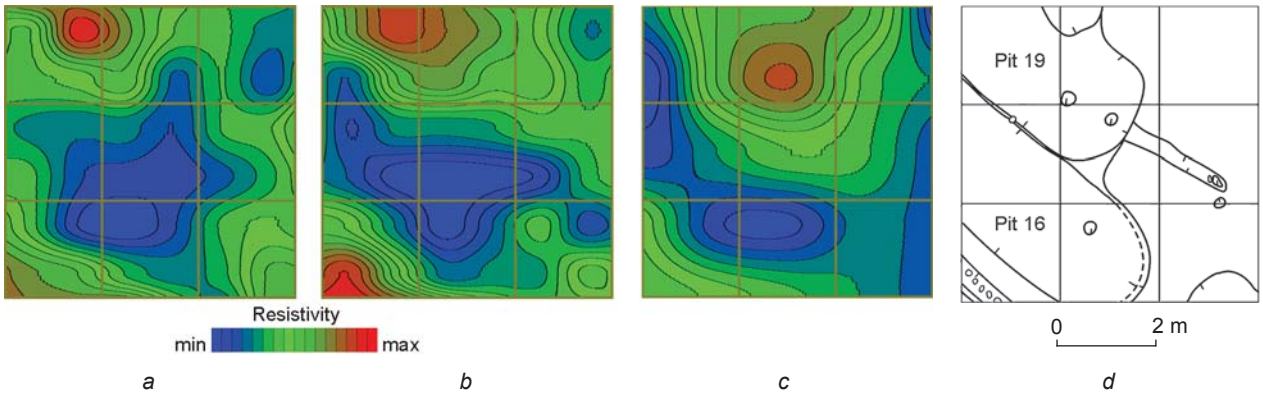

Fig. 6. Results of electrical profiling and excavations at the Kistysh-3 settlement.
a – depth of probing 0.7 m; *b* – 1.0 m; *c* – 1.5 m; *d* – generalized drawing of the subsoil cleaning plan.

studying relatively small quantities of archaeological objects, primarily remains of deep (up to 2 m) cellars of buildings and separate vaults characterized by large plan dimensions and depth (Shpolyansky, 2008). Specifically, radargrams made during the survey of Kibol-5 have identified (with a reasonable degree of accuracy) pits representing deep cellars of medieval buildings (3.6 × 4.5 × 1.9 m and 3.5 × 4.0 × 1.8 m in size). Nevertheless, it has been impossible to identify a number of objects similar in their archaeological characteristics and size.

Assessing the thicknesses of cultural strata was another important task. The density of local magnetic anomalies in the eastern part of Shekshovo-2 (Fig. 7, *a*) is appreciably smaller than in the western one. This territory was probably the settlement's periphery. Electrical prospecting has revealed an increased-resistance zone in the eastern part of the geophysical table. Its border is most distinctly observed in the lower measurement "layers" (Fig. 7, *b*). This suggests that the cultural layer's thickness is smaller in the western part. The results of excavations confirm this interpretation of the geophysical data: the thickness of the humus layer in excavation area 4 smoothly increases from west to east from 0.10 to 0.25 m (Fig. 7, *b*, *d*), and reaches 0.5–0.6 m in excavation area 3 (Fig. 7, *b*, *e*).

In general, electrical profiling ensures more detailed reconstruction of the cultural strata's structure than magnetic prospecting does. When studying Suzdal Opolye settlements, electrical prospecting allows for accurate determination of the borders of areas with great thicknesses of cultural layer. Information about the shapes and structures of anomalies provides the basis for qualitative interpretation of local archaeological objects, and for rough assessment of their geometric parameters and depth of location. Consequently, for detailed reconstruction of the spatial distribution of objects in the cultural layer, it is necessary to supplement data from planigraphic survey (magnetic prospecting, electrical profiling) with geophysical information about the site's stratigraphy.

Assessing spatial characteristics of the identified objects

Normally, such studies are conducted only in the key areas, identified on the basis of preliminary measurements, rather than throughout the entire area of interest. This line of research was implemented at Suzdal Opolye settlements by means of electrical tomography, which resulted in a geoelectrical section, i.e. a map showing the possible distribution of resistivity in a vertical plane along the selected profile.

At Shekshovo-2, electrical tomography was applied in order to refine interpretation of data obtained by preliminary geophysical survey. Specifically, additional studies of the local resistivity anomaly, revealed in the western part of settlement, allowed not only confirmation of the prediction, but also determination of the geometric parameters of the pit before the excavations (see Fig. 5, *b*). The geoelectrical section in the eastern part of this settlement clearly indicates changes in the thickness of the cultural layer (see Fig. 7, *c*), which is in good agreement with the data from electrical profiling and the results of excavations.

Conclusions

Study of the Suzdal Opolye settlements demonstrates the necessity for comprehensive use of geophysical methods to record various physical parameters of the near-surface soil layer. Consistent application of magnetic prospecting, electrical profiling, and electrical tomography, and also comparison of geophysical findings with those of drilling,

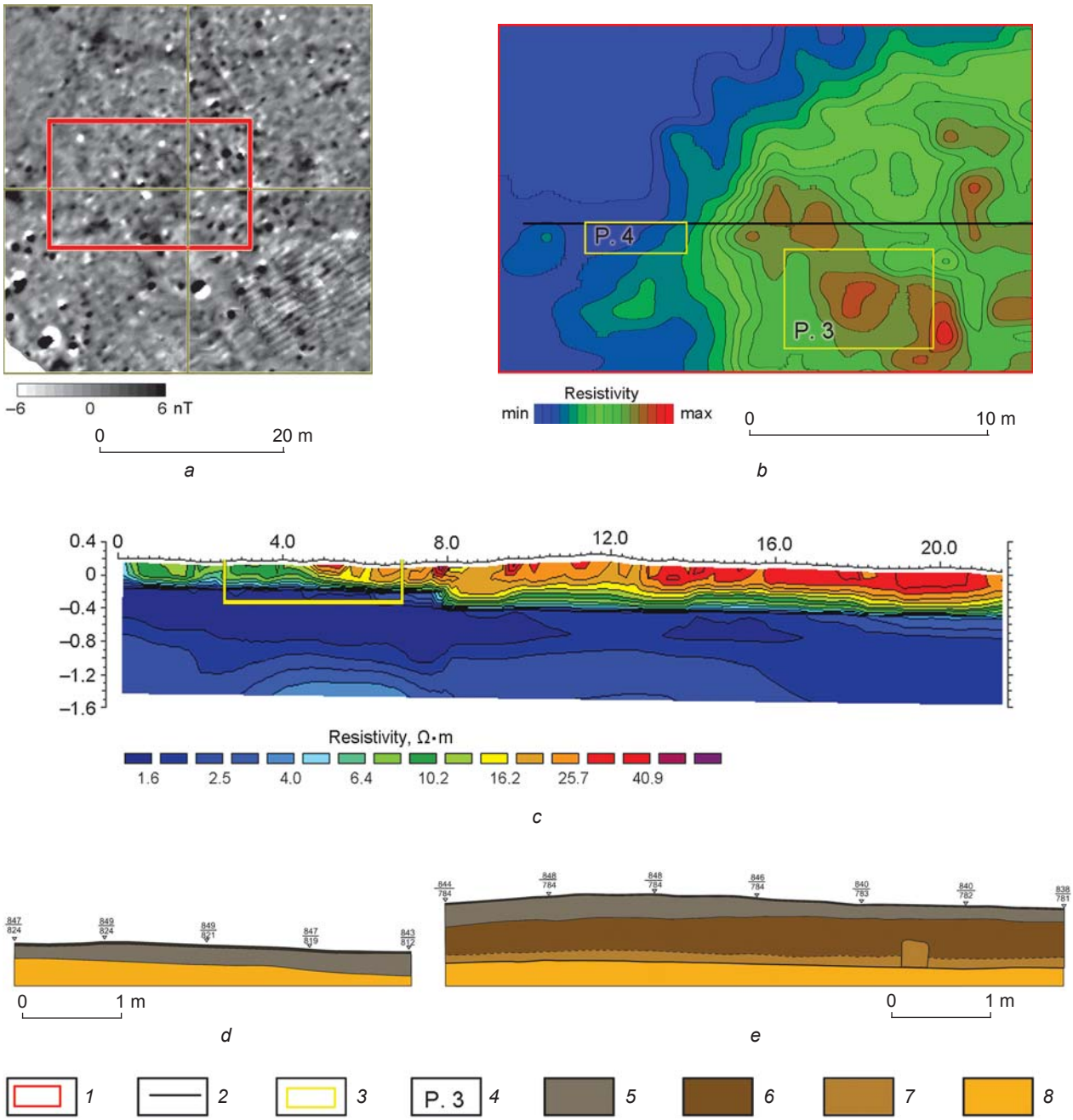

Fig. 7. Results of studies at the Shekshovo-2 settlement.
a – fragment of magnetogram on settlement's periphery; *b* – results of electrical profiling; *c* – geoelectrical section; *d* – generalized drawing of the northern outline of excavation area 4; *e* – generalized drawing of the northern outline of the excavation area 3.
1 – border of the survey loop of electrical profiling; *2* – location of the geoelectrical profile; *3* – borders of excavation areas; *4* – numbers of excavation areas; *5* – plowed land; *6* – undisturbed cultural layer; *7* – zone of contact between cultural layer and subsoil; *8* – subsoil.

pilot excavations, and tendencies in the distribution of surface finds, allow more accurate interpretation of anomalies and assessment of the distinguishing features of changes in the cultural layer. A combination of conventional techniques of archaeological exploration and field recording of sites with geophysical surveys of medieval settlements makes it possible to outline the borders of settlements; to reveal production zones, primarily those relating to iron smelting; and to localize densely inhabited areas in the territory of sites.

References

Fedorina A.N. 2012
Srednevekovye selskiye poseleniya Suzdalskoi zemli po dannym arkheologii i geofiziki: Issledovaniya 2008 g. *KSIA*, iss. 226: 77–87.

Fedorina A.N., Krasnikova A.M., Mesnyankina S.V. 2008
Lokalizatsiya i issledovaniye zhilykh i khozyaistvennykh sooruzheniy na selishchakh Ves 5 i Shekshovo 2 s ispolzovaniyem metodov geofiziki i arkheologii. In *Arkheologiya Vladimiro-Suzdalskoi zemli: Materialy nauch. seminara*, iss. 2. Moscow: pp. 23–35.

Frantov G.S., Pinkevich A.A. 1966
Geofizika v arkheologii. Leningrad: Nedra.

Ibsen T. 2013
On Prussians and Vikings: New excavation results from the early medieval Viking Age site Wiskiauten/Moxovoe in Kaliningrad Region, Russia. In *Arkheologiya Baltiyskogo regiona*. Moscow: IA RAN; St. Petersburg: Nestor-Istoriya, pp. 223–241.

Krasnikova A.M., Fedorina A.N. 2008
Nebolshiye poseleniya blizhnei okrugi Suzdalya (po materialam issledovaniy selishch Vishenki 3 i Kistysh 3. In *Trudy II (XVIII) Vseros. arkheol. syezda v Suzdale*, vol. II. Moscow: pp. 347–349.

Makarov N.A. 2008
Srednevekovoye rasseleniye v Suzdalskom Opole: Novye rezultaty i perspektivy issledovaniy. In Arkheologiya Vladimiro-Suzdalskoi zemli: Materialy nauch. seminara, iss. 2. Moscow: pp. 3–22.

Shpolyansky S.V. 2008
Konstruktsii podpoliy srednevekovykh postroyek v Suzdale i ego okruge (opyt sistematizatsii). In *Arkheologiya Vladimiro-Suzdalskoi zemli: Materialy nauch. seminara*, iss. 2. Moscow: pp. 56–66.

Zakharov S.D., Zozulya S.S. 2015
Novye polevye issledovaniya na territorii timeriovskogo arkheologicheskogo kompleksa. *KSIA*, iss. 236: 157–161.

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Metal Bowls from a Medieval Cemetery at Rusenikha

Unusual metal bowls, one intact and three fragmented, from a medieval Mari cemetery at Rusenikha, in the Nizhny Novgorod Region, are described. Coins indicate that the cemetery dates to the 11th century. The results of the chemical analysis of the metal are presented. The bowls are made of "white bronze", and are decorated with geometric patterns on the inside. Similar items are rather frequent in medieval (9th–11th century) Mari cemeteries (Veselovo, Dubovsky, Nizhnyaya Strelka), and isolated finds are known on the Oka and Middle Volga. Numerous parallels relate to Western Siberia, most notably to the Ob Basin, among works of the 10th–11th century toreutic art of Eastern Iran and western Central Asia. Certain features of the Rusenikha bowls offer a deeper view of the technology, decoration, and features of individual artistic style. It has also become possible to specify the date of those vessels and the places of their manufacture. The routes whereby they were imported to the Middle Volga might have varied, but the principal one, passing across Volga Bulgaria, had been taken by Ibn Fadlan in the early 10th century. This stretch of the Great Silk Road connecting East and West was especially important from the 9th to the mid-11th century, when the Kipchak-Cuman tribes established hegemony in the Eastern European steppes.

Keywords: *Middle Ages, Mari, cultural contacts, technology, dating.*

Introduction

A considerably large series of metal bowls was found at the medieval Mari cemeteries of Veselovo, Dubovsky, and Nizhnyaya Strelka in the 1950s–1980s. Similar objects are known from a vast territory from the Oka River in the west to the Ob River in the east (Rudenko, 2000a: 87–90). The bowls date to the 10th–11th century (Nikitina, Rudenko, 1992; Rudenko, 2000b, 2010). Noteworthy are the bowls from the cemetery of Nizhnyaya Strelka (Nikitina, Rudenko, 1992), exhibiting original decorative motifs, whose exact analogs have not been recorded so far.

In the recent years, the collection of bowls has been supplemented by unique items from the medieval Mari cemetery at Rusenikha, located on the right bank of the Vetluga River in the Nizhny Novgorod Region. The site was discovered by T.B. Nikitina in 2009, and was studied in 2010–2013 by the archaeological expedition team of the Mari Research Institute of Language, Literature and History, headed by Nikitina and supported by the Russian Foundation for the Humanities, projects

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No. 10-01-18045e, 11-01-18023e, and 13-01-18052. The study area totaled over 1500 m^2, including a continuous archaeological survey area of 948 m^2 and a geophysical survey area of ca 1000 m^2. The excavated section of the cemetery revealed 18 burials, and 15 sacrificial assemblages located in the space between burials.

In accordance with the burial rite and grave goods, the site is attributed to the Mari culture of the 10th–11th century. This age estimate was proposed by D.G. Mukhametshin, senior researcher of the Bulgarian State Historical and Architectural Museum-Reserve, on the basis of dirham coins recovered from some burials. These coins are mostly imitations, the earliest of which date to the reign of Jafar ibn Abdallah (9th century to early 20s of the 10th century), while the younger coins were manufactured during the reign of At-Tai Billah (late 10th century).

The Rusenikha grave goods include a great number of typologically diverse artifacts: adornments, labor tools, weapons, and household utensils. Metal bowls are of especial interest with respect to the burial rite, esthetics, and cultural and trade contacts. During excavations, one almost intact bowl and isolated fragments of a few other bowls were found. Two bowls were associated with sacrificial assemblages; other fragments were embedded in the ploughed field between graves.

Description of bowls

Bowl 1. The fragments were associated with sacrificial assemblage 1 (Fig. 1, *4–6*). It represents a set of adornments wrapped in cloth and fur, and buried in a shallow pit between graves 1 and 2. The outlines of a rounded pit, 40 cm in diameter, were noted at a depth of 28 cm from the present daylight surface. The goods were placed on wooden bedding. They included two spectacle-shaped pendants and two large umbo-shaped pendants with rattling suspensions, fragments of an iron knife, ten large metal beads, small metal pieces of bowl, and birch-bark fragments. Judging by the composition of the finds, the assemblage contained shoe-ornaments.

There were seven fragments of a bowl: three rim-fragments and four wall-fragments. The bowl had a hemispherical, flattened shape; the approximate diameter was 14 cm, the height might have been in the range of 5–7 cm. The color of the metal was dark green, nearly black. The bowl was decorated on both interior and (what is especially remarkable) exterior surfaces. Its walls were very thin (0.01–0.10 cm), brittle, and fragile. Some fragments demonstrated uneven surface; convexities were formed because of metal corrosion, as demonstrated by exfoliation of the metal at bulging areas.

1.1. Fragment of a rim, consisting of three pieces stuck together (Fig. 1, *4*), 3.60 × 2.90 × 0.01 cm in size. The inside shows an ornamental band spaced 1.7 cm from the rim's edge, and consisting of small circles 0.2 cm in diameter with a dot in the center of each. Traces of marking remained preserved: a thin line serving as a guide-mark for installing a circular burin (Fig. 1, *5*, *6*). The exterior surface bears a motif of overlapping circles 0.5 cm in diameter with dots in their centers, the motif representing a continuous chain of circles spaced 0.7 cm from the rim's edge. The artisan must have been very skilled in engraving for the ornamentation on either side not to show through the extremely thin walls of the vessel. Apparently, he used a special support-plate or a small wooden anvil with soft coating to secure engraving on the inner bowl surface. The exterior decoration motif is noteworthy because the edges of the image are smoothed. Possibly, it was made during the preparation of the template, and was applied on it.

1.2. Fragment of a rim, consisting of two irregular triangular pieces stuck together (2.80 × 1.30 × 0.01 cm), with a straight cut, without decoration.

1.3. Fragment of a rim (1.70 × 1.60 × 0.01 cm) of an irregular rectangular shape, with a straight cut, without decoration.

1.4. Wall-fragment (3.10 × 1.70 × 0.01 cm) of an irregular triangular shape, with decorative motif of small circles (0.15–0.20 cm in diameter), with dots in their centers, the circles being executed with thin lines (0.01 cm thick).

1.5. Wall-fragment (1.70 × 2.0 × 0.01 cm) of irregular square shape, with the same decoration as described above.

1.6. Wall-fragment of two irregular rectangular pieces (1.80 × 0.75 × 0.01 cm) stuck together. Decoration similar to the above, partially preserved.

1.7. Fragment of bowl's bottom (4.00 × 2.45 × × 0.01 cm) of irregular sub-rectangular shape with decoration in the form of a ring, 4 cm in diameter, composed of small circles, 0.15 to 0.20 cm in diameter, with dots in their centers. On the reverse side, vague circles are seen, ca 0.4 cm in diameter, with dots in their centers.

Bowl 2. This bowl is represented by four fragments from surface finds.

2.1. The fragment 7.60 × 6.10 × 0.15 cm is well preserved, but has some contaminated areas and a fissure over 1/3 of its surface (Fig. 1, *1*). The bowl had a hemispherical shape, was 13.6 cm in diameter and ca 7–9 cm high. It was manufactured of a sheet blank made by casting with a subsequent mandrel forging, for shaping. At first, the bottom was forged, and then the walls were drawn down. The external undecorated surface of the bowl shows the traces of processing of the template's wooden blank in the form of wide cuts intended for the template's fashioning (similar traces are also noted on the inside of the rim). The interior surface of the fragment has linear signs obtained by polishing the surface with

sand. All signs are parallel to one another, suggesting that polishing was unidirectional.

The interior surface of the bowl was polished, and decoration was only applied after that, as evidenced by the rough edges of the engraved lines (which would otherwise be smoothed by polishing). This complicated the artisan's work: the burin was unstable and slid over the smooth surface, despite the marking made with a punch. Binocular microscopic examination has shown the uneven depth and width of the engraved ornamental lines. When making the external ring, the artisan engraved a double line.

The decorative composition is simple and fits the bowl's shape. It includes an ornamental band immediately (1.1 cm) below the edge of the rim, and large circles on the curved walls. The band consists of three stripes 0.4, 0.5, and 0.3 cm wide, delimited by four parallel lines. The middle stripe is filled with adjoining or overlapping circles 0.4 cm in diameter with dots in their centers. The two outer stripes are empty.

The main ornamental motif consists of concentric circles 3.4–3.5 and 1.5 cm in diameter, delimited by a double line (where lines are spaced by 0.2 cm), with the smaller circle containing three adjoining circles 0.5 cm in diameter with dots in their centers. There are also displaced circles, which are, possibly, due to the sliding of the tool over the smooth surface. The space between large circles, apparently, should have been filled with small circles 0.4–0.5 cm in diameter; but this task was only partially completed by the artisan: in one space, he made three small circles, and in another space, two. An attempt to select other variants of decoration failed: there is only a series of punched dots left (made for a pair of compasses), which are connected by small cut marks.

2.2. Fragment of a rim (1.60 × 1.80 × 0.15 cm) of sub-rectangular shape, gold color, polished inner surface, and smooth exterior surface; undecorated.

2.3. Wall-fragment (2.30 × 1.30 × 0.15 cm) of sub-rectangular shape and gold color (Fig. 1, *2*). The inner surface shows the lower lateral parts of two large circles (3.4 cm in diameter) of the main ornamental motif, a section of an arch from the ring band of the central roundel, and one small circle with a dot in its center from the background decoration (i.e. from free space between large circles).

2.4. Bottom fragment (Fig. 1, *3*). Its polished inner surface preserved a part of a large circle 3.2 cm in diameter, with a double outline (where the lines are spaced 0.2 cm apart). Another large circle, also with a double outline, is situated 0.6 cm from the first, and separates the image on the wall from the bottom decoration. In the central roundel, judging by two overlapping arches, a multi-petalled rosette was represented; and between its petals, there were small circles (at least one circle) with dots in their centers.

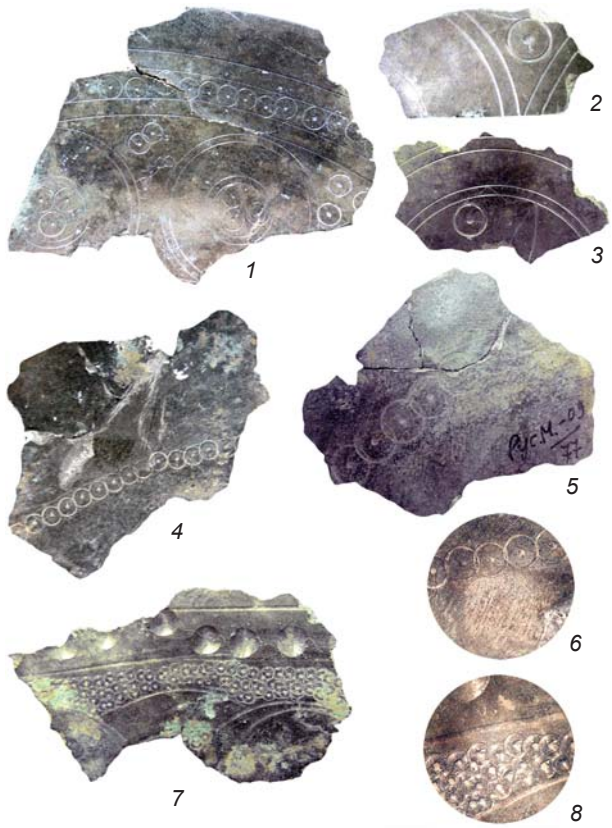

Fig. 1. Fragments of metal bowls.
1–3, *7*, *8* – surface finds; *4–6* – sacrificial assemblage 1.

Bowl 3. This bowl is represented by a wall-fragment (Fig. 1, *7*, *8*) 4.00 × 2.50 × 0.05 cm in size, decorated with circular ornament on the inside. The exterior surface of this fragment shows no decoration. Both surfaces demonstrate traces of polishing. Furthermore, the exterior surface shows signs of soldered seams, which suggests that the bowl was made of several plates.

The ornament includes concentric circles 1.6 and 0.8 cm in diameter, where the large circles are connected with one another by half-arches in their upper parts. The space up to the above ornamental stripe is densely filled with small circles (0.1 cm in diameter) with dots in their centers. The lines, 0.01 cm thick, were carved with a very thin burin. The ornamental stripe, formed by two parallel lines, is decorated with shallow halfway-drilled notches 0.3 cm in diameter. The drilling of these notches was preceded by the attempts to fill the stripe with small circles 0.3 cm in diameter; however, the burin slid over the smooth surface, and these attempts failed.

Bowl 4. This was found in the southern birch-bark box of sacrificial assemblage 5. The bowl, laid upside down, covered the following objects, wrapped in fur and cloth and placed into the birch-bark box: four fragments of a round-wire bronze bracelet, two horse pendants with rattling suspensions, two silver temple rings with

upturned ends, silver "mustached" finger-rings, fragments of two laminar bracelets made of nonferrous metal, a bronze bead, fragments of a pectoral adornment in the form of a plate with rattling bottle-shaped suspensions, woolen threads (with spiral metal winding, clips, and small metal beads from a plait decoration piece), bronze bell and beads, an iron knife, remains of an adornment (which included a bone horse and two heavily damaged ear-picks, as well as bronze pipe-shaped and round beads), textile pieces with embroidery made with metal thread, bronze pipe-shaped beads, leather fragments, umbo-shaped pendants, shoe-straps and metal shoe-decorating beads, shoe-laces plaited of two-colored thread, a small pretzel-shaped steel and a small piece of flint, a sandstone bar (probably a casting mold) wrapped in birch bark and placed over three evenly cut wooden planks, a copper chainlet, a buckle with rattling suspensions made of non-ferrous metal, and one more silver finger-ring. The bowl was covered with birch bark. Thereupon, charcoal pieces were noted. At the bottom of the pit containing the sacrificial assemblage, traces of bast and twigs were found.

The bowl had a hemispherical shape (Fig. 2, *1*), and was 13.0–13.6 cm in rim diameter and 5.7 cm high. The inner surface was golden yellow; the exterior surface was gray with a greenish shade. The bowl was made of several cast plates connected through forged welding. First the bottom was forged, and then the walls were drawn down. The bowl shows clear forged sections. The bottom is very thin, brittle, and fragile. The bowl is decorated on both surfaces, with the inner surface being decorated after polishing.

The ornamentation of the exterior surface is simple: there are two concentric circles 6.0 and 4.5 cm in diameter on the slightly flattened bottom, and seven engraved representations, made of intersecting incisions (5 × 5; 5 × 7; 4 × 5 cm in various combinations) arranged in compact compositions, in the free space (Fig. 2, *2*). These are rhomboid motifs formed primarily by pairs of intersecting segments (1 cm long on average) in the upper part of the motif, and by one segment in the lower part. Into the rhomboid central part, a diagonal cross is inscribed, forming four small rhomboids inside. This combination of lines is similar in all compositions, which were executed with varying degrees of care and precision. Sometimes, all segments forming the rhomboid motif are paired, with an additional segment in the upper part. Such combinations are primarily incidental, because the artisan made the incisions rather arbitrarily, and the rhomboids were formed through intersection of lines without any evaluation of the distance between them. Between these ornamental features, paired incisions are situated, ca 1 cm long and spaced 1 cm apart. They have an inclination from the right to the left, as if showing clockwise movement.

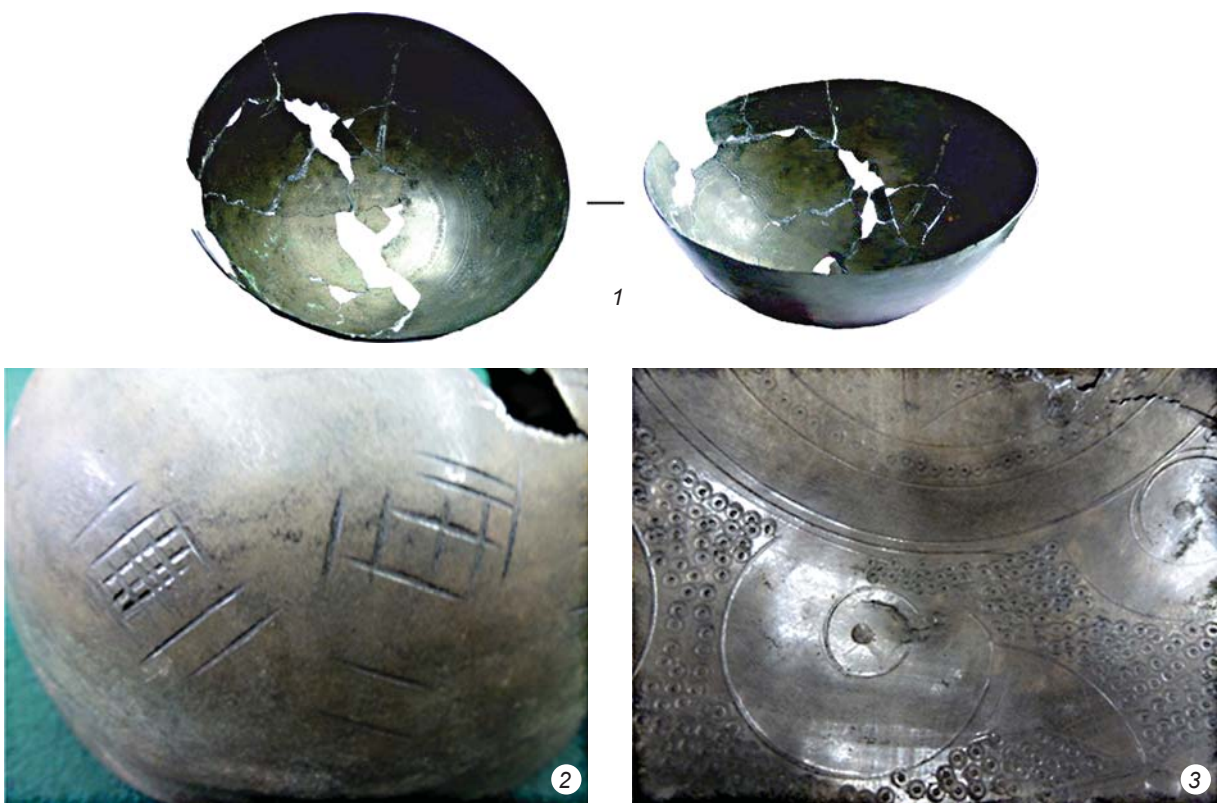

Fig. 2. Metal bowl from sacrificial assemblage 5.

The decoration of the inner surface of the bowl is more complicated. It consists of a central roundel and three ornamental stripes. In the center, there is a six-petalled rosette inscribed into a circle 6 cm in diameter (Fig. 2, *3*). The petal-tips are connected with one another by arches adjoining the roundel's outline. The background of the motif is filled with small circles 0.2 cm in diameter with dots in their centers. They are rather randomly scattered over the free spaces between the petals.

The first ornamental band, with a chain of small circles 0.2 cm in diameter with dots in their centers, is formed by an external outline of the central roundel, and by a large circle incised 0.5 cm apart from it; the second band is spaced 0.8 cm apart from the first. The artisan seems to have had problems in precisely establishing the pair of compasses, which slid over the polished surface and left erroneous lines. The main outline is situated at a distance of 4.5 cm from the central point, while the erroneous ones are at 4.3 and 4.6 cm. The second edge of the ornamental stripe was defined by a large circle 7.2 cm in radius. Decoration of this stripe 3.2 cm wide consisted of seven stylized images of vegetative shoots of similar shape, while the free space was filled with small circles 0.2 cm in diameter, with dots in their centers.

The shoots are represented rather simply. At a distance of 0.7 cm from the lower edge of the stripe, according to preliminary marking, small circles 0.7 cm in radius were incised. In two cases, the burin slid off, which resulted in one "blurred" circle, and one having an "additional" outline. Then, from the center of each circle, another circle 1.6 cm in radius was incised, forming the external curve of the shoot. The latter ended up quite originally: in its left part, it ended with another small circle (0.7 cm in diameter). A spring coming out from the curve was formed by the arches 1.8 and 1.7 cm in radius. In this case, the compass leg was installed on the external outline of the ornamental stripe or slightly above it. The central part of this shoot, in the place of installing the compass leg, is additionally halfway-drilled.

The third ornamental band, 0.7 cm wide, consisted of halfway-drilled notches 0.4 cm in diameter. The artisan seems to have attempted to make a preliminary marking, which is preserved in the form of thin outlined circles, but he failed to do this and began to use the drill instead. The drill slid over the polished surface, and the marked sequence of notches was broken; they are located quite irregularly.

Thus, during the excavations at Rusenikha cemetery in 2009–2011, four hemispherical metal bowls showing decoration with geometric patterns were found (one almost intact, and three in a fragmented state). According to the results of the quantitative spectral analysis (see *Table*), the bowls were made from high-tin bronze, which is typical of such objects from the Mari region of the Volga basin (Nikitina, Rudenko, 1992).

Bowls' attribution and place of manufacture

The bowls from the Rusenkikha cemetery are mostly thin-walled, unlike similar finds from other ancient Mari burial grounds. Only one of them is comparatively thick, and thus similar to the bowls from the Veselovo and Dubovsky cemeteries. Another similar feature is the technology of ornamentation with thin lines. Sometimes, small circles with dots in their centers, a motif common

Chemical composition of metal of the Rusenikha bowls (X-ray fluorescence analysis)

No. of fragment in the description	Place of discovery	Fe	Co	Ni	Zn	Pd	Pb	Sn	Cu	As	Bi	Ag
1.1	Sacrificial assemblage 1	0.52	0.11	0.23	0.07	0.62	0.53	45.35	52.16	0.41	–	–
1.6	"	0.93	0.07	0.21	–	0.65	0.31	40.07	57.79	–	–	–
2.1 (rim)	Ploughed field	0.49	0.13	0.23	0.07	0.58	0.17	27.96	70.37	–	–	–
2.3 (wall)	"	0.62	0.21	0.27	0.13	0.56	0.40	28.71	68.80	–	–	–
2.2 (wall)	"	0.91	0.18	0.29	0.09	0.61	0.27	38.76	58.89	–	–	–
2.4 (bottom)	"	0.71	0.16	0.25	0.09	0.62	0.34	35.91	61.93	–	–	–
3	"	0.64	0.13	0.24	0.07	0.62	0.91	31.28	66.10	–	–	–
4 (wall)	Sacrificial assemblage 5	0.53	0.11	0.22	–	0.64	0.94	34.68	62.76	–	0.03	0.08
4.1 (bottom)	"	0.44	0.08	0.23	0.06	0.67	0.73	35.45	62.21	–	–	0.12
4.2 (wall)	"	0.47	0.10	0.27	–	0.59	0.42	28.40	69.58	–	–	0.17

for almost all decorative compositions on such vessels, overlap one another.

The rest of the bowls show considerable similarity in their ornamental features (combinations of engraved motifs with halfway-drilled notches) to the vessels from the Nizhnyaya Strelka cemetery. However, the Nizhnaya Strelka bowls are larger, with thicker walls. Furthermore, they have a rather different primary ornamentation style, based on zoomorphic motifs.

The closest analogs to the Rusenikha motif of multi-petalled rosette can be seen on the bowls from Malyshevo cemetery of the medieval Muroma tribes and from the Semenovskoye I settlement in Tatarstan, both of which are dated to the 10th century. The Semenovskoye I bowl has a hemispherical shape; its inner surface is polished and decorated. The central roundel shows a geometric rosette with thin petals, between which the pyramids of small circles 0.3 cm in diameter with dots in their centers are located. The ring ornamental stripe, bordered on top and bottom by plain stripes 0.2 and 0.4 cm wide, is composed of eight elements, each representing a circle 4 cm in diameter with a rosette of circles in the center framed by a decorative band. The background between them is filled with small circles with dots in their centers (Rudenko, 1990).

Judging by its decoration and size (14 cm in diameter and 4.9 cm high), bowl 4 from Rusenikha is very close to that from the Yamal Penisula (Sokrovishcha…, 2003: 34, No. 4). Notably, the same Yamal site yielded a bowl* bearing decoration very similar to that on the vessel from Nizhnyaya Strelka. Of great interest also is the presence of a bowl with circular ornament on its inner surface in cremation burial 18 at Nad Polyanoi cemetery on the Yenisei River. A.A. Gavrilova, the researcher of this site, has dated the bowl to the 9th–10th century on the basis of B.I. Marshak's data on the Oriental Muslim antiques (Gavrilova, 1974: Fig. 5, *6*, *7*).

In Western Siberia, cast Iranian bowls decorated with small circles with dots in their centers have been found (Baulo, 2011: 249–250, cat. No. 382, 383; Fedorova, 1981). They are quite numerous (Fedorova, 1985: 130, tab. I). Spherical bowls with circular ornament or undecorated are dated to the 8th–10th century. Two such bowls, from the collection of artifacts donated to the Yamal-Nenets Regional Museum Complex by the physician B.I. Vasilenko, were found in the Yamal Peninsula, at the destroyed burial ground of Kheto-se (personal communication of A.G. Brusnitsyna); one more bowl was recovered in 2002 during excavations at the archaeological site in vicinity to Zeleny Yar on the Polui River, 46 km east of Salekhard (Fedorova, 2009).

Bowls of this type are most frequently attributed as Iranian ones of the 9th–11th century (Ettinghausen, 1957). However, it has been traditionally assumed that in the 10th century metal ware was imported into the Upper and Middle Volga from Volga Bulgaria, where manufacturing centers for metal artworks were located. The discovery of such a bowl at the Bulgarian trade settlement of Semenovskoye, close to the Kama River mouth, seems to have supported this hypothesis. However, there is no evidence that this item was necessarily manufactured by Bulgarian artisans. Moreover, such bowls have been discovered not only in the Middle Volga, but also in Western Siberia.

Bulgarian items of the 10th–11th century that were identified by Marshak, including bowls (Sokrovishcha…, 2003: 58–66, No. 23–290), differ from the bowls under study in material, technology, and decoration patterns. The decoration of the Bulgarian bowls included neither compositions with circles nor a characteristic ornamental feature—small circles with dots in their centers. The same traits also do not allow us to correlate these items with the Khazarian toreutics (Ibid.: 52, No. 18).

The closest analogs to the bowls from Rusenikha cemetery, as from the whole Mari region of the Volga, can be established in the metal art from the states that existed in the territory of Eastern Iran and western Central Asia in the 10th–11th century: the Kara-Khanid Khanate (Ghaznavids) and the Samanid Empire (Litvinsky, Soloviev, 1985: 166, fig. 47, *3*). However, apart from the general appearance and coincidence of multiple ornamental motifs (composition of circles, decoration with small circles with dots in their centers, etc.), there are also considerable differences: all Iranian bowls are cast, and decorated primarily on both sides; furthermore, they show inscriptions (Ivanov, 1985a: 198–201). They also have no zoomorphic motifs typical of the Mari Volga bowls. However, some Iranian bowls still show animal and bird images ("animal rut") and animal figurines in the form of zodiac signs (Ivanov, 1985b: Fig. 1, *2*). Exactly the indicated region is the possible place of manufacture of the items under discussion. This hypothesis is partially supported by the fact that in Volga Bulgaria itself, many pieces of art were manufactured by the examples elaborated in trade centers of western Central Asia (Rudenko, 2010). In addition, felt rugs from the sacrificial assemblages of the Rusenikha cemetery are also associated with the culture of Turkic tribes populating western Central Asia and Southern Siberia (Nikitina, 2013).

The routes of delivery of the bowls to the Middle Volga might have varied, but the principal route was the way through Volga Bulgaria, which had been taken by Ibn Fadlan's envoys in the early 10th century. This route, which was part of the Great Silk Road connecting countries of East and West, was frequently used from the 9th to the mid-11th century, the onset of Kipchak-Cuman hegemony in the Eastern European steppes.

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References

Baulo A.V. 2011
Drevnyaya bronza iz etnograficheskikh kompleksov i sluchainykh sborov. Novosibirsk: Izd. IAE SO RAN.

Ettinghausen R. 1957
The "Wade cup" in the Cleveland museum of Art, its origin and decorations. *Ars Orientales*, vol. II: 327–366.

Fedorova N.V. 1981
Novyi klad epokhi srednevekovya s Barsovoi Gory. In *Problemy zapadnosibirskoi arkheologii: Epokha zheleza.* Novosibirsk: Nauka, pp. 148–152.

Fedorova N.V. 1985
Importnoye serebro v Zapadnoi Sibiri. In *Khudozhestvennye pamyatniki i problemy kultury Vostoka*. Leningrad: Iskusstvo, pp. 125–133.

Fedorova N.V. 2009
Khudozhestvennyi metall srednevekovogo Vostoka na severe Zapadnoi Sibiri. *Gumanitarnye nauki v Sibiri*, No. 3 (2): 29–33.

Gavrilova A.A. 1974
Sverkayushchaya chasha s Eniseya (k voprosu o pamyatnikakh uigurov v Sayano-Altae). In *Bronzovyi i zheleznyi vek Sibiri*. Novosibirsk: Nauka, pp. 177–183. (Materialy po istorii Sibiri: Drevnyaya Sibir; iss. 4).

Ivanov A.A. 1985a
Nadpisi na srednevekovykh bronzovykh izdeliyakh iz Yuzhnogo Tadzhikistana. In *Litvinskiy B.A., Solovyev V.S. Srednevekovaya kultura Tokharistana v svete raskopok v Vakhshskoi doline*. Moscow: Nauka, pp. 198–204.

Ivanov A.A. 1985b
Bronzovaya chasha iz Khunzakha. In *Khudozhestvennye pamyatniki i problemy kultury Vostoka*. Leningrad: Iskusstvo, pp. 181–187.

Litvinsky B.A., Soloviev V.S. 1985
Srednevekovaya kultura Tokharistana v svete raskopok v Vakhshskoi doline. Moscow: Nauka.

Nikitina T.B. 2013
Voilok v pogrebalnom obryade Rusenikhinskogo mogilnika. *KSIA*, No. 230: 253–260.

Nikitina T.B., Rudenko K.A. 1992
Chashi iz mogilnika Nizhnyaya Strelka. *Srednevekovye drevnosti Volgo-Kamya: Arkheologiya i etnografiya Mariyskogo kraya*, iss. 21: 51–71.

Rudenko K.A. 1990
Bronzovaya chasha iz 1 Semenovskogo selishcha. In *Pamyatniki istorii i kultury Verkhnego Povolzhya: Tezisy dokl. I region. nauch. konf. "Problemy issledovaniya pamyatnikov istorii i kultury Verkhnego Povolzhya"*. Gorky: pp. 211–217.

Rudenko K.A. 2000a
Metallicheskaya posuda Povolzhya i Priuralya v VIII–XIV vv. Kazan: Reper.

Rudenko K.A. 2000b
Metallicheskiye chashi VIII–XI vv. iz Srednego Povolzhya. *Drevnosti Oksko-Surskogo mezhdurechya*, iss. 2: 69–81.

Rudenko K.A. 2010
Metallicheskiye chashi iz mogilnika Nizhnyaya Strelka i ikh znacheniye dlya izucheniya srednevekovogo khudozhestvennogo metalla Srednego Povolzhya. *Materialy i issledovaniya po arkheologii Povolzhya*, iss. 5: 166–172.

Sokrovishcha Priobya: Zapadnaya Sibir na torgovykh putyakh srednevekovya: Katalog vystavki. 2003
Salekhard, St. Petersburg: n.p.

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Newly Discovered Bronze Artifacts of the Scythian Period from Archekas Mountain, Kuznetsk Alatau*

The borderland between the West Siberian Plain and the Kuznetsk-Salair mountain region is a narrow strip of the Mariinsk forest-steppe, which was a transit and contact area between two ancient cultural centers: that of the Upper Ob and the Middle Yenisei. Archaeological finds from this area are especially interesting. One of the important geographic features of the Mariinsk forest-steppe is Archekas Mountain. About a dozen archaeological sites on this mountain date to the Bronze and Early Iron Ages. In October 2015, several bronze items were found there: a cauldron, four arrowheads, a "mirror", a deer figurine, and a dagger, whose handle is decorated in the Scytho-Siberian style. All items are cast of tin bronze; a small amount of arsenic is also present in certain cases. This article describes the context and the location of the finds, the items, and their cultural affinities. Despite the generally Scythian appearance of all the artifacts and the wide distribution area of their parallels, it is shown that the assemblage belongs to the Tagar culture and, by Tagar standards, should date to 600–400 BC. However, the artifacts resemble those manufactured in the forest-steppe periphery and were probably custom-made for the Kulai people of the taiga zone. If so, they must belong to a later period, and fall within the 400–200 BC interval. The analysis of assemblages with cauldrons has allowed us to assume that the Archekas assemblage was ritual, associated with a sanctuary.

Keywords: *Siberia, Early Iron Age, daggers, cauldrons, arrowheads, Tagar culture, Kulai culture, Scytho-Siberian animal style.*

Introduction

The southeastern border zone of the world's largest plain, the West Siberian Plain, is a narrow forest-steppe belt, which separates it from the Kuznetsk-Salair mountain region of Southern Siberia. The present-day level of archaeological knowledge of this territory makes it possible to conclude that the space bounded by the mountains of the Kuznetsk Alatau on the south and lowland taiga on the north were a transit zone in ancient times. In rare historical periods, large ethnic and cultural entities settled on the forest-steppe boundary. One of

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the examples is the Tagar culture, which existed in the so-called Achinsk-Mariinsk forest-steppe from the 6th century BC until the turn of the eras (Martynov, 1979: 3–4). However, more often this territory was a contact zone for various peoples belonging to two major centers of cultural development: one on the Upper Ob and the other on the Middle Yenisei (Bobrov, 1992: 6). The inhabitants of the northern taiga also took part in this interaction. Although archaeologically their contacts with the forest-steppe population are less expressed, we can theoretically assume that they played a significant role in the life of the taiga hunters and fishermen.

Given the historical context of the border zone, many issues related to the history of its preliterate period remain beyond our knowledge. Therefore, archaeological research and new findings in this area are of special interest for specialists in the field. Such finds include an assemblage of bronze objects found on Archekas Mountain in the Kemerovo Region not far from the town of Mariinsk.

Geographical context of the discovery

The small Archekas Ridge covers an area of about 50 km^2 and is located between the rivers Kiya and Yaya. These are the extreme northwestern spurs of the Kuznetsk Alatau bordering the West Siberian Plain. The height of the ridge is only 204 m above sea level. Archekas Mountain is located on the right bank of the Kiya and stretches for about 10 km along the river. From an orographic point of view, the mountain is an insignificant hill cut by deep ravines and rising above flat terrain. The ruggedness of the terrain, more pronounced on the western and southern slopes, decreases to the north and almost disappears on the eastern periphery. Despite the small area, there are several types of vegetation, including forests, meadows, and steppes. Two archaeological sites (the settlements of Archekas V and VI) are located on the southern and southeastern slopes of Archekas Mountain, overgrown with birch groves and bordered by floodplain lakes and shallow channels, one of which is the Kabedat stream. The general physiographical situation can be described as foothill taiga or the borderland between forest-steppe and foothill taiga zones.

Archaeological research on the Archekas Ridge

A considerable area of Archekas Mountain has been well studied from an archaeological point of view. Over the last half a century, seven sites concentrated along the winding bank of the river Kiya to the southeast of the town of Mariinsk (Fig. 1) have been discovered, which are from the Bronze Age to the Tashtyk period. The first studies were carried out in the 1960s on the southwestern, western, and southern slopes of Archekas Mountain by the local ethnographer I.I. Baukhnik, who discovered a fortified settlement and three habitation sites (Archekas I–III, V). On the basis of pottery assemblages, Baukhnik dated these sites to the Bronze Age and the Early Iron Age. According to him, the sites were multilayered. The analysis of the materials allowed Baukhnik to identify the ornamental motifs typical of the forest zone and suggest the mutual influence of the forest and steppe cultures of Western Siberia (1970: 49, 52). Bronze celt axes with geometric ornamental pattern (Ibid.: Fig. 4, *1*; Kovtun, Marochkin, 2011), objects of art, and an object of bone are of particular interest among the discovered artifacts. These objects were initially kept at the Mariinsk House of Pioneers, but were subsequently transferred (a part of them were lost) to the district museum of local history.

In 1971, A.M. Kulemzin excavated two burial mounds of the Scytho-Sarmatian period at the site of Archekas (discovered in 1967), 4 km south of Mariinsk, on the side of the western slopes of the mountain. Distinctive features of the burial ritual, especially structural features of the tombs, did not allow Kulemzin to determine their cultural attribution. According to Kulemzin, the similarity of some objects from the burials with Tagar objects may explain only their general Scythian nature. Most of the objects have parallels far beyond the forest-steppes of Southern Siberia (Kulemzin, 1979). Over thirty years later, a group of specialists dated this burial ground to the 4th–3rd centuries BC in their publication of the results of monitoring the archaeological heritage of Kemerovo Region, and attributed the burial ground to the Tagar culture (Bashtannik et al., 2011: 12).

In 1976, A.V. Tsirkin continued the studies of the fortified settlement of Archekas I discovered by Baukhnik. The site was located on a promontory of the western slopes 6.5 km southeast of the town of Mariinsk. The pits of dugout dwellings, household pits, and hearth stains have been revealed. Knives, fishhooks, bone arrowheads, polishers, borers, etc., over 400 pottery objects, and 2500 fragments of bones of domestic animals have been found in the cultural layer. The dishware was decorated with a "duck-like" or snake-like ornamental pattern, or with slanting crosses. On the basis of a cornelian biprismatic hexagonal bead, Tsirkin dated the fortified settlement to the 2nd–1st centuries BC (1977: 251), while V.V. Bobrov dated the pottery assemblage with stamped ornamentation to the period of transition from the Bronze Age to the Early Iron Age (1999). Currently, the site has been fully explored. In the same year of 1976, Tsirkin discovered the Archekas IV habitation site of the Late Bronze Age on the western slopes of the mountain 500 m to the north of the fortified settlement (1977: 252).

In 1997, the Kuzbass Archaeological Expedition of the Joint Laboratory of Archaeology and Ethnography

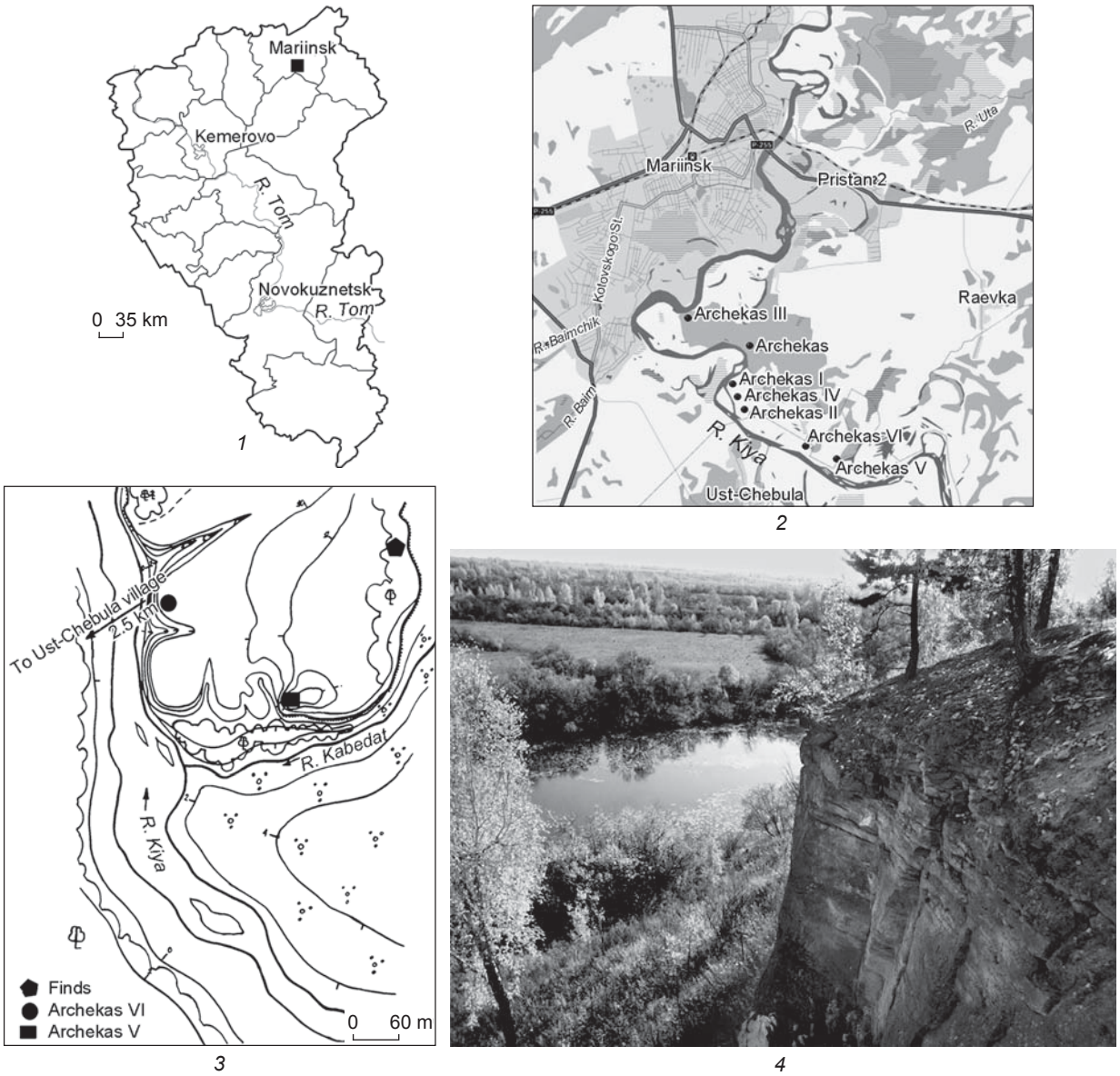

Fig. 1. Location of the Mariinsky District in the Kemerovo Region (*1*) and location of archaeological sites on Archekas Mountain (*2*); topographic plan with the settlements of Archekas V and VI, and the place of discovery of bronze objects (*3*); precipitous bank of the Kabedat stream with birch forest, where the objects were discovered (*4*).

of the Institute of Archaeology and Ethnography SB RAS and Kemerovo State University did a survey in the Mariinsky District of the Kemerovo Region. During the works, the Expedition established the precise coordinates of the Archekas V habitation site, which was discovered by Baukhnik in 1963; a cultural layer 0.4 m thick was identified; pottery of the Tagar-Tashtyk period was collected in the outcrop. The Expedition also discovered a new site of Archekas VI of the Late Bronze Age.

The presented chronology of fifty years of archaeological works in Archekas show that this unique natural object has never become a place of targeted research. Seven archaeological sites have been discovered on the territory of the ridge, but only two were studied in detail (Kulemzin, Borodkin, 1989), although it can be assumed that the small ridge in a flat environment was the most attractive place in terms of habitation and sacral activities for the ancient and medieval groups of the population.

Circumstances and location of discovering the ancient artifacts

In October 2015, an assemblage of ancient metal objects was accidentally found. The location of the discovery

was associated with a birch forest and the edge of a plowed field on the high steep bank of the Kabedat stream 200 m to the northeast of the Archekas V site. To find out the circumstances and the exact location of the discovery, an interview was arranged with A.P. Mironov, who had found the objects. He provided information on the depth of their occurrence; the GPS-coordinates of the discovery have been determined.

The objects were found near and along the field. The first find was a bronze cauldron covered with a stone on top. It was found standing vertically in a layer of dark gray sandy loam at a depth of 0.35 m from the present-day surface. In the humus layer above the cauldron, two plates of Devonian sandstone were found. The plates had traces of depressions of possibly artificial origin. The exact location of the plates relative to each other was not established. Probably, the cauldron was intentionally placed in a pit in a vertical position and covered with stone "lids". Four arrowheads in a compact group were found to the south of the cauldron. A "deer" plaque was discovered to the southeast and a bronze "mirror"—to the northeast of the cauldron. Finally, a dagger was found in the same direction, but at a considerable distance from the cauldron.

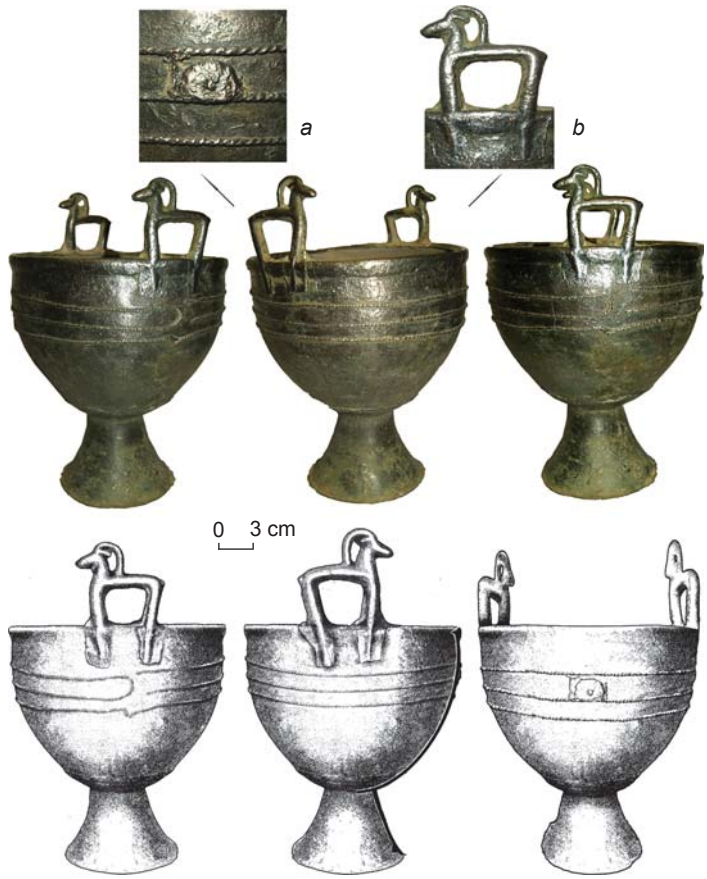

Fig. 2. Bronze cauldron with zoomorphic handles (KMAEE, KP 284). *a* – patch; *b* – handle.

Description of the finds

The cauldron (Fig. 2) was made of tin bronze*. It was damaged in ancient times, as evidenced by repairs in the form of a neat metal patch on the body (Fig. 2, *a*). The cauldron is a hemispherical vessel on a stand in the form of truncated cone; zoomorphic handles of square cross-section, which significantly extend to the outer side of the shoulders, are attached to the upper edge of the body. Stylized inverted U-shaped goat figurines show a horizontally elongated body and vertically placed legs. The heads on reinforced necks are slightly lowered; the eyes and mouth are not represented; the ears are rendered as semi-ovals. The horn starts from the forehead of each goat, bends behind, and joins the back of the animal (Fig. 2, *b*). A corded ("rope", according to (Bokovenko, 1977: 231)) belt of three rows runs along the cauldron's body in the area of its largest diameter; two of the corded rows are connected with a loop. The height of the cauldron is 28 cm (the height of the stand is 7.8 cm; the height of the zoomorphic handles is 5.5 and 6.0 cm). The diameter of the rim is 18 cm; the diameter of the body is 18.8 cm and of the bottom part of the stand is 10.7 cm. The width of the edge of the flat rim, which is inclined inward, is 0.9 cm; the width of the figurines (with muzzles) is 6 cm. The thickness of the wall is 0.3 cm; the size of the patch is 1.7 × 1.2 cm.

All arrowheads belong to the tanged type with flat tangs thinning out towards the ends (Fig. 3). The arrowheads are all of the same size: 5.5 cm; the only difference is the length of the tangs. Three arrowheads are bilobate with a blade of triangular shape but with specific individual features in the design of the tip and the base. Two arrowheads have tips with a lozenge-shaped cross-section and small lowered ears at the base. The rib of the lozenge transforms into a longitudinal rib, which smoothly converges with the plane of the tang in one arrowhead, and abruptly ends at the beginning of the tang in the other arrowhead. The rib in the third bilobate

*We express our gratitude to the experts from the Cenozoic Geochronology Department of the Center for Collective Use at the Institute of Archaeology and Ethnography SB RAS, who analyzed the composition of metal samples taken from the archaeological objects using elemental analysis on the basis of energy dispersive spectrometry with a Hitachi TM 3000 electron microscope (Japan) and a Bruker Quantax-70 unit (Germany).

arrowhead starts from the tip and is smoothly transformed into the tang near the straight base of the blade. The fourth tip is trilobate with barely marked ears at the base. All the arrowheads were cast of tin bronze, and only one contains a small admixture of arsenic.

The finds from Archekas Mountain include a bronze "mirror" 8.5 cm in diameter with an arched loop in the center for attaching the object, and a bronze figurine of a deer—the so-called "deer" plaque (Fig. 4). The animal is rendered in a traditional posture for the Scytho-Siberian animal style with bent legs joined under its body. The head of the animal rather resembles an elk's head. A small hole marks the nostrils, and a groove marks the mouth. The eye is rendered by a round hole. Its antlers are connected to its back and are represented as a short but wide rod with two tines with its end bending upward. They look more similar to an elk's antlers. The body is thin and elongated. The gap near the scapula is a casting defect. A specific feature of this "deer" plaque is a round hole on the rump and an arched hole on the body.

The bronze dagger stands out not only in terms of the quality of craftsmanship, but also of its pattern made in the animal style typical of the Scythian cultures of South Siberia. It is a solid cast object made in a double-sided casting mold (Fig. 5). A relief bar runs along the central axis of the dagger from the pommel to the tip of the blade cutting through the guard. There are two more bars on the handle on both sides of the central bar and parallel to it. The rib on the blade is made in the same way, but all bars converge at the tip. A very important morphological feature of the dagger is recession under the guard, but it is barely noticeable. The length from the blade to the crossbar is 15.4 cm (the length from the blade to the beak of the bird is 12.5 cm); the length of the handle including the pommel is 9.6 cm. The width of the blade is 2.7 cm; the width of the handle is 2.2 cm; the thickness (without the rib) is 0.30 and 0.35 cm respectively.

The pommel of the dagger is a sculptural representation of a bear (Fig. 5, *a*). The paws of the animal are stretched downwards and make the figure look as if the belly of the bear is resting upon the handle. The head is slightly lowered, but corresponds to the natural posture of the animal. A posture similar to the posture of the bear on this dagger is known in the Scytho-Siberian art of the animal style. It is called "on tiptoe" or "en pointes". The bear is represented in a relatively realistic manner. Thus, the figurine is proportional, and the outline of the head is rendered with such precision that there is no doubt what kind of animal is represented in the round sculpture. Small ears are depicted as rounded protrusions, small eyes as round holes, and a slightly too large mouth is marked with a groove. All these features add to the typical image of a bear. The length of the figurine is 4.8 cm; the height is 3.0 cm; the thickness is 0.9 cm.

The crossguard was made in the form of bird's heads turned in opposite directions (Fig. 5, *b*). The bodies of the birds were made in flattened sculpture, and the necks of the birds were executed in bas-relief in the plane of the

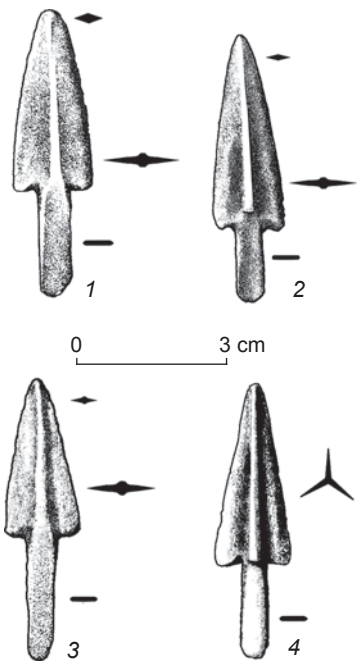

Fig. 3. Bronze arrowheads.
1–3 – bilobate arrowheads (KMAEE, KP 287, 288); *4* – trilobate arrowheads (KMAEE, KP 289).

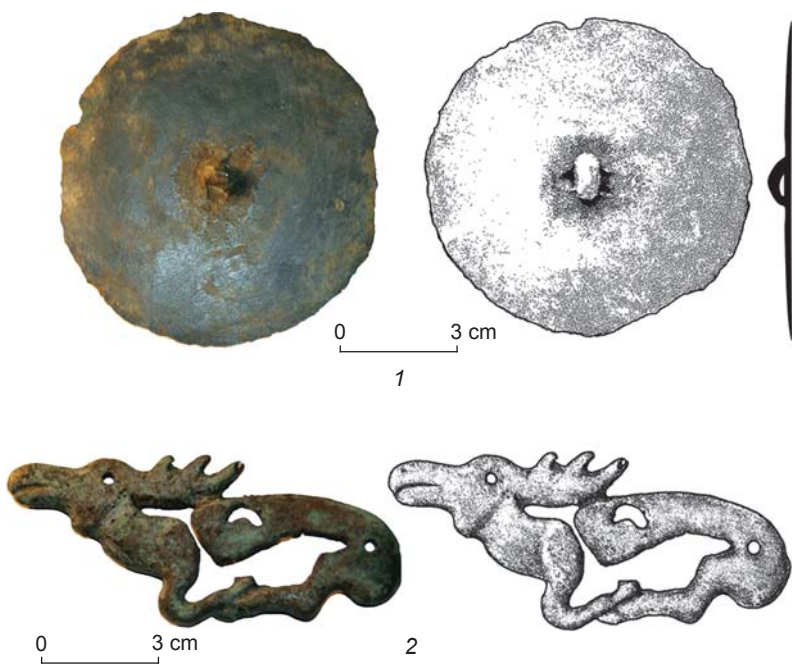

Fig. 4. Bronze "mirror" (KMAEE, KP 286) and "deer" plaque (KMAEE, KP 285).

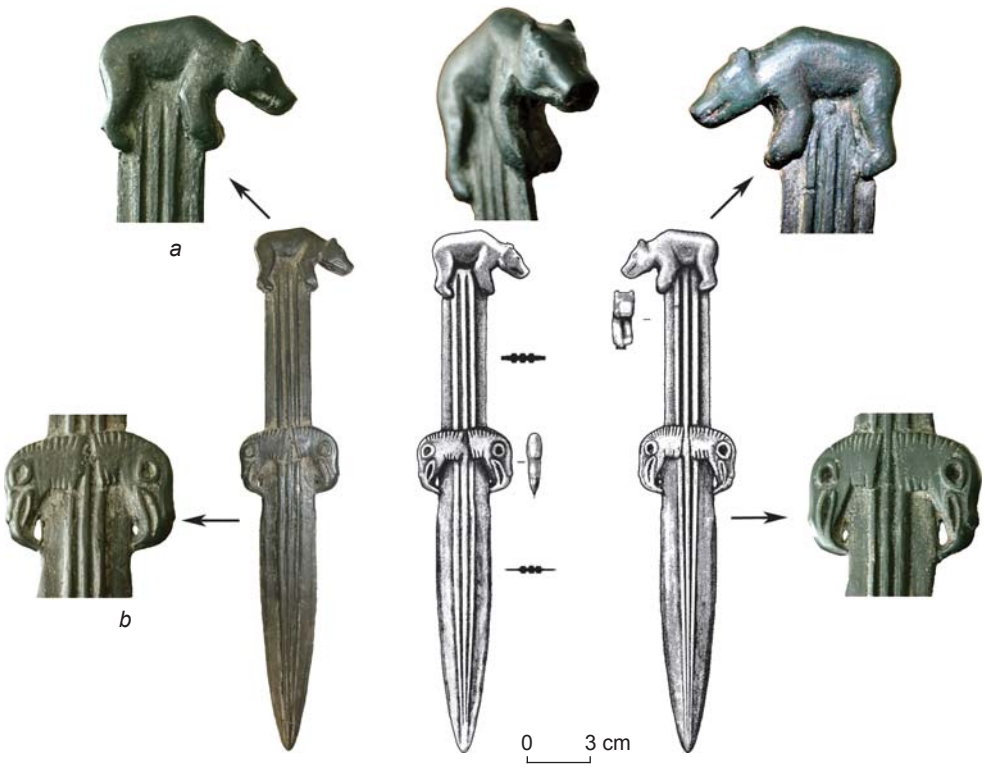

Fig. 5. Bronze dagger (private collection).

dagger. The edges of the necks are located at an angle to the central rib. Thin transverse grooves (notches) were made on the top of the necks; the length of the grooves decreases towards the tops of the heads. The bottom of the necks is decorated in the same manner. The heads of the birds are lowered down; thus the sharp ends of fairly wide beaks curved at a blunt angle (close to a right angle) touch the blade of the dagger. A segmented hole and an untreated part of the casting seam can be seen between the beaks and the blade. The eyes are depicted by relief bands forming weakly expressed ovals, and holes of the same shape. The same artistic device was used for representing the birds' beaks, but this narrow segment (band and groove) has a different size in all four cases. The operculum of the beak enhances the image of a predatory bird. In general, the image looks more like a sea eagle than a gryphon, but the iconography of both is identical in the Scytho-Siberian style.

Historical and archaeological interpretation of the bronze objects

From a general point of view, all bronze objects that were found together with the cauldron are associated with the cultures of the Scythian period, primarily with the cultures of Southern Siberia. Cauldrons are common Scythian objects, but cauldrons similar to the Archekas vessel have been found only in the area of the Tagar culture. Thus, a small cauldron on a stand with vertical handles of cast figures of mountain goats was found in the 1920s in the Minusinsk Territory (currently kept in the Irkutsk Museum of Local History, KP 7486-36); it was first published in the article by E.R. Rygdylon and P.P. Khoroshikh (1959: 255–256). The difference is only a more expressive interpretation of the image of the goat: the muzzle is lowered, the relief horns, which rest on the neck repeat its bend; the legs are slightly bent; the tail is more pronounced and is bent upwards. M.P. Zavitukhina provided a description of the cauldron's handle with the stylized figure of a mountain goat from the collection of I.A. Lopatin, accidentally found in the village of Chadobets of Yenisei Governorate (State Hermitage Museum, inv. No. 5531/1482) (1983: 38). Stylistically, the fragment is similar to the handles of the Archekas cauldron, but there are some differences, including the size of the figure (11.2 cm), the shape of the straightly extended muzzle with a pronounced projection of the supraorbital arch, and the absence of a tail. Stylistically similar cauldrons, but with the handles in the form of horses, were found near the village of Tigritskoye in the Minusinsk Territory (Chlenova, 1967: 283), at the Chernaya Rechka south of the city of Tomsk (Museum of Tomsk State University, KP 7313), and near the village of Kolyvan on the Chaya River, about 12 km from the Kulaika Mountain (Myagkov, 1929: 60).

In accordance with the established typological features, the cauldrons with zoomorphic handles belong to type A I/5 (Chlenova, 1967: 94); in accordance with the morphological features, such cauldrons belong to the subtype A-1 of type I (Bokovenko, 1981: 46). N.A. Bokovenko suggested that they were produced in the Minusinsk center (Ibid.). The chronological attribution of the cauldrons causes some problems among specialists, since most of the objects were accidental finds. An exception is the burial mound of Arzhan-2 in the territory of Tuva, where two cauldrons have been found behind the wall of the burial chamber (Chugunov, 2004: 25–26). It is interesting that one of these cauldrons was identical to the Archekas cauldron in size, proportions, "corded" decoration, and U-shaped handles, which, however, were not in the form of animal figures. As far as dating is concerned, Bokovenko considered it premature to establish the chronology of the cauldrons; one could only assume their emergence (in particular, of type I) approximately in the 8th–7th centuries BC (1981: 49). Zavitukhina attributed the cauldrons with the zoomorphic handles to the Early Tagar objects of art with archaic imagery. She considered the pronounced geometrization of form to be one of the style-defining features of these objects. According to Zavitukhina, such cauldrons should be dated to the 7th–6th centuries BC (1983: 22). N.L. Chlenova expressed the same point of view when she noted that the handles of the cauldron from the Irkutsk Museum were made in the typical "Minusinsk style" of the 6th century BC, but allowed for the existence of similar products at a later period when cauldrons became a part of cultic objects (1967: 95, 97). Her idea that the cauldrons with the zoomorphic handles did not follow the main line of development in this category of objects in the Tagar culture is quite interesting. Rygdylon and Khoroshikh allowed for the existence of such cauldrons in the Late Tagar period up to the Tashtyk period (1959: 258).

Bronze tanged arrowheads, both bilobate and trilobate, were typical of the cultures of the Scytho-Siberian world inhabiting its eastern parts. Extensive academic literature is dedicated to the publication of such arrowheads; therefore we will limit ourselves to only some studies on the archaeology of Southern Siberia and the adjacent territories. Thus, describing Tagar bronze arrowheads, Kulemzin noted that the type of bilobate tanged arrowheads was traditional for the local population, although some parallels are known from the sites in the eastern regions of Central Asia (Hudiakov, Erdene-Ochir, 2011: 74; Volkov, 1962; Tsybiktarov, 1998: Fig. 63). Kulemzin established the time of such arrowheads as the 4th–3rd centuries BC (1976: 49–52). A.I. Martynov dated them to the 5th–4th centuries BC in the forest-steppe territory of the Tagar culture (1976: 10–13). Chlenova considered bilobate arrowheads to be a separate type and dated them to the 7th–6th centuries BC (1967: 41–42). The same situation is with the area and chronological range of trilobate arrowheads, although they appear not only in the areas of the Tagar culture, but also in Southern Siberia, the Transbaikal region, and Mongolia. Thus, scholars date the Tuvan arrowheads of this type to the 7th–6th centuries BC, also allowing for the possibility of their existence in the 5th century BC (Chlenova, 1961: 137) or in the 5th–4th centuries BC (Chugunov, 1999: 36, 44).

"Mirrors" similar to the Archekas "mirror" were the most important objects in the burial ritual of the Southern Siberian population in the Scythian period. They occur in great numbers in the necropolises of the Tagar culture. Undeniably, our "deer" plaque also belongs to this culture, which is confirmed by its iconographic and stylistic features (Bobrov, 1973: 17–18). In addition, these features make it possible to attribute the plaque to the 4th–3rd centuries BC. The bend of the hind leg in the thigh area as well as the holes on the rump and the body of the animal are untypical features compared to other Tagar plaques, and it is tempting to regard these features as transformed elements of the Sayan-Altai style.

According to its morphological features and artistic style, the dagger undoubtedly belongs to the Scythian period and was made by Tagar artisans. If its proportions and general appearance are typical of the daggers used in the cultures of the Scytho-Siberian world, the design of the pommel and crossbar in the animal style is more typical of Tagar bladed weapons. In addition to finding the dagger in the northwestern periphery of the area of Tagar culture, its cultural attribution is confirmed by another feature—the recession on the blade under the guard. G.A. Maksimenkov and A.M. Kulemzin convincingly proved that this feature was typical for the evolution of daggers in the northern forest-steppe regions of the area of the Tagar culture (Maksimenkov, 1961: 306; Kulemzin, 1974: 34). The posture of the bear emphasizes the attribution of the dagger to the South Siberian animal style of the Scythian period. Daggers and knives with the pommel in the form of the animal standing "on tiptoe" are not so numerous in the territory of Southern Siberia, and they have been predominantly found in the area of the Tagar culture (Bobrov, Moor, 2011).

Four daggers with pommels in the form of the figurine of a wild boar standing in such a way that its legs come down to the handle, originate from the Middle Yenisei region. The same pommel appears on the dagger found in the burial mound of Arzhan (Gryaznov, 1980: 22, fig. 11, *3*, *4*). The handles of some Tagar knives are also decorated with the figure of a standing wild boar (Grishkin Log, barrow 16, burial 1 (Maksimenkov, 2003: 40, Chlenova, 1997: 16)) or elk (Podgornoye Ozero, barrow 1, burial 3; Kichik-Kyuzyur, barrow 2, burial 7 (Zavitukhina, Morozov, 2003: 107, Zavitukhina, 1983: Pl. 151–152)).

Such representations of hoofed animals to a greater degree correspond to the art of the eastern regions of the Scythian world, but as pommels they more often occur in the area of the Tagar culture. Representations of animals in this posture have been found on stone surfaces or as bas-reliefs on metal. The distinctive features of the dagger are the image of the bear on the pommel, the rib of triple bands, and representations of sea eagle heads, which are very rare for Scytho-Siberian art (Shulga, 2002). The image of the bear appears in the toreutics in the second half of the first millennium BC in the Novosibirsk region of the Ob (Troitskaya, Durakov, 2003) and, most likely, is associated with the Kulai migrants from the regions of northern taiga. It is quite possible that the Tagar artisans were commissioned to make the dagger for the taiga inhabitants.

The location of the Archekas Ridge in the terrain gives us some reason to suggest a cultic attribution of the finds, and to regard the cauldron as a ritual symbol. It should be noted that the cauldron was accompanied by a set of objects. The finds at the mouth of the river Malaya Kirgizka, 10 km from Tomsk, represent a good parallel to our discovery. There, too, a bronze cauldron was found, which had been set in a shallow pit. A bell-shaped pommel and a pottery vessel on a stand were found at a slight distance from the cauldron (Pletneva, Mets, 1999: 11–13). The authors convincingly argue for the ritual purpose of this set of objects. It is impossible not to note the comparatively small size of the Archekas cauldron, which may indicate its non-utilitarian purpose. According to S.I. Rudenko, such small pots could have been used for kindling herbs (1953: Pl. XXIV). Rygdylon and Khoroshikh also mention this purpose in their article (1959: 256). The handles must have had some sacral and magical functions (Bokovenko, 1977: 232). Not going into detail on the semantic interpretation of the sacred function of cauldrons, which was mentioned many times in the studies by A.K. Akishev (1984: 22–28), A.L. Toporkov (1989: 89–95), G.S. Dzhumabekov (1996), and N.A. Bokovenko (1977: 232), we can note that all these scholars consider cauldrons to be the main attributes of religious commemorative feasts or cultic actions performed at specific "sacred" places. The fact that two stone plates were found together with the cauldron is noteworthy. Most likely, they were in some way functionally connected with the cauldron. Thus, A.M. Tallgren regarded the stone "tables" as supports for vessel-censers (1937).

As far as the objects discovered on Archekas Mountain are concerned, we may assume that some activities were carried out using the cauldron in the center of the settlement or on the hill above the settlement. One such hill was mentioned in relation to the discovery, and we may offer several possible explanations as to why the cauldron was placed there: it was either purposely hidden in the ground with the hope of returning for it, remained there because of the sudden termination of the sanctuary's functioning and the departure of its owners, or was left for the next ritual for an unintentionally long time.

References

Akishev A.K. 1984
Iskusstvo i mifologiya sakov. Alma-Ata: Nauka.

Bashtannik S.V., Zharonkin V.N., Simonov D.A., Sokolov P.G., Shirin Y.V., Fribus A.V. 2011
Rezultaty arkheologicheskikh razvedok po monitoringu sostoyaniya, sokhrannosti i ispolzovaniya obyektov arkheologicheskogo naslediya Kemerovskoi oblasti. In *Istoriko-kulturnoye naslediye Kuzbassa (aktualnye problemy izucheniya i okhrany pamyatnikov arkheologii)*, iss. III. Kemerovo: Kuzbassvuzizdat, pp. 5–41.

Baukhnik I.I. 1970
Arkheologicheskiye nakhodki s gory Archekas. In *Izvestiya laboratorii arkheologicheskikh issledovaniy*, iss. 2. Kemerovo: Kem. Gos. Ped. Inst., pp. 49–53.

Bobrov V.V. 1973
Olen v skifo-sibirskom iskusstve zverinogo stilya (tagarskaya kultura). Cand. Sc. (History) Dissertation. Novosibirsk.

Bobrov V.V. 1992
Kuznetsko-Salairskaya gornaya oblast v epokhu bronzy. D.Sc. (History) Dissertation. Novosibirsk.

Bobrov V.V. 1999
Kompleksy keramiki s figurno-shtampovoi ornamentatsiei na yugo-vostoke Zapadnoi Sibiri. In *Arkheologiya, etnografiya i muzeinoe delo*. Kemerovo: Kem. Gos. Univ., pp. 32–43.

Bobrov V.V., Moor N.N. 2011
Zverinyi stil v dekore tagarskikh kinzhalov. In *Arkheologiya Yuzhnoi Sibiri*. Iss. 25: Sbornik nauchnykh trudov, posvyashchennyi 80-letiyu so dnya rozhdeniya Yakova Abramovicha Shera. Kemerovo: Kuzbassvuzizdat, pp. 146–151.

Bokovenko N.A. 1977
Tipologiya bronzovykh kotlov sarmatskogo vremeni v Vostochnoi Evrope. *Sovetskaya arkheologiya*, No. 4: 228–235.

Bokovenko N.A. 1981
Bronzovye kotly epokhi rannikh kochevnikov v Aziatskikh stepyakh. In *Problemy zapadnosibirskoi arkheologii: Epokha zheleza*. Novosibirsk: Nauka, pp. 42–52.

Chlenova N.L. 1961
Mesto kultury Tuvy skifskogo vremeni v ryadu drugikh "skifskikh" kultur Evrazii. *Uchenye zapiski TuvNIIYALI*, iss. IX: 133–155.

Chlenova N.L. 1967
Proiskhozhdeniye i rannyaya istoriya plemen tagarskoi kultury. Moscow: Nauka.

Chlenova N.L. 1997
Tsentralnaya Aziya i skify. Moscow: Nauka.

Chugunov K.V. 1999
Nekotorye itogi issledovaniy mogilnika Dogee-Baary II. In *Krug znaniy*, iss. 2. Kyzyl: pp. 33–46.

Chugunov K.V. 2004
Arzhan – istochnik. In *Arzhan: Istochnik v doline tsarei: Arkheologicheskiye otkrytiya v Tuve*. St. Petersburg: Slaviya, pp. 10–39.

Dzhumabekov G.S. 1996
O sakralnoi funktsii kotlov iz semirechenskikh "kladov". In *Zhrechestvo i shamanizm v skifskuyu epokhu: Materialy Mezhdunar. konf.* St. Petersburg, pp. 83–86.

Gryaznov M.P. 1980
Arzhan: Tsarskiy kurgan skifskogo vremeni. Leningrad: Nauka.

Hudiakov Y.S., Erdene-Ochir N. 2011
Voyennoye delo drevnikh kochevnikov Mongolii (II tysyacheletiye – III v. do n.e.). St. Petersburg: Nestor-Istoriya.

Kovtun I.V., Marochkin A.G. 2011
The Archekas celt and the issue of the Seima-Turbino Period in the Kuznetsk Basin and in the Achinsk-Mariinsk forest-steppe. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 39 (1): 69–76.

Kulemzin A.M. 1974
Ob evolyutsii tagarskikh kinzhalov. In *Izvestiya laboratorii arkheologicheskikh issledovaniy*, iss. 5. Kemerovo: Kem. Gos. Ped. Inst., pp. 27–36.

Kulemzin A.M. 1976
Tagarskiye bronzovye nakonechniki strel. In *Yuzhnaya Sibir v skifo-sarmatskuyu epokhu*. Kemerovo: Kem. poligrafkombinat, pp. 43–56.

Kulemzin A.M. 1979
Archekasskiye kurgany. In *Arkheologiya Yuzhnoi Sibiri*, iss. 10. Kemerovo: Kem. Gos. Univ., pp. 87–99.

Kulemzin A.M., Borodkin Y.M. 1989
Arkheologicheskiye pamyatniki Kemerovskoi oblasti, iss. 1. Kemerovo: Kn. izdatelstvo, pp. 73–75.

Maksimenkov G.A. 1961
Novye dannye po arkheologii rayona Krasnoyarska. In *Voprosy istorii Sibiri i Dalnego Vostoka*. Novosibirsk: Izd. SO AN SSSR, pp. 301–315.

Maksimenkov G.A. 2003
Materialy po rannei istorii tagarskoi kultury. St. Petersburg: Peterburg. Vostokovedeniye.

Martynov A.I. 1976
Khronologiya i periodizatsiya pamyatnikov lesostepnoi tagarskoi kultury.In *Izvestiya laboratorii arkheologicheskikh issledovaniy*, iss. 7. Kemerovo: Kem. Gos. Ped. Inst., pp. 3–39.

Martynov A.I. 1979
Lesostepnaya tagarskaya kultura. Novosibirsk: Nauka.

Myagkov I.M. 1929
Drevnosti Narymskogo kraya (v sobranii Tomskogo krayevogo muzeya). *Trudy Tomskogo kraevogo muzeya*, vol. II: 51–86.

Pletneva L.M., Mets F.I. 1999
Ritualnyi kompleks epokhi rannego zheleza v Tomskom Priobye. In *Priobye glazami arkheologov i etnografov*. Tomsk: Izd. Tom. Gos. Univ., pp. 10–25.

Rudenko S.I. 1953
Kultura naseleniya Gornogo Altaya v skifskoye vremya. Moscow, Leningrad: Izd. AN SSSR.

Rygdylon E.R., Khoroshikh P.P. 1959
Kollektsiya bronzovykh kotlov Irkutskogo muzeya. *Sovetskaya arkheologiya*, No. l: 253–258.

Shulga P.I. 2002
O stilizovannykh obrazakh orla i grifona VII–IV vv. do n.e. v Yuzhnoi Sibiri. In *Istoriya i kultura Vostoka Azii: Materialy Mezhdunar. nauch. konf. (Novosibirsk, 9–11 dekabrya 2002 g.)*, vol. 2. Novosibirsk: Izd. IAE SO RAN, pp. 170–175.

Tallgren A.M. 1937
Portable altars. In *Eurasia septentrionalis antiqua*, vol. XI. Helsinki: pp. 47–68.

Toporkov A.L. 1989
Simvolika i ritualnye funktsii predmetov materialnoi kultury. In *Etnograficheskoye izucheniye znakovykh sredstv kultury*. Leningrad: Nauka, pp. 89–101.

Troitskaya T.N., Durakov I.A. 2003
Izobrazheniya losei i medvedei v torevtike Priobya (V v. do n.e. – nachalo VIII v. n.e.). In *Arkheologiya Yuzhnoi Sibiri*. Iss. 26: Sbornik nauchnykh trudov, posvyashchennyi 70-letiyu so dnya rozhdeniya Anatoliya Ivanovicha Martynova Novosibirsk: Izd. IAE SO RAN., pp. 114–117.

Tsirkin A.V. 1977
Issledovaniya v okrestnostyakh g. Mariinska Kemerovskoi oblasti. In *Arkheologicheskiye otkrytiya 1976 goda*. Moscow: Nauka, pp. 251–252.

Tsybiktarov A.D. 1998
Kultura plitochnykh mogil Mongolii i Zabaikalya. Ulan-Ude: Izd. Buryat. Gos. Univ.

Volkov V.V. 1962
Bronzovye nakonechniki strel iz muzeyev MNR. In *Mongolskiy arkheologicheskiy sbornik*. Moscow: Nauka, pp. 18–26.

Zavitukhina M.P. 1983
Drevneye iskusstvo na Eniseye: Skifskoe vremya. Leningrad: Iskusstvo. (Ermitazh. Publikatsiya odnoi kollektsii).

Zavitukhina M.P., Morozov S.V. 2003
Tagarskiy mogilnik Kichik-Kyuzyur I v Khakasii (raskopki 1965–1967 gg.). *Arkheologicheskiy sbornik Gosudarstvennogo Ermitazha*, No. 36: 100–116.

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Bronze Age Axes from the Forest-Steppe Altai*

This article describes a series of Bronze Age metal axes from the forest-steppe zone of the Altai. Most are random finds without definite cultural or chronological attribution. We provide a detailed description of four specimens from Bor-Forpost, Mamontovo, Karpovo, and Severny, owned by various museums of the Altai Territory. The chemical composition of alloys is assessed by X-ray fluorescence spectrometry. Results are discussed with reference to bronze metallurgy, sources of copper ore, and typological parallels. The chronology of each type of axe is tentatively evaluated in the context of Middle and Late Bronze Age cultures of the Ob-Irtysh watershed and adjoining regions.

Keywords: *Altai, forest-steppe, Bronze Age, axes, alloys, X-ray fluorescence analysis, chronology.*

Introduction

So far, a sufficiently representative series of twelve shaft-hole axes of the Bronze Age has been found on the territory of the forest-steppe Altai, which indicates that this region was one of the areas where that type of object was widely used. Information on nine axes makes it possible to mark on a map the locations where they were discovered (Fig. 1). The forest-steppe Altai includes the Pre-Altai plain, the Biysk-Barnaul Depression, the Pre-Ob Plateau with the adjacent Kulunda Steppe, and the Ob-Chumysh Highland (Tishkin, Gorbunov, Kazakov, 2002: 4), and can be considered a specific resource and environmental area with great cultural and historical significance in the Metal Ages (Tishkin, 2007).

This article intends to present and analyze data on several metal axes that reflect an important aspect of the material culture of the Bronze Age in the south of Western Siberia. This data make it possible to see in more detail the morphology, the ornamental decoration, and production technique of shaft-hole axes on the eastern part of the territory where this category of objects were found. The most complete descriptions are provided for four axes found in various areas of the Altai Territory near the villages of Bor-Forpost, Mamontovo, Karpovo, and Severny**. These materials either have not been

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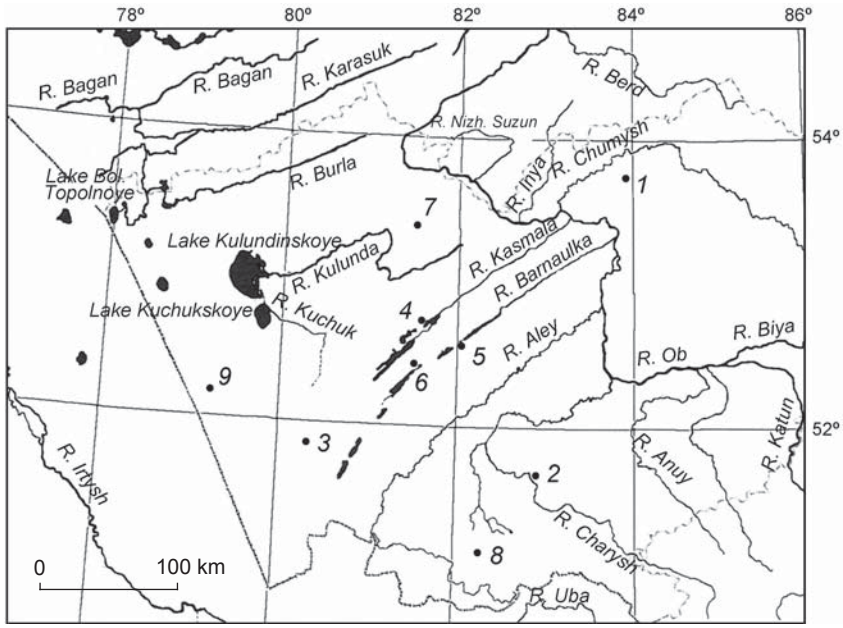

Fig. 1. Map showing the locations where metal axes have been discovered on the territory of the forest-steppe Altai.

1 – village of Severny; *2* – village of Karpovo; *3* – village of Bor-Forpost; *4* – village of Mamontovo; *5* – village of Urlapovo; *6* – settlement of Krestyanskoye IVa; *7* – village of Tyumentsevo; *8* – Zmeinogorsk mine; *9* – village of Klyuchi.

previously published or they required adjustment, since their descriptions and illustrations in the preliminary reports revealed substantial inaccuracies.

Description of the axes

Before the analysis of the findings, it would be useful to provide their detailed description (Table 1).

The axe from the vicinity of the village of Bor-Forpost (Volchikhinsky District of the Altai Territory) (Fig. 2, 3)* was kept in the village school until the late 1980s, and then was transferred to the V.M. Komarov District Museum of Local History (OF, No. 306) in the village of Volchikha. This axe was an accidental discovery.

A part of its blade is missing (Fig. 2, *1–3*; 3, *1–3*). Most likely, it was broken off already in ancient times. In its current form, the place of the breakage was sharpened using a modern grinding machine (Fig. 3, *1–3*). The surface of the object is covered with oxides. The spots of active corrosion of malachite and red-brown colors are visible on one side, and mature patina of brown color is visible on the other side of the object. These features reflect the fact that the axe was located in the soil until it was discovered. In some places, the object shows abrasions and traces of abrasive, which appear on the blade and on the upper edge of the shaft (Fig. 2, *1–3*; 3, *1–3*). These features are associated with the modern actions of the finders of the axe.

The axe was cast in a bipartite mold. Casting seams are clearly visible on the blade and on the shaft (Fig. 2, *3*, *4*, *8*). The seam was hammered out on part of the blade (Fig. 2, *3*). A casting defect appears on the butt; most likely it resulted from incomplete filling (a misrun), and a distinctive loop-like crested protrusion turned out to be not fully formed (Fig. 2, *1*, *2*, *5*). One more defect is a hole (Fig. 2, *6*) in the shaft (1.2 × 0.4 cm in size). The butt was battered in the process of the axe's use (Fig. 2, *5*).

The surface of the axe is uneven and porous. The ornamental decoration on the shaft is slurred, and in some places it is not visible at all. This feature indicates that the mold for manufacturing the object was made by imprinting an already existing axe in wet clay. Precisely this method resulted in the above defects. Two small, shallow funnel-shaped recesses are visible inside the shaft; one is directed towards the blade, and the other towards the butt (Fig. 2, *7*; 3, *4*). Similar defects have been previously observed in other objects of this kind. These are probably blowholes formed during crystallization of the metal (Tishkin, Frolov, 2015: 139), but this suggestion requires special analysis.

The hexagonal blade gradually flattens and expands towards the cutting edge (Fig. 3, *3*, *a–c*). The shape of the shaft hole is oval (Fig. 2, *3*, *4*; 3, *3*, *5*). The upper edge

*The drawings of the four published axes were made by A.L. Kungurov.

Table 1. **Parameters of shaft-hole axes**

Place of discovery	Mass, kg	Length, cm		Width / thickness of the blade, cm			Sizes of the shaft at the center, cm			Sizes of the hole, cm	
		total	blade	at the shaft joint	in the center	at the cutting edge	Height	Width	Thickness	bottom	top
Bor-Forpost	1.134	19.0	12.3	3.9 / 3.5	3.5 / 2.2	4.4 / 1.2	7.0	6.9	4.0	4.6 × 3.3	5.4 × 3.5
Mamontovo	1.196	23.4	16.3	4.1 / 3.3	3.9 / 2.2	4.5 / 1.2	7.8	6.4	4.5	–	4.9 × 3.3
Karpovo	1.736	25.1	17.2	4.6 / 3.3	4.2 / 2.1	5.7 / 0.9	7.5	7.0	4.9	4.3 × 3.2	4.7 × 3.5
Severny	1.329	22.2	13.5	4.0 / 4.3	2.8 / 3.3	5.5 / 1.1	6.3	6.2	4.9	4.0 × 3.1	4.7 × 3.1

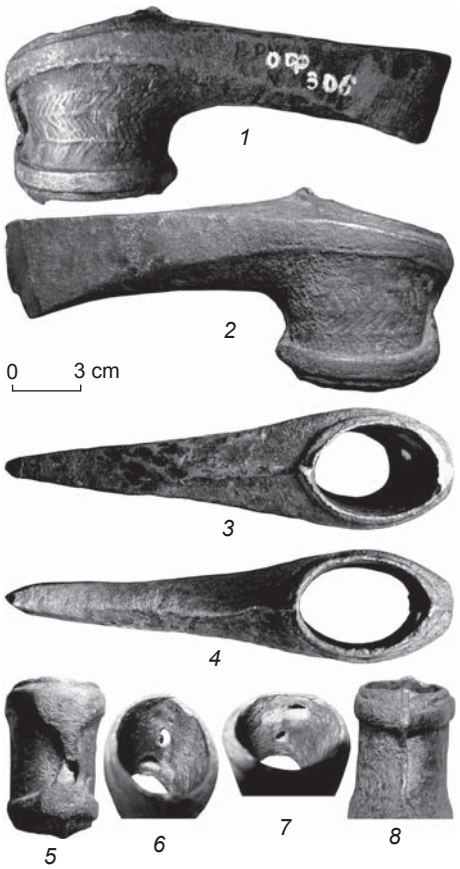

Fig. 2. Bronze axe from the vicinity of the village of Bor-Forpost.

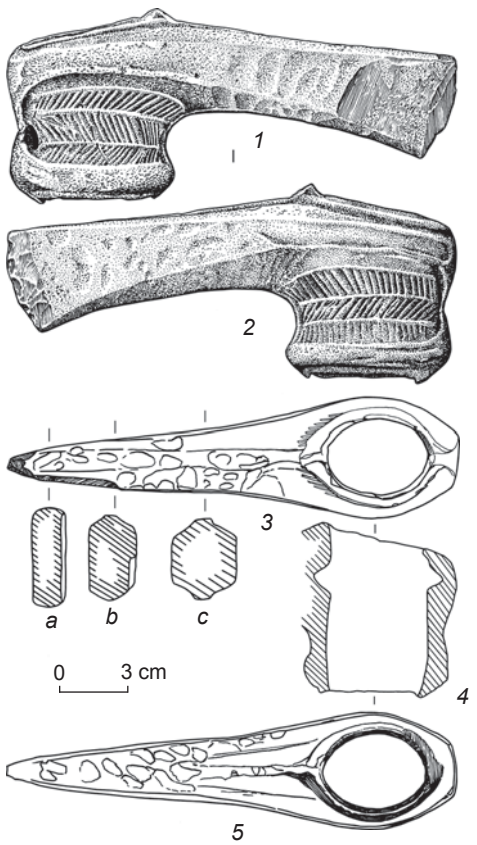

Fig. 3. Drawing of an axe from the vicinity of the village of Bor-Forpost.

of the shaft is inclined towards the butt (Fig. 2, *1*, *2*; 3, *1*, *2*, *4*). Two "bands" are clearly visible on the top and bottom edges of the shaft (Fig. 2, *1*, *2*; 3, *1*, *2*). These bands have subrectangular profile with ridges, which are not clearly defined. The band on the upper edge of the shaft extends from the butt (its average width is 1.1 cm, and 1.3 cm in the center) to the blade, thereby forming its lateral surface, the cheek. The butt of the axe is reinforced with a crested protrusion (Fig. 2, *5*) showing a casting defect. This "crest" is a continuation of bulging bands on the outer walls of the shaft. In the process of manufacturing the axe, the artisan apparently failed to produce a loop-shaped projection that appears on similar axes. The outer walls of the shaft are decorated with an ornamental pattern of three bands (decorative borders) filled with rows of slanting lines (Fig. 2, *1*, *2*; 3, *1*, *2*).

The axe from the vicinity of the village of Mamontovo (Mamontovsky District of the Altai Territory) (Fig. 4, 5) is kept in the Mamontovo District Museum of Local History (OF, No. 5642). It was found before the 1980s probably on the territory of this village (Ivanov G.E., 2000: 35).

The object has a defect that most likely originated from a misrun in the shaft. Furthermore, in the process of the axe's use, a part of the shaft at the bottom must have broken off and is missing (Fig. 4, *2*). The use of the axe in the ancient times is manifested by sharpening of the blade (up to 5 cm wide), as well as notches and spalls on the cutting edge (Fig. 5, *1*, *2*). There are wear traces on the loop of the butt (Fig. 4, *5*). The surface of the object is covered with small cavities, which probably indicates that it was cast in a clay mold. Stains of active corrosion of malachite color are visible in some places.

The object was cast in a bipartite mold, which is confirmed by the casting seam on the blade, the shaft, and inside the loop on the butt. The seam on the "back" and "belly" of the blade was in part roughly hammered (Fig. 4, *3*, *4*). A recess of subrectangular shape with irregular edges was found inside the shaft (in the direction of the blade) (Fig. 4, *6*; 5, *4*); its depth is about 1 cm; its size on the surface is 1.0 × 0.6 cm.

The axe blade at the shaft is hexagonal in cross-section (Fig. 5, *2*, *b*, *c*). The shape of the hole is oval (Fig. 4, *3*, *4*; 5, *3*, *6*). The upper edge of the shaft is inclined towards the butt (Fig. 4, *1*, *2*; 5, *1*, *2*, *4*). At the bottom and at the top its edges are reinforced with two bulges ("bands"). The upper band on each side is smoothly transformed into the side face of the axe forming the cheek. A loop of arched shape is located on the butt; its width reaches 1.1 cm (Fig. 4, *2*, *5*; 5, *2*, *4*). The loop is connected to the band and extends for 2 cm (from the shaft to the highest non-battered part). The inner sizes of the loop are 2.8 × 0.8 cm. The shaft of the axe is decorated with a pattern of four bands (decorative borders) filled with rows of slanting lines (Fig. 4, *1*, *2*, *4*, *5*, *7*; 5, *1*, *2*, *5*). The ornamental decoration partly expands to the "belly" of the blade (Fig. 4, *4*, *7*; 5, *6*).

The axe from the village of Karpovo (Krasnoshchekovsky District of the Altai Territory) (Fig. 6, 7) is kept in the Altai State Museum of Local History (OF, No. 18906). It was discovered in the vegetable garden of one of households of the village in the early 1990s. The finder of the object assumed that the axe could have been brought together with the soil from the area of the town of Shemonaikha (East-Kazakhstan Region, the Republic of Kazakhstan), which in our opinion is unlikely (Frolov, 1996: 91–92).

The object is well preserved; it only shows some wear on the blade and on the shaft. The surface is covered with brownish and sometimes dark green patina (Fig. 6). The corner of the semi-oval cutting edge of the blade is broken

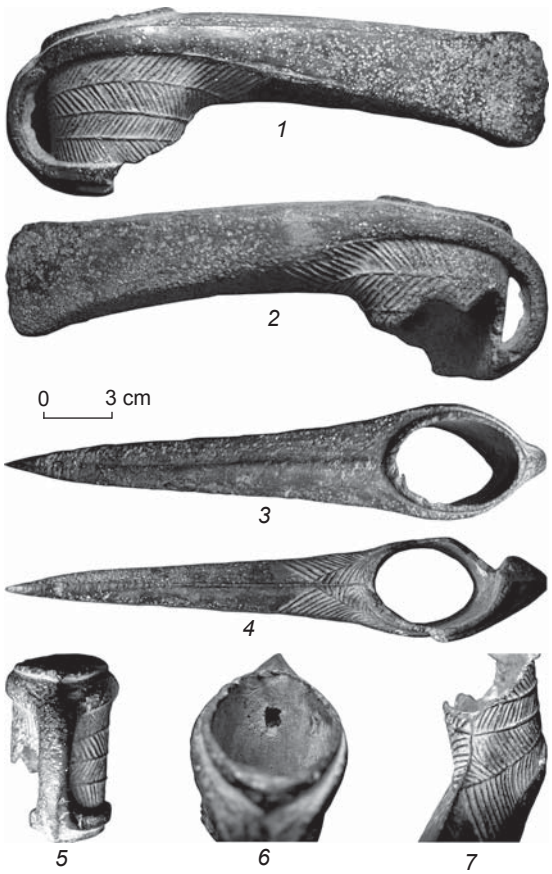

Fig. 4. Bronze axe from the village of Mamontovo.

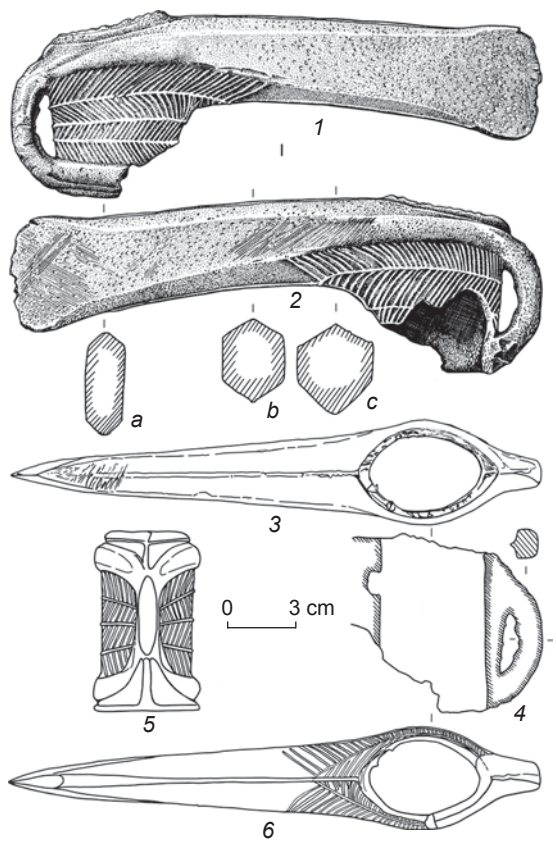

Fig. 5. Drawing of an axe from the village of Mamontovo.

off. The blade was sharpened; one edge of the blade is worn out more than the other edge (Fig. 6, *1*, *3*; 7, *1*, *3*). There are wear traces in the upper part of a crest-like protrusion on the butt (Fig. 6, *6*).

The axe was probably made using a wax model, as evidenced by the traces of dents treated manually, and other typical features (Fig. 6, *1*, *3*; 7, *1*, *3*). The casting was carried out in a bipartite mold. The casting seam is visible on the shaft (Fig. 6, *9*), on the "back", and on the "belly" of the blade (Fig. 6, *4*, *5*). There is a distinctive funnel-shaped recess inside the shaft on the side of the blade (Fig. 6, *7*, *8*).

The pentagonal blade gradually flattens and expands towards the cutting edge (Fig. 7, *1*, *a–c*). The shape of the hole is oval (Fig. 6, *4*, *5*; 7, *4*, *5*). The upper edge of the shaft is inclined towards the butt (Fig. 6, *1*, *3*; 7, *1*, *3*). At the bottom and at the top, its edges are reinforced with two bulges ("bands"). The top band is a thin line in relief; the bottom band is bipartite; a longitudinal groove is visible in the middle. A short "crest" of subrectangular shape appears on the butt of the axe; its size is 6.1 × 1.0–1.2 cm (Fig. 6, *1*, *3*; 7, *1*, *3*). It is slightly flattened in the center. A hole is absent. The shaft on both sides is decorated with the pattern of a diagonal cross formed by two lines in relief (Fig. 6, *1*, *3*; 7, *1*, *3*). A tamga-like symbol in the form of a "bird" also appears on the shaft near the beginning of the blade (Fig. 6, *2*; 7, *2*). Two or three more short slanting notches can be seen slightly lower.

The axe from the vicinity of the village of Severny (Pervomaisky District of the Altai Territory) (Fig. 8, 9) is kept at the Altai State Museum of Local History (OF, No. 11887/1). It was found in the early 1960s on a sand dune near the forest (Umansky, 1967: 99).

The surface on one side of the axe is covered with brownish and green patina and shows numerous cavities—the traces of active corrosion (Fig. 8, *1*; 9, *1*).

The axe was cast in a bipartite mold, which is manifested by a casting seam on the butt and on the blade (Fig. 9, *3*, *4*) where it was ground down in some places. The defects appear in a number of places. There is a "bulge" on one side of the blade (Fig. 8, *2*; 9, *2*). Attempts were made to remove it by grinding, but because of its large size it was not removed completely. The same but less pronounced defect also appears on the shaft. A casting defect can be seen on the edge of the hole, which has irregular outline (Fig. 8, *2–4*).

The axe shows traces of use. The butt is heavily battered (Fig. 8, *6*). The metal in this location was hammered down, which resulted in the irregular mushroom-like shape of the heel protrusion on the "crest". The surface shows numerous notches (Fig. 8, *1*, *2*; 9, *1*, *2*). An accumulation of such notches appears on one cheek of the blade, possibly indicating that the axe was used as an anvil. The notches are particularly numerous at the joint of the shaft and the blade. One may get the impression that

Fig. 6. Bronze axe from the village of Karpovo.

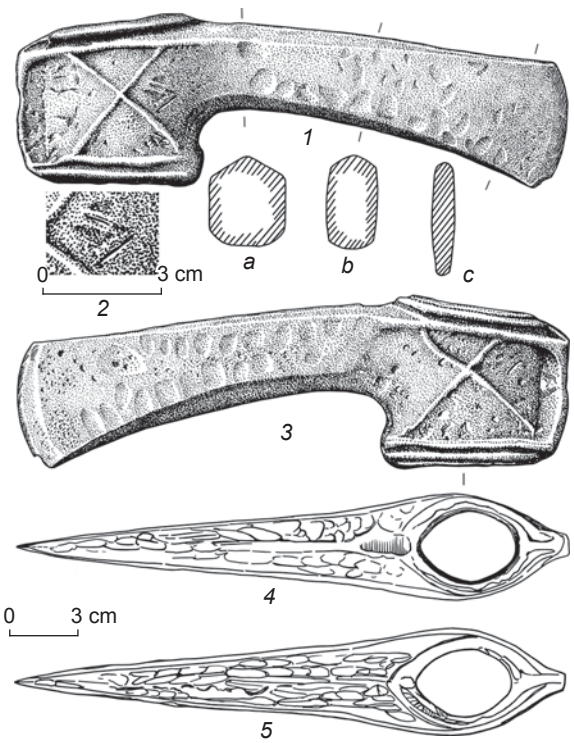

Fig. 7. Drawing of an axe from the village of Karpovo.

Fig. 8. Bronze axe from the vicinity of the village of Severny.

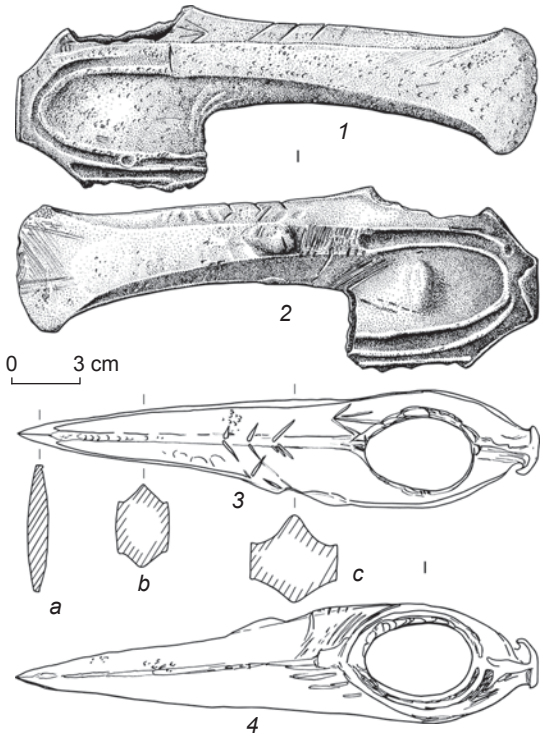

Fig. 9. Drawing of an axe from the vicinity of the village of Severny.

several blows were made on this area by a tool with a wide blade. It is possible that one of the blows resulted in the spalling of metal from the edge of the shaft. The cutting edge of the axe shows traces of sharpening and notches. Numerous small chipping is especially noticeable on the heel and the toe of the blade. A funnel-shaped recess is visible inside the hole on the side of the butt, similar to those observed in the previous axes. Its upper size is about 1.5 × 1.0 cm; the depth is 3 cm. The place where a sample of metal was taken by drilling is located next to the recess.

The blade narrows in a basically symmetrical way from the shaft to the cutting edge (Fig. 9, *3*, *a–c*) and is hexagonal in cross-section. The facets are slightly concave. The shape of the hole is oval (Fig. 8, *3*, *4*; 9, *3*, *4*). Along the edges of the hole, the shaft was reinforced by double ridged "bands", which make an oval forming the small crested protrusion of the butt; in their upper part they transform into the side face of the blade (Fig. 8, *1*, *2*; 9, *1*, *2*). Another band appears along the lower edge of the shaft. The width of the bands ranges from 0.9 to 1.2 cm. The butt was reinforced by small "crest", having a heel-shaped protrusion in the middle—a rounded striker 2.9 × 2.1 cm in size, which has acquired a mushroom-like shape in the process of its use (Fig. 8, *3*, *4*, *6*).

On the axe, notches can be seen that form tamga-like symbols. Several of the notches are made on the "back" of the blade and form a herringbone pattern (Fig. 8, *5*; 9, *3*). The tamga-like symbol of an arrow with an additional line is visible on the cheek of the blade near the shaft (Fig. 8, *1*, *5*; 9, *1*, *3*).

Using a portable X-ray fluorescence spectrometer ALPHA SERIES™ (Alpha-2000 model, made in the USA), the chemical composition of alloys of the above four axes was studied at the Altai State University (Table 2). The "Analytical" mode was used for these studies. Tests were made on parts of the objects where the oxides were removed.

Table 2. **Results of the X-ray fluorescence analysis, %**

Place of discovery of the axe	Test No.	Cu	Sn	Pb	Fe
Bor-Forpost	2225-04-2015	86.40	13.27	0.33	–
Mamontovo	3325-04-2015	71.93	27.81	0.10	0.16
Karpovo	604-04-2015	86.88	13.06	0.06	–
Severny	918-04-2015	75.71	23.86	0.05	0.38

The analysis shows that all the axes were made of bronze. Nominally, two objects stand out with an increased and decreased tin content. It is possible that these differences are of cultural and chronological nature.

Discussion

The greatest number of shaft-hole axes from the territory of the forest-steppe Altai originated from the areas near the ribbon-like pine forests and from the north-western foothills (Fig. 1–10). These are the objects found in the vicinity of the villages of Mamontovo (Ivanov G.E., 1982: Fig. 2, *1*; 2000: Fig. 2, *5*), Urlapovo (Kiryushin, Ivanov, 1996: 84, fig. 2), Klyuchi (Papin, Fedoruk, Shamshin, 2006: 86–87, fig. 5), Bor-Forpost (The V.M. Komarov District Museum of Local History, OF, No. 306), Tyumentsevo (Tishkin, Frolov, 2015), Karpovo (Frolov, 1996: 91–92, fig. 1, *2*), at the settlement of Krestyanskoye IVa (Ivanov G.E., 2000: 25–26, fig. 7, *1*), as well as the axe from the territory of the Altai (Zmeinogorsk mine?) from the collection of P.K. Frolov (State Hermitage, coll. No. 1122-84) (Avanesova, 1991: Fig. 13, *50*). In the Ob region, such objects were found near the village of Lyalino (Lyanino) (Museum of Archaeology and Ethnography of Siberia at Tomsk State University, coll. No. 2822) (Gryaznov, 1956: 20, fig. 5, *1*) and the village of Severny (Umansky, 1967: 99). Two axes from the collection of L.I Shrenk (Museum of Anthropology and Ethnography, No. 35-11, 35-14) originate from the territory of the Altai (Avanesova, 1991: Fig. 13, *54*, *55*). This group of objects can be nominally supplemented by two pickaxe-like shaft-hole tools found in the Altai on an old roadway (Fig. 10, *10*) and in the Zmeinogorsk mine (Fig. 10, *9*) (Levitsky, 1941: 14, fig. 5; Kiryushin, Shulga, Grushin, 2006: 47–48, fig. 3, *1*).

According to the terminology used by the majority of scholars, the above axes and other similar objects discovered on the territory of the forest-steppe Altai belong to several varieties of shaft-hole axes (Kuzmina, 1966: 11; Avanesova, 1991: 11; Agapov, 1988: 85; Ivanov S.S., 2014: 94; Grishin, 1971: 23). The cultural and chronological attribution of different types of such

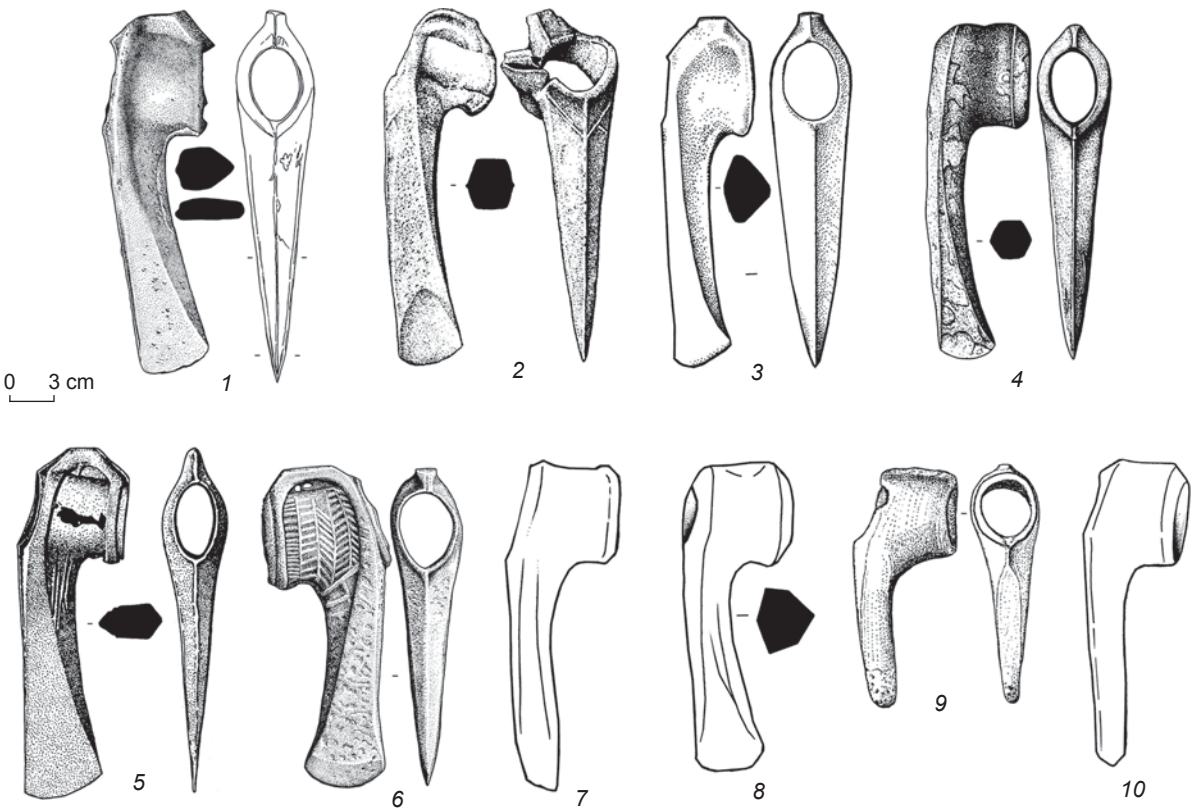

Fig. 10. Shaft-hole tools from different areas of the forest-steppe Altai.
1 – village of Tyumentsevo (after: (Tishkin, Frolov, 2015: Fig. 2, *2*, *4*)); *2* – village of Klyuchi (after: (Papin, Fedoruk, Shamshin, 2006: Fig. 5, *1*)); *3* – village of Lyalino (Lyanino) (drawing after: (Avanesova, 1991: Fig. 13, *52*)); *4* – settlement of Krestyanskoye IVa (after: (Ivanov, Isaev, 1999: Fig. 1, *1*)); *5* – village of Urlapovo (after: (Kiryushin, Ivanov, 1996: Fig. 2)); *6* – vicinity of the town of Zmeinogorsk (collection of Frolov, State Hermitage, No. 1122–84); *7*, *8* – Altai (collection of Shrenk) (drawing after: (Avanesova, 1991: Fig. 13, *54*, *55*)); *9* – Zmeinogorsk mine (after: (Kiryushin, Shulga, Grushin, 2006: Fig. 3, *1*)); *10* – Altai (the Zolotushinsky or Zmeinogorsk mines) (drawing after: (Avanesova, 1991: Fig. 13, *53*)).

tools is complicated by the fact that a substantial part of them are accidental finds not associated with specific assemblages.

On the basis of the typological analysis, N.A. Avanesova suggested a relative chronology of the evolution of shapes exhibited by shaft-hole axes. In her opinion, the earliest are the "smooth shaft-hole" axes (type A); somewhat later are the axes "without a crest, with bulges at the edges of the shaft" (type B), and the final stage of development is represented by axes "with a crest" (type C) (Avanesova, 1991: 11–15). Avanesova connected the chronological changes in the morphology of axes with the selection of the most advanced forms of shaft and blade, the desire to reinforce the shaft and butt by adding "bands" at the edges and a "crest" at the heel (Ibid.: 16). Avanesova correlated the shaft-hole axes of type A with the Petrovka and Early Alakul assemblages, type B—with the Fedorovka culture (Ibid.: 12–14), and type C—with the Late Bronze cultures (late stage of the Andronovo cultural entity) (Ibid.: 15). However, this smooth model is far from being that straightforward.

According to the classification of Avanesova, the axes found in the Altai belong to type B (3 objects) and C (8 objects). Type B is represented by the find from the settlement of Krestyanskoye IVa (Fig. 10, *4*) and two objects from the collection of Shrenk, originating "from the Altai" (Fig. 10, *7*, *8*) (Avanesova, 1991: Fig. 13, *54*, *55*; Ivanov G.E., 2000: 26, fig. 7, *1*). Notably, the axe from the settlement of Krestyanskoye IVa and one axe from the collection of Shrenk show weakly defined crest-like protrusions on the butt, which brings them closer to the objects of type C. G.E. Ivanov dated this settlement to the end of the second millennium BC and attributed it to the circle of sites with cordoned pottery (Ivanov G.E., 1998: 101; 2000: 26). In addition, Ivanov argued that objects of type B, which Avanesova correlated with the Fedorovka assemblages, coexisted with shaft-hole axes with the "crest" (Ivanov G.E., 2000: 26).

In turn, V.I. Molodin believed that axes with a "crest" and articulated butts, which have been found in Baraba, must have been widely used in the Andronovo period. He explained his conclusion by their similarity with pendants in the form of miniature shaft-hole axes, which were found at the Andronovo (Fedorovka) burial grounds (Molodin, Novikov, Sofeikov, 2000: 162; Molodin, Ermakova, 2009: 336). It is important that the pendants from the sites of Stary Tartas-4 (Molodin, Novikov, Grishin, 1998: 297, fig. 2, *b*; Molodin, Novikov, Zhemerikin, 2002: 60–61, fig. 10) and Lanin Log (Avanesova, 1991: 14, fig. 13, *63*) particularly accentuated the axe morphological features of a bulge resembling "bands" on the shaft, and a protrusion ("crest"?) on the butt. It is possible that these details were the most significant features of the actual shaft-hole axes for the artisans who created these adornments. Therefore, it was the axes with the "crest" that were the prototypes behind the production of pendants originating from the Andronovo (Fedorovka) burials of Siberia.

It should be emphasized that although the relative chronology of different types of shaft-hole axes is not so clear-cut, the general sequence of advancements in these tools proposed by Avanesova is still quite acceptable. The objects found in the vicinity of the village of Tyumentsevo, Lyalino (Lyanino), and Klyuchi show transitional forms between types B and C (according to the classification of Avanesova) (Fig. 10, *1–3*). The common features of their morphology include weakly defined "bands" along the edges of the shaft with no clear facets in relief, which continue into a small "crest" of rounded shape without a hole. They show a combination of rounded "bands", as in the objects of type B, and crested protrusion on the butt, typical of type C (according to the classification of Avanesova). The shape of these axes shows similar details to those found in the pendant from Stary Tartas-4. Therefore, based on their morphological features, they cannot be definitively attributed to the Andronovo period or the Late Bronze period. These axes represent a transitional form between the Andronovo objects without a "crest" and the crested axes of the Late Bronze Age, which have expressed ridge-like "bands" along the shaft and the butt, as well as loops on the butt.

Crested axes with ridge-shaped "bands" must have been later than the previous group, since they are more advanced. "Bands" with pronounced facets gave extra rigidity to the walls of the shaft. Such objects have been found near the villages of Urlapovo, Mamontovo, Bor-Forpost, and in the vicinity of Zmeinogorsk (collection of Frolov) (Fig. 2–5; 10, *5*, *6*). The common morphological features of this group include ridge-shaped "bands" in relief reinforcing the edges of the shaft and forming the arch ("crest" or loop) on the butt. All objects of this type, found on the territory of the forest-steppe Altai, have ornamental décor on the shaft in the form of matching bands in relief (decorative borders) filled with slanting lines, or, as is the case with the axe from the village of Urlapovo, vertical lines in relief on the bottom face of the cheek of the blade (Fig. 10, *5*). Numerous parallels to these axes, known from Kyrgyzstan, Kazakhstan, and Xinjiang, also confirm a stable combination of these morphological traits (Avanesova, 1991: Fig. 11, *27–30*, fig. 12, *35–39*; Ivanov S.S., 2014: Fig. 3, *5*; Bekhter, Khavrin, 2002: Fig. 1, *11*, *17*).

Scholars who have studied the ornamental decoration of shaft-hole axes of the above group, have compared it with pottery decoration, in particular with the herringbone pattern (Avanesova, 1991: 15; Ivanov S.S., 2014: 97–100). However, we should emphasize one significant difference between the herringbone patterns on pottery and similar decoration on tools. On the axes, the slanting lines forming the herringbone pattern are separated by horizontal lines and constitute closed decorative borders.

Such décor does not occur in pottery. It can be assumed that the decoration on the axes imitated rope or leather wrapping. The presence of only horizontal lines without filling in the space between them on the shafts of some objects indicates a greater significance of this element compared to the rows of slanting lines. Therefore, the interpretation of the ornamental décor as consisting of matching decorative borders filled with slanting lines in imitation of the fastening of the axe to the haft seems to be more preferable.

The axe found in the vicinity of the village of Severny is close to the latter group (Fig. 8, 9). However, a number of morphological features (double "bands", a striker on the heel, the blade sharply expanding towards the cutting edge) make it possible to view it as a separate item. Avanesova also identified a special sub-group (C3) with other similar axes (1991: 15, fig. 9, *c3*). The find from the village of Karpovo also stands out among other shaft-hole axes (Fig. 6, 7) both in terms of its morphology and manufacturing technique. This axe shows clear signs of using a wax model. Its decoration in the form of intersecting lines in relief on the shaft is also unique and possibly imitates the attachment to the wooden haft. This may indicate the relative antiquity of this object.

In general, crested axes with ridge-shaped "bands" and loops to a greater extent can be associated with the Late Bronze period. Following N.A. Avanesova, S.A. Agapov (1988) dated shaft-hole axes with a "crest" to the time of the Sargary-Alekseyevka culture. Other scholars believed that such objects belonged to the final stage of the Bronze Age (Bekhter, Khavrin, 2002: 75).

Most shaft-hole axes from the territory of the Altai reveal similar manufacturing traditions, manifested by the presence of numerous casting defects. Casting seams, places of breakage of the casting gate, and other defects were intentionally not eliminated. Most traces of hammering and grinding occurred during the use of the axes. The casting defects inside the loops on the butts of the axes are very telling. Artisans intentionally planned to produce the loops in a number of axes. Loops in some axes are well elaborated (for example, on the axe from the village of Mamontovo (Fig. 4, 5)), and only small holes can be seen in other axes because of casting defects (Fig. 10, *6*), while in other axes the loops are completely closed by the lapping of metal (Fig. 10, *1*, *5*). It would have been easy to eliminate this defect, but this was not done, and the loop lost its functionality. It is possible that there was some ban on the secondary treatment of objects after their manufacturing.

Conclusions

Shaft-hole axes are often used as indicators in cultural and chronological attribution of archaeological sites in the Eurasian steppe belt and the adjacent areas. Several scholars noted that the boundaries of their distribution on the territory of Western Siberia coincided with the eastern area of the Andronovo cultural and historical entity (Kuzmina, 1966: 12; Avanesova, 1991: 11; and others). The main problem with using this group of material sources is that the majority of these metal objects are represented by accidental finds, while only a small number of axes have been found at burial grounds and settlements. In this situation, mapping becomes an effective method of establishing the geographical range where various types of axes occurred. This method makes it possible to conduct the analysis at different levels of comparison. Such work has been done for the forest-steppe Altai. In terms of the number of discovered shaft-hole axes (12 objects), this region stands out from all of Western Siberia. It is possible that part of the finds is associated with the eastern part of the sites of the Sargary-Alekseyevka culture (Agapov, 1988). It seems no accident that most of axes from this territory exhibit the late forms with the "crest", where pronounced ridges on the "bands" (the reinforcements of the edges) are present.

Shaft-hole axes that have been discovered in the Altai are typical objects of the Bronze Age, which have also been found in various regions of Kazakhstan, Kyrgyzstan, Xinjiang, and Western Siberia. Their morphology shows transitional features typical of axes used both by the Andronovo cultural and historical entity and by the cultures of the Late Bronze Age (primarily, the Sargary-Alekseyevka culture). The presence of different types of shaft-hole axes is an additional testimony to the complexity of the transformation of cultures on the territory of the forest-steppe Altai at the end of the Bronze Age, which deserves a separate study. A study of the entire array of bronze axes from the forest-steppe Altai according to a unified program and using X-ray fluorescence analysis would be desirable for further productive studies.

References

Agapov S.A. 1988

O kulturnoi prinadlezhnosti "toporov s grebnem". In *Khronologiya i kulturnaya prinadlezhnost pamyatnikov kamennogo i bronzovogo vekov Yuzhnoi Sibiri*. Barnaul: IIFF SO AN SSSR; Alt. Gos. Univ., pp. 85–86.

Avanesova N.A. 1991

Kultura pastusheskikh plemen epokhi bronzy Aziatskoi chasti SSSR. Tashkent: Fan.

Bekhter A.V., Khavrin S.V. 2002

Stepnye bronzy iz provintsii Gansu i Sintszyan-Uigurskogo avtonomnogo raiona Kitaya i problemy vostochnoi linii sinkhronizatsii. In *Tsentralnaya Aziya i Pribaikalye v drevnosti*. Ulan-Ude, Chita: Izd. Buryat. Gos. Univ., pp. 73–78.

Frolov Y.V. 1996
Sluchainye nakhodki predmetov iz raionov Vostochnogo Kazakhstana. In *Sokhraneniye i izucheniye kulturnogo naslediya Altaiskogo kraya*, iss. VII. Barnaul: Izd. Alt. Gos. Univ., pp. 91–94.

Grishin Y.S. 1971
Metallicheskiye izdeliya Sibiri epokhi eneolita i bronzy. Moscow: Nauka. (SAI; iss. B3-12).

Gryaznov M.P. 1956
Istoriya drevnikh plemen Verkhnei Obi po raskopkam bliz s. Bolshaya Rechka. Moscow, Leningrad: Izd. AN SSSR. (MIA; iss. 48).

Ivanov G.E. 1982
K arkheologicheskoi karte verkhovyev Kasmaly. In *Arkheologiya i etnografiya Altaya*. Barnaul: Alt. Gos. Univ., pp. 24–52.

Ivanov G.E. 1998
Poseleniye epokhi pozdnei bronzy Krestyanskoye-4. In *Sokhraneniye i izucheniye kulturnogo naslediya Altaiskogo kraya*, iss. IX. Barnaul: Izd. Alt. Gos. Univ., pp. 99–102.

Ivanov G.E. 2000
Svod pamyatnikov istorii i kultury Mamontovskogo raiona. Mamontovo, Barnaul: Alt. poligraf. kombinat.

Ivanov G.E., Isaev N.N. 1999
Bronzovyi topor s poseleniya Krestyanskoe IV. In *Sokhraneniye i izucheniye kulturnogo naslediya Altaiskogo kraya*, iss. X. Barnaul: Izd. Alt. Gos. Univ., pp. 82–85.

Ivanov S.S. 2014
Novye nakhodki ornamentirovannykh visloobushnykh toporov epokhi bronzy iz Kyrgyzstana. *Teoriya i praktika arkheologicheskikh issledovaniy*, No. 1 (9): 91–100.

Kiryushin Y.F., Ivanov G.E. 1996
Novye nakhodki metallicheskikh izdeliy iz Shipunovskogo raiona. In *Sokhraneniye i izucheniye kulturnogo naslediya Altaiskogo kraya*, iss. VII. Barnaul: Izd. Alt. Gos. Univ., pp. 81–88.

Kiryushin Y.F., Shulga P.I., Grushin S.P. 2006
Sluchainye nakhodki bronzovykh predmetov v severo-zapadnykh predgoriyakh Altaya. In *Altai v sisteme metallurgicheskikh provintsiy bronzovogo veka*. Barnaul: Izd. Alt. Gos. Univ., pp. 45–53.

Kuzmina E.E. 1966
Metallicheskiye izdeliya eneolita i bronzovogo veka Srednei Azii. Moscow, Leningrad: Nauka. (SAI; iss. B4-9).

Levitsky L.P. 1941
O drevnikh rudnikakh (v pomoshch pervootkryvatelyu). Moscow, Leningrad: Gosgeolizdat.

Molodin V.I., Ermakova N.V. 2009
Bronzovyi visloobushnoi topor iz Tsentralnoi Baraby. In *Problemy arkheologii, etnografii i antropologii Sibiri i sopredelnykh territorii*, vol. XV. Novosibirsk: Izd. IAE SO RAN, pp. 334–336.

Molodin V.I., Novikov A.V., Grishin A.E. 1998
Rezultaty poslednego goda polevykh issledovaniy mogilnika andronovskoi kultury Staryi Tartas-4. *Problemy arkheologii, etnografii i antropologii Sibiri i sopredelnykh territorii*, vol. IV. Novosibirsk: Izd. IAE SO RAN, pp. 294–299.

Molodin V.I., Novikov A.V., Sofeikov O.V. 2000
Arkheologicheskiye pamyatniki Zdvinskogo raiona Novosibirskoi oblasti. Novosibirsk: Nauch.-proizvod. tsentr po sokhraneniyu istoriko-kulturnogo naslediya. (Svod pamyatnikov istorii i kultury narodov Rossii; iss. 4).

Molodin V.I., Novikov A.V., Zhemerikin R.V. 2002
Staryi Tartas-4 burial ground: New data on the Andronovo culture. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 3: 48–62.

Papin D.V., Fedoruk A.S., Shamshin A.B. 2006
Nakhodki bronzovykh predmetov s territorii Kulundinskoi stepi. In *Altai v sisteme metallurgicheskikh provintsiy bronzovogo veka*. Barnaul: Izd. Alt. Gos. Univ., pp. 83–96.

Tishkin A.A. 2007
Kulturno-ekologicheskiye oblasti i kontaktnye zony na yuge Zapadnoi Sibiri. In *Kulturno-ekologicheskiye oblasti: vzaimodeystviye traditsiy i kulturogenez*. St. Petersburg: Eleksis Print, pp. 85–95.

Tishkin A.A., Frolov Y.V. 2015
Novaya nakhodka bronzovogo topora s territorii Lesostepnogo Altaya. *Teoriya i praktika arkheologicheskikh issledovaniy*, No. 1 (11): 135–144.

Tishkin A.A., Gorbunov V.V., Kazakov A.A. 2002
Kurgannyi mogilnik Teleutskiy Vzvoz-I i kultura naseleniya Lesostepnogo Altaya v mongolskoye vremya. Izd. Alt. Gos. Univ.

Umansky A.P. 1967
Pamyatniki andronovskoi kultury na Altae. In *Izvestiya laboratorii arkheologicheskikh issledovaniy*, iss. 1. Kemerovo: Kem. Gos. Ped. Inst., pp. 96–100.

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Wooden Paddles from Trans-Urals and from Eastern and Western European Peat-Bog Sites

The study describes the morphology of prehistoric wooden paddles from the Trans-Urals and from Stone Age peat-bog sites in Eastern and Western Europe. Their general technological features are evaluated, the archaeological context is analyzed, and some proposals concerning chronology are made. Considerable regional variation notwithstanding, the general evolution of blades is from wide spatular to narrow elongate. Apparently, the optimal paddle shape, whereby it could be used for both rowing and pushing off, had been elaborated by the Early Chalcolithic. The Eastern Baltic paddles differ from their Trans-Uralian counterparts by leaf-shaped blades with narrow tips. Although it has been believed traditionally that people in both regions mostly traversed shallow waterlogged lakes, certain petroglyphs point to a different use of Eastern Baltic paddles. The handles of certain Eastern European and Trans-Uralian paddles are shaped like heads of waterfowl; these rare specimens may have been destined for ritual purposes. The Trans-Uralian sample of Chalcolithic and Early Bronze Age paddles may be the largest worldwide. Its distinctive features are standard proportions; and composite handles, occasionally decorated with ornithomorphic representations. Certain small paddles with short handles may have served for nonutilitarian purposes, possibly related to ritual, play, household, or manufacture.

Keywords: *Peat-bog sites, Trans-Urals, Eastern Baltic, paddles, Chalcolithic.*

Introduction

Wooden paddles have been found almost at all Trans-Uralian peat-bog sites. Their analysis is presented in a number of general studies (Eding, 1940; Rauschenbach, 1956: 6, 9, 23, 30, 33, fig. 1, *15*; 9, *18*; Chairkina, 2005: 116, 119, 159, 215, 216, fig. 23, 44, 45), and a special study summarizing information on 76 items of this category (Pogorelov, 1998). A new approach to this topic has been initiated by introduction of the information about paddles from Section VI of the Gorbunovo peat-bog, discovered in recent years (Chairkina, 2010; Chairkina, Pavlova, Vilisov, 2014), and the earlier unattributed items stored in the State Historical Museum (Kashina, Chairkina, 2015). This information substantially expands the existing body of data, and supplements and corrects certain ideas about this sort of organic material from the Uralian peat-bog sites.

The proposed article summarizes information about 160 items, both intact paddles and their fragments, found at the sites of Razboinichy Ostrov, Karasye Ozero IA and IIB; settlements of Shuvakish I, IA, VIC,

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VIIID, and XIE, Elnichnoye IA; the Section VI and Section Dalny of the Gorbunovo peat-bog; the placers of Stary, Novy, Yazevsky and 2nd Kuryinsky; the site of 2nd Yazevka; and the settlement of Shigir A of the Shigir peat-bog. Judging by the stratigraphic context, accompanying goods, treatment type and shape, almost all the paddles, both simple and composite, were made in the Chalcolithic (4000–2500 BC) and the Early Bronze Age (2570–1970 BC). Unfortunately, the majority of the artifacts are fragmented, so these items are difficult to classify correctly.

Sources and technical and morphological characteristics of items

At the settlements of Shuvakish I and IA, two intact specimens, five handles, three blades, and three blades with partial handles of single-piece paddles; one intact handle, and two handles of composite paddles have been discovered. One intact single-piece paddle is short, only 97 cm long. A wide (12 cm) elliptical blade with a transverse axis in the middle makes up almost a half (44 cm) of the total length of the item (Fig. 1, *1*). Another intact single-piece paddle of medium length (127 cm) has a narrow (9.5 cm) blade 51 cm long. It is oval, with a transverse axis slightly displaced from the center to the blade's tip (Fig. 1, *2*). Both paddles have blades with subtriangular cross-sections, while the cross-sections of the handles are oval (2 × 3 cm). The tips of the handles are fashioned by cutting, then rounding. One more single-piece paddle is almost intact. The tip of its handle is broken off. The length of the remaining part is 125 cm. The blade is wide (14 cm), 61 cm long, elliptical, with a transverse axis in the middle. The handle has an oval cross-section (Fig. 1, *3*).

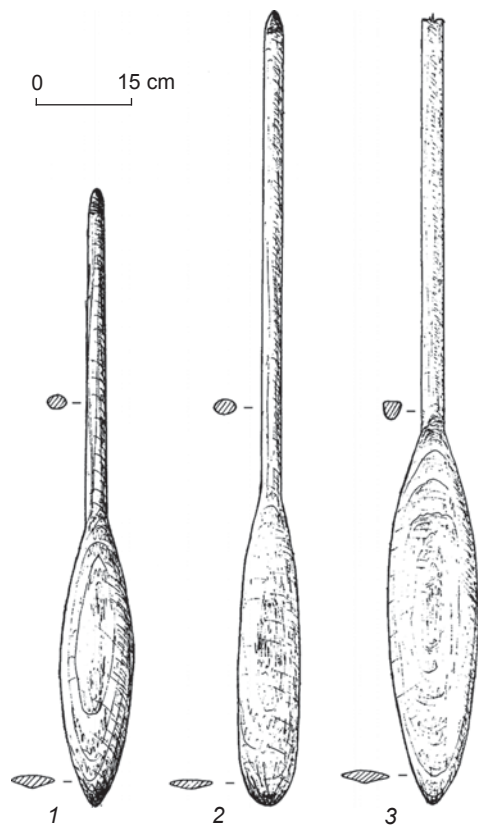

Fig. 1. Single-piece wooden paddles from the settlement of Shuvakish I. Collection of the Scientific Production Center.

The composite paddle consists of a blade with a partial handle, and a handle. Its length in a working state is 135 cm. A wide elliptical blade (12–13 cm) with a transverse axis located in the middle has a length of 55 cm. The profile of the blade is slightly curved, its cross-section is subtriangular, with a stiffening-rib. The handle has an oval cross-section (4 × 3 cm), the tip is fashioned by cutting, then rounding. The parts of the item were fastened by bringing the skewed edges into coincidence and wrapping the composite handle with an organic material (?) (Fig. 2, *3*).

At the Shuvakish I settlement, a fragment of paddle has been found, represented by a portion of a wide blade (60 × 15 cm), probably of elliptical or oval shape, with a broken-off oval handle. One plane of the blade is covered with a black-painted pattern located 20 cm from the handle in the form of two filled isosceles triangles facing each other with their corners and resembling the outline of a butterfly, with three radiating rows of points (seven points in each) (Fig. 2, *2*).

Six intact paddles and fragments of 10–12 single-piece ones (Fig. 3) have been found at the Razboinichy Ostrov site. The finds are dominated by items 112–118 cm long, each with an elliptical blade making up about half the paddle. The blades are 12–13 cm wide and 0.8–1.8 cm thick, their cross-sections are subrhomboid or oval. The tips of handles with oval cross-sections (2.0 to 3.5 × 1.5 to 2.3 cm) are bent and trimmed by a system of cuts. A paddle with a wide (up to 13 cm) and short (up to 30 cm) blade making up slightly more than a quarter of its length has been discovered at the site. This artifact differs from the others in the shape of its blade: this is oval, with a sharpened edge, to which the maximum width is displaced (Fig. 3, *3*). A wooden spade (?), probably made of a paddle with a broken-off blade, may have been used as a pole. The working portion has an oval shape in plan and in section. Its length is 7.0 cm and its width is 1.4–1.8 cm. The handle is oval in section (2.5 to 3.0 × 1.2 to 2.4 cm) (Fig. 3, *6*).

One fragment of an oval handle was found at each of the Shuvakish VIC and VIIID, Yelnichnoye IA, Karasye Ozero IA and IIB settlements; and a similar handle and a narrow blade of suboval shape, 50–60 cm long,

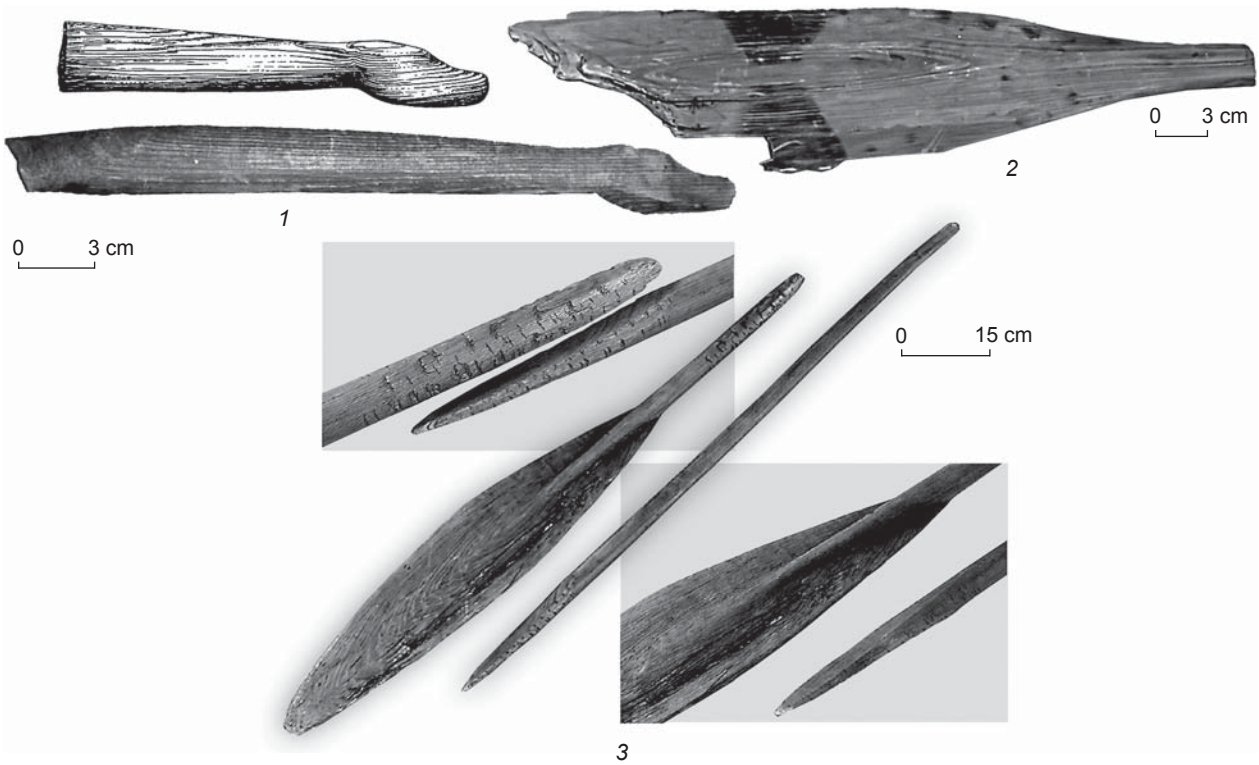

Fig. 2. Fragments of paddles (*1*, *2*), a composite paddle (*3*).
1 – Shigir collection of the Sverdlovsk Regional Local Lore Museum, col. No. S/m 8973; *2*, *3* – settlement of Shuvakish I, collection of the Scientific Production Center.

were found at the site of Shuvakish XIE. Fragments of two blades and two handles with oval cross-sections, with one handle's tip being slightly wavily bent and, possibly, representing a stylized image of a waterfowl's head, have been discovered at the Shigir A settlement.

At the Stary and Novy placers of the Shigir peat-bog, fragments of 15 paddles have been found occasionally, including: barely identifiable fragments of six paddles and one handle; a narrow medium-length suboval blade with nearly parallel sides; blades and handles of six single-piece and one composite paddles; a long and wide blade of one single-piece paddle of elliptical shape, with an oval handle; wide lancet blades of two other single-piece paddles, with shoulders at the junction to an

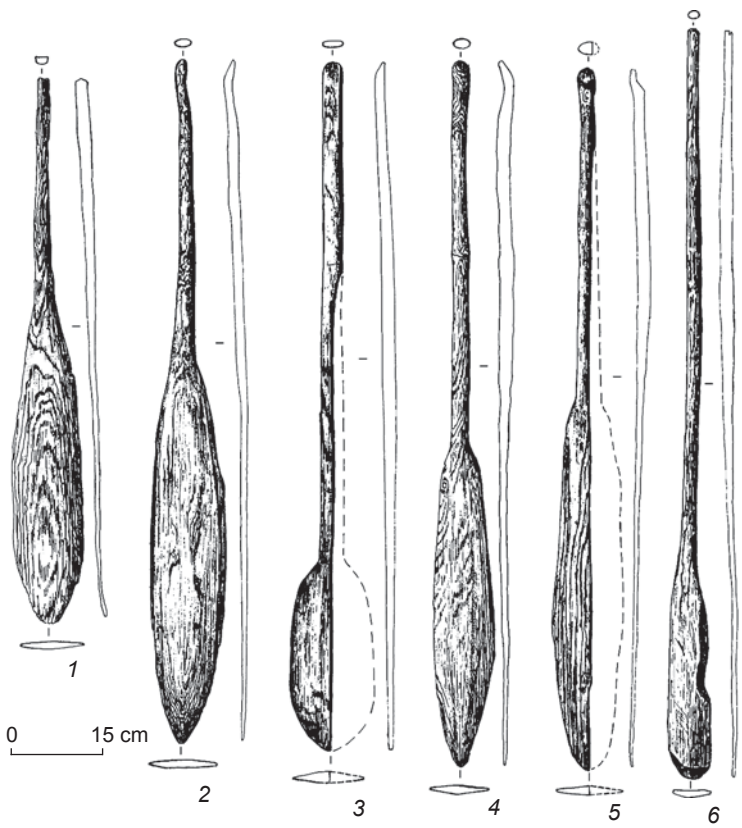

Fig. 3. Single-piece wooden paddles from the Razboinichy Ostrov site. Collection of the Institute of History and Archaeology, Ural Branch, RAS, col. inv. 57.

oval handle. The collection represents two small paddle-like items with short blades and subrectangular and oval handles. One of them has a round bulb at the side—probably a stylized image of an animal's head. Another item, 36.5 × 4.5 × 1.0 cm in size, of suboval shape with nearly parallel sides, is decorated with wavy lines ("striated pattern") made by impressions. A rounded-section handle is broken off; the preserved part is 36.0 × 1.6 × 1.2 cm. The small size of the item and the presence of ornament possibly point to a special function for this artifact. A composite paddle is represented by a long and wide elliptical blade with a transverse axis in the middle and an oval handle.

At the Yazevsky placer of the Shigir peat-bog, fragments of a composite paddle, an intact specimen, and a blade with a partial handle from a single-piece paddle have been found. The intact single-piece paddle has a narrow medium-length suboval blade with nearly parallel sides, and a short oval handle with a rounded tip. The single-piece paddle, represented by a fragment 91.5 cm long, has a suboval blade 37 × 8 cm in size, and an oval handle. A narrow long suboval blade with nearly parallel sides and a portion of an oval handle are preserved from the composite paddle. At the 2nd Yazevsky site of the Shigir peat-bog, blade-fragments and blades with parts of their handles have been found that preclude reconstructing the general shapes and sizes of items. In the section of the 2nd Kuryinsky placer, at a depth of 4 m, an intact single-piece paddle with a narrow medium-length suboval blade with nearly parallel sides has been discovered, perhaps along with the Big Shigir Idol. The handle of the item has a medium length, a subtriangular cross-section and a rounded tip.

The Shigir collection comprises a paddle handle ending with a stylized sculptural representation of a head of an animal, probably a bear, made schematically, without small details. The length of the remaining portion of the oval handle is 31.9 cm. The figurine has a size of 6.1 × 2.3 to 2.7 cm (see Fig. 2, *1*).

In Section VI of the Gorbunovo peat-bog, 95 paddles, both intact and fragmented, have been discovered, and are currently stored in the State Historical Museum (SHM) (Kashina, Chairkina, 2015), the Nizhniy Tagil Museum-Reserve, and the Institute of History and Archaeology, Ural Branch, Russian Academy of Sciences. A review by S.N. Pogorelov (1998) provides tabular information about 24 items from this site (from excavations made by D.N. Eding in 1926–1928 and 1936, and by V.F. Starkov in 1979–1981), and about three items found at the Dalny Section (the latter are stored in the Nizhniy Tagil Museum-Reserve).

The Nizhniy Tagil Museum-Reserve's collection comprises one handle with a stylized image of an animal's head at the tip of a composite paddle, and 12 intact (or almost intact) single-piece paddles. Three of them have wide (10–16 cm) medium-length or long (50–75 cm) elliptical blades and long or medium-length handles. The handle tip of one paddle is flattened, slightly widened and bent in the form of a stylized image of a waterfowl's head; two others are fashioned by cutting, then rounding. Three paddle-fragments having oval handles without tips are assigned to the same type of items with wide blades. Four paddles have wide, oval blades, mostly of medium-length, with suboval or triangular cross-sections. The handles of these items are short or of medium length. The tips of two handles are fashioned by cutting, then rounding, and the tip of another handle is flattened, slightly widened, and bent in the form of a stylized image of a waterfowl's head. The blades of two intact paddles and of one fragment are narrow (up to 10 cm), oval, and subtriangular in cross-section; one of them is long and the two others are of medium length. The handle tips of intact items are fashioned by cutting, then rounding. Two paddles (an intact item and a paddle with a broken-off handle) have suboval blades; in cross-section, one is subtriangular and the other is oval. The handle tip of the intact specimen is fashioned by cutting, then rounding. The tips of short handles of two small paddle-like items are worked in the same manner. The paddle fragments are represented mainly by short oval handles. Five of them have flattened, slightly widened, and bent tips. Two handles are fashioned in the form of waterfowl (?) heads, and one handle, in the form of an animal's head (a bear?).

The SHM collections comprise five intact paddles and 53 fragments, including four from composite items (Kashina, Chairkina, 2015). Four fully preserved single-piece paddles are 128, 129, 136, and 154 cm long respectively. Their blades have oval and elliptical shapes and average size (9.9 to 11.5 × 50.0 to 54.0 cm). The handle tips, 76–100 cm long, are fashioned by cutting, then rounding.

We managed to analyze the shapes of the blades of 15 specimens: (Fig. 4, 5): wide- or narrow-oval are most common, while elliptical and lancet (?) are rare. A number of items have a stiffening-rib located in the lower third of the blade and rarely reaching its middle portion. The cross-sections are rhombic or elongate-oval, or sometimes trapezoidal. Blades are most frequently of medium-length (slightly more than 50 cm), one having a length of 72 cm, and two of them only 32 and 35 cm. The width varies from 7.6 to 13.0 cm, the thickness is 0.9–1.7 cm, most often close to 1.0 cm.

Handles are generally oval or, more rarely, subsquare or circular in cross-section. Sizes of the cross-section are rather standard, predominantly 2.2 × 2.8 cm; however, there are cross-sections 3.4 cm and 2.1 cm long. The handle with a 2.1 × 1.7 cm cross-section is so "elegant" that an idea arises that it must have been a fragment of a

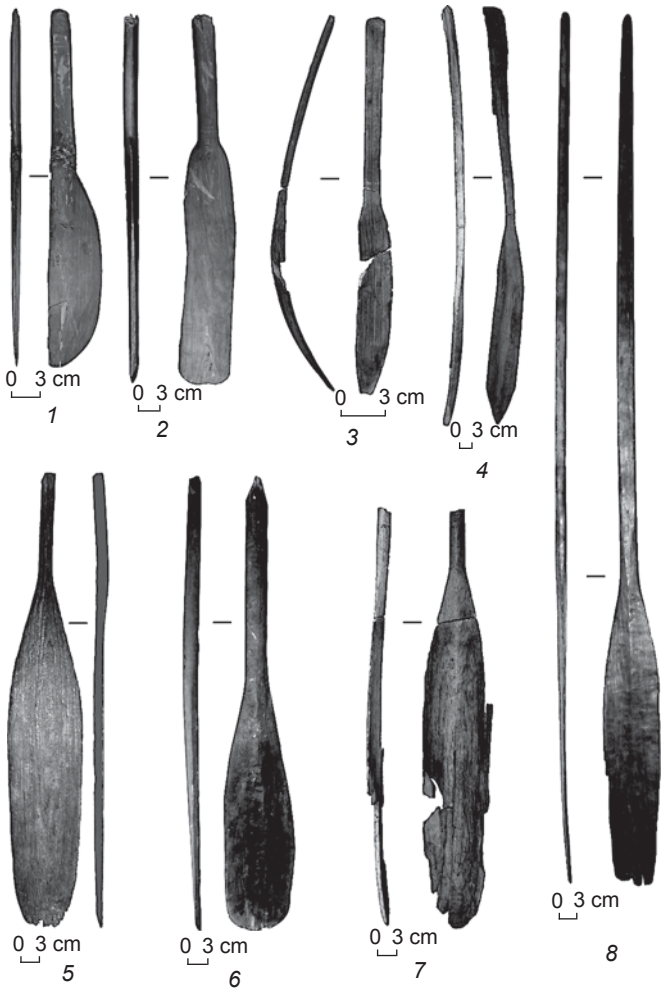

Fig. 4. Wooden artifacts from Section VI of the Gorbunovo peat-bog, SHM collection, col. inv. A380, A383, A385, A387, A530.
1, *2*, *6* – short-handle "paddles"; *3* – a paddle "model"; *4* – a paddle blank; *5*, *7*, *8* – paddles.

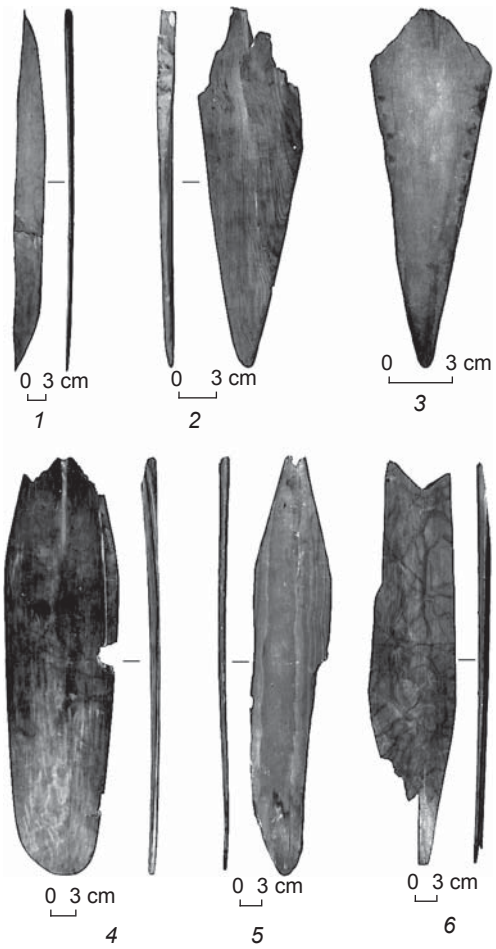

Fig. 5. Fragments of paddle blades.
1, 2, 4–6 – Section VI of the Gorbunovo peat-bog, SHM collection, col. inv. A383, A387; *3* – settlement of Modlona.

child's or woman's (?) paddle. The shaping of handles' ends is various. Among serial shapes (Fig. 6), sharpened, bent and bent-and-widened, flattened, and round-face varieties can be distinguished. Some of them can be assigned to conditionally stylized ornithomorphic and zoomorphic images (?). Three handles undoubtedly have sculptured tops: one of them is fashioned in the form of a duck's head, and two others in the form of a mammal's (?) head. (Fig. 7).

It is hard to tell whether a composite handle was made intentionally or only because of breakage. The method of creating oblique cuts could have been used to perform repairs as well. For example, the collection comprises a very short handle with a top and a cut made at an acute angle, i.e. the piece was obviously repaired after breakage (see Fig. 6, *4*). On a cut of a composite handle of one item, cross-hatching is observed, which was presumably applied for better engagement of the connected surfaces (see Fig. 6, *7*). The presence of two counter-oblique cuts on another piece, which were probably not intended for fastening a composite handle, allows it to be considered as a short paddle (see Fig. 4, *6*). One handle has three projections on the cut-opposite side that were obviously intended for convenient binding with its counterpart (see Fig. 6, *5*).

Manufacturing technique and use of paddles

All items are apparently made of pine (Pogorelov, 1998: 231). The technique of paddle manufacture can be reconstructed in general terms owing to a unique find, a single-piece paddle blank (see Fig. 4, *4*) from the SHM collection, which was left at the stage of cutting the profile of the piece out of a pine half-timber and

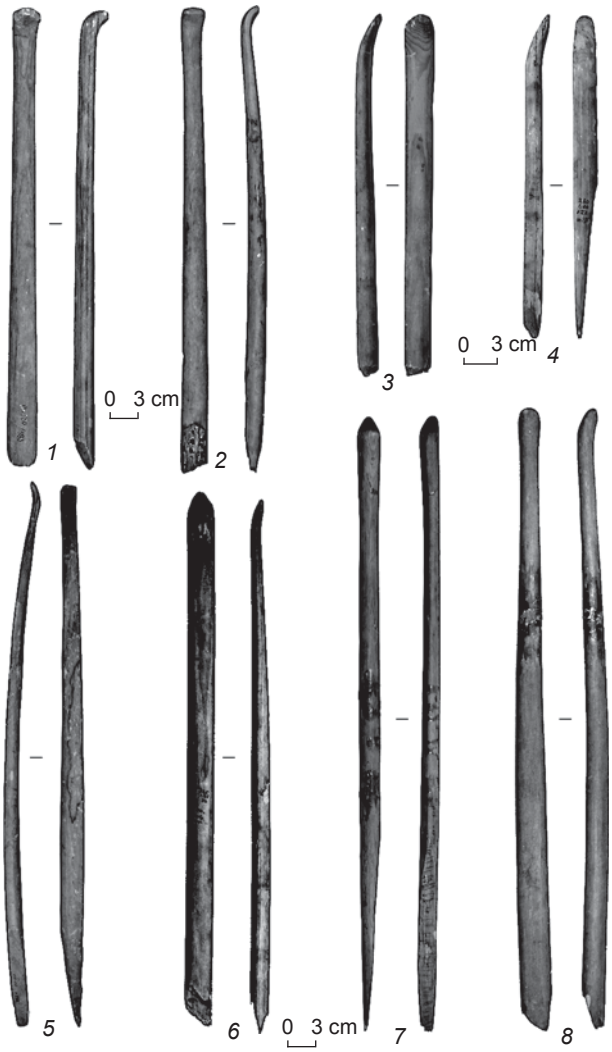

Fig. 6. Fragments of paddle handles. Section VI of the Gorbunovo peat-bog, SHM collection, col. inv. A380, A383, A385, A387.

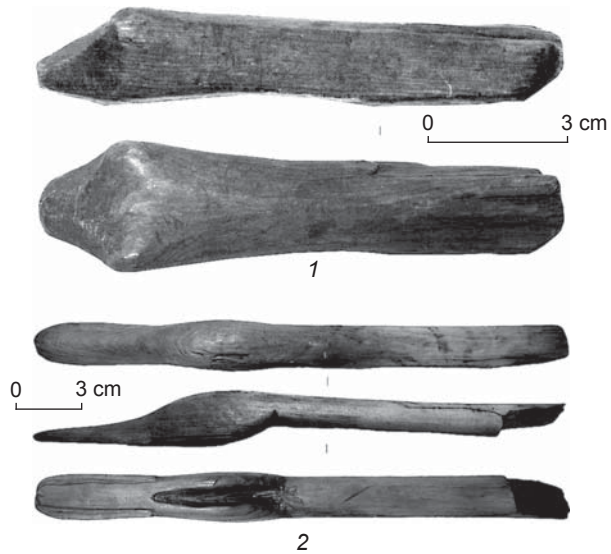

Fig. 7. Fragments of paddle handles with zoomorphic (*1*) and ornithomorphic (*2*) tops. Section VI of the Gorbunovo peat-bog, SHM collection, col. inv. A387.

starting the blade's trimming. The total length of the blank is 167 cm, that of the handle is 91 cm, the blade size is 13 × 76 cm. The proportions correspond to those of the known intact (finished) paddles. The handle has a well-pronounced rectangular cross-section. A sharp tip of the blade is cut out, and a series of facets created by fine trimming from the edges to the center can be seen on one side of the blade. Traces of such actions, strongly smoothed by polishing, are barely perceptible on several finished items (see Fig. 4, *8*). On other items, they are possibly represented in the form of rhythmical series of cut marks/cross-hatching (see Fig. 4, *2*; 5, *5*). It cannot be excluded that these may be traces of minor damage incidental to their use.

A series of subsquare hollows (see Fig. 4, *8*), the purpose and origin of which are unclear, is observed on the reverse side of blade of one paddle from the SHM collection. Another specimen shows shallow notches on the handle. There are also three fragments of handles (two fragments of the middle portion, and one with a top) that have such common features as the presence of intentional circle-wise notches and a break at one end (see Fig. 6, *3*). Possibly these are the remains of deliberately chopped handles of paddles.

The presence of a small blade with a short cut-off handle (see Fig. 4, *2*) suggests that broken and worn paddles were not discarded but, possibly, kept for another purpose. The collections from the Gorbunovo peat-bog comprise several items, the so-called "spatulas", that vaguely resemble such a paddle.

Noteworthy is the careful treatment of the paddles. The entire surfaces of items are grounded and polished; sometimes, no manufacturing traces of shaping are present on a blade. Apart from possible evidence of handle-repairs, a careful attitude to paddles is evidenced by the fact that even when blade edges were chipped, paddles apparently continued to be used, because in many cases the surface of a chipped spot looks worn and smoothed.

Thus, about 150 fragments and fully preserved single-piece paddles, plus a considerably smaller number (11–12 spec.) of composite paddles, made during the Chalcolithic and Early Bronze Age, have been found at the Uralian peat-bog sites. The prevailing are items 120–130 cm long with oval blades 50–60 cm long and rounded handle edges (Shuvakish I settlement, Yazevsky placer of the Shigir peat-bog, and Section VI of the Gorbunovo peat-bog). Less frequent are handles fashioned in the form of a realistic or stylized image of a waterfowl's head (Shuvakish I and Shigir A settlements,

Section VI of the Gorbunovo peat-bog, Razboinichy Ostrov); tops in the form of animal's head are rare (Shuvakish I settlement, Stary and Novy placers of the Shigir peat-bog, Section VI of the Gorbunovo peat-bog). Samples of paddles from various peat-bog sites of the Trans-Urals have obvious morphological similarities (Pogorelov, 1998: 228–240; Chairkina, 2005: 116, 119, 159, 215, 216, fig. 23, 44, 45).

Wooden paddles from Eastern and Western Europe

Comparing the collection of Uralian paddles with the samples from the peat-bog sites of the Mesolithic and Chalcolithic Ages of other regions (the Komi Republic, the Arkhangelsk, Pskov and Moscow Regions, Latvia, Lithuania, Denmark, Germany, Great Britain) suggests the existence of various convergent shapes and traditions in the manufacture of these items. The paddle blade from the Okaemovo V site (the Moscow Region, Mesolithic) is narrow, 8 cm wide. Its broken-off tip was, probably, sharpened. "Shoulders" project along the blade's edges. The length (32 cm) and cross-section (2.0 × 2.5 cm) point to a very small size for the item. This was probably a child's paddle (Okorokov, 1994, 186–187). In general, a sample of artifacts belonging to this category (7 spec.) from the Mesolithic layers of the Zamostye 2 settlement is very similar to the Trans-Uralian series in its sizes and shapes; however, two items (Zamostye 2…, 2013: 29–30, fig. 9, 10) are distinguished by very wide leaf-shaped blades, which resembles paddles from Denmark. A blade having a unique pentagonal shape with parallel edges and a sharpened tip has been found in the Mesolithic layers of the Vis I site (the Komi Republic). Its length is about 50 cm, and a stiffening-rib occupies approximately two-thirds of the length (Burov, 1990). Fragments of a paddle blade and a handled spade (presumably, a paddle) were discovered in the Mesolithic layer of the Nizhneye Veretye settlement (the Arkhangelsk Region) (Oshibkina, 2006: 140; Burov, 2011: 6, fig. 2, *5)*. Their shape is hard to characterize.

Fragments of paddle handles, two blade tips, and an edge fragment have been found at Modlona (the Vologda Region), a settlement attributed to the Late Neolithic and the Early Metal Age (SHM collection, col. inv. A400/2295, 2296, 2298, 2321, 2323, 2327) (see Fig. 5, *3*). These handles are very similar to the items discovered at Section VI of the Gorbunovo peat-bog in their size and type of cross-section. One of them shows traces of intended chopping up, like some Gorbunovo handles, and a counter blaze at the tip, very similar to that of the paddle from the excavations by A.Y. Bryusov at Section VI (see Fig. 4, *6*). The tips of the blades from Modlona are sharpened. Probably, the blade was elongate (?) and rather narrow. One fragment shows a pattern in the form of triangles applied with gray-brown paint along one edge of the blade. Thus, an exceptional resemblance between the shapes of paddles from the Modlona settlement and the Gorbunovo peat-bog in a number of indicators can be recorded.

A wooden item 27.0 × 10.5 × 1.0 to 2.0 cm in size from Arkhangelsk (Kuznechikha River), found along with Chalcolithic pottery during well-sinking, may represent a blade-fragment of paddle made of spruce. On one side of the item, there is a unique ornamental composition of rhomboids made by red paint (Smirnov, 1940). A probable fragment of a paddle's blade (33 cm long) with two drilled holes has been discovered at Repishche, a stratified site containing layers from the terminal Mesolithic to Chalcolitic in the Novgorod Region (excavations by M.P. Zimina; SHM collection, col. inv. A2205/62). The blade's shape is unclear.

Five fragments (Kolosova, Mazurkevich, 1998) and one intact paddle have been found at the settlements of Usvyaty IV, Dubokray V and Naumovo (Pskov Region). The intact paddle (Usvyaty IV) is dated to the late 4th–early 3rd millennium BC according to the calibrated values of absolute dates (Bronzovyi vek…, 2013: 349). It is made of maple and has a length of 162 cm. The elongate leaf-shaped blade with a sharpened tip finds analogs among the paddles from the Sārnate site (Latvia). The handle has an flattened-oval cross-section (3 cm long). Its slotted top with a sculpture representation of two identical waterfowls' heads with long beaks (stork or sandpiper)* is unique.

Numerous paddles from Sārnate (the cultural range of Comb-Pitted and Porous ceramics of the Neolithic and the Early Metal Age) have elongate leaf-shaped blades (Vankina, 1970: 92, 93, pl. I, IX, X), which are generally longer than the Trans-Uralian blades (65–89 cm long, the shortest one is 56 cm). A stiffening-rib is located in the lower third. Cross-sectional diameters of the handles vary from 1.5 to 3.0 cm. 36 items made of ash-wood and maple, and two blanks, have been found at the site; three paddles were stuck into the soil nearby, with their blades down. Judging by the series of broken off rods discovered in the immediate vicinity of the blades, the tips of the paddle handles were fashioned in different ways, which matches the above Trans-Uralian materials. Referring to the ethnographic materials, including the Latvian ones, L.V. Vankina reasonably suggests that during rowing only one paddle was used, and that elongate shape of blade with a nearly pointed tip was perfectly suitable for boat movement through the water of a dead lake.

*This determination was made by I.V. Fadeev, Leading Researcher of the State Darwin Museum, for which the authors express their gratitude.

Paddles from the Šventoji settlements in Lithuania (settlement 1, layers A, B; settlement 2, layer B; settlement 3; settlement 4, layer B) form a sample consisting of several dozen items. They are made of ash-wood, except for one that is made of pine. The layers of the settlements are dated to the beginning of the 4th to the second quarter of the 3rd millennium BC (according to the calibrated values of absolute dates) and associated with the Narva culture, the ceramic assemblages of which, at its late stage, include the ceramics of the Globular Amphora and Funnelbeaker cultures (Rimantiene, 2005: 518–521). Two blade-shapes can be distinguished: an elongate leaf-shaped blade, like that of Sārnate paddles; and elongate oval, like that of Trans-Uralian items. It is hard to tell whether this is due to chronological differences, because excavations were carried out 40 years ago, and the archaeological context of some finds is not clear. Also, a number of wooden items, which can be assigned to handles with oval or circular cross-sections, have been found at the Šventoji settlements; they also include items with various tops (Ibid.: Fig. 127; 194, *14*), in particular, pseudo-sculpture ones (Ibid.: Fig. 113, *10*; 173). Besides, handles with surface notches and, apparently, deliberately chopped handles have been discovered, as well as a paddle blade with a smoothed handle-stump (Ibid.: Fig. 194; 127, *1*). Thus, shapes and ways of using Lithuanian and Trans-Uralian paddles show quite a lot of similarities.

Among the Western European materials, noteworthy is a sample of paddles from the settlements of Tybrind Vig, Flinderhage, and Horsens Fjord (Denmark), which comprises materials pertaining to the late stage of the Ertebølle culture (the 5th millennium BC, according to the calibrated values of absolute dates). The blade-shape of these items is extremely unusual, close to heart-shaped or pentagonal. The handle, judging by the remaining specimens, is very long. The traces of blade-painting with brown dye in the carved recesses allow us to reconstruct a complicated symmetric pattern that, according to researchers, reflects totemic-clan concepts and points to kin relationships between the inhabitants of these settlements (Andersen, 1987; Malm, 1995). Let us remember that blades with painting traces have also been found in the Trans-Urals, Arkhangelsk and Vologda regions (Chairkina, 2005: 119, fig. 23, *1*; Smirnov, 1940). In Denmark, paddles were also discovered at the Ulkestrup Lyng, and Olby Lyng sites containing the Maglemosian culture materials of the earlier time (Lanting, 2000). They differ from the Tybrind Vig sample in terms of morphology. One of them has a wide-oval blade without a stiffening-rib, and another paddle has a narrow leaf-shaped blade like that of Sārnate items. There are reports of two paddles attributed to the Mesolithic Maglemosian culture in Holmegaard (Ibid.).

In Germany, paddles have been discovered at Duwensee-2 (this specimen closely resembles wide-oval items from Ulkestrup), Gettorf, and Friesack IV sites. The ages of these sites indicate that their materials are generally synchronous with the Maglemosian culture (Ibid.). A blade-fragment of birch paddle from the Star Carr settlement (Great Britain) (Ibid.) pertains to the same time. Judging by the drawing, the blade-shape might be identified as elongate.

The petroglyphs of Lake Onega (Peri Nos III) and Lake Kanozero (Kamenny 4) comprise images of mythological anthropomorphic characters, each holding a paddle with a leaf-shaped blade in one hand, very similar to wooden artifacts from Usvyaty IV and Sārnate (Fig. 8). The petroglyphs are dated to the Neolithic

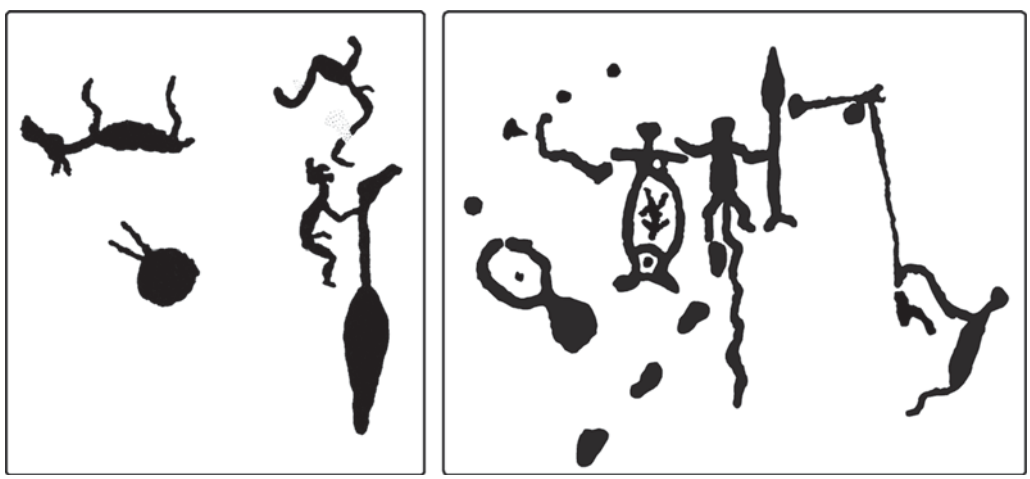

Fig. 8. Characters with paddles on petroglyphs of the Neolithic and Early Metal Age.
1 – Peri Nos III (Lake Onega, Karelia); *2* – Kamenny 4 (Lake Kanozero, Kola Peninsula).

and the Early Metal Age (Zhulnikov, 2009: 17, fig. 6; Kolpakov, Zhumkin, 2012: 151, 350).

Conclusions

Summing up the review of the Stone Age paddles in Western Europe, we note their considerable regional variation, along with the apparent preservation of the general evolution of blades from wide spatular to narrow elongate. There is an opinion that paddles appeared before dugout boats, and could have been used, for example, for rafting (McGrail, 1987; Berzins, 2000). They had the double function of rowing and pushing off. Possibly, owing to the narrow shape of a dugout, as compared, for example, to a raft, it was more convenient to use a narrow-blade paddle that could be easier to place in a boat. The damage to blade tips observed in many cases in the Gorbunovo and Sārnate materials point to the fact that paddles were used to push off the bottom.

However, the Trans-Uralian paddles of the Chalcolithic and the Early Bronze Age differ in blade-shape from their Neolithic and Chalcolithic Eastern Baltic counterparts (with leaf-shaped blades and narrow tips)—although, supposedly, people in both regions mostly traversed shallow waterlogged lakes. The petroglyphic materials suggest that paddles with elongate leaf-shaped blades, similar to the Eastern Baltic ones, could have been used for movement across different-type water bodies.

The existence of special ritual paddles, at least in Eastern Europe and the Trans-Urals, is evidenced by several rare finds with handle-tops in the form of a waterfowl's head. Recall that, apart from Section VI of the Gorbunovo peat-bog, such an item has been found in the Pskov Region. Paddles represented on the petroglyphs of Northern European Russia have handles with tops in the form of a waterfowl's head (and two heads (?)) and are in the hands of characters endowed with supernatural features, probably a specific "cultural hero".

It can be assumed that the optimal dimensional parameters of individually used paddles had been elaborated by the beginning of the Early Metal Age. Modern canoe-paddles are very similar in their sizes and forms to the Trans-Uralian archaeological ones (Paddles…, (s.a.)).

The Trans-Uralian sample of Chalcolithic and Early Bronze Age paddles may be the largest in the world. In our opinion, its originality consists primarily in a substantial uniformity of the items, in their standard proportions, and fashioned handles. A distinctive feature of this sample can be considered the prescence of composite handles.

Certain small paddles with short handles may have served for nonutilitarian purposes, possibly related to ritual, play, household, or manufacture.

References

Andersen S.H. 1987
Mesolithic dug-outs and paddles from Tybrind Vig, Denmark. *Acta Archeologica*, vol. 57 (1986): 87–106.

Berzins V. 2000
The conditions for travel and transport in the Stone Age. *Muinasaja Teadus*, vol. 8: 27–48.

Bronzovyi vek: Evropa bez granits:
Chetvertoye – pervoye tysyacheletiye do n.e.:
Katalog vystavki. 2013
St. Petersburg: Chistyi list.

Burov G.M. 1990
Die Holzgeräte des Siedlungsplatzes Vis I als Grundlage für die Periodisierung des Mesolithikums im Norden des Europäischen Teils der UdSSR. In *Contributions to the Mesolithic in Europe*. Leuven: Leuven Univ. Press, pp. 335–344.

Burov G.M. 2011
Rybnaya lovlya v epokhu mezolita na Evropeiskom Severe Rossii. *Rossiyskaya arkheologiya*, No. 2: 5–15.

Chairkina N.M. 2005
Eneolit Srednego Zauralya. Yekaterinburg: Izd. Ural. Gos. Univ.

Chairkina N.M. 2010
Arkheologicheskoye issledovaniye stoyanki VI Razrez Gorbunovskogo torfyanika v 2007 g. In *Drevnosti Gorbunovskogo torfyanika*. Yekaterinburg: Bank kulturnoi informatsii, pp. 140–164. (Okhrannye arkheologicheskiye issledovaniya na Srednem Urale; iss. 6).

Chairkina N.M., Pavlova O.A., Vilisov E.V. 2014
Arkheologicheskoye issledovaniye raskopa No. 72 VI Razreza Gorbunovskogo torfyanika v 2009 g. *Uralsky istoricheskiy vestnik*, No. 1 (42): 112–122.

Eding D.N. 1940
Novye nakhodki na Gorbunovskom torfyanike. *MIA*, No. 1: 41–57.

Kashina E.A., Chairkina N.M. 2015
Derevyannye vesla VI Razreza Gorbunovskogo torfyanika v sobranii Istoricheskogo muzeya. In *Sedmye Bersovskiye chteniya*. Yekaterinburg: Kvadrat, pp. 346–350.

Kolosova M.I., Mazurkevich A.N. 1998
Identifikatsiya derevyannykh predmetov po priznakam anatomicheskogo stroeniya drevesiny iz neoliticheskikh torfyanikovykh pamyatnikov Lovatsko-Dvinskogo mezhdurechya. In *Poseleniya: Sreda, kultura, sotsium*. St. Petersburg: Izd. SPb. Gos. Univ., pp. 52–56.

Kolpakov E.M., Shumkin V.Y. 2012
Petroglify Kanozera. St. Petersburg: Iskusstvo Rossii.

Lanting J.N. 2000
Dates for origin and diffusion of the European logboat. In *Palaeohistoria*, vol. 39/40 (1997–1998): 627–645.

Malm T. 1995
Excavating submerged Stone Age sites in Denmark – the Tybrind Vig example. In *Man and Sea in the Mesolithic*, A. Fischer (ed.). Oxford: Oxbow Books, pp. 385–396. URL: http://www.abc.se/~pa/publ/tybrind.htm

McGrail S. 1987
Ancient boats in NW Europe: The archaeology of water transport to AD 1500. London, New York: Longmans.

Okorokov A.V. 1994
Drevneishiye sredstva peredvizheniya po vode. Kaliningrad: Muzei Mirovogo okeana.

Oshibkina S.V. 2006
Mezolit Vostochnogo Prionezhya: Kultura Veretye. Moscow: IA RAN.

Paddles by W. Bruce Smith. (s.a.)
URL: http://www.brucesmithpaddles.com

Pogorelov S.N. 1998
Vesla iz torfyanikovykh pamyatnikov Srednego Urala. In *Voprosy arkheologii Urala*, iss. 23. Yekaterinburg: Izd. Ural. Gos. Univ., pp. 228–240.

Rauschenbach V.M. 1956
Sredneye Zauralye v epokhu neolita i bronzy. Moscow: Goskultprosvetizdat. (Trudy GIM; iss. 29).

Rimantiene R. 2005
Die Steinzeitfischer an der Ostseelagune in Litauen. Vilnius: Litauisches Nationalmuseum.

Smirnov V.N. 1940
Predvaritelnoye soobshcheniye o stoyanke na r. Kuznechikhe. *Sovetskaya arkheologiya*, iss. VI: 289–292.

Vankina L.V. 1970
Torfyanikovaya stoyanka Sarnate. Riga: Zinatne.

Zamostye 2: Ozernoye poseleniye drevnikh rybolovov epokhi mezolita – neolita v basseine Verkhnei Volgi. 2013
St. Petersburg: Izd. IIMK RAN.

Zhulnikov A.M. 2009
Petroglify Karelii: Obraz mira i miry obrazov. Petrozavodsk: Skandinaviya.

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A Golden Plaque of the Hellenistic Period from Zeravshan, Uzbekistan*

A rare Sogdian golden plaque from Zeravshan, Uzbekistan, dating to the Hellenistic period, is described. Results of science-based analysis are relevant to the assessment of the sources of gold and the technology used. Stylistic analysis helps to establish cultural ties and contacts between various manufacturing centers of the Hellenistic era in Central Asia. In terms of decoration, the Zeravshan plaque is indirectly paralleled by several Early Iron Age toreutic items from southern Siberia and Central Asia, specifically those from the Peter the Great Siberian Collection, Oxus and Kargaly treasure hoards, and Tillya Tepe. The central part of the Zeravshan specimen is reminiscent of Near Eastern and Scythian toreutic art and of Hun bronzes. Similarly rendered heads of animals are found on late first millennium BC carved bone artifacts from the southwestern Siberian forest-steppe (Novotroitskoye, Ust-Ishtovka). This similarity may be due to close contacts between various manufacturing centers in the Early Iron Age. The distinctive feature of the Zeravshan plate is its small size. The artifact evidently belongs to the Yuezhi-Kushan cultural complex (200 BC–100 AD). The high content of gold in the plaque may be due to its having been manufactured from native gold, which is a rather archaic technique.

Keywords: *Toreutics, Central Asia, Hellenistic period, alloy composition, manufacturing centers, cultural ties.*

Introduction

Great historical events in Central Asia of Antiquity have time and again led to redistribution of accumulated golden objects (Marfunin, 1987: 22), which resulted in their extreme rarity (Drevneishiye gosudarstva…, 1985: 283, 291). Such objects have survived only in exceptional cases as parts of buried treasures, temple treasures (Zeimal, 1979), or as single finds. One of such finds is a small, golden cast sub-rectangular plate with zoomorphic representations, which was accidentally found in the autumn of 1988 by O.B. Kasparov in the vicinity of a quarry near the Zeravshan River not far from the Samarkand airport in Uzbekistan (Fig. 1). The object was located 2 km northwest of the excavations of Afrasiab in a layer of sand and river mud, fragments of which survived on the front and back sides of the plate. In the 1990s, the owner of the plate sent a request for its attribution to the British Museum. In 2015, the object was given to me for a detailed study.

Materials and methods

For examining the golden object from Zeravshan, we followed a comprehensive approach combining

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Fig. 1. Golden object from Zeravshan.

traditional archaeological and natural scientific methods such as scientific description, search for parallels, analysis of representation style and execution technique, material energy-dispersive analysis of the surface, and trace analysis.

The size of the golden plate with the zoomorphic decoration is 3.4 × 2.5 cm, the thickness is up to 4 mm, and the weight is 10.43 g. The object has four holes drilled with a knife on the reverse side. The traces of this method include the asymmetric edges of the holes, cut marks on internal surfaces, and welts on the front face of the object, where soft and pliable gold was extruded. The holes were intended for fastening the plate to a textile or leather base. Corner holes on rectangular frames appear on a number of larger golden plaques from the Siberian Collection of Peter the Great (Kochevniki…, 2012: 86, cat. No. 191). Some of them preserved golden nails. The diameter of the holes is much smaller on the object from Zeravshan, which implied sewing as the fastening method. Given the weight of the object, it must have been sewn to a relatively rigid base. Judging by its size, the object most likely belonged to the category of belt fittings or decoration on the edges of garments that fastened over the shoulders. The experts from the British Museum preliminarily interpreted the golden plate from Zeravshan as a detail of a prestigious military belt fitting made of bronze with surface gilding.

Multi-element analysis of the metal composition, which was conducted using a Hitachi TM-3000 electron microscope with a Bruker Quantax-70 unit for energy-dispersive analysis (operator M.M. Ignatov) made it possible to establish the main qualitative features of the object's alloy. The sample from the front face of the plate (taken in the area of the shoulder of the right zoomorphic representation) contained 93.4 % gold, 5.1 % silver, and 1.6 % copper; the sample from the back of the plate contained 93.7 % gold, 4.9 % silver, and 1.3 % copper.

Findings

The sufficiently high concentration of precious metal in the alloy of the object from Zeravshan and the uniqueness of the known antique golden objects of jewelry originating from the Sughd region pose a certain problem for the attribution of the raw materials of the object. According to ancient authors, gold was produced in the mountains of Fergana and Sughd (Shefer, 1981: 459). The earliest evidence of such extraction is associated with ancient Sogdiana of the 6th century BC (Marfunin, 1987: 165). Traces of panning for placers' gold have been found along the upper reaches of the Zeravshan River (the Polytimetos of Antiquity) (Ibid.: 164). A gold deposit was discovered downstream in that river in the late 1950s (Ibid.: 18). According to the written sources, Sogdian gold was in great demand and was exported (Shefer, 1981: 459). However, the absence of a detailed description of its composition necessitates the use of data for comparison from the adjacent territories of southern Siberia (the Altai Mountains) and Mongolia, where such studies have been conducted (Malakhov et al., 2000; Shcherbakov, Roslyakova, 2000; Dashkovsky, Yuminov, 2012; Shatskaya, Derevyagina, Glazyrina, 2011). Thus, the composition of golden objects of the Early Iron Age from the Ukok Plateau (Ak-Alakha-2, Verkh-Kaldzhin II, VI) in the south of the Russian Altai is distinguished by a significant variety of fineness, which makes it possible to divide these objects into several groups (Malakhov et al., 2000: 170; Shcherbakov, Roslyakova, 2000: 185). According to the analysis of the alloy quality of golden objects discovered during the study of the barrow burial grounds of Khankarinsky Dol and Inskoy Dol of the Pazyryk culture, the objects from Northwestern Altai typically show a significant presence of copper and silver, as well as the presence of platinum group minerals in ancient

jewelry (Dashkovsky, Yuminov, 2012; Zaykov et al., 2016: 98), which most likely was caused by the natural qualities of the raw materials.

A specific type of late Sogdian gold was the so-called purple gold. The Chinese authors of the Tang time described it as being of "*tsi* color". In fact, in the color palette, this tint was close to crimson-red, since the alloy consisted of copper and gold (Shefer, 1981: 459). The quality and color of the metal plate from Zeravshan are completely different. The alloy composition of this object is most similar to the first group of golden objects from Ukok (horse tail fitting from Ak-Alakha-2) (Shcherbakov, Roslyakova, 2000: 185), which was probably caused by the natural origin of gold. A similar feature of the gold was noted in the atomic-absorption analysis of a plate with the representation of a dragon from burial mound No. 20 in Noin-Ula in Mongolia (Shatskaya, Derevyagina, Glazyrina, 2011: 153).

According to the experts from the British Museum, the representation on the golden plate from Zeravshan is associated with the Central Asian pictorial tradition of the Eurasian nomads with a possible Chinese artistic influence. From my point of view, the decoration of this object shows a number of indirect parallels to various complexes of toreutics of the Early Iron Age in southern Siberia and Central Asia, including the Siberian Collection of Peter the Great (Rudenko, 1962; Kochevniki…, 2012), the Oxus (Zeimal, 1979) and the Kargaly (Tasmagambetov, 2003) treasure hoards, as well as individual golden objects from Tillya Tepe (Bactrian Gold…, 1985). The presence of the outer three-dimensional frame on the plate from Zeravshan is similar to a rare variety of toreutics objects made in the Scytho-Siberian animal style. For example, a series of massive gold plates with representations of feline predators and pouncing of prey have similar smooth frames (Kochevniki…, 2012: 85, 86, cat. No. 189, 193). This decorative element is typical of the Scytho-Siberian toreutics of the mid first millennium B.C. In turn, the compositional arrangement of the decoration on the Zeravshan plate in the form of two animals fighting against each other is generally typical of the Hunno-Sarmatian toreutics (Borodovsky, Larichev, 2013: 41, 47). The main difference between those objects and the object from Zeravshan is their size and much less precise treatment of the details (wool, mane, tail end) in the zoomorphic representations. A distant similarity with such treatment of the details can be found on a massive golden diadem from the Kargaly Treasure in Kazakhstan dated to the 2nd–1st centuries BC (Tasmagambetov, 2003: 206, 209), and the golden pommel of a dagger from Tillya Tepe in Afghanistan (Bactrian Gold…, 1985: 213). Nevertheless, the object from Zeravshan belongs to a small circle of miniature golden objects decorated in animal style of the Early Iron Age from southern Siberia and Central Asia (Fig. 2).

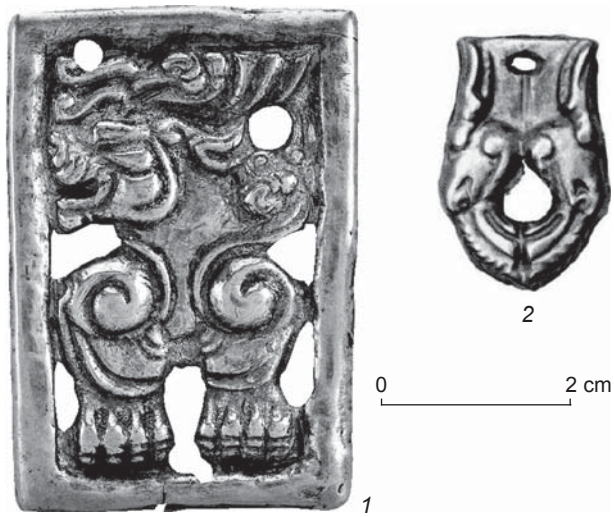

Fig. 2. Miniature golden items of the Early Iron Age made in animal style from the Siberian Collection of Peter the Great (*1*) and from the Tulkhar burial ground in Tajikistan (*2*).

In terms of parallels, representation of the noses of the predators with bared teeth on the golden object from Zeravshan is of special interest (Fig. 3, *1–3*). This detail was rendered as a curl, which to a certain extent resembles the representation of the noses of fantastic wolves known from the Siberian Collection and clearly associated with the representation of predators in the Early Iron Age in Western and Central Asia (Rudenko, 1962: 32, Fig. 35). The central part of the composition on the golden plate from Zeravshan in the form of two joined muzzles of felines with bared teeth, depicted opposite each other, also has some interesting parallels (Fig. 3, *2*). In Middle Eastern toreutics, such representations are known beginning with the Luristan bronzes (early 1st millennium BC). In the middle of the 1st millennium BC, they were occasionally found in the Scythian metalwork in the area of the Northern Black Sea region; in the second half of the 1st millennium BC, such motifs occur on the objects of carved bone in the forest-steppe region in the south of western Siberia (Borodovsky, 2007: 123, fig. 105). It is worth noting one more artistic device typical of the Early Iron Age in southern Siberia and Central Asia. The heads of feline predators were sometimes depicted face forward (Shulga, Umansky, Mogilnikov, 2009: 317, fig. 117, *11*), and sometimes sideways (Kochevniki…, 2012: 86, cat. No. 193; Korolkova, 2015: 234, ill. 4) (see Fig. 2, *1*; 4, *1*). So-called double side-face representations with two animal heads with open mouths forming a single outline have also been found. In some cases such a compositional feature could have been reflected in stylized representations on the objects of carved bone (Frolov, 2001). One of the examples is a zoomorphic decoration on a horn sheath from Ust-Ishtovka in the

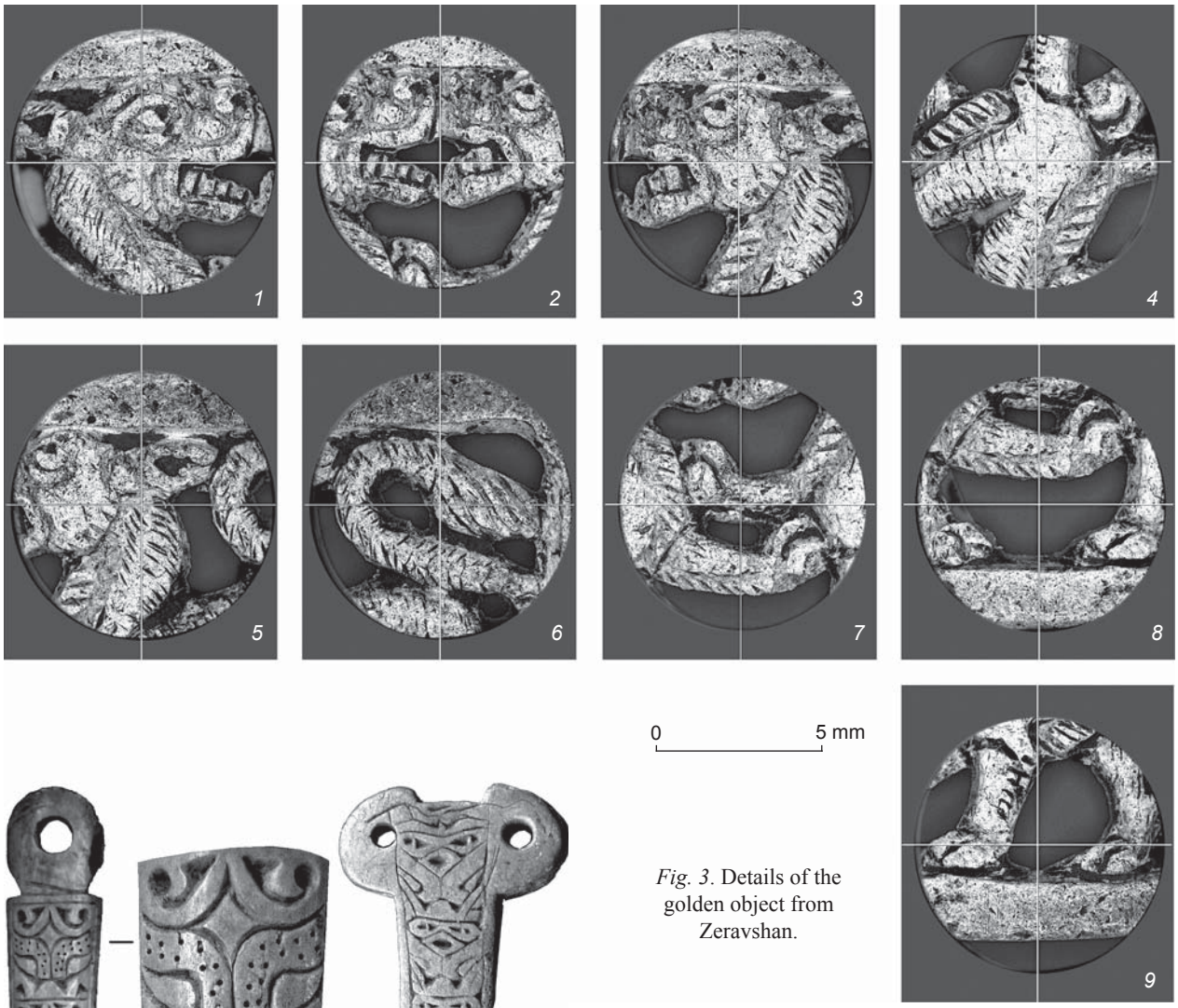

Fig. 3. Details of the golden object from Zeravshan.

Fig. 4. Specific features of rendering the heads of feline predators in the animal style on the objects of carved bone of the Early Iron Age in the south of Western Siberia.
1 – Novotroitskoye cemetery; *2* – Ust-Ishtovka.

Upper Ob region (Fig. 4, *2*). These parallels are quite important not only for analyzing the artistic and stylistic features of the image on the plate from Zeravshan, but also for its dating. Objects of carved bone and specific features of their decoration could both precede similar metal objects, be subsequently copied from them, or reflect the influence of metalwork (Borodovsky, 2008: 71). From a traditional point of view, if we attempt to archaeologically date the objects of carved bone showing certain similarities with metal objects, it is not entirely correct to date the objects of bone to a later time. Most likely, it is more correct to use the average date for objects with similar form and decoration, which were made of different raw materials (organic and mineral). Given the earlier dates of the objects of carved horn from southern Siberia with similar decorative elements, the golden plate from Zeravshan can be dated to the end of the 1st millennium BC or to the turn of the 1st millennium AD. It should be emphasized that parallels between the golden

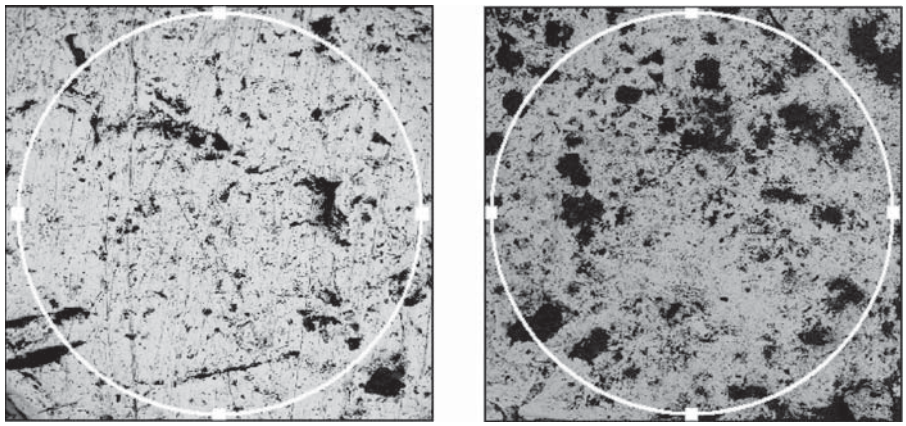

Fig. 5. Traces of wear on the surface of the golden object from Zeravshan.
1 – front; *2* – back.

objects from Central Asia and carved objects from southern Siberia are not rare. One more example is the golden buckle of the late 2nd century BC–1st century AD with the representation of a pair of saiga heads from the Tulkhar burial ground (see Fig. 2, *2*), similar to a horn saddle pendant from a burial mound on the Aley River in the Altai Territory (see: (Kochevniki…, 2012: 165, cat. No. 416, p. 166; Barkova, 2003: 16, 17, fig. G)).

Conclusions

Trace analysis of the surface of the golden plate from Zeravshan made it possible to establish its strong wear on the front side in contrast to its back surface (Fig. 5). This indicates the intensive use of the object, which was fastened to some base through the holes. Long scratches on the front side of the golden object are similar to the signs of wear typical of the elements of belt fittings (Borodovsky, 1991).

The high content of gold in the antique object from Zeravshan is probably associated with the use of native metal for its production. Judging by the analysis of the extensive collection of silver objects from the south of Western Siberia, the use of fine native metal was the most typical technological feature of the earlier periods of metalworking with precious materials (Borodovsky et al., 2005: 74).

Compositional and stylistic features of the zoomorphic imagery on the golden object from Zeravshan make it possible to attribute the object to the circle of Central Asian toreutics of the Hellenistic period. This circle was distinguished by eclecticism and wide territorial ties, which reflect not only the Central Asian pictorial tradition of the Eurasian nomads with a possible Chinese artistic influence, but also the "replication" of specific details appearing on the objects of carved horn of the Early Iron Age from the south of Western Siberia. It should be emphasized that bone-carving in this region had sophisticated and many-sided connections, including the distribution of imagery of the Hellenistic period (Borodovsky, 2008: 71, fig. 22, *9–12*, 72). The golden object from Zeravshan should be attributed to the Yuezhi-Kushan historical and cultural complex of the 2nd century BC–1st century AD (Botalov, 2007: 64, fig. 1), which had stable connections with the Upper Ob region.

References

Bactrian Gold: From the Excavations of the Tillya-Tepe Necropolis in Northern Afghanistan. 1985
Leningrad: Aurora.

Barkova L.L. 2003
Predmety zverinogo stilya iz kollektsii P.K. Frolova. In *Stepi Evrazii v drevnosti i srednevekovye: Materialy Mezhdunar. nauch. konf., posvyashchennoi 100-letiyu so dnya rozhdeniya M.P. Gryaznova*, bk. 2. St. Petersburg: pp. 14–19.

Borodovsky A.P. 1991
Interpretatsiya naznacheniya dlinnykh rogovykh nakladok epokhi rannego zheleza i tekhnologiya ikh izgotovleniya. In *Problemy arkheologii i etnografii Sibiri i Dalnego Vostoka: Posvyashchaetsya 100-letiyu N.K. Auerbakha: Kratkoye soderzhaniye dokladov XXXI RASK*, vol. 3. Krasnoyarsk: pp. 22–24.

Borodovsky A.P. 2007
Drevniy reznoi rog Yuzhnoi Sibiri. Novosibirsk: Izd. IAE SO RAN.

Borodovsky A.P. 2008
Metodika issledovaniya drevnego kostoreznogo proizvodstva. Novosibirsk: Izd. Novosib. Gos. Univ.

Borodovsky A.P., Larichev V.E. 2013
Iyusskiy klad: Katalog kollektsii. Novosibirsk: Izd. IAE SO RAN.

Borodovsky A.P., Obolensky A.A., Babich V.V., Borisenko A.S., Mortsev N.K. 2005
Drevneye serebro Sibiri. Novosibirsk: Izd. IAE SO RAN.

Botalov S.G. 2007
Turkestan kak edinoye geopoliticheskoye prostranstvo v epokhu rannego zheleza. In *Altaye-Sayanskaya gornaya strana i sosedniye territorii v drevnosti*. Novosibirsk: Izd. IAE SO RAN, pp. 61–83.

Dashkovsky P.K., Yuminov A.M. 2012
Vklyucheniya mineralov platinovoi gruppy v zolotykh izdeliyakh iz mogilnika Khankarinskiy dol (Altai). *Vestnik NGU*. Ser.: Istoriya, filologiya, vol. 11, iss. 7: 50–55.

Drevneishiye gosudarstva Kavkaza i Srednei Azii. 1985
Moscow: Nauka. (Arkheologiya SSSR).

Frolov Y.V. 2001
Interpretatsiya izobrazheniy na dvukh kostyanykh plastinakh iz pogrebeniy rannego zheleznogo veka Verkhnego Priobya. In *Problemy izucheniya drevnei i srednevekovoi istorii*. Barnaul: Izd. Alt. Gos. Univ., pp. 98–102.

Kochevniki Evrazii na puti k imperii: Iz sobraniya Gosudarstvennogo Ermitazha: Katalog vystavki. 2012
St. Petersburg: Slavia.

Korolkova K.F. 2015
O nekotorykh fantasticheskikh obrazakh zverinogo stilya v Sibirskoi kollektsii Petra I: Rabota nad oshibkami. In *Arkheologiya bez granits: Kollektsii, problemy, issledovaniya, gipotezy*. St. Petersburg: Izd. Gos. Ermitazha, pp. 234–239. (Trudy Gosudarstvennogo Ermitazha; vol. LXXVII).

Malakhov V.V., Vlasov A.A., Ovsyannikova I.A., Plyasova L.M., Kraevskaya I.L., Tsybulya S.V., Stepanov V.G. 2000
Veshchestvennyi sostav nakhodok iz "zamerzshikh" zakhoroneniy pazyrykskoi kultury. In *Fenomen altaiskikh mumiy*. Novosibirsk: Izd. IAE SO RAN, pp. 162–175.

Marfunin A.S. 1987
Istoriya zolota. Moscow: Nauka.

Rudenko S.I. 1962
Sibirskaya kollektsiya Petra I. Moscow, Leningrad: Izd. AN SSSR. (SAI; iss. D3-9).

Shatskaya S.S., Derevyagina I.A., Glazyrina N.F. 2011
Rezultaty issledovaniy metallicheskikh izdeliy 20-go i 31-go kurganov. In *Polosmak N.V., Bogdanov E.S., Tseveendorj D. Dvadtsatyi Noin-Ulinskiy kurgan*. Novosibirsk: INFOLIO, pp. 150–163.

Shcherbakov Y.G., Roslyakova N.V. 2000
Sostav zolotykh i bronzovykh izdeliy, istochniki metallov i sposoby ikh obrabotki. In *Fenomen altaiskikh mumiy*. Novosibirsk: Izd. IAE SO RAN, pp. 179–187.

Shefer E. 1981
Zolotye persiki Samarkanda. Moscow: Nauka.

Shulga P.I., Umansky A.P., Mogilnikov V.A. 2009
Novotroitskiy nekropol. Barnaul: Izd. Alt. Gos. Univ.

Tasmagambetov I. 2003
Kentavry velikoi stepi: Khudozhestvennaya kultura drevnikh kochevnikov. Almaty: Berel.

Zaykov V.V., Yablonsky L.T., Dashkovsky P.K., Kotlyarov V.A., Zaykova E.V., Yuminov A.M. 2016
Platinoid microinclusions of a native osmium group in ancient gold artifacts from Siberia and the Urals as a source of geoarchaeological information. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 44 (1): 93–103.

Zeimal E.V. 1979
Amudaryinskiy klad: Katalog vystavki. Leningrad: Iskusstvo.

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Albazin, a Russian Town on the Amur: Population Size in the Late 1600s*

Judging by modern studies and written sources, the town of Albazin, founded more than 330 years ago, has lost its western rampart, facing the Amur; and also 17 % of the enclosed area (the latter totaled 7630 m^2 in 1684). Given the reports stating that the fort had a garrison of 222 men, it could not have accommodated 826 inhabitants during the 1686 siege. It is proposed that in the 1680s, owing to a military threat, Fort Albazin was turned into a fortified town numbering more than 1000 inhabitants. The Cossacks used a nearby Mohe or Daur fortification, consisting of three ramparts and moats, to erect an external defense-belt around the fort with a piece of land accommodating 53 houses. During the first three months of the war, more than 800 Cossacks defended the town from the Manchu attacks, after which the surviving defenders took refuge in the fort. The estimated population size at that time was 310, including 241 persons buried in dugouts, 66 survivors of the siege (including women and children), and three Cossacks who left the fort in November 1686 to report on the siege.

Keywords: *Amur Region, Albazin, 17th century, Manchu, Albazin siege.*

Introduction

Fort Albazin was built in 1665 by the Cossack ataman N.R. Chernigovsky, at the site of fortified winter quarters destroyed in 1651 (by a detachment commanded by E.P. Khabarov) that, in turn, were erected on the territory of Yaksa town, in the lands of Daurian Prince Albazy (Novikov-Daursky, 1961: 16). In the 1680s, Fort Albazin became the largest settlement in Eastern Russia, and was turned by the Russians into an outpost for development of the Amur River basin (Fig. 1, 2). It is considered the first capital of the Russian Amur region (Cherkasov et al., 2012: 28). Information on Fort Albazin can be obtained from written sources that describe various episodes of the fortress's history (Artemiev, 1999: 102), as well as from the abundant archaeological materials discovered during excavations. Finds collected by the Amur Museum expedition "near the base of the western rampart currently being destroyed by flood water" were mentioned by S.G. Novikov-Daursky (1961: 17). Archaeological excavations at the Fort Albazin site were carried in 1974–1976 and 1979–1980 by the Amur party (headed by S.V. Glinsky) of the North Asian Joint Expedition of the Institute of History, Philology and Philosophy of the SB USSR Academy of Sciences, over

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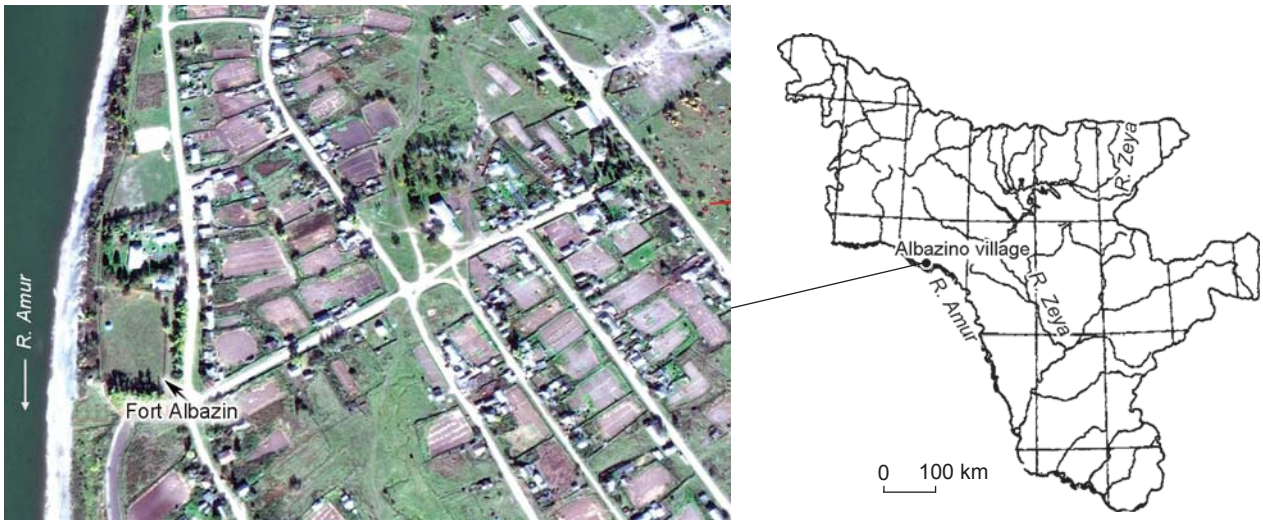

Fig. 1. Location of Fort Albazin in the territory of Albazino village, the Amur Region.

Fig. 2. View of Fort Albazin from the eastern side (Albazinskiy ostrog…, (s.a.)).

an area of about 400 m^2*. From 1989 to the beginning of the 2000s, excavations at Fort Albazin were conducted by the Amur Archaeological Expedition (headed by A.R. Artemiev) of the Institute of History, Archaeology and Ethnography of the Peoples of the Far East FEB RAS. During these years, a fort-area of 819 m^2 has been studied (Artemiev, 2007: 131). In 2007 and 2013, a party of the Center for the Preservation of Historical and Cultural Heritage of the Amur Region (headed by D.P. Volkov) carried out salvage operations in an area of 143 m^2 on the western side of Fort Albazin. In 2011–2016, this site was an object of multidisciplinary studies conducted by the Albazin Archaeological Expedition (headed by A.N. Cherkasov), created by the *Petropavlovsk* foundation with support from the Center for the Preservation of Historical and Cultural Heritage of the Amur Region. Within a period of six years, the expedition has excavated a fort territory of 236 m^2, and discovered numerous artifacts and anthropological remains.

Thus, about 1670 m^2 of the Fort Albazin area have been studied by excavations up to now, which totals about 15 % of the 1686 fortress's territory within its outer boundaries (including towers, ramparts and the moat). Comprehensive studies have yielded a lot of new information about Fort Albazin; however, there are still many issues in its history to be solved.

Dynamics of Fort Albazin's size

The first issue involves inconsistencies between the data on Fort Albazin's size and the levels of its destruction in various periods of its existence, which are available in the scientific literature.

*In 2013, the materials obtained during these years were entrusted by the Institute of Archeology and Ethnography of SB RAS to the custody of the Amur Regional Local History Museum of G.S. Novikov-Daursky (Blagoveshchensk), where a permanent exhibition takes place.

The first Russian Fort Albazin had a size of 13 × × 18 sazhens*, or 28 × 39 m (Kradin, 1992: 74), which totals 1092 m^2. It was provided with palisade fencing, two towers on the Amur-facing side, and one tower on the field-facing side. In 1677, a moat 2 sazh. (4.32 m) wide was dug out, and a fence in the form of six rows of sharpened pillars, arranged in star-shapes, was erected around the fort. According to a written report by Albazin's estate-manager A. Voeikov: as early as 1681, as a result of rebuilding, the fort whose sides totaled 165.5 sazh. (357.5 m) in length had two gate-towers and three corner-towers. The *voivode*'s yard was located in the northwestern corner. A palisade accommodating 53 dwelling houses was located near the fort (Glinsky, Sukhikh, 1992: 20). In view of the threat of Manchu attacks, new walls and towers had been erected by the summer of 1693 in order to strengthen the defensive capability (Artemiev, 1999: 107). A description of Fort Albazin, signed by *voivode* A.L. Tolbuzin, who took over the command of the fortification from estate manager M. Voloshnikov in 1684, is preserved in the archive of the Russian Academy of Sciences. This document indicates the lengths of the fort's sides: the northern side 85 m, the southern side 83 m, the western side 97 m, and the eastern side 92 m (Ibid.: 110).

According to data from the topographic survey conducted by S.V. Glinsky and V.V. Sukhikh in 1974, the fortress, in plan view, had the form of a parallelogram, wherein the northeastern corner was 105º, and the southeastern corner was 85º. The length of the northern side (partially destroyed by caving of its bank) was 70 m, the eastern side reached 90 m, and the southern side (also destroyed by the Amur River) was more than 56 m. The eastern and northern walls were straight, while the southern wall, which followed the shape of the terrace's edge, curved outwards (Fig. 3) (Glinsky, Sukhikh, 1992: 17–18). According to the archival information and to the present-day archaeological, topographical, and geophysical data on the size and configuration of the walls, the fort had an irregular quadrangular shape (not in the form of parallelogram); in 1684, the area of its interior space was about 7630 m^2; and the perimeter was 357 m, which is in agreement with the fortress's perimeter in 1681. Excavations of portions of wall, carried out by A.R. Artemiev, have revealed the presence around the fort of wooden palisade fencing made of vertical logs (1999: 279–281, fig. 61–63); possibly, *voivode* Tolbuzin meant the size along the palisade fencing when indicating the length of the fort's sides.

It is believed that the fort, newly built in 1685–1686, had a length of walls on the inner side similar to that of the fortress burned out in June 1685, after the first Manchu siege: it was erected in the same place. Meanwhile, the earthen base of the ramparts (which was 8.64 m wide and

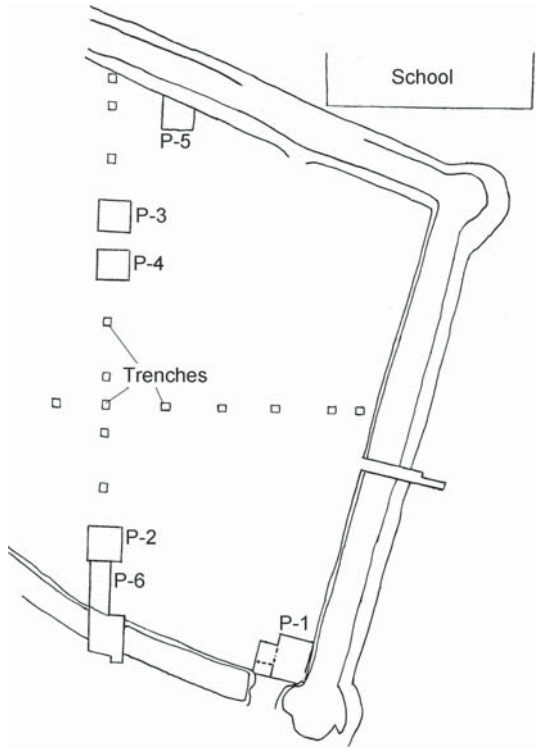

Fig. 3. Layout of Fort Albazin drawn up by S.V. Glinsky and V.V. Sukhikh in 1974 (Sukhikh, 1979: 169, pl. 1).

3.69 m high) of the new fortification presumably started from the palisade fencing burned out in 1685. This is evidenced by data from the geophysical survey conducted in 2011: the length of the *interior* portion of the eastern rampart reached 92 m (Cherkasov et al., 2011: 62).

Taking into account that the modern area of the interior space totals 6333 m^2—rather than the 4000 m^2 according to Cherkasov (2014: 674), and rather than the 7630 m^2 according to the data of the 17th century (Artemiev indicates an area of 8000 m^2 (Fig. 4) (1999: 109))—the following conclusion can be reached: over a period of 333 years, the fort had lost 17 % of its area, where 15 % (according to Artemiev, who proceeded from the layout drawn by R.K. Maak (1825–1886), an explorer and researcher of Siberia and the Far East) had been lost within 140 years after its destruction (Ibid.: 115); exactly in this period, the 8.64 m wide western rampart, facing the Amur, was totally lost (Fig. 5).

Number of defenders of Fort Albazin in 1686

The second issue involves identification of the number of people who were in the fortress in the first days of battle, and during the siege of 1686; and of the reasons for the great casualties among the defenders, since the available data vary.

*In the 17th century, the sazhen was equal to 2.16 m.

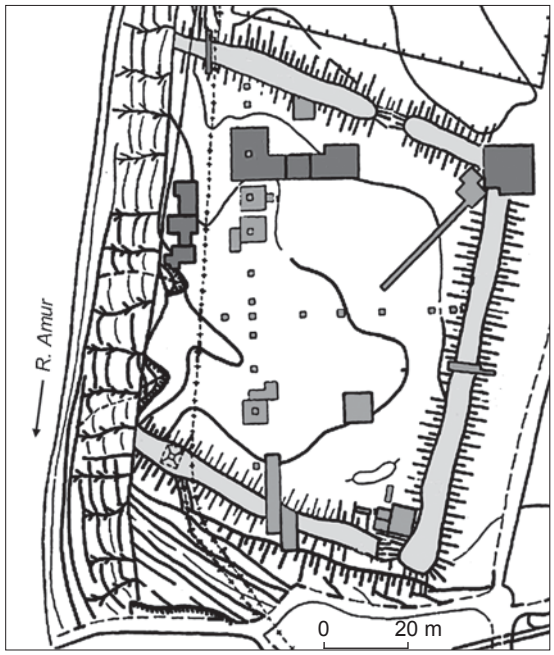

Fig. 4. Layout of Fort Albazin drawn up by A.P. Artemiev (1999: 276, fig. 58).

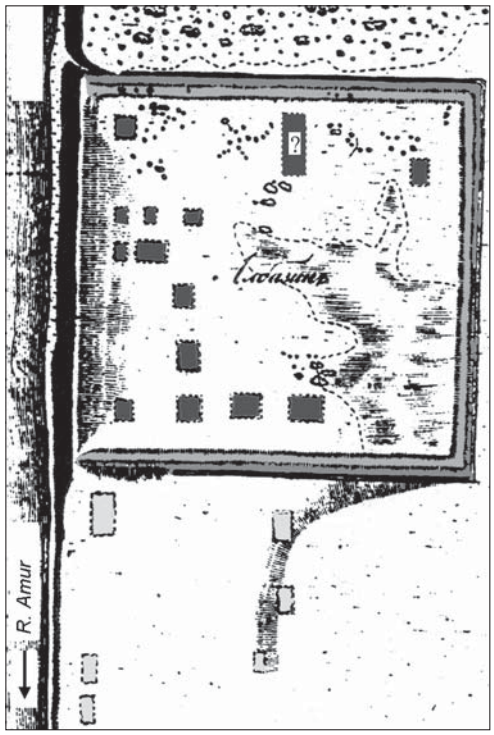

Fig. 5. Layout of Fort Albazin drawn up by R.K. Maak in 1855 (Artemiev, 1999: 273, fig. 55).

In 1682, the population of the town of Albazin, as Manchu called the fort (Melikhov, 1974: 173), consisted of 222 Cossacks of the fortress's garrison and, according to various estimates, 330–420 peasants (Aleksandrov, 1984: 43), who probably lived in the 53 houses of the palisade rather than in the fortress: i.e. about 550–640 people in total. As early as the summer of 1684, according to Manchu intelligence data, the size of Albazin population reached approximately 900 people, including 400 people who came from Nerchinsk (Melikhov, 1974: 157). In 1685, during the first siege, 450 persons took refuge in the fortress. Having regard to the fact that the initial area of the fortified settlement was about 7630 m^2, there were ca 17 m^2 for each of 450 Albazin inhabitants. Their accommodation would have required approximately 50–56 dwellings.

In 1686, the number of defenders became even greater: on July 26 (the beginning of the battle), the Albazin population numbered 826 servicemen, hunters, fishermen, and ploughmen (Bagrin, 2013: 104). In this case, there would be ca 9 m^2 for each Albazin inhabitant (whether that be a man, a woman, or a child). To accommodate everybody, at least 100 dwellings would have been required, or at least 50 "earthen houses", considering that some men kept rotational guard-duty in the first days. In 1686, Fort Albazin did not have so many living quarters, specialized premises (gunpowder magazine, grenade warehouse, church) or auxiliary rooms*.

The layout of Fort Albazin drawn up by Maak in 1855 shows depressions that correspond to 13–14 buildings (Fig. 5) (Artemiev, 1999: 273). The dugout excavated by Artemiev had a size of 6.0 × 3.5 m, i.e. 21 m^2, where an area of 2.25 m^2 was occupied by an oven. Such dwellings could have accommodated no more than 10–12 persons. "Earthen houses" excavated by Glinsky and Sukhikh were smaller: No. 1 was 3.4 × 2.0 m (6.8 m^2), No. 2 was 3.2 × 3.0 m (9.6 m^2). According to Sukhikh, each of them could have accommodated 2–5 persons (1978: 143). The conclusion about the small number of log houses follows from the report submitted to *voivode* I. Vlasov by Cossacks I. Buzunov, V. Baksheev and Y. Martynov, who in November 1686 managed to get out of the besieged fort and leave for Nerchinsk. They particularly noted the lack of firewood: there were not many log structures that could have been dismantled to make it; in addition, the amount of water was insufficient: as was proposed by Sukhikh, during the cold season, it was gone from the fortress's water-well, while the route to the Amur River was cut off by the besiegers. The excavations of the well revealed that a wooden ladder was lowered down therein, so that accumulating water could have been scooped out by a bailer (also found at the bottom of the well) (Sukhikh, 1979: 85).

*For comparison: in 2014, 377 persons per 200 households lived in Albazino village. In 1768 (according to F.F. Bolonev), 824 persons lived in 98 houses or households in the Kunaleyskaya village in the Trans-Baikal region (2013: 83).

A drawing of the Albazin siege from the Chinese atlas *Map Aihun, Luosha, Taiwan, Nei Menggu tu* of 1697 shows ca 65 wooden houses, including two adjoining large tent-roofed structures (Fig. 6) (Aihun…, (s.a.)). According to Artemiev, the author, who was probably a witness to the events, presented in the same image the sieges of the fortress conducted both in 1685 and in 1686–1687. Near the northwestern edge of the fortress, he showed a chapel "in log obstacles" burned out in 1685 (Artemiev, 1999: 112–113). The large number of buildings depicted is inconsistent with the data on the scarcity of log houses given in the report of the Cossacks who left the fort in November 1686.

A drawing made by Dutch explorer Nicolaes Witsen (1641–1717) depicts Albazin during the second siege (Fig. 7). Only eight buildings, including three armament depots, are shown in its territory.

Thus, the available stock of housing in the fortress was extremely limited. Obviously, the number of those who took refuge in the fort (450 persons) in 1685 was beyond this limit; the main garrison could have totaled ca 220 persons, as in 1682. The besieged fortress, insufficiently provided with water and firewood, just could not have accommodated 826 persons.

The numbers involved in the Russian losses are startling: as early as December 6, 1686, five months after the beginning of battle and siege, only 150 defenders remained in the fortress, i.e. the decline in population amounted to 676 persons. In May 1687, six months later, there were only 66 persons there, including teenagers. Presuming that 450 persons (in 1685) and 826 persons (in 1686) stayed in the fortress simultaneously, we can make an assumption about the reasons so many were killed, or otherwise deceased. One is severe overcrowding, which resulted in numerous victims when cannonballs and bullets hit targets inside the fortress. For example, more than 100 persons were killed during just one day of the siege in 1685 (Aleksandrov, 1984: 142). Among other factors were starvation due to insufficient food, shortage of water and firewood, and "siege" illnesses (in October 1686, epidemics burst out even among the Manchus who were besieging the fortress) (Melikhov, 1974: 179). However, according to Manchu intelligence data, Albazin possessed stocks of bread for two years, (Ibid.: 174), and these could barely have become exhausted to the point that people began starving to death massively. It is known that in spring 1687 the fortress defenders handed over a large loaf of bread to the Manchus, who were already seriously starving, as a symbolic "treat" (Artemiev, 1999: 108). People who sheltered themselves in Albazin were probably suffering badly from scurvy. This illness usually starts within 1–3 months in the full absence of vitamin C, and within 4–6 months in the case of insufficiency. V.A. Aleksandrov reported more than 500 people who died of scurvy (1984: 150). The losses among Albazin's inhabitants over the period till December 1686 and till May 1687 amounted to 82 % and 56 %, respectively. Obviously, they were considerable during the second stage as well, though smaller by a third compared to the beginning of the siege.

The combat activity of the Manchus decreased with the onset of cold weather. In addition, on November 13, 1686, a letter from the Moscow government with a

Fig. 6. Drawing of Fort Albazin siege from the atlas *Map Aihun, Luosha, Taiwan, Nei Menggu tu* (Aihun…, (s.a.)).

request to abandon the siege of Albazin, signed as early as December 10, 1685, was delivered to the Kangxi Emperor (Chinese 'Xuanye'). Obviously, the siege that took place in summer 1685 was meant. Kangxi, in light of the political and military situation at hand in 1686, ordered his troops to draw off from the Russian fortress; to move away to the Manchu ships (near the mouth of the Uldugichi River, about 3.0–3.5 km upstream the Amur River from the fortress); not to prevent the Russians from leaving the town and returning; and to permit no arbitrary actions towards them. However, it was only on May 13, 1687 that the Manchus fell back, by a distance of 10 km; while the actual raising of the siege occurred no earlier than August 19, 1687 (Melikhov, 1974: 180–181).

Thus, the heavy mortality among the fortress's defenders after November 1686 was a result of poor nutrition and illnesses, rather than military activities. Paradoxically, a wrong idea of the size of the town of Albazin can be considered one of the reasons for great losses during the first months of defense.

Boundaries of the town of Albazin

The third issue may be defined as follows: are we correct in restricting the territory of the town of Albazin to the fortress's limits alone?

Fort Albazin's remains are situated on the salient promontory of a high terrace. Southward, perpendicular to the Amur River and an abrupt riverside, there is a steep slope with the southern rampart of the fort raised thereon, to which a floodplain terrace adjoins. To the east of the fortress, the terrace's surface lowers smoothly towards the scour of a dried brook (Glinsky, Sukhikh, 1992: 17).

In 1686, the Manchu troops, having failed to seize the fortress at one go, besieged it and dug moats on three sides, behind which they constructed a wooden fence and chevaux-de-frise, and also built embankments for cannon. Security posts were located everywhere. On the other bank of the river, on an island west of the fort, a Manchu detachment was quartered. Two moats and three ramparts arranged archwise near the fortress, and at a certain distance from it, are clearly seen in the drawing by N. Witsen (Fig. 7). Artemiev discovered three rows of ramparts 800 m east of Fort Albazin. Two of these are preserved in a section 100 m long; the third (outer) rampart has been traced in a section 300 m long. The present-day width of ramparts is 6 m, their height is 1 m, and the moats have a depth of up to 50 cm. One rampart northeast of the fortress runs 300 m from it. In the opinion of Artemiev, the ramparts formed part of the Manchu fortifications. At the same time, the embankment for cannon that was erected by the Manchus on the northern side of the fortified settlement (known as "Batareyka" among the local population) was located as close as 150 m from the fortress (Artemiev, 1999: 115); apparently, the builders took into account the range of artillery-fire in the 17th century.

The impracticality of the double cordon of fortifications created by the Manchus is evident. The fact that the near fortifications were erected for siege and defense is evidenced by the Kangxi's order that mentioned digging the moats (Melikhov, 1974: 177). Consequently, the Russians were engaged in frequent combat operations. According to the available data, the Albazin's defenders destroyed the embankments for Manchu cannon south of the fortress, prevented the fortress from being set on fire, etc. None of the written sources contains any information about the construction or the purpose of the three-rampart defense system 800 m from the fort. It is unlikely that the Manchus had cannon capable of bombarding the fortress from such a large distance. There are data only

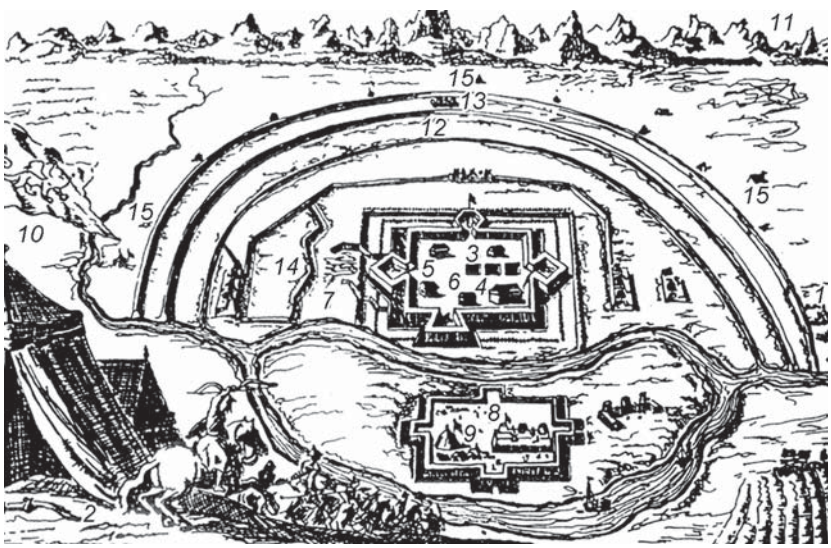

Fig. 7. Representation of the siege of Albazin fortress in 1686 provided in a book by Nicolaes Witsen (Artemiev, 1999: 275, fig. 57).
1, *2* – dugouts of the Manchu command; *3* – dugouts; *4* – armory; *5* – grenade magazine; *6* – gunpowder magazine; *7* – firewood for burning the fortress; *8* – Manchu fortifications opposite Albazin; *9* – Manchu general's tent; *10* – Belaya mountain; *11* – Kamennye mountains; *12* – moat; *13* – trench-lines; *14* – close positions of Manchu; *15* – Manchu camp.

about construction of trenches, a rampart, and four small platforms for cannonry 150–200 sazh. (320–430 m) from the fortress walls (Aleksandrov, 1984: 149).

It is possible that this complex fortification, consisting of three parallel ramparts and moats adjacent to the fort, was erected neither by Russians nor by Manchus (although it might have been used by them). The caption to the drawing by Witsen mentions the "moat excavated by reinforcements of the Manchu cavalry" under No. 12, and "Manchu trench lines (sconces)" under No. 13 (Fig. 7) (Ibid.: 153). This fortification system could have been created by representatives of the Mohe Troitsky group in the Early Middle Ages. It was exactly the Mohe people of the Western Amur region who gradually colonized the territory in the upper reaches of the Amur River and in the Southeastern Trans-Baikal region: their fortified settlements enclosed by a system of ramparts and moats are known near the Shilka River (Alkin, 2012). Promontory Mohe settlements are found in the territory of Far East and Manchuria (Istoriya Amurskoi oblasti…, 2008: 140–142; Dyakova, 2009: 190–196). The results of excavations in the Uldugichi River mouth reveal the presence of Mohe in the area of Albazino (Valchak, Cherkasov, 2014). Possibly, the remains of the triple rampart near the Albazino village are a part of the structure that enclosed the Albazin cape.

The fortified settlements, referred to as Daur in the archaeological literature, were erected following the same principles (in the form of several parallel ramparts and moats). They are attributed to the Vladimirovskoye culture of the Late Middle Ages, whose ethnic representatives were the Mongolian-speaking Daurs (Bolotin, 1995). The Albazin's ramparts apparently belonged to the Daurs: the town of Prince Albazy, who could have created a defense system enclosing the Albazin cape to ensure additional fortification, was situated exactly in this area. It may well be that the aboriginals of the 17th century used the earlier fortifications of the cape and kept them in working order. The town of Albazy could have included the territory enclosed by three ramparts, and the citadel that was occupied and then burnt out by people of Khabarov in 1650. It is not improbable that in 1680s these ramparts and moats were clearly visible along their entire length, which is why they are present in the drawing made by Witsen.

In preparation for seizure of the fortress, Manchu intelligence established in 1683 that "an additional *wooden palisade* [my italics – **S.N.**] was constructed around the town of Albazin, inside which palisade the above mentioned 53 dwelling houses were located. The peasants from the neighboring lands were resettled to the town. An observation point, from which five people watched over the area in rotation day and night, was established on the top of a nearby mountain" (Melikhov, 1974: 157). In 1684, double wooden walls, with the space between them covered with soil, were erected around Albazin. According to Chinese intelligence data, the manpower in the Russian forces reached a thousand people (Ibid.: 165). Thus, accommodation for a thousand people (apart from peasants, hunters, etc.) in the fortress with an area about 7.6 thousand m^2 was barely probable. Obviously, this number included inhabitants of the territory enclosed by the three ramparts strengthened by the wooden palisade. It is not quite clear where the double wooden walls covered up with soil were constructed, since during the first siege in 1685, Manchu cannonballs penetrated the fortress's walls. What had happened to the town's inhabitants, totaling more than a half of the population, if only 450 persons took refuge in the fortress? Probably, a part of the population spread out in the neighboring forests, while another part was killed. After defeat in the first siege, Tolbuzin led 636 Albazin survivors, including 324 men and 312 women and children, to Nerchinsk in the Trans-Baikal region (Aleksandrov, 1984: 143), although only about 350 persons left the besieged town.

Approximate calculations of the size of Albazin's population in 1683–1686 and the fort's area during these years allow a conclusion to be drawn that the fortress was only the citadel (stronghold) of the town, whose boundaries were limited by an additionally fortified line of defense composed of three ramparts and two moats. The traces of the trading-quarter in the form of six dwellings south of the fort, marked by Maak in his layout (see Fig. 5), can be considered an indirect proof of this.

The data provided by those who examined the Albazin fortress's remains in the 19th century differ considerably in details. Thus, N.Y. Bichurin described the fortress as a "quadrangle of up to 60 Russian sazhens (about 128 m) across, which can be noticed even now by an earth three-sided rampart surrounded by a moat, with three exits from the fortress. A steep bank slopes down towards the riverside, and no rampart can be seen there" (cited after (Ibid.: 146)). Notably, N.N. Muravyov-Amursky (the Governor-General of Eastern Siberia in 1847–1861) identified the fortress of Albazin as a citadel, which presumes the presence of one more fortification around it. This fortification around a considerable area is also mentioned by ethnographer S.V. Maksimov (1831–1901), who visited Albazino in the early 1860s. He wrote: "…the fortress's area is so large that a modern Cossack village of 40 households was located inside an earth rampart four sazhens at the base and three sazhens in height; seemingly, remains of a water-well were near the bank, and those of a bricked gunpowder magazine were found upon a mountain" (cited after (Ibid.)). It is unlikely that 40 households could have been accommodated in the territory of Fort Albazin, the more so since the church built in 1858 would have occupied a considerable space therein. There is no mountain within the fortress either (see Fig. 2). The nearest prominence is situated ca 300 m east of the fortress. According to data from military

engineer D.I. Romanov, published in 1857, Fort Albazin "had the form of a quadrangle or a square" with a side of 40 sazh. (about 85 m), one of which ran along the crest of a bank cliff (Ibid.).

If the town of Albazin included more than the fort, the reason that the Manchus were unable to seize a rather well-fortified citadel-fortress surrounded by a wide and deep moat comes to be understood. The excavations have demonstrated that the moat's width on the eastern side exceeded 7 m (the moat was not explored thoroughly, since it went beneath a street of Albazino village), its depth was 2.8 m, the bottom's width 2.2 m, and the angle of inclination of its sides reached 35º. Besides, there was ground ca 1 m wide between the moat and rampart of the fort (Glinsky, Sukhikh, 1992: 23).

Initially, the main battles would have been conducted beyond the fort's walls, on the outer defense line composed of triple ramparts with a wooden palisade. This may be evidenced by a report by the Cossacks who arrived to help the Albazin defenders, but were unable to force their way to them. The Cossacks noted that "the combat order was maintained in Albazin, and no particular damage was visible, though the enemy's cannonry threw continuous fire into the walls and towers of the fortress from three sides" (Aleksandrov, 1984: 149). There might not have been serious damage, because the cannonballs' flight was impeded by a three-rampart enclosure located at a substantial distance from the fort. Manchu Qing historical records as of September 10, 1686 stated: "…our troops besieged the town of Albazin. The Russians found themselves in a difficult situation" (Melikhov, 1974: 176). But it was not until October, after three months of battle, when the ranks of the defenders thinned, that this line was seized by the Manchus; the remaining Albazin inhabitants (Cossack warriors, women, and children) took refuge in the fortress. Possibly, this event is related to the October orders issued by Kangxi, which mentioned a defense-siege system composed of earthen walls, moats, wooden fence, and chevaux-de-frise created by the Manchus in the immediate vicinity of three sides of the fortress. The Kangxi Emperor noted in his order to the Military Governor of Heilongjiang: "Cold weather is gradually coming, the rivers will freeze soon. Obviously, *after return to Albazin* [my italics – **S.N.**], the Russians will be waiting for reinforcements to arrive; they hope that our troops will move away as soon as the river freezes over" (Ibid.: 177). By the "return of the Russians to Albazin", Kangxi, most likely meant their leaving the trading-quarter for the fort, to find protection within its walls.

On the basis of the proposed definition of the Albazin town's boundaries, we can assume that the main military and civil losses were incurred by the defenders beyond the walls of the fortress. And it was there that they should have been buried.

Four mass-casualty burials of people in dugouts (half-dugouts), and separate scattered burials in coffins have been excavated in the territory of Fort Albazin. The first "common grave" was discovered by Glinsky and Sukhikh in 1980. There is no exact information about the number of people buried in dugout No. 3. Study of field-drawings allows the presumption that about 80 people, including children, were buried there. Three mass-casualty burials of the fortress's defenders from 1686–1687 were found by the expeditions headed by Artemiev and Cherkasov. The remains of 57 people were discovered in a dugout 6.0 × 3.5 m in size, excavated by Artemiev; and only one skeleton was found in a coffin. Among the buried, there were 10 women and a few children (Artemiev, 1999: 113). A mass-casualty burial in a dugout 2.8 × 3.8 m in size (an area of 10.6 m^2), found in 2014, contained the remains of 64 people, including 13 children and adolescents. The only persons buried in coffins were: a 4–5-year-old child and a 14–15-year-old adolescent in one coffin, and an adolescent 14–15 years old in another (Sorokin, (s.a.)). One more common grave was found at the end of the 2015 field season. According to Cherkasov, this was a dugout, "where people, who died or were killed during the siege, were nearly stacked up" (Kozyrin, 2015). Anthropological studies have established that it contained the remains of not less than 40 persons (Sezon raskopok…, (s.a.)). Thus, the excavations have determined that about 241 persons were buried in four dugouts (or "in winter huts above the ground", as the Cossack chief, lieutenant A.I. Beyton, reported to the Nerchinsk *voivode* (Artemiev, 1999: 108)). Two separate burials were discovered in 1975 near the base of the southern rampart. The skeletons were laid side by side; one of them was between planks, and another one in a coffin. Hearth-masonry was placed at the head of the latter. According to stratigraphic observations, the burials were performed in the period of the fort's destruction in 1689 (Sukhikh, 1979: 43–44). Cherkasov relates 19 individual coffin-burials discovered in 2015 to the period of fort defense in 1686, when the defenders still were able to observe the burial rite (Kozyrin, 2015). It is logical to assume that the leader of the defense, Tolbuzin, who, obviously, was killed in the western tower during shelling of the fortress from the Amur River side, was honorably buried within the fortress; his death happened on the ninth day of Manchu attacks (Aleksandrov, 1984: 149). Possibly these burials in coffins were performed after capitulation of the Russians in 1685, when more than 100 people perished, or in the period after the siege was raised in 1687–1689. Cherkasov reasons that up to 1 thousand people could have been buried within the limits of Fort Albazin (2014: 674).

When circumstances had forced the town's defenders to shelter within the fortress's walls, there was obviously no possibility of burying the deceased outside of the fort. And even after Kangxi issued the directive of December 10,

1686 that prohibited preventing the Russians from leaving the fortress (Melikhov, 1974: 179–180), the latter were already unable to perform proper funeral ceremonies. Furthermore, the local priest died, and Beyton made a decision to put bodies in the "earthen houses", since there was no possibility of reading a funeral service for the deceased. The main reason for using dugouts was the mass mortality of the fortress defenders from illnesses, and lack of people to perform individual burials (for example, in December 1686, only 45 out of 150 people were able to draw their duties).

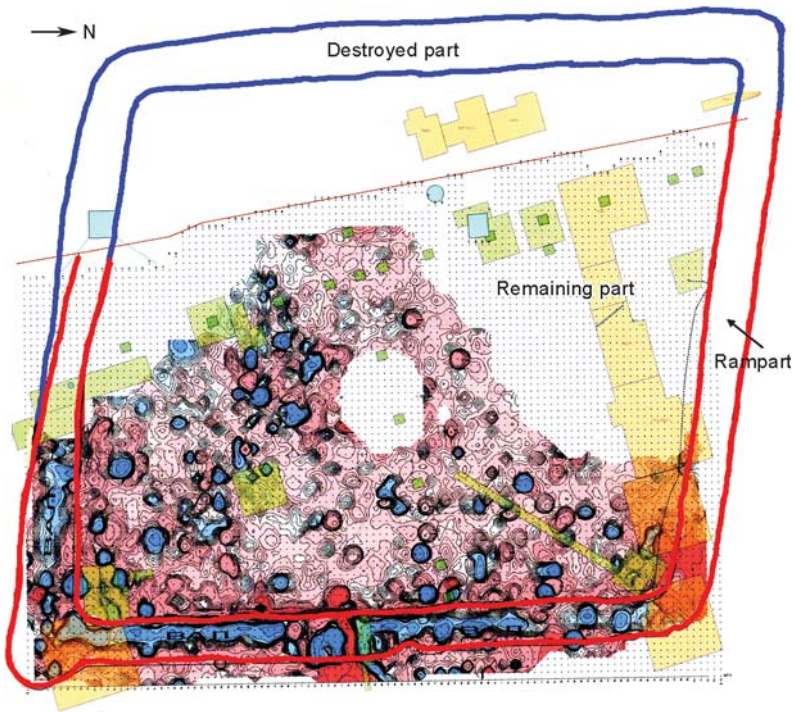

Fig. 8. Reconstruction of Fort Albazin's boundaries in 1686, made on the basis of the 2011 geophysical layout.

Conclusions

Study of changes in Fort Albazin in the second half of the 17th century has made it possible to establish the approximate size of its inner area in 1686, when it was besieged by Manchu troops; and after the Treaty of Nerchinsk (1689) was signed between Russia and China, when it was abandoned and destroyed by Cossacks (Stepanov, 2011: 58). The fortress, 7.6 thousand m^2 in area with one water-well and small number of dwelling houses, could easily have accommodated about 220 members of the military garrison; but it was insufficient to house more than 820 people in a state of siege.

Analysis of Russian losses during the defense of Albazin has demonstrated that by October 1686, as a result of two Manchu assaults (in July and September) and during outfalls, 66 persons were killed, including *voivode* A.L. Tolbuzin. 50 persons died of scurvy. By this time, according to the report submitted by Beyton, "*about eight hundred* officers and other ranks remained" in Albazin [my italics – **S.N.**] (Bagrin, 2013: 104) out of 826 people, according to his own data. That is, the *voivode* did not possess precise information on the number of people in the fortress, though about 130 persons had already been killed or died by that time. In November-December 1686, another 100 persons were killed during outfalls and shelling, more than 500 persons died of scurvy, and 3 men left the fort to deliver a report. Taking into account 66 people who survived until May 1687, the initial total number of the besieged should have been 866 rather than 826 people. It appears that 800 people died or were killed. Possibly, a considerable part of the more than 500 people who died of scurvy fell on the period before November 1686. At this time, the epidemic might already have been rife in the fortress. Then the figure of 500 people would reflect total losses caused by the illnesses throughout the siege, among which 50 persons died as early as September. So far, the discrepancies in these written sources concerning the number of people who were killed, died of illnesses, or survived do not allow an exact determination of the number of defenders who were found in the fort by November 1686.

Taking into account 241 persons buried in four dugouts, 66 survivors*, and 3 Cossacks who managed to leave the fort to report on the siege as early as November 1686, we may refer to 310 persons who sheltered in the fortress, but not to 826 (or 866) persons. Apart from Cossacks, they included women and children of various ages. It is not improbable that the latter had taken refuge in the fortress since the beginning of the battle, while the Cossacks conducted warfare in the territory of the town enclosed by three ramparts. And only after great losses had been incurred under the onslaught of superior enemy forces, did they retreat to the citadel (Fig. 8), not stopping combat operations even then. The Manchus never succeeded in seizing the last stronghold of the town of Albazin, and passed over to the defensive themselves.

*However, different data on those who survived the siege are also available. For example, the Cossacks' petition indicates 50 persons, while Beyton in his letter mentions 97 militiamen, to whom their salary should be paid; however, this information pertains to 1689, when the blockade of the town had been raised, and the fort's garrison had been supplemented by fresh troops (Aleksandrov, 1984: 154).

References

Aihun, Luosha, Taiwan, Nei Menggu tu. (s.a.)
The Library of Congress Researches. URL: http://www.loc.gov/item/gm71005078 (Accessed March 2, 2016).

Albazinskiy ostrog snyali s vysoty ptichyego poleta. (s.a.)
Amurskaya pravda, No. 96 (28384). URL: http://www.ampravda.ru/2016/08/09/ (Accessed February 27, 2017).

Aleksandrov V.A. 1984
Rossiya na dalnevostochnykh rubezhakh (vtoraya polovina XVII v.). Khabarovsk: Kn. izd.

Alkin S.V. 2012
Migratsiya mokhe na r. Shilka v Zabaikalye: K probleme rannikh kontaktov prototungusov i protomongolov. In *Drevniye kultury Mongolii i Baikalskoi Sibiri*, iss. 3.2. Ulan-Bator: Izd. Mongol. Gos. Univ., pp. 499–504.

Artemiev A.R. 1999
Goroda i ostrogi Zabaikalya i Priamurya vo vtoroi polovine XVII–XVIII vv. Vladivostok: Izd. Inst. istorii, arkheol. i etnogr. narodov Dalnego Vostoka DVO RAN.

Artemiev A.R. 2007
Pamyatniki istorii osvoeniya russkimi Sibiri i Dalnego Vostoka na sovremennom etape arkheologicheskogo izucheniya. In *Russkiye pervoprokhodtsy na Dalnem Vostoke v XVII–XIX vv.: Istoriko-arkheologicheskiye issledovaniya*, vol. 5, pt. 1. Vladivostok: Dalnauka, pp. 124–171.

Bagrin E.A. 2013
Voyennoe delo russkikh na vostochnom pogranichye Rossii v XVII v.: Taktika i vooruzheniye sluzhilykh lyudei v Pribaikalye, Zabaikalye i Priamurye. St. Petersburg: Nestor-Istoriya.

Bolonev F.F. 2013
Amurskaya epopeya v XVII i XIX vekakh. Pereseleniya staroobryadtsev (semeiskikh) na vostok Rossii (XVIII – nachalo XX veka). Novosibirsk: Izd. IAE SO RAN.

Bolotin D.P. 1995
Etnokulturnaya situatsiya na Verkhnem Amure v epokhu pozdnego srednevekovya (XIII–XVII vv.). Cand. Sc. (History) Dissertation. Novosibirsk.

Cherkasov A.N. 2014
Rabota Albazinskoi arkheologicheskoi ekspeditsii v 2011–2013 godakh: Rezultaty i perspektivy. In *Trudy IV (XX) Vseros. arkheol. syezda v Kazani*, vol. III. Kazan: Otechestvo, pp. 674–677.

Cherkasov A., Belyakov A., Valchak S., Chkhaidze V., Volkov D. 2012
Arkheologicheskiye issledovaniya v Albazino: Ot amurskogo neolita do russkogo srednevekovya. *Rodina*, No. 12: 28–30.

Cherkasov A., Zaitsev N., Onishchuk V., Sukhorukov N. 2011
Albazinskaya ekspeditsiya. Sovremennye geofizicheskiye metody v issledovanii Albazinskogo ostroga. *Rodina*, No. 12: 59–63.

Dyakova O.V. 2009
Voyennoye zodchestvo Tsentralnogo Sikhote-Alinya v drevnosti i srednevekovye. Moscow: Vost. lit.

Glinsky S.V., Sukhikh V.V. 1992
Rekonstruktsiya krepostnykh sooruzheniy Albazinskoi kreposti po arkheologicheskim istochnikam i opublikovannym materialam. In *Zapiski Amur. obl. krayeved. muzeya i obshch. krayevedov*, iss. 7. Blagoveshchensk: pp. 17–25.

Istoriya Amurskoi oblasti s drevneishikh vremen do nachala XX veka. 2008
Blagoveshchensk: RIO.

Kozyrin A. 2015
Itogi Albazinskoi ekspeditsii etogo goda: Deti-metisy, kazaki-velikany i novye massovye zakhoroneniya. URL: http://www.amur.kp.ru/daily/26419/3292892/ (Accessed March 16, 2016).

Kradin N.P. 1992
Krepost Albazin. Oboronnoye stroitelstvo na severo-vostoke Russkogo gosudarstva v XVII veke. *Rossiya i ATR*, No. 1 (I): 67–79.

Melikhov G.V. 1974
Manchzhury na Severo-Vostoke (XVII v.). Moscow: Nauka.

Novikov-Daursky G.S. 1961
Istoriko-arkheologicheskiye ocherki, statyi, vospominaniya. Blagoveshchensk: Amur. kn. izd.

Sezon raskopok v Albazine zavershilsya. (s.a.)
URL: http://www.amur.info/news/2016/08/25/114967 (Accessed April 4, 2017).

Sorokin R. (s.a.)
"Albazinskaya ekspeditsiya" zavershila izucheniye massovogo zakhoroneniya na territorii Albazinskogo ostroga. URL: http://www.amurvisit.ru/article/6002 (Accessed March 1, 2016).

Stepanov D. 2011
Albazin v XVII v.: Voennaya i dukhovnaya krepost Priamurya. *Rodina*, No. 12: 53–58.

Sukhikh V.V. 1978
Zemlyanki Albazinskoi kreposti. In *Arkheologicheskiye materialy po drevnei istorii Dalnego Vostoka SSSR*. Vladivostok: Izd. Inst. istorii, arkheol. i etnogr. narodov Dalnego Vostoka DVO RAN, pp. 138–144.

Sukhikh V.V. 1979
Khozyaistvennoye osvoyeniye Priamurya russkimi v XVII veke (po materialam raskopok Albazinskoi kreposti). Cand. Sc. (History) Dissertation. Novosibirsk.

Valchak S.B., Cherkasov A.N. 2014
Raskopki poseleniya Uldugichi I v Amurskoi oblasti. In *Trudy IV (XX) Vseros. arkheol. syezda v Kazani*, vol. III. Kazan: Otechestvo, pp. 494–498.

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The Variation of Russian Festive Ritualism in Russian Ethnography*

This article deals with the shifts of focus of general versus local elements in traditional Russian festive rites, as seen in the works of 19th–20th century Russian ethnographers. Two periods are described. The first lasted from the 1830s to the 1970s; the second began in the 1980s–1990s and is ongoing. The first period falls into two stages. From the 1830s to the 1950s, ethnographers sought to disclose common features, and in the 1960s and 1970s, they were interested in both the general and the specific in Russian and Slavic (specifically Eastern Slavic) festivals. Studies of this period were based on a macro-approach in that they used a wide range of sources relating to Russian, Slavic, and other European ethnic groups. As a result, common elements of Russian ritualism and their spatial variations were revealed, and broad generalizations were proposed. During the second period, the geographic scope narrowed. Boundaries between regional and local variants of festive traditions were delineated both in synchrony and diachrony. The attention has shifted to common Russian versus local elements within separate festivals and their parts rather than groups of rites within the annual cycle as before.

Keywords: *Russian folk festivals, ethnography, Slavs, East Slavs, variability.*

Variability of folk culture became the focus of research in the second half of the 20th century, involving active use of the mapping method and area studies in linguistics, folklore studies, and ethnology (Problemy lingvo- i etnogeografii…, 1964; Problemy kartografirovaniya…, 1974; Arealnye issledovaniya…, 1971, 1977, 1978). The most large-scale projects included publishing of linguistic, ethnographic, and other types of atlases (Istoriko-etnograficheskiy atlas…, 1961; Dialektologicheskiy atlas…, 1969, 1986). The greatest progress in the study of variability in Russian folk culture was made in the field of material culture, such as agricultural tools, housing, and clothing (Russkiye…, 1967, 1970). Despite the long period of study, research of calendar rituals has not yet revealed similar important results. Certain achievements in the study of the variability of popular festivals (Chicherov, 1957; Sokolova, 1979; Narodnaya traditsionnaya kultura…, 2002; Fursova, 2002, 2003; Zolotova, 2000, 2002; Chernykh, 2006, 2007) rather suggest that we are still at the initial stage of understanding this aspect of the festive calendar.

This article discusses the history of studying variability of Russian festivals before the 1980s when the period of large-scale research projects on the subject ended. The main attention will be given to the studies that focus on common and local features of festive rituals, or analytical studies, as opposed to descriptive studies such as studies of local history, which provide regional description usually without local features and without comparison with other regions. Works that focus solely on identifying the common features in festive rituals (for example, by scholars belonging to the

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mythological school) will also be out of the scope of the present overview.

Despite the fact that it was relatively late when the problem of variability of Russian calendar rituals came to the fore of research, we can find descriptions of regional and local features already in the survey studies of the 1830–1840s, that is, from the very beginning of collection of materials on festivals. Thus, I.M. Snegirev pointed to the local distinctiveness of Russian festivals and rituals starting in Old Rus, explaining it by the different genesis and ethnic history of the Eastern Slavic tribes, their relationships with other ethnic groups, and the local features of Christian history (1837: Iss. 1, 3–4, 6–10). In fact, in the very beginning of Russian ethnology, Snegirev correctly identified the main areas of research into the reasons for synchronic and diachronic variation in festive rituals.

Considering individual festivals, Snegirev observed "some local deviations in the celebration of the Cheesefare Week from its general basic nature" (1838: Iss. II, 127). The regional features that he mentioned included the tradition in Siberia of making a ship out of sleighs nailed together with masts, sails, and guisers inside; a huge sleigh (by attaching several regular sleighs together), setting up a vertical-mast pole with a wheel on the top, on which a guiser would sit in Pereslavl-Zalessky, Yuryev-Polsky, Vladimir, Vyatka, as well as the Simbirsk and Penza Governorates; carrying a bull on sleighs tied together in Arkhangelsk; building snow towns in the Penza and Simbirsk Governorates, or singing carols in Yaroslavl (Ibid.: 127–136).

In addition to noting local differences in individual festivals, Snegirev came to more general conclusions, for example, in distinguishing two different areas of the Eastern Slavic world: the west (southwest)—the earliest area of Slavic customs and rituals, and the northeast—the later area, associated with the settlement of the Slavs on the eve of the emergence of the Russian State (1837: Iss. I, 3–4, 8–10, 21). This conclusion was confirmed by many scholars and is widely used today in historical linguistics and folklore studies (see, e.g., (Tolstoy, 1995: 50)).

Snegirev also noted some differences in the Christmas terminology, "Koleda in Southern and Western Russia is the eve of the Nativity Fast, which is better known under the name of Avsen or Tuasen in the Northeast of Russia" (1838: Iss. II, 28–29). Snegirev also observed the dominating custom of visiting houses with manger scenes and the star in "Little and White Russia", that is, in the Ukraine and Belarus, and the local presence of this tradition in Northern Russia (the Shenkursky and Velsky Uyezds) and Siberia (Ibid.: 54–56). Further, describing rituals of greeting the spring, Snegirev thus wrote, "Depending on the climate and locality, meeting and hailing spring falls at different times, and is done in different ways" (Ibid.: Iss. III, 12). Thus, in the Smolensk Governorate, people would "invoke" spring with a short song "Vesna krasna" (lit. 'beautiful spring') on the day of St. Eudokia and the Forty Martyrs, climbing on the roofs of barns or on the mountains; in the Buysky and Soligalichsky Uyezds of the Kostroma Governorate, at sunrise on Holy Thursday, people would wash up or immerse themselves in water, and then roll on the ground and climb on the roof of the house to sing a song in honor of the spring; in the Tula Governorate, this would happen starting from the Sunday of Doubting Thomas (the second Sunday after Easter), and in the Kaluga Governorate spring was hailed with round dances and the song, "Oh Dido, oh Lado!" (Ibid.: 12–14).

However, the main focus of Snegirev's study was the search for similarities among the Slavic, European, and Asian peoples, which can be attributed to his desire to outline the general trend of development of the rituals using mythology "as a basis for popular festivals" (Snegirev, 1837: Iss. I, 8, 54–215; 1838: Iss. II, III; 1839: Iss. IV). The following statements can serve as a good illustration of such an approach to individual festivals, "Despite local characteristics, the *Semik* is the same in essence, and from time immemorial is known over almost all of Great Russia…" (Snegirev, 1838: Iss. III, 101); "the location, climate, and customs of the inhabitants of Great Russia gave certain specific features to the Pentecost myths and games, although in essence they remained the same almost everywhere" (Ibid.: 133).

Another scholar, I.P. Sakharov, did not pursue the goal of identifying general and specific features in Russian festive rituals in his studies, but made an important theoretical observation concerning the description of the Avsen festival, which can be applied to many other festive events. According to Sakharov, who was critical of Snegirev's attempts to prove the existence of a unified structure of the festivals, "There is no place in the Russian land where all rituals would be done in the same way. In one place people would cook porridge, in another place they would sow grain, and in a third place they would go from door to door" (Sakharov, 1885: 3). Sakharov also pointed to substantial differences in the custom of "sowing grain" in Russia and in the Ukraine, and noted the local occurrence of the third element, "I know about the ritual of going from door to door only in two regions, the Kostroma and Ryazan Governorates" (Ibid.: 4–5).

At the same time, Sakharov paid great attention to the common features of the festivals. His description of the Day of St. John the Baptist can be a good illustration of that point, "Distinctive rituals of this festival are the following: bonfires, songs, games, jumping over the fire and nettle bushes, bathing at night in the dew and

in the daytime in the rivers, dancing around the *marina* tree and its immersion into the water, burying herbs, the belief about witches flying on the 'Bald Mountain'. The Kupalo and the Kupalo fires are better known in Great Russia, Little Russia and White Russia" (Ibid.: 85). However, Sakharov pointed out that "in the Little Russian villages, St. John's fires are associated with special rituals that do not exist among the Great Russian people. Here we see the nettle bush, doll, feasting next to the *marina* tree; here we can hear songs with the name Kupalo" (Ibid.: 90).

Differences in the Russian festive ritual complex were noted by A.V. Tereshchenko. It is interesting that he did so out of necessity, due to the variability of the materials he obtained. In the preface to the first volume, he mentioned "persistent obstacles in gathering information" and "difficulty in presentation", arising from the "excessive diversity on the same subject", including local versions and "altering one and the same ritual or game not only over the whole of Russia, but even in the same governorate—moreover, in one and the same uyezd; whatever is being done in one village is either out of use in another village of the same uyezd or is done in a completely opposite way" (Tereshchenko, 1848: Iss. I, p. V).

Although Tereshchenko noted a number of local features in the ritual complex, he often refrained from articulating conclusions that followed logically (for example, concerning *Semik* ('Green week'), Pentecost, Christmastime, or Cheesefare Week) (Ibid.: Iss. VI, VII). Sometimes, his conclusions failed to take into account local materials. Thus, upon describing many versions of celebrating the Day of St. John the Baptist, Tereshchenko made the following conclusion, "…the information collected on the Kupalo shows that its celebration was accompanied by lighting fires, jumping over fires, bathing, and collecting medicinal and protective herbs" (Ibid.: Iss. V, p. 95). The addition of the statement that in some places Kupalo was falling out of use, while in other places it was barely known (and this clearly referred to the Russian ritual complex, since Tereshchenko pointed out that "in the Ukraine, Belarus, and Lithuania" the Kupalo rituals were still in use in his time) (Ibid.: 96) is not very important, and makes it possible to say that Tereshchenko adhered to the evolutionary approach with its theory of survivals.

We can observe a similar picture in the study of E.V. Anichkov. Thus, listing similar elements of the Day of St. John the Baptist found among various European peoples, (lighting fires, hetaeric rituals, or customs associated with the relationship of godparents or sworn brotherhood), Anichkov pointed to different forms of completing the rituals: burial or drowning of a special doll (Marena, Kostroma, Kostrubonka) or a decorated tree (1903: 48). At the same time, Anichkov put the main emphasis on the common elements of the festivals, for example, while describing the rituals of the *Dozhynki* harvest festival, of Christmastime, etc. (Ibid.: 49–50, etc.). Highly appreciating the work of Anichkov, the well-known ethnologist V.K. Sokolova emphasized that he was mostly interested in the "common earliest elements whose remnants survived in various forms in the rituals of different peoples; he did not identify specific features of the Eastern Slavic rituals, their common and regional components" (1979: 8).

This trend continued in a number of studies of the Soviet period. Thus, in his monographic study on the Russian winter festivals, V.I. Chicherov aimed at detecting the presence of common structural elements in all festive and ritual actions. "Even a partial list of rituals performed on the above-mentioned days is characterized by a systematic repetition of the same actions", says Chicherov. "Games are repeated… which are similar to the Christmastime games: wearing masks, making bonfires, bathing, incantation against evil spirits, etc." (Chicherov, 1957: 20–21). Later, this aspect of the calendar rituals was deeply and thoroughly studied by V.Y. Propp (1963).

Chicherov pointed to the presence of both regional and local features in the Russian festivals. In some cases, such variability seems to be clearly secondary, as can be seen from the following examples he cited, "Variation between 'Kuzmodemyanki' and "Kuzminki' is manifold, but their essence is the same. The rituals of the Kuzminki are reminiscent of the wedding games" (Chicherov, 1957: 46); "The difference between the Pokrovki and Kuzminki, on the one hand, and Christmastime, on the other hand, lies not in the qualitative changes in actions, but in a greater variety of their performance on New Year's, in greater clarity of conducting them" (Ibid.: 64–65); "In their structure, the spring and summer fortunetelling coincide with the winter (especially with Christmastime) fortunetelling, and the only change is in the material that is used for prediction" (Ibid.: 85).

Variability became a significant addition in the descriptions of some festivals, particularly those belonging to the main winter cycle—Christmastime. Thus, speaking about the custom of baking *korovki* (lit. 'small cows') and *kozulki* (lit. 'small goats'), Chicherov observed their functional differences in the northern areas on the one hand, and in the central Russian and southern Russian regions on the other hand. Describing the "kutia" ritual meal, he pointed to the local features of that dish of grains in different regions of Russia. The *tolokno* oat flour also had specific regional features (Ibid.: 76–77, 81–82).

Chicherov wrote, that "parallels between the summer and winter fortunetelling reveal some typical traits:

a) preferential use of vegetation and the inclusion of fortunetelling into a ritual that is conducted independently of the spring and summer festivities; b) a variety of objects used by those who perform fortunetelling; incorporation of different kinds of fortunetelling into a special ritual complex in the winter festivities (Ibid.: 86). Describing the Christmastime and New Year's songs, Chicherov identified three types of songs: *koliada*, *ovsen*, and *vinogradye*. The first type is general Slavic; the second type is specific for Central Russia and the Volga region, while the third type distinguishes the Russian North. In the Southern Russian regions, people would sing various types of songs. Chicherov connected the area of the *ovsen* with the lands near Moscow, and the area of *vinogradye* with the territory of the Novgorod colonization. Describing the kinds of *koliada* singing, Chicherov identified a specific "Great Russian" ritual (the generalized type) that was different from other Slavic kinds (the differentiated type) (Ibid.: 116–122). Furthermore, outlining the circle of the zoomorphic imagery used by the guisers, Chicherov considered the horse (mare), the bull, as well as the chicken and goose (crane) to be the general Russian characters. At the same time, he considered the image of the goat, which had been previously viewed as common to the East Slavs, as a regional image (Western Russian and Southern Russian regions) (Ibid.: 196–198). Finally, he defended the specificity of the calendar rituals among the Russians compared to other Slavic peoples, including the Ukrainians and the Belarusians, which had not been observed in the scholarly works of the 1930s that viewed the Russian rituals as a distortion of Slavic texts (Ibid.: 232–234).

The study of Chicherov completed the initial very long phase of the first period of identifying the general and the specific in the Russian festive rituals. This phase is distinguished by an accumulation of materials and emphasis on the general as opposed to the specific. Nevertheless, many local elements were identified at that time, and the findings of that period still retain their relevance to this day.

After Chicherov, G.A. Nosova analyzed the variational features of Russian festive rituals using the materials of Cheesefare Week. She believed that this subject "is of great interest for solving some problems of ethnic genesis" (Nosova, 1969: 45). According to Nosova, "mapping the elements of the festival" makes it possible "to clearly identify the boundaries of variation in the rituals, and provides the opportunity for identifying their regional and local forms" (Ibid.: 45–46). In fact, the study of Nosova initiated the second phase of the first period in identifying the general and specific in Russian festive rituals and represented the first focused attempt to explore these aspects, which, however, was carried out using not a very rich array of materials. This study had the advantage of a wide use of the mapping method that made it possible to visually analyze the observed patterns compared to many similar studies.

Nosova identified two main complexes of Cheesefare Week rituals in the European part of Russia: Northern and Central Russian–Volga. The approximate boundary between them lay along the line "Pskov–Novgorod–Poshekhonye, then it passed through the northern districts of the Yaroslavl and Kostroma Governorates" (Ibid.: 48). The main area of the Central Russian–Volga complex comprised the central regions of European Russia and the Middle Volga region (the Governorates of Tver, Kostroma, Yaroslavl, Vladimir, Moscow, Kaluga, Ryazan, Nizhny Novgorod, Simbirsk, Samara, Saratov, and Penza). In its northwestern part, the geographic area of this complex included a large part of the Pskov Governorate and the southern parts of the Novgorod Governorate; in its northeastern part it included the Vyatka Governorate. A "mixed complex" began to appear to the north of Kursk–Voronezh. In this complex, "the leading role belonged to games of the military type ('gorodok', 'ikantsy'), fist fights, and various competitions in agility and courage", while in the Ukraine, the rituals with the "kolodka" ('wood block') were the main distinctive element of the Cheesefare Week games (Ibid.: 46, 50, 54).

According to Nosova, the parting ritual of the Cheesefare Week festivities, which constituted the core of the festival in the central regions, was missing from the northern complex. She believed that family and household rituals and, generally, rituals related to young people and newly married couples dominated in the northern complex as opposed to the Central Russian–Volga complex, which was dominated by agrarian themes. In its most concentrated form, the agrarian theme was manifested in the parting ritual of Cheesefare Week, which was carried out in different places in the form of undressing, destroying, burying, or burning a straw doll (Ibid.: 46, 48). Nosova suggested that the area of the parting ritual of Cheesefare Week could be compared with the area of the "ovsen songs", identified by Chicherov. In addition, Nosova pointed to the great similarity of Russian, Ukrainian, and Belarusian rituals, which involved the destruction of a straw man, to similar rituals of the West Slavs (Ibid.: 52, 54–55). The insufficient source base, which Nosova used for her research, did not enable her to highlight the correct key points in the identified Cheesefare Week complexes*. Nevertheless, the study of Nosova initiated a new phase in the understanding of the variability of Russian (and

*See the criticism of V.K. Sokolova (1979: 16–17).

Slavic) festive rituals, based not only on purposeful identification of general and specific traits, but also on new methodologies (the typological method and mapping method).

Nosova rightly believed that the "mapping of rituals around the entire annual cycle of the Russian agrarian calendar" would make it possible to outline the boundaries of the main complexes of the Pentecost–*Semik*, the Kupala rituals, as well as the rituals of the autumn and winter seasons. This could give good grounds for establishing "the initial areas where a certain ritual existed, its ancient ethnic nature" and make it "possible to trace the historical and cultural ties between the ethnic communities and to uncover the origin, meaning, and purpose of calendar festivals in a more profound way". Finally, this research goal would make it possible to conduct a comparative analysis of Eastern Slavic rituals with the Western Slavic and common Slavic rituals, and with the rituals of the European peoples (Ibid.: 56). These half a century old conclusions are important guidelines even today for further studies of festive rituals within any ethnic group.

In the introduction to his study of festivals, Propp (1963) expressed regret that Chicherov "had not studied the entire annual cycle of the peasants' calendar", but only the autumn-winter cycle. Propp believed that "the major spring festivals should be included into the scope of research" (2000: 15). Two decades later such work was done by Sokolova (1979). In addition to identifying the common Russian and regional features in the calendar rituals, she fulfilled the wish of Chicherov (Chicherov, 1957: 232–235) in identifying the features of Russian rituals against the background of the Eastern Slavic (Russian, Ukrainian, and Belarusian) materials. Unlike her predecessor, Sokolova purposefully set that as a research goal. "Comparative juxtaposition of rituals among the Russians, the Ukrainians, and the Belarusians makes it possible to identify both their common elements, which may possibly go back as early as the common Slavic ethnic community, and various ethnic, regional, and local forms that rituals acquired in the course of the historical development of the Slavic peoples" (Sokolova, 1979: 7). Speaking about the problems of a comparative study, Sokolova pointed out the difficulties associated with the irregularity of materials deriving from different peoples and regions, and the confinement of the same elements of rituals to different festivals among the Russians and the Ukrainians, caused by different climatic conditions and specific features of historical development. Common elements, which "passed from one ritual cycle to another", attracted the particular interest of Sokolova. Unlike Propp, Sokolova pointed out that common elements occupied an unequal place in various ritual complexes, and some of them were multifunctional, that is, they performed different functions in different festivals, which needed to be taken into consideration with each ritual (Ibid.: 7–9).

Describing the Cheesefare Week festivities, Sokolova emphasized their specific development among the Russians in comparison with the Ukrainians and Belarusians, and identified the following essential elements of the Russian Cheesefare Week rituals: the parting ritual, customs associated with newly married couples, sliding down ice slides and riding on horseback, the festive meal (crepes), and commemoration of deceased parents. In addition to these rituals, Sokolova noted meeting Cheesefare Week as a local feature in the western and some southern Russian governorates (Ibid.: 11, 13, 16).

Sokolova identified two main types of parting rituals during Cheesefare Week: making bonfires and the farewell-burial of a ritual straw man. The first type was most common in the 19th–early 20th century, and was typically performed in the northern, central, and Volga regions. The farewell-burial ritual "consistently persevered" in the southern Russian regions and sometimes in the central (the Vladimir, the Moscow Governorates), western (the Pskov Governorate) regions, and Siberia. In some cases, a straw man was burned, which, according to Sokolova, was a survival of a wider tradition. As a local version, she mentioned the custom of making "family" dolls, which represented a kind of "family replication" of the Cheesefare Week festivities, in the Moscow, Kaluga, and Vladimir Governorates (Ibid.: 16, 25, 36). Sokolova agreed with the hypothesis of V.F. Miller, according to which the bonfires and the farewell-burial of Cheesefare Week were two distinct rituals. Sokolova considered the farewell-burial of the ritual straw man to be a chronologically earlier, "original" form among the Slavs and other European peoples. However, in her view, making bonfires was also an ancient tradition, which had great importance particularly for the South Slavs (Ibid.: 35–36).

Sokolova noted some less significant differences in the customs associated with newly married couples. Sleigh rides of young couples are known as a universal custom, while sliding down ice slides became widespread only in the North and in the central part of Russia. In the southern regions harrows were often used along with sleighs. Sokolova considered bride shows, wallowing in the snow, and kissing young married women by young men to be local customs (Ibid.: 38–41). The common Cheesefare Week sliding down ice slides and horse riding were even less variable. Among festive food, Sokolova primarily noted Russian crepes and Ukrainian dumplings, as well as local Cheesefare Week dishes in Siberia and in certain parts of European

Russia (*khvorost*—'angel wings', *pirozhki*—'stuffed bread pockets', etc.) (Ibid.: 43–47). Sokolova believed that guisers' plays during Cheesefare Week were not an original, but a local and fairly recent phenomenon, which became more widespread in the Southern Russian regions and partly in the Volga region (Nizhny Novgorod and the Vladimir region). Sokolova also considered the tradition of "storming a snow fort", widespread in Siberia and in some towns of European Russia, to be a local ritual; Sokolova connected its origins with the Cossack subculture (Ibid.: 49–52).

According to Sokolova, Ukrainian and Belarusian Cheesefare Week rituals in general were a transitional link between the Russian and the Western Slavic traditions. At the same time, the Russian Cheesefare Week festivities showed some features that were similar to the rituals of the South Slavs (making fires) (Ibid.: 67).

In the festival of greeting the spring (baking "larks", "hailing" the spring), Sokolova finds the elements of ritualism that obtained different forms and meanings in different regions. In the late 19th century, the main form of the ritual among the Russians was baking rolls in the form of birds ("larks") on the Day of the Forty Martyrs and baking "sandpipers" in the southern governorates, which were different in different places. At the bordering areas with the Ukraine and Belarus, singing *vesnyanka* spring folk songs was added to the festivities, which distinguished the Russian tradition from the customs of the western neighbors who performed these rituals separately. Depending on the region, the "hailing" of spring was done at different times. In some places (mainly in the western and southern regions), "larks" became the main object of ritual actions and later of various games. A less common form of greeting the spring was baking the *soroki*—forty balls of dough (Ibid.: 68–77, 82).

Sokolova thus concluded, "The development of ritual among the Russians, Ukrainians, and Belarusians went different ways. In most of the territory inhabited by the Russians, the arrival of spring started to be celebrated only with baking of 'larks' of dough, which symbolized the coming of the spring; the *vesnyanka* songs were also addressed to them… The Ukrainians and Belarusians combined the greeting of the spring with later spring games; they would start to 'hail' the spring at different times" (Ibid.: 82).

Holy Thursday was distinguished by somewhat lesser variability compared to Cheesefare Week and other major dates of the festive calendar. In this respect Sokolova noted significant similarity of the rituals among all Eastern Slavic peoples. The most common custom of the festival was cleansing with water, which was performed in various ways (washing, dousing with water, or bathing) in different regions. In addition to bathing, this tradition took the form of cleaning the house for Easter. The preparation of Holy Thursday salt was a universal ritual, which differed in terms of local methods and details. The custom of cooking certain specific dishes and coloring eggs was closely associated with Easter (Ibid.: 101–110).

According Sokolova, the tradition of fumigation, widespread in the northeastern regions of European Russia (the Novgorod, Vologda, and Vyatka Governorates) and parts of Siberia was a more confined and later tradition compared to cleansing with water. Sokolova identified a similar geographic area for the ritual of delineating the magic circle. She argued that various customs associated with magical protection of domestic animals and preparation for agricultural works had a local nature, but some of them could have been earlier practiced in a wider area (Ibid.: 103–108).

Sokolova suggested that the celebration of Easter showed similar trends. Yet, as opposed to Holy Thursday, there were considerably more differences between the Eastern Slavic peoples. As far as the ritual meals were concerned, Sokolova pointed out that the Ukrainians and Belarusians used the word "paska" for Easter bread, while the Russians called such bread "kulich", while "pascha" was made of farmer's cheese. Ukrainian and Belarusian Easter dishes included suckling pigs, while the Russians considered it a New Year's dish. There were also differences in Easter games. Rolling eggs was considered to be the most important game among the Russians and partly the Belarusians, but it was less common among the Ukrainians (Ibid.: 110–113). Another major difference was the lack of a common tradition of dousing with water among the Russians at Easter, whereas it was common among the Ukrainians. The customs of circle dancing and swinging on swings at Easter was widespread among the Russians. Swinging on swings was also known among the South Slavs. Easter games of young people near church were common among the Ukrainians. Commemoration of the deceased was performed on different days: on Radunitsa among the Russians (Tuesday after St. Thomas' Sunday), on Thursday of Easter Week or on Radunitsa among the Belarusians, and on Thursday of the Easter Week and later on the Monday of St. Thomas' Week among the Ukrainians (Ibid.: 114–122).

Some Russian Easter customs were local. This was the case with making bonfires near the church, which was widespread among the Belarusians and South Slavs. The so-called *vyuniny* (*vyunets*, *vyunishnik*) or "hailing the young couple" on the Saturday of Easter Week or on the Sunday of St. Thomas' Week were a regional tradition (in the Kostroma, Yaroslavl, Nizhny Novgorod, and Vladimir Governorates) among the Russians (Ibid.: 116, 134–141).

Sokolova pointed out that "Eggs, swinging on swings, circle dancing, and the ancestors' cult can be considered the main, typical, and to some extent specific elements of the earliest spring ritualism, transferred to Easter. They were shared by the Russians, Ukrainians, and Belarusians; the local differences were more often manifested in details without affecting the essence. However, in addition the Belarusians had a special dragging ritual, which gave ethnic specificity to Belarusian Easter ritualism" (Ibid.: 123–124).

Sokolova argued that the basic elements of the cattle breeding complex (the ritual of feeding the cattle, ritual visitation of the animals, beating with willow branches, shepherds' walking around the herd, gift giving to the shepherds, etc.) in the rituals associated with St. George's Day, "are the same not only among all Eastern Slavic peoples, but also among the West Slavs, as well as among many non-Slavic European peoples". However, these rituals survived among the Russians, Ukrainians, and Belarusians, "not to the same extent, and evolved in different ways, including some other rituals, different in origin" (Ibid.: 180). Sokolova drew attention to the differences in St. George's agrarian magic: it appeared among the Russians in a minimal form, but played an important role among the Ukrainians and Belarusians. These rituals included walking around the fields, preparing a ritual meal, and rolling on the ground. Among the Russians, these rituals could have been mostly found in southern governorates, and were mostly performed on the Ascension Day. Unlike the Russians, the Ukrainians and Belarusians attached great importance to dew and water on St. George's Day. Serious differences can also be observed in the songs. The Belarusians had the greatest number of St. George's songs; the Ukrainians had less songs, while among the Russians, St. George's songs could only have been found in the border areas—in the Bryansk and Smolensk regions (Ibid.: 171–177).

With regard to the *Semik*-Pentecost rituals, Sokolova observed many differences both between the Eastern Slavic peoples and within the Russian ethnic group. The richest set of rituals was found among the Russians. This was caused by the fact that the rituals of the following Rusalka Week and some of the Kupala rituals fell on the *Semik*-Pentecost. The main elements of the *Semik*-Pentecost among the Russians included the decorating of houses, yards, and streets with birch branches and young birch trees; weaving birch branches and wreaths; *kumlenie* initiation rituals under birch trees; decorating a small birch tree and walking around with it and submerging it in the water; throwing wreaths into the water, and a common ritual meal of the girls (Ibid.: 206, 223). However, rituals in such a complete form were not found among all Russians, but only to the south of the line running along the Smolensk, Tver, Yaroslavl, Kostroma, and Nizhny Novgorod Governorates, the southern part of the Perm Governorate, and the Kazan Governorate, as well as Siberia. People would not walk around with a small decorated birch tree in the western areas (the Smolensk and Bryansk regions), and in the Tula, the Kaluga, the Kursk, and the Orel Governorates *kumlenie* initiation rituals of girls were supplemented with the "baptism of a cuckoo bird". In the southern areas, ritual farewell to *rusalkas* was timed to the day before St. Peter's Lent" (Ibid.: 207, 223).

In conclusion, Sokolova identified three complexes of the *Semik*-Pentecost ritualism among the Russians: the main "Central Russian–Volga–Siberian" complex, the Southern Russian complex (as a specific version of the main complex), and the Northern complex (Ibid.: 223). The most minimal ritualism was in the north of Russia: people there would only decorate their houses with young birch trees and visit the cemeteries. As far as the Belarusians and Ukrainians are concerned, the former had some elements similar to Russian ritualism (weaving birch branches and *kumlenie* initiation rituals), while the latter had some customs associated with vegetation and *rusalkas* (Ibid.: 207, 223).

According to the study of Sokolova, great variability distinguished the Day of St. John the Baptist (or Ivan Kupala)—one of the most important annual festivals in Europe. In spite of the common basis of the festival among the East Slavs, its elements among the Russians, Ukrainians, and Belarusians in the 19th century survived unevenly: the most archaic elements survived among the Belarusians and to a large extent among the Ukrainians. A bonfire was the focal point of activities among the Belarusians on the day of Ivan Kupala, and in addition to the bonfire the Ukrainians used a tree, which can be connected with the Russian *Semik*-Pentecost ritualism (Ibid.: 228–230, 249).

The rituals associated with the Day of St. John the Baptist among the Russians were minimal, and were reduced to picking herbs, bathing, and searching for flowering fern. John's fires are known mostly from the areas bordering with Belarus and the Ukraine. Dousing with water and ritual meals made of cooked grains among the girls were of local nature. In the north of Russia, people would certainly go to the *banya* for a steam bath, weave various flowers and herbs into the *banya* birch whisks, and then tell fortunes using them (Ibid.: 242–246).

The last festival studied by Sokolova, was St. Peter's Day, which was celebrated on a large scale by the Belarusians and Ukrainians, whose Peter's ritualism was close to the rituals of Ivan Kupala and Pentecost among the Russians (*kumlenie*). Among the Russians, special rituals of this festival were performed only in the southern governorates, such as customs of "guarding the

sun", protection from the evil spirits (beating on oven dampers, frying pans, etc.), ritual theft in gardens, and making blockades on the roads with stolen harrows, carts, logs, etc. (Ibid.: 252–254).

Speaking about the tendencies in the development of the spring-summer calendar rituals among the Russians, Ukrainians, and Belarusians, Sokolova came to the conclusion that there was a common early basis behind the all traditions, but in the course of history, "rituals diverged sometimes very substantially, were transformed and were understood in different ways, were supplemented by a variety of new elements, which were often not ritualistic in their origin". As a result, different "preservation degree of rituals and different combinations of their elements created different ethnic and local versions" (Ibid.: 261, 267). Sokolova noted that "ethnic and regional specificity" was manifested to the greatest extent in the most important annual festivals. In addition to the New Year's ritual cycle, similar among all Eastern Slavic peoples, the Cheesefare Week festivities and the *Semik*-Pentecost stand out among the Russians, and Ivan Kupala among the Ukrainians and Belarusians (Ibid.: 261).

Thus, the monograph of Sokolova concluded the first period of research into variability of Russian (and Eastern Slavic) calendar ritualism as a part of the generalized studies covering the territory of Russian, Slavic, and other European peoples. In addition, studies identifying common Russian and local elements in individual festivals began to appear in the second half of that period. In the future, such projects will continue and will take the form of studies of a generalized nature focused on a single festival rather than on the group of festivals, as had been formerly the case.

An important outcome of the first period of studying the common and specific traits of Russian (and Eastern Slavic) calendar rituals was identification of the main elements of the festivals, their versions (types), and the distribution of these versions over the general Russian geographical space. At the same time, such a macro-research approach obviously could have not succeeded in defining clear boundaries of regional and local versions of festive traditions even at the synchronic, not to mention the diachronic level. The latter is possible only in a smaller-scale territorial scope of research. This trend, which can be defined as areal or regional, has been developing since the 1980–1990s, and comprises the studies of general and specific traits in Russian festive rituals (Fursova, 1998, 2002, 2003; Zolotova, 2000, 2002; Narodnaya traditsionnaya kultura…, 2002; Chernykh, 2006, 2007), which will ultimately provide a more detailed picture of the variability of Russian (and Eastern Slavic) calendar rituals not only of the 19th–first third of the 20th century, but also of the earlier periods.

References

Anichkov E.V. 1903
Vesennyaya obryadovaya pesnya na Zapade i u slavyan, pt. I. St. Petersburg: [Tip. Imp. Akad. nauk].

Arealnye issledovaniya v yazykoznanii i etnografii: Tezisy dokladov i soobshcheniy. 1971
Leningrad: Nauka.

Arealnye issledovaniya v yazykoznanii i etnografii. 1977
Leningrad: Nauka.

Arealnye issledovaniya v yazykoznanii i etnografii: Kratkiye soobshcheniya. 1978
Leningrad: Nauka.

Chernykh A.V. 2006–2007
Russkiy narodnyi kalendar v Prikamye: Prazdniki i obryady kontsa XIX – serediny XX v. In 2 parts. Perm: Pushka.

Chicherov V.I. 1957
Zimniy period russkogo narodnogo zemledelcheskogo kalendarya XVI–XIX vekov: (Ocherki po istorii narodnykh verovaniy). Moscow: Izd. AN SSSR.

Dialektologicheskiy atlas russkogo yazyka: (Prospekt svodnogo atlasa). 1969
Moscow: n.p.

Dialektologicheskiy atlas russkogo yazyka: Tsentr evropeiskoi chasti SSSR. 1986
R.I. Avanesov, S.V. Bromlei (eds.). No. 1. Moscow: Nauka.

Fursova E.F. 1998
Semiko-troitskiye obychai i obryady vostochnykh slavyan Priobya vtoroi poloviny XIX – nachala XX v. *Etnograficheskoye obozreniye*, No. 3: 35–48.

Fursova E.F. 2002–2003
Kalendarnye obychai i obryady vostochnoslavyanskikh narodov Novosibirskoi oblasti kak rezultat mezhetnicheskogo vzaimodeistviya (konets XIX – XX v.). Pt. 1. Novosibirsk: Agro. Pt. 2. Novosibirsk: Izd. IAE SO RAN.

Istoriko-etnograficheskiy atlas Sibiri. 1961
Moscow, Leningrad: Izd. AN SSSR.

Narodnaya traditsionnaya kultura Pskovskoi oblasti: Obzor ekspeditsionnykh materialov [iz nauchnykh fondov Folklorno-etnograficheskogo tsentra]. 2002
A.M. Mekhnetsov (ed.). In 2 vols. St. Petersburg, Pskov: Izd. Obl. tsentra narod. tvorchestva.

Nosova G.A. 1969
Kartografirovaniye russkoi maslenichnoi obryadnosti (na materialakh XIX – nachala XX v.). *Sovetskaya etnografiya*, No. 5: 45–56.

Problemy kartografirovaniya v yazykoznanii i etnografii. 1974
Leningrad: Nauka.

Problemy lingvo- i etnogeografii i arealnoi dialektologii: Tezisy dokladov. 1964
Moscow: Nauka.

Propp V.Y. 1963
Russkiye agrarnye prazdniki: (Opyt istoriko-etnograficheskogo issledovaniya). Leningrad: Izd. Leningr. Gos. Univ.

Propp V.Y. 2000
Russkiye agrarnye prazdniki: Opyt istoriko-etnograficheskogo issledovaniya. Moscow: Labirint.

Russkiye: Istoriko-etnograficheskiy atlas: Zemledeliye. Krestiyanskaya odezhda. Krestiyanskoye zhilishche: (Seredina XIX – nachalo XX veka). 1967
Moscow: Nauka.

Russkiye: Istoriko-etnograficheskiy atlas: Iz istorii russkogo narodnogo zhilishcha i kostyuma (ukrasheniye krestyanskikh domov i odezhdy): Seredina XIX – nachalo XX v. 1970
Moscow: Nauka.

Sakharov I.P. 1885
Skazaniya russkogo naroda: Narodnyi dnevnik. Prazdniki i obychai. St. Petersburg: Izd. A.S. Suvorina.

Snegirev I.M. 1837–1839
Russkiye prostonarodnye prazdniki i suevernye obryady. Moscow: [Universitet. tip.]. In 4 vols.

Sokolova V.K. 1979
Vesenne-letniye kalendarnye obryady russkikh, ukraintsev i belorusov: XIX – nachalo XX v. Moscow: Nauka.

Tereshchenko A.V. 1848
Byt russkogo naroda. Iss. I, VII. Moscow: [Tip. MVD]. Iss. V, VI. Moscow: Tip. voenno-ucheb. zavedeniy.

Tolstoy N.I. 1995
Yazyk i narodnaya kultura: Ocherki po slavyanskoi mifologii i etnolingvistike. 2nd revised edition. Moscow: Indrik.

Zolotova T.N. 2000
Lokalnye osobennosti i mesto v obshcherusskoi traditsii kalendarnykh prazdnikov russkikh Tobolo-Irtyshskogo regiona. *Gumanitarnye nauki v Sibiri*, No. 3: 51–56.

Zolotova T.N. 2002
Russkiye kalendarnye prazdniki v Zapadnoi Sibiri (konets XIX – XX vv.). Omsk: Izdatel-poligrafist.

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Ust-Tsilma Female Headdress: Description and Use (Mid 19th to Early 21st Century)*

The study describes the headdress worn by girls and women in a group of Russian Old Believers known as Bespopovtsy (the Pomors, the Priestless Old Believers), who had moved in the late 1700s from northwestern Russia to the Lower Pechora, and currently live in the Ust-Tsilemsky District of the Komi Republic. Some headdresses were collected during my field studies in 2010–2014 in Ust-Tsilma villages; others, by A.V. Zhuravsky in the early 1900s (those are owned by the Peter the Great Museum of Anthropology and Ethnography (Kunstkamera), St. Petersburg). A detailed description and an analysis of headdresses and headscarves are provided, as well as the ways they were worn and fastened, and their local names. On the basis of this analysis, ethno-cultural ties of Russian Old Believers with Russian and non-Russian groups professing official Orthodoxy are examined. The functions of the headdress, related beliefs, and everyday and ritual use are discussed. The article is supplemented by stories told by informants about their clothing, and illustrated with original photographs.

Keywords: *Russian Old Believers, headdress, Komi Republic, Ust-Tsilma, ritual.*

Introduction

Russian Priestless Old Believers (the Pomors) living in Ust-Tsilemsky District of the Komi Republic is a compact confessional group, which has the exonym of "Ust-Tsilemy". They have been living in the European Northeast, surrounded by different ethnic groups (the neighboring Izhma Komi, and the Nenets), for over three centuries, and preserve the Old Orthodox faith and a distinctive culture. Despite the stable existence of traditional forms of dress until the mid-1950s, folk clothing, as a manifestation of their culture, has never been the subject of a special study. The development of folk clothing was undoubtedly fostered both by endogenous processes associated with the search and elaboration of distinctive ethnic features, and by exogenous processes resulting from the impact of foreign cultures.

At present, women of the older generation in the Ust-Tsilemsky District wear exclusively traditional clothing (for everyday use, festive clothing, and clothing for prayer), while young women may wear both modern and traditional clothing. In the post-Soviet period, people began to sew festive *sarafan* dresses and shirts for children of all ages to be worn at folk-festivals. Male and female festive clothes are made according to old models for participants of folklore groups active in the Ust-Tsilemsky District and in the places where

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Ust-Tsilma communities live: in the towns of the Komi Republic, in Moscow, St. Petersburg, Arkhangelsk, and Naryan-Mar.

This article examines and analyzes female headdress. Headdress with the name of *shapka* ('hat') was exclusively male in the traditional culture of Ust-Tsilma dwellers. Women wore bonnets and decorated headdresses on solid bases, which did not have a single common name. Headdress in the form of hat became a part of the clothing of the Ust-Tsilma women only in the 1970s. In the past, the word *shapka* was used in the colloquial speech of local residents, for example, for designating the capacity of a woman not to respond to the gossip of the villagers, "to hang a hat on one's ear". The phrase "put on a deaf hat" described the man living in the house of his wife. The phrase, "He will take off his last hat" characterized an unselfish, generous person; careless lightheaded people were called "sewn-on sima"*.

The main female headdress was the headscarf, which was worn from infancy to the last days of life; all deceased females were buried wearing headscarves. Wearing a headscarf conformed to the norms of behavior for a girl/woman. The expression "to lose the scarf from one's head" described girls of loose conduct.

The severe climate of the Far North predetermined the range of basic economic activities for Ust-Tsilma dwellers, which did not include cultivation of technical crops (flax, hemp) necessary for textile production. Homemade and industrial textiles were brought to the region by merchants, who would come by winter roads to the fairs in the Pomor villages (Dronova, 2011: 13). All pieces of headdress that we have observed, including headscarves, were made of industrial textiles.

Early information about the types of headdress that existed at the Pechora has not survived. The sources for this study were headscarves, bonnets, and headbands made no earlier than the mid-19th century, which are a part of the collection of A.V. Zhuravsky (kept in the Peter the Great Museum of Anthropology and Ethnography (Kunstkamera)), as well as field materials of the present author's, and objects from the family collections of the Ust-Tsilemsky District's residents.

Types and varieties of headdress

Headdress of women and girls is represented by headbands, ribbons, bonnets, and headscarves. Girls' headdress included numerous headbands, which were worn throughout entire Russia. Currently, despite the frequent use of traditional clothing in Ust-Tsilma villages, the tradition of wearing headbands has been lost. This type of headdress is described using the collection of Zhuravsky, which includes fragments of two types of headbands:

1) *pozatylen* or headband for the back of the head, made of linen fabric dyed in red, with lining. Consists of *ochelye* (the part for the forehead) and the back part; embroidered with beads of white, blue, black, and green colors; bears an independent and complete decorative pattern on each part;

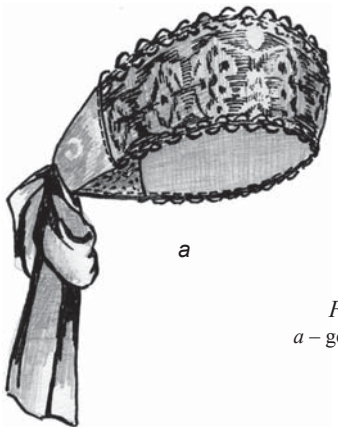
2) forehead-band made of a narrow dense strip of golden embroidery.

The most expensive headdress for girls was *khaz*, a wide headband with strings (Fig. 1). This name of the headdress is known only in the Ust-Tsilma villages, and is associated with wide gold-interwoven ribbon-galloon, which was called "khaz" in the Russian North and was also used for decoration of *sarafans*. Forehead bands were cut out of dense textile embroidered with golden or silver threads, and trimmed with wide galloons, which was decorated at the bottom with river pearls used for these purposes throughout the entire north and northwest of Russia. The side parts closer to the back of the head were cut out of silk or semi-silk fabric of the same kind, and the ribbons were cut out of another kind of fabric. The headdress was fastened to the back of the head using hidden strings; ribbons served as a decorative element; they were tied in a half hitch (Fig. 1).

Festive headdress for girls also included a small headscarf, or kerchief, folded into a band. If it was tied around the head leaving the top of the head open, this meant that the girl was ready for marriage; and married women completely covered their heads with the headscarf. At the semantic level, the head-decoration of a girl who had reached adulthood, and the way she tied her headscarf-band, were the symbols of girlhood, beauty, freedom, and dignity. The use of a headscarf-band as a head decoration for maidens occurs among all dwellers of the Russian North, as well as the Old Believers of the Altai (Fursova, 1997).

At the turn of the 19th–20th centuries, headdress in Ust-Tsilma villages was of various types, which were divided into subtypes: *kokoshnik* of the *morshen* type, *kokoshnik* on a solid base, *kokoshnik-sbornik, samshura,* and *povoinik*. The area where kokoshniks and samshuras were worn mostly coincides with the Old Novgorod area and territories that for a long time were under the influence of Novgorod, including the areas in the Pechora River basin (Lebedeva, Maslova, 1956: 24–25). Kokoshniks and samshuras were widely used in Cherdynsky Uyezd of the Vologda Governorate, where golden embroidery was common. As a part of other imported goods, pieces of headdresses were brought by the merchants from Cherdynsky Uyezd to the Pechora (Maslova, 1960: 111–112). The types of headdress mentioned above are available in the collection of Zhuravsky. Unfortunately, the collector did not specify their local names, providing

**Sima*—'hood'.



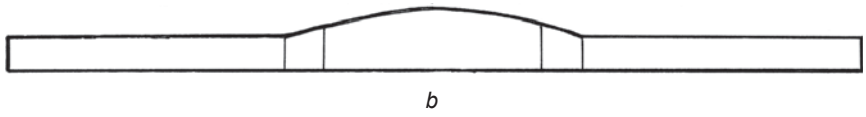


Fig. 1. Festive *khaz*.
a – general view; *b* – structure.

exclusively common Russian names. Currently, headdress of two types is commonly used in the Ust-Tsilemsky District (the local names are given):

1) *kokoshnik* – soft low cap with lining, which has a drop-shaped bottom, band, strings on the back of the head, and trimming of denser textile along the edge (Fig. 2). This headdress resembles the common Russian *povoinik*, and that name is given to the object in the inventory by Zhuravsky. In Ust-Tsilma villages, the headdress of this kind is called *kokoshnik*. Its Ust-Tsilma version is a low bonnet, the size of which is regulated by a special cut: the edges on the back of the head remain free, and overlap each other when they are tied (Fig. 2, 3). It is worn by married women and widows. Festive *kokoshnik* is made of expensive textiles; everyday *kokoshnik* from cotton or satin. *Kokoshnik* is always covered by a headscarf, which is tied with a knot at the back of the head;

2) *poboinik* – wedding headdress on a solid base. Its name is derived from the common Russian word

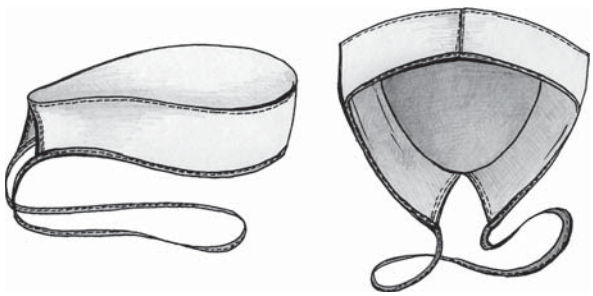


Fig. 2. Kokoshnik.

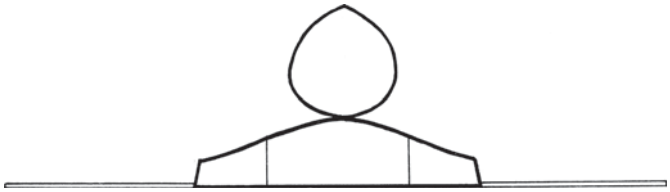


Fig. 3. Structure of *kokoshnik*.

"povoinik". In its shape, *poboinik* is a version of *sbornik*, which was in use in the Arkhangelsk Governorate until the 1930s. It is one of the versions of the Old Russian *kokoshnik*. Some families preserved *poboiniks* made of old textiles and embroidered with gold and silver; according to the owners, they had been used until the end of the 19th century. At present, dressmakers sew *poboiniks* from modern brocade according to traditional models. The Ust-Tsilma version of this headdress uses a ribbon (*otdirysh*) of textile with "golden" embroidery, which is fastened around the head from the top by a special knotless method: the ends of the ribbon are taken forward from the back of the head, twisted, separated on two sides, and hidden under the base. This method of decorating the headdress with a ribbon seems to be typical of the Ust-Tsilma tradition. When the bride was moving to the house of her groom, a large rep shawl folded diagonally was placed upon the *poboinik* of the bride; it was not tied, and its ends loosely hung on both sides.

The headscarf was, and still remains, the most common female headdress. The value of the headscarf depends on its size and texture of fabric. *Kanafatnye* and large rep headscarves are especially valued (Fig. 4); the Ust-Tsilma women measure their sizes in "quarters" (a distance from the pinky finger to the thumb of wide open palm). Headscarves of square form were large (some were 12–14 quarters); when being worn, their ends would reach the level of the knees. The Ust-Tsilma women call such headscarves *starinnye* ('age-old') or *samoluchshiye* ('the very best').

Headscarves are of several kinds. Their local names are derived from the words indicating the texture of the textile and the method of production, and sometimes coincide with the commonly known Russian names. In Russian, there is a word *plat*, meaning 'headscarves and kerchiefs different in size and manner of wearing' (Russkiy traditsionnyi kostyum…, 1998: 213). The Ust-Tsilma women use this word only for festive large and medium-sized headscarves. They tie the headscarf over *kokoshnik* with a half hitch at the back of the head. Such headscarves are still in demand among Ust-Tsilma women. *"Decorated headscarves were very much cared for. Women would wear small rep headscarves for weddings; they would sit on benches and were afraid to crumple them, and they could also have torn them, as they were thin and flimsy. Brocade headscarves would be worn for parties at people's homes, small rep, silk, and satin headscarves.*

At such parties, many people, up to fifty, would gather; they would stay in two houses, and they sometimes sweated. Silk and satin headscarves could be washed; but rep headscarves were never washed, they were only hung out in the open air in summer time" (FMA (field materials of the author), recorded in the village of Chukchino in 2002 from P.G. Babikova, born in 1932). *"On feast-days, the day before Lent, regardless of whatever frost there might be, women in these rep and kanafatny headscarves would walk in the streets; they would dress nicely, and would not tie any other headscarf. Wearing beautiful reindeer-fur coats with cuffs and collar, shirts made of cloth or stof fabric, women would gather by the road near each other's house in groups of five to ten people, sing songs, and watch the guys taking the girls horse-riding. Our father had reindeer, and he would harness reindeer, and we would drive the reindeer"* (FMA, recorded in Syktyvkar in 2009 from M.N. Epishina, born in 1921 in the village of Chukchino). *"There were many golden or rep headscarves brought to Tsilma from Arkhangelsk in the fifties* [the 1950s – **T.D.**]. *We would go to Arkhangelsk and bring headscarves from there; in Arkhangelsk, women wouldn't wear them anymore, but would use them instead of tablecloths to cover tables; but here, women would wear them and really wanted to buy them"* (FMA, recorded in the village of Rochevo in 2010 from I.G. Ananina, born in 1932).

In Ust-Tsilma villages, the use of the following types of headscarves has been observed:

Aglitsky – this name was used in Ust-Tsilma villages for small half-woolen shawls; their main background was red; white, blue, and green were used in floral ornamentation along the rim;

Kanafatny plat – a silk headscarf with geometric ornamentation consisting of large squares, with their centers decorated with "golden" thread (Fig. 5). In some places, such a headscarf was called *konovatka* or *konovatny* (Lavrentieva, 1999: 41). It was a strip of fabric, which was used by the inhabitants of the Vologda Territory as a wedding veil, and by the Ust-Tsilma women as a headscarf. Two headscarves could have been made from a single strip of fabric. The *kanafatny* headscarves were considered to be "rich"; if golden thread was present in the headscarf, it was called "golden" *plat,* and the Ust-Tsilma women referred to it as "honored". Such a headscarf in a woman's wardrobe was associated with wealth: *"Not every woman had a kanafatny headscarf, only the rich. The bride would be dressed in such a headscarf the day after the wedding; women would wear it to gorka festivities; it was a very honored headscarf. Now very few of them are left"* (FMA, recorded in the village of Ust-Tsilma in 2008, from I.P. Tomilova, born in 1932). *"A golden headscarf was considered kanafatny; our mother did not have one. Very wealthy people, who would go on trips and buy them for their wives and daughters, had kanafatny headscarves; but now they are not produced anymore"* (FMA, recorded in the village of Chukchino in 2004, from A.I. Durkina, born in 1912);

Fig. 4. E.N. Toropova showing rep shawls.

Fig. 5. N.A. Matveeva wearing a *kanafatny* headscarf.

Parchovy – length of brocade; began to be used as a headscarf in the mid-1960s; the thread was raveled at the edges of the headscarf, and short tassels were made, or ready-made tassels of silk threads were sewn to the edges;

Pukhovy – a headscarf knitted of goat-down; the Ust-Tsilma women started to commonly use them relatively lately, only in the mid-20th century. At the present time,

Fig. 6. I.I. Nosova and A.A. Chuprova showing *redninnye* headscarves.

downy shawls of various sizes, including kerchiefs, are in demand;

Redninny – a half-woolen or cotton headscarf, most often green and blue with a multicolored printed design; its central ornamental motif is a paisley pattern, or small flowers (Fig. 6). Such headscarves were a part of the ritual outfit: they were used for joint prayers, and at the betrothal of the bride in the marriage ritual. In the past, headscarves of the Ust-Tsilma women had smooth edges without tassels, since people regarded tassels as sinful, *"Tassels were not sewn to the headscarves that would be worn to prayer; it was a sin. It is as if demons sat on tassels; so in the past, they would say that you cannot decorate the clothing in which you pray with pendants. Headscarves with tassels are only put on when one wants to dress up, to go to gorka festivities or to house parties; but not when people stand in front of the icons"* (FMA, recorded in the village of Ust-Tsilma in 2004 from A.A. Chuprova, born in 1928). Currently, headscarves are decorated with tassels;

Repsovy plat – festive headscarf of silk or half-silk, "the fabric on the right side was distinguished by small rounded ribs formed by a double drive of the weft (rep weave) or by the difference in the thickness of weft threads and warp threads (false rep weave)" (Lyutikova, 2009: 71). Such headscarves were common throughout the entire Russian North. They have a distinctive pattern, with its elements becoming larger from the center towards the edges, with curls different in shape and size, and different sets of colors. Rep headscarves of the following sets of colors prevail in Ust-Tsilma villages: red-green, blue-orange, green-lilac with the local name *chafranenye*), and orange-light blue. Black is common for all the above combinations. White-blue, white-pink, and white-orange headscarves are decorated with two-colored ornamentation of various kinds. Small flowers in the center, large bouquets/garlands of flowers in the corners, and a large stylized floral ornamentation of curls along the rim, form the basis of decoration for all headscarves. Some headscarves were additionally decorated with embroidery. Headscarves differed in size (small, medium, or large);

Sorochka – small headscarf of cotton or satin for everyday wear. This is tied under the cheeks with a half hitch called *soroka**;

Shalyushka – headscarf of average size, of staple textile or wool; it is used for wearing on weekdays, and a headscarf of silk or cashmere is worn on Sundays and feast-days (Fig. 7). The headscarf was considered to be festive if it had tassels of silk or woolen threads; sometimes, women decorated industrially manufactured headscarves with such tassels themselves, thus making them festive;

Shalcha – fairly worn headscarf or small shawl, still suitable for use.

The Ust-Tsilma women wore all headscarves folding them diagonally. The method of attachment depended on the age and status of the owner. Infant girls' heads were completely covered with headscarf; the ends were crossed under the chin and fastened behind the neck. After seven years of age, the girls would wear the same headscarf on weekdays and feast-days, tying it with the *soroka* half hitch; and only in their teenage years they would start wearing headbands. On feast-days, during street festivities and while walking around the village, the girls were allowed to tie two headscarves: one was folded into a band, and was tied on the back of the head beneath the braid, leaving the top of the head open; another one covered the head from the top with the headscarf tied under the chin, *"In spring, girls would start strolling in the streets on feast-days; it is cold outside, and they would tie the headscarf po golovy ('the underscarf') as a band, and they would put on light-colored sorochka po kofty ('the outer scarf'), and would tie it under their cheeks with the soroka knot. In spring, when the river becomes clear of ice, it was cold in open places. The girls would always wear light-colored headscarves—they protected from the wind a little"* (FMA, recorded in Syktyvkar in 2009, from M.N. Epishina, born in 1921 in the village of Chukchino of the Ust-Tsilemsky District).

*In Russian, the word *soroka* denoted the old-time headdress of the married women.

Traditionally, married women and elderly women had to cover their heads at all times of the day with the headscarf. Outside, they would wear two headscarves, which can be conventionally divided into the outer scarf and underscarf; or, according to the Ust-Tsilma terminology, *po golovy* and *po kofty*, *"On such days* [weekdays – **T.D.**]*, married women would tie small headscarves over kokoshniks: staple or cotton headscarves were tied po golovy, while large shawls would be worn po kofty, tied on top of them"* (FMA, recorded in the village of Koroviy Ruchei in 2004, from S.M. Durkina, born in 1926).

The Ust-Tsilma women always paid much attention to how the headscarf, especially the underscarf, was tied; the criteria for a proper tying were equal ends, and a straight line along the *ochelye* headband. On feast-days and at evening parties, girls and young married women were allowed to open the hair slightly along the *ochelye* headband, and tie a headscarf-ribbon slightly higher than usual. Married women were required to always hide their hair completely under *kokoshnik* and headscarf. Even today, people would say about a woman who tied the headscarf above her forehead, "she is tied like an Izhemka"* / "in the Izhma way", which means "wrong", "not in the Ust-Tsilma manner". If the headscarf was tied unevenly on some woman, any person could come and fix it; this was not considered impolite—on the contrary, it was welcomed. For everyday wear, headscarves were tied with a knot at the back of the head, when the ends were left loose or tucked from the top behind the knot.

In winter, early spring, and late autumn, women would wear large headscarves made of wool or cashmere (shawls) together with outer clothing. The Ust-Tsilma women had a special way of wearing and tying shawls: the ends of the shawl in front were crossed, folded backwards, and fastened with a knot at the back of the head. In the past, the knot was tied on the top of the head; "high" fastening according to the Ust-Tsilma vocabulary was considered to be "very honorable", and preferable. Everyday and festive headscarves were worn in this way. A woolen headscarf (*shalyushka*) was worn together with outer clothing, and was fastened with a half hitch under the chin; while a worn-out headscarf (*shalcha*) was used in spring or autumn for household work within the yard.

Functions of headdress and adornments

A headscarf was the first gift to an infant girl, which she received from her godmother during the baptism, along with a baptismal cross and a belt. In everyday life, a girl/woman would wear cotton or satin headscarves made out of a piece of industrially produced textile; and on feast-days and Sundays, she would wear woolen or silk headscarves. A silk headscarf would be tied on a girl the first time in her teen years when she became a participant in youth gatherings and people would say about her that she "was becoming a bride". At that same time, she was allowed to use hair-adornments and festive headbands.

Fig. 7. U.I. Chuprova wearing a *shalyushka*.

"The braid is a girl's beauty", the people would say. Before getting married, the girl would plait one braid by twisting the strands of hair towards the outer side (away from herself). People would learn about girl's physiological maturity from the way she arranged her hair: the braid-adornment was replaced with the ribbon, while festive ribbons became decorated with beads. On weekdays, girls would plait the braid in the usual way; on feast-days they would plait a special braid from four strands of hair (the *trupchata* braid), and decorate it with brightly colored ribbon. Another adornment was a silk headscarf, which was folded into a band and tied around the head. The Ust-Tsilma girls would buy ribbons from the Cherdyn merchants, or receive them as gifts from potential suitors. Such a gift was given publicly, usually at gatherings; the very fact of offering raised the status of the girl as compared to the rest of the girls, even if the gift-giver was not her eventual suitor. In ritual communication, the guys who wanted to express outrage at the behavior of a bride, would cut off her ribbon/braid. For example,

*The Izhma Komi is an ethnic Komi group, which lives in close proximity to the Russians (the Ust-Tsilma dwellers).

if a girl repeatedly refused to dance with a guy at the gatherings, the guy might shorten her ribbon and even her braid. One of the informants described such an incident which occurred in mid-1950s, *"When Kondraty Konikhin tried many times to invite me to dance at the gathering, and I kept refusing him, he just cut off my braid right at the gathering. He cut a lot, about a quarter. I hated it. I used to sing and liked to dance very much. He cut it off and thought that I would not go to the gatherings, but I kept going anyway, and then the braid grew back. <…> Girls and guys did not laugh at me"* (FMA, recorded in the village of Chukchino in 2000, from P.G. Babikova, born in 1932). For a bride, shortening her braid was a relatively severe punishment; it was believed that it assaulted her dignity. Such an attitude towards stubborn brides was manifested everywhere; for example, to humble the excessive pride of the bride, the Russian guys from Zaonezhye agreed between themselves not to invite her to dance for the entire evening (Kuznetsova, Loginov, 2001: 25).

Despite the skeptical attitude of the Old Believers to wearing adornments, and despite the warnings of elders about future torments for foppery in the afterlife, wealthy families would always prepare for the weddings of the girls by assembling the dowries and sewing the outfits. By the age of majority, most of the brides had brooches, silver chains, golden rings and earrings (*chuski*), and also copper/gilded cufflinks. Metal adornments were considered to be good protective amulets. Another hair adornment was *flag*, a construction of colored satin ribbons attached to the wire with which the *flag* was attached to the braid.

Fig. 8. O. Samarina wearing a *khaz*.

Khaz – a wide headband, which brides would wear to weddings, walk around the village in the summer, and participate in the *gorka* round dance festivities, was considered to be a festive headdress (Dronova, 2013a). *Khaz* was a mandatory headdress of girls during adulthood; its presence indicated the wealth of the girl's family (Fig. 8). During outdoor walks, the girls would cover their shoulders with large rep headscarves or cashmere shawls. A guy could pull off the headscarf from the girl whom he was attracted to, so she would not refuse him when he sent the matchmakers. If the girl rejected the guy, the headscarf was not returned; this was not forbidden by tradition.

By the early 1930s, *khaz* appears to have been out of use, and fancy headbands were worn by girls of eight or ten years of age, *"Khazes were sewn from the lines* [gold-plated ribbon – **T.D.**]*; they were ripped off of old sarafan and sewn. During the collectivization, young people began wearing kerchiefs; they began to consider khaz ugly and old-fashioned; then, little girls, from eight to ten years old, would use them until worn out. They would parade on the streets like brides"* (FMA, recorded in the village of Sinegorye, from M.I. Kucherenko (Nosova), born in 1923 in the village of Ust-Tsilma).

Married women would completely hide their hair under the headscarf. They would plait two braids (at the temples) by twisting the strands of hair inwards (toward themselves), and fasten them around the head using a ribbon or rope (*gasnik*). If the braids were thin, a roll (*keet*) was placed over the forehead, and a *kokoshnik* was put on top. In the past, widows who did not want to re-marry stopped wearing *kokoshniks*, and village matchmakers no longer considered them as potential brides. At present, *kokoshniks* are worn even by single old women "to keep warm". A headscarf was always tied over the *kokoshnik*. Fancy headscarves were worn and stored carefully; this is why they are well preserved, and are used by the Ust-Tsilma women even today.

Among the Ust-Tsilma dwellers, a headscarf was regarded as the cover not only of the woman, but also of the entire family. Wearing pious clothing and headscarves, which were considered protective, was necessary while working with livestock, which was the main asset of the family. Together with headscarf, a ritual shirt *kabat* was worn. According to popular beliefs, *"One shouldn't milk a*

cow without wearing a headscarf—milk will disappear"; "Fancy clothes were not worn in the barn, good clothing is for wearing in public, protective clothing would be for the barn; old people knew well and took care of cows, wearing kabats; it is only now that young people live indiscriminately" (FMA, recorded in Chukchino village in 2003, 2004, from P.G. Babikova, born in 1932).

A headscarf was associated with cover and protection, although it was believed that malicious sorcerers could inflict damage through headscarves. According to strong conviction, *eretniki* [malicious sorcerers – **T.D.**] could cast a spell on the headscarf and leave it in a public place, and the person who picked up the headscarf would pay for that with his own health.

Women collected headscarves for their own hour of death; after death, relatives gave the headscarves away, requesting prayers for the deceased. When the coffin with the deceased was being brought to the cemetery, it was covered with a festive headscarf. After the burial, this headscarf was given to the goddaughter or the closest female relative. It was believed that if that headscarf was returned to the house of the deceased, another person might die in this house.

According to the common Russian tradition, the headscarf was the wedding symbol of "covering" ("hiding") of everything that had to do with the newlyweds during all stages of the ritual (Dronova, 2013a: 111). After ensuring that a girl consented to marry, a guy would act as the initiator of matchmaking. The sign of the mutual agreement was the exchange of pledges: the girl would give the guy a *zadatok* ("an advance"), usually her personal things: a golden ring or *sarafan*. In return, the groom would give her a headscarf, which she would start to wear even before matchmaking: she would put on this headscarf for going out, and happily tell her friends about the proposal; from the headscarf, the villagers would learn of the agreement. "Since the guy gave the headscarf, he will soon send the matchmakers" (Maksimov, 1987: 345). The exchange of gifts "sarafan–headscarf" symbolized the readiness of young people for family life, the agreement of the girl to become a wife, and the guy's obligation to take his chosen one under his protection. Sometimes it so happened that after the exchange of pledges the girl would unexpectedly jilt the guy. In this case, the offended groom would not return the "advance" and would announce the deception in the following way: he would tie the advance to the shaft bow of the harnessed horse and would drive the horse the entire day around the village, which was considered to be a disgrace for the girl. If a girl who did not want to marry an unloved guy committed suicide (drowned herself), she would leave her headscarf as a sign of her departure from this life next to the ice-hole or on the shore.

Gift-giving of headscarves also occurred at matchmaking. During the meal, the bride would thank each male from the groom's family for participating in the ritual, and would give him a headscarf. From that moment, she had to wear a headscarf, and was forbidden to eat with the groom: "you cannot eat with your fiancé before the wedding". It was believed that at all stages of the wedding ritual the headscarf protected the bride from envious people and ill-wishers.

A headscarf was used for inviting the guys to participate in the wedding ritual as groomsmen: at a farewell party, the bride would tie a red headscarf (*odirok*) around the neck of each of them, and sew scarlet ribbons to the sleeves of their caftans.

The headscarf was the main attribute of the wedding day. It covered the bride's head from morning till noon, when the most important rituals of transition (betrothal and bringing the girl to the bath house) were performed; holding her headscarf, the father would take the bride and "hand her over" to the groom together with her headscarf; during the first day, the newly married couple would hold on to the ends of the headscarf to show their unity.

If the wedding was performed without a church ceremony*, with the parents' blessing, the headdress was replaced with the wedding headdress after the bath house ritual. Before taking the bride to the table to the groom, the bride's hair was braided with two braids, and she was dressed in *povoinik* (*poboinik*), on top of which the *otdirysh* band was attached. The bride remained dressed in *povoinik* until the moment the newlyweds were taken to the ground floor of the house, where they retired for some time during the wedding. After that, the *povoinik* was changed to the married headdress—*kokoshnik* and headscarf. This ritual definitively confirmed the entry of the girl into the group of married women.

In the case that the wedding was to be performed in the *edinoverchesky* (coreligionist) church, the bride would go there wearing girl's *khaz* headband, and only after the wedding was her hair braided, and she dressed in *povoinik*. As late as the 1920s, the headscarf with which the bride was covered, was folded into a band in the church, and bride's mouth was covered with it; it was taken off after leaving the ground floor of the house. Tying

*Despite the fact that the Ust-Tsilma Old Believers belonged to the Pomor confession, in the mid-19th century a part of them (mostly inhabitants of Ust-Tsilma Volost center) insisted on opening a *edinoverchesky* (coreligionist) parish. At the beginning of their stay at the Pechora, the Old Believers avoided church communion; a church wedding was performed only under compulsion. However, already in the second half of the 19th century, some peasants performed church weddings contrary to their convictions, so as to obtain legal rights to inheritance. The priests of the Ust-Tsilma parish wrote in Diocesan newspapers about the non-serious attitude of the Ust-Tsilma dwellers to Church Orthodoxy (see: (Mikhailov, 1903)).

up the bride's mouth with the headscarf is an ancient custom in which silence symbolizes a lifeless state and, in the case of a wedding, the temporary "death" of the bride. In the stories of informants about the behavior of the bride in groom's house until the newly wedded couple was taken to the ground floor of the house, it is noted that the bride "would sit as if lifeless", "frozen" (Dronova, 2013a: 143). After staying on the ground floor, where the first marital intercourse took place, the wedding headdress was replaced by everyday *kokoshnik*; for the first time, the bride would tie the headscarf in a manner of married women. After the rituals of "untying" the mouth and replacing the headdress, the bride would become cheerful, would eat food, and communicate with the guests; but she would not participate in dances, and would not sing. The function of the custom was to prevent girl's talkativeness in her status of wife.

On the second day of wedding, crepes (*olabyshi*) were the obligatory dish. These were always brought to the newlyweds covered by headscarf, or a piece of cloth. On this day, a *golden headscarf* would be tied on the head of the young wife. Unlike the previous day, the bride was expected to radiate happiness, sing, have fun, and try all the dishes she was offered.

In self-identification of Ust-Tsilma dwellers, folk clothing has always been one of the most important components of culture, like faith, language, and territory. It is very important that nowadays, young dwellers of Ust-Tsilma wear traditional clothes only on special occasions, and they are sewn according to the traditional cut. Therewith, they strictly observe all the rules relating to the color palette of the costume (including headdress), tailoring, and wearing.

In the 1990s, folk culture started to be actively revived in the villages. At present, the headdress *poboinik* is worn not only by brides on their wedding days; it has become a part of the folk costume of girls participating in the popular *gorka* round dance (Fig. 9). The girls three to seven years of age, who are brought to the place of *gorka* round dancing, are also dressed in this way (Dronova, 2010: 108–109). This is a violation of tradition; but the elders welcomed this innovation, believing that this would motivate the Ust-Tsilma dwellers to preserve traditional folk clothing and to use it. The *khaz* headdress is starting to be used again.

For Ust-Tsilma dwellers, who are surrounded by other ethnic groups, folk costume is a sign of their belonging to the Russian people, an expression of their ethnic consciousness. Currently, women wearing the Northern Russian *sarafan* and *poboinik* are positioned in the towns of the Republic of Komi as Ust-Tsilma dwellers (the local identity). For the residents of the Republic of Komi, the Ust-Tsilemsky District is known as the land where the famous festival of *gorka* is celebrated, where folk clothes are an indispensable part of authentic traditional festivities.

Fig. 9. Popular *gorka* festivities.

Conclusions

Trying to escape to remote frontier forests and establishing their secluded life in villages, the Old Believers recognized only correct Christian clothing as acceptable popular dress. Headdress, which preserved Old Russian forms, performed an important semantic role in ritual practices. Headdress reflected the aesthetic tastes of the Ust-Tsilma dwellers, and served as indicators of the economic status of the owners.

The Ust-Tsilma women followed their preferences in the selection of a color palette for the headdress. Despite the prohibitions common in Old Believers' environment, brightness and diversity of textile colors in girls' headbands and wedding headdress were maintained; the so-called golden embroidery, expensive bright shawls and headscarves, hair adornments, and ribbons were frequently used.

The analysis of the female headdress used by the Old Believers of Ust-Tsilma has shown that some types of headdress were not only distinguished by specific local names, but also by the character of their cut and their methods of attachment to the head. For example, among the Ust-Tsilma women, the name "kokoshnik" is applied to the common Russian *povoinik*, while the word "poboinik" (*povoinik*) designates the *kokoshnik*. Unlike the Northern Russian *kokoshnik* with high forehead part in the shape of high crown, which was not covered with the headscarf, the Ust-Tsilma *kokoshniks* were sewn in the form of a low soft cap with strings; they were always worn together with headscarves which were placed on top of *kokoshniks* and tied on the back of the head.

A local version of the girls' festive headdress *khaz* was associated by its name with gold-interwoven ribbon-galloon, which was used in other Northern Russian areas for decoration of *sarafans*. At the same time, everyday girls' headbands were identical to the Northern Russian headbands.

Great importance in the Ust-Tsilma tradition was given to headdress through which the transition of the girl into married life was visually confirmed during the wedding rituals. For example, at the Pechora, *povoinik* was put on the bride on the first day of wedding for the period of moving from the parents' house to the groom's house. Only after the ritual of *podklet* ('the ground floor of the house'), the *povoinik* was replaced by *kokoshnik* and a headscarf. Headscarf as a cover was an indicator of the married status of the woman; it reliably protected her health and contributed to maintaining overall well-being of the family. The headscarf was the most important attribute of the costume; it served as protective amulet, and was used in the rituals filled with magical symbolism.

Old headscarves, which were made in the mid and late 19th century, are still preserved as family heirlooms; they are worn by the women who participate in folk festivities. The way they were worn in Ust-Tsilma showed a certain specificity: the inhabitants of Central Russia and the Russian North most often used rep headscarves as festive cover-ups, while the Ust-Tsilma women used them for covering their heads over the *kokoshnik* and tied them with a knot at the back of their heads.

References

Dronova T.I. 2010
Circle dance festival "Gorka": Traditions and innovations. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 38 (4): 103–109.

Dronova T.I. 2011
Odezhda staroverov Ust-Tsilmy: Traditsionnye tipy i funktsii v poveryakh i obryadovoi kulture. Syktyvkar: KNTs UrO RAN.

Dronova T.I. 2013a
Semya i brak staroverov Ust-Tsilmy. Syktyvkar: KNTs UrO RAN.

Dronova T.I. 2013b
Etnokulturnaya identichnost staroverov Ust-Tsilmy (na primere obryadovoi *gorki* XX – nachala XXI v.). In *Russkiye: Etnokulturnaya identichnost*. Moscow: IEA RAN, pp. 45–75.

Fursova E.F. 1997
Traditsionnaya odezhda russkikh krestyan-starozhilov Verkhnego Priobiya (konets XIX – nachalo XX v.). Novosibirsk: IAE SO RAN.

Kuznetsova V.P., Loginov K.K. 2001
Russkaya svadba Zaonezhya (konets XIX – nachalo XX v.). Petrozavodsk: Izd. Petrozavod. Gos. Univ.

Lavrentieva L.S. 1999
O platke. In *Zhenshchina i veshchestvennyi mir kultury u narodov Evropy i Rossii*, vol. LVII, T.A. Bernshtam (ed.). St. Peterburg: Peterburgskoye Vostokovedeniye, pp. 39–52.

Lebedeva N.I., Maslova G.S. 1956
Russkaya krestyanskaya odezhda XIX – nachala XX veka kak material k etnicheskoi istorii naroda. *Sovetskaya arkheologiya*, No. 4: 18–31.

Lyutikova N.P. 2009
Krestyanskiy kostyum Mezenskogo uyezda Arkhangelskoi gubernii kontsa XIX – nachala XX veka: Katalog. Arkhangelsk: Pravda Severa.

Maksimov S.V. 1987
God na Severe, vol. 1. Moscow: Khud. lit.

Maslova G.S. 1960
Odezhda. In *Materialy i issledovaniya po etnografii russkogo naseleniya evropeiskoi chasti SSSR*, P.I. Kushner (ed.). Moscow: Izd. AN SSSR, pp. 102–143.

Mikhailov I. 1903
Religiozno-nravstvennoye sostoyaniye Bugayevskogo prikhoda Pechorskogo uyezda. *Arkhangelskiye eparkhialnye vedomosti*, No. 3: 84.

Russkiy traditsionnyi kostyum: Illyustrirovannaya entsiklopediya. 1998
N. Sosnina, I. Shangina (comp.). St. Petersburg: Iskusstvo.

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Principles of the Information Modeling of Cultural Heritage Objects: The Case of Wooden Buddhist Temples*

This article describes the principles and prospects of using the BIM (building information modeling) technology, which was for the first time used to reconstruct wooden Buddhist temples, to assess cultural information relating to them, and to evaluate the impact of the environment and exploitation. Preserving and restoring such temples is difficult because their construction includes wooden brackets—dougong. The BIM technology and our own method based on treatises of old Chinese architecture have enabled us to generate an information model of the temple (a new means of information processing) and to test it for geometric consistency. To create a library of elements, the Autodesk Revit software was used. To test the efficiency of the library we applied the information model to the Shengmudian temple in the Shanxi province. The adaptation of the dougong library elements to wooden Buddhist temples provides the possibility for applying such technologies to generate a unified system regardless of the software.

Keywords: *Architectural monuments, information modeling, BIM, Buddhist temples, dougong.*

Introduction

Wooden Buddhist religious structures are an important part of the world cultural heritage. They most commonly appear in the traditional areas of Buddhism, such as the Far East, and Central and Southeast Asia. In Russia, 26 datsans are known on the territory of the Republic of Buryatia, Zabaykalsky Territory, and the Irkutsk Region. Some temples (dugans) in these datsans are made of wood and require constant monitoring of their condition. Recent archaeological excavations in Primorye have unearthed the remains of several ancient Buddhist temples, which poses the problem of reconstructing their former appearance. The preservation and restoration of Buddhist buildings is complicated by the uniqueness of their structures. Most of them were built using a system of brackets that provided linkage between the horizontal beams and the vertical columns. This system

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was called *dougong* in the Old Chinese architecture. The main function of such sophisticated units of specially designed elements between the beam and the column was to provide elasticity and relieve stress arising from strong external impact of natural and climatic conditions on the building, for example, hurricanes or earthquakes. Constructing a model of a building that underwent such multi-factor influences requires special technologies based on computer processing of large arrays of information. Currently, scholars use both computer modeling of the shapes of historical buildings and digital reconstruction of the monuments' appearance, carried out with documented historical reliability (Borodkin et al., 2015; Mainicheva, Kulakov, 2015). It has become obvious that a fundamental advance in processing large groups of information will only be possible if information is clearly structured following unified rules and simultaneously is linked to a specific research object and its parts. Attempts have already been made to develop computer modeling of wooden Buddhist structures. For example, Japanese experts from Chiba University created an information model of a five-story wooden pagoda in the Hokekyo temple of the Nichiren Shū Buddhist School (Novyi vzglyad…, 2008). This pagoda was built in 1622 and has survived numerous earthquakes. Since it is visited by believers even today, the main purpose of the work was modeling and checking the structural properties of the architectural monument in its current conditions, taking into account the real state of the wooden elements. The project was also aimed at monitoring the condition and operation of the building. The information modeling of wooden Buddhist structures so far has not been widely used, since a computer library of elements, primarily the system of brackets for fastening columns and beams, has not yet been compiled. This article discusses the principles of using the relatively recent BIM technology (building information modeling, see: (Eastman et al., 2011)) for recreating the appearance and monitoring the state of such important immovable objects of cultural heritage as wooden Buddhist temples. For the first time the article presents the methodology for adapting the library of elements for modeling the Old Chinese *dougong* system and other similar libraries in order to create a unified system of basic elements, which makes it possible to standardize the process of modeling and information processing regardless of the software used.

Information modeling of wooden architectural monuments in the Buddhist Orient

The BIM system is widely used around the world for designing new buildings and operating already existing structures (Talapov, 2015b). This suggests its successful application for working with immovable objects of cultural heritage, including those which have been completely or partially lost. With the help of this technology, it is possible to create a model of the building, which will not only render its external appearance, but also serve as a kind of "container" for storing and processing heterogeneous information about the structure. The BIM toolkit and our methodology have made it possible to create an information model of an immovable object of cultural heritage, which represents a new way of recording data on buildings. The information in the model is processed using the tools of search and analysis, and it is checked for geometric consistency, which is especially important when using measurement drawings of structures (Talapov, 2015a).

The BIM technology fully meets the specific aspects of constructing timber structures that consist of individual elements (logs, boards, shingles, verge rafters, etc.). This determines the discrete nature of information modeling carried out in two stages: first, the constituent primary elements are created, and then the main model is assembled out of them (Kozlova et al., 2014). Such a method is based on the previously compiled library of elements and is particularly helpful for further use of the models to monitor the condition of wooden immovable objects of cultural heritage. The successful use of information modeling technology depends on availability and continuous replenishment of the library of primary wooden elements, which can be accomplished if the three following factors are combined:

– obtaining information from historical and cultural studies concerning the structural features of wooden architectural monuments and classification of parts and structures of buildings;

– developing software tools for information modeling and the general methodology for creating the libraries of elements; and

– updating these libraries taking into account the expansion of knowledge about the objects of cultural heritage, advancements in information modeling technology, as well as emergence of new needs in information processing.

Information modeling of architectural monuments, just as any other buildings and structures, can be considered as a process of creating sequential information models; being an intermediate result of research, each model summarizes the individual stages of research.

The system of *dougong* brackets (Talapov, Zhang Guanying, 2016) employed for constructing Buddhist temple structures, was used for assembling the library of elements. According to the treatise *Yingzao Fashi* (*Architectural Methods*, 1103) composed by Li Jie, this system reached its summit in the 12th century. The treatise provided a parametric and functional classification of the *dougong* elements, which already at

that time made it possible to design new structures and assess their strength (Ma Bingjian, 2003). The *dougong* system is based on eight basic types of sizes (*cai*), which determine the dimensions of all the system elements used in the construction, adjusting them to the scale, but not changing their interconnection. This approach made it possible to typify and bring the construction of wooden temples, palaces, and pavilions in Old China to a higher technological level, and in a certain sense make their construction a wide-scale process.

The main difficulty in applying information technologies to the Old Chinese system was the problem of reading the documents written in the Old Chinese language, as well as incomplete information about the three-dimensional nature of the elements of the *dougong* system, which has survived in two-dimensional schematic drawings or designs. The latter problem was solved in the process of computer modeling, when a hypothesis about the purpose of a particular bracket and specific features of its appearance, which emerged on the basis of drawings, was checked and corrected in a three-dimensional model.

The *Autodesk Revit* BIM-software proved its effectiveness in creating library elements of the *dougong* system. Each of the elements has several geometric parameters (their number depends on the complexity of element's shape). The main parameter is the value of the main dimensional type *cai* of the *dougong* system. Working with the element begins with entering the *cai* value. Then the rest of the geometric parameters are entered, but their values change in the permissible range determined by the *cai* value. After that, the software generates the needed element of the *dougong* system, which can be inserted into a specific unit in the model of the architectural monument (Fig. 1). In addition to geometric parameters, each library element has a certain number of blank entries for attributive values, where one may input historical and cultural information, data about the material of the element or nature of its wear, the time and quality of its last restoration or replacement, attached links to the results of laser scanning, drawings and historical documents, as well as other information required for working with this element as a constituent part of the architectural monument.

In total, the library contains several hundred basic files in the RFA format (the main format of the library elements of the *Autodesk Revit* software). Various combinations of these files give about 100,000 models of specific elements of the *dougong* system. This number can be increased, since the library allows for replenishment with new elements, created not only by its authors, but also by other users. Languages used for filling the parameter table (originally, Chinese and Russian) can be easily replaced with other languages, since the *Autodesk Revit* software is adapted for many languages of the world.

For testing the effectiveness of using the library of elements of the *dougong* system, an information model of the Shengmudian temple located in Shanxi province in China, was created (Fig. 2). This is an operating wooden temple built in 1102–1106 and surviving in its almost original form. This temple is also of interest for modeling because it contains the elements of the *dougong* system of two dimensional types of *cai* (Fig. 3–5).

The created library of elements should be adapted to the Buddhist structures from different regions, since despite the existing similarities, there are some

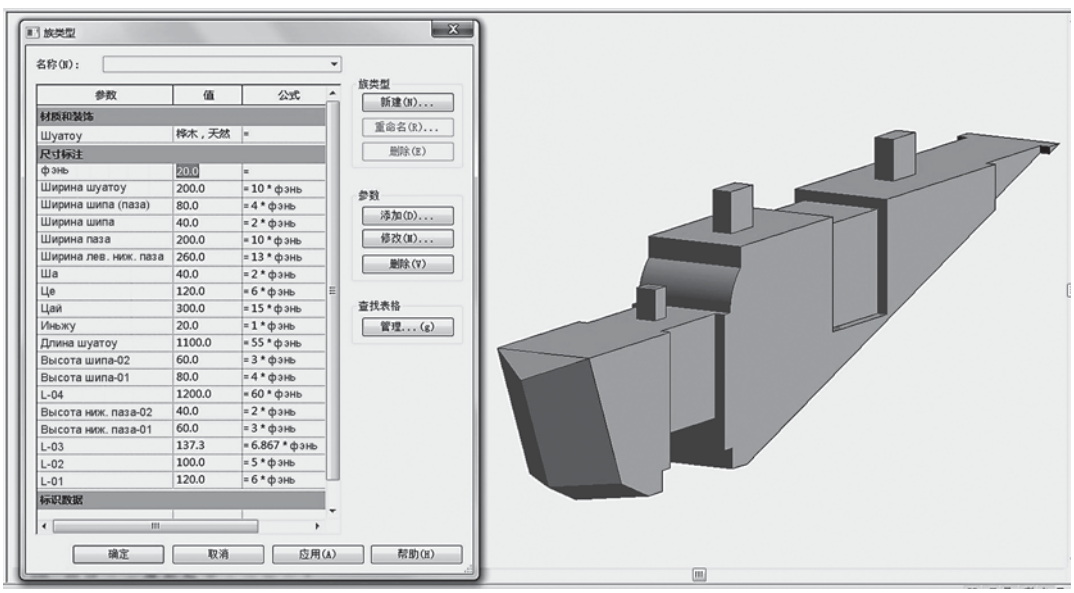

Fig. 1. The *shuatou* library element of the *dougong* system and its parameters.

Fig. 2. The Shengmudian temple—monument of Buddhist wooden temple architecture of the 12th century.

Fig. 3. Various systems of *dougong* brackets used in the Shengmudian temple.

regional differences in the forms of the brackets (see: (Arkhitektura…, 1971; Minert, 1983)). According to the main principles of BIM (Talapov, 2016), the adaptation should be based on pragmatism. This principle is formulated as "Adapt only that which is directly needed for the work at hand", and the adaptation should be carried out in three main areas:

– revision of the general content of the library of elements, resulting from the historical and architectural analysis of the system under consideration, which reveals its features typical of this region or period, and differences from the *dougong* system, as well as appearance of new elements that were not commonly used in the *dougong* system;

– changes in the geometry and parametric table of individual previously created library elements in accordance with new historical and cultural data. This is best done with the existing library elements in their original RFA format using the Family Editor of the *Autodesk Revit* software. An alternative and most radical

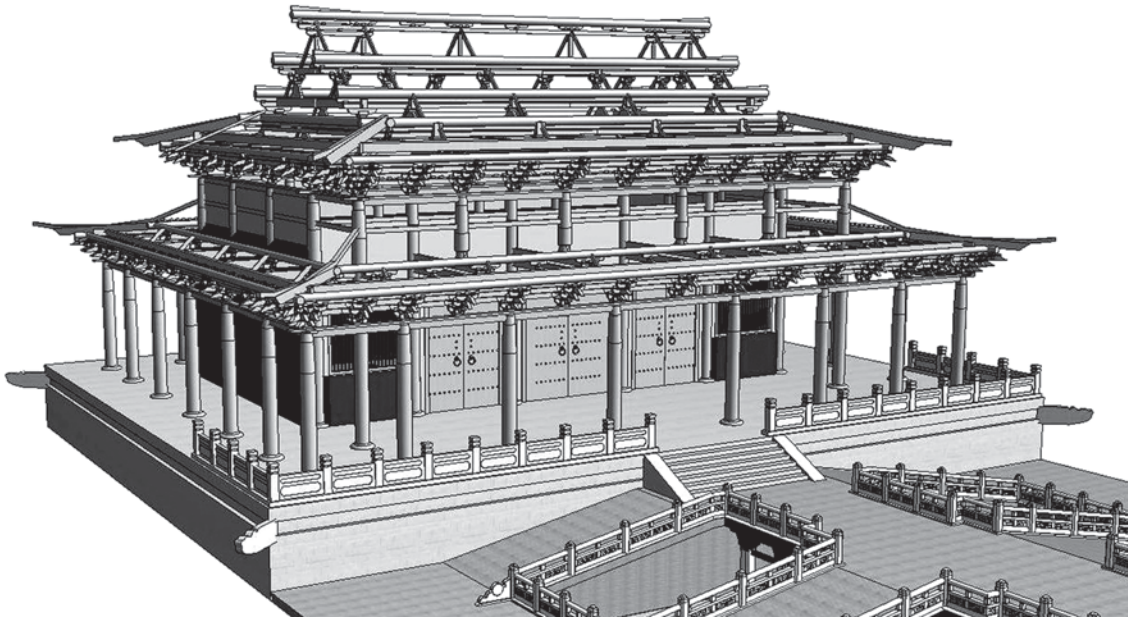

Fig. 4. One of the stages of building the information model of the Shengmudian temple, reiterating the stages of its construction.

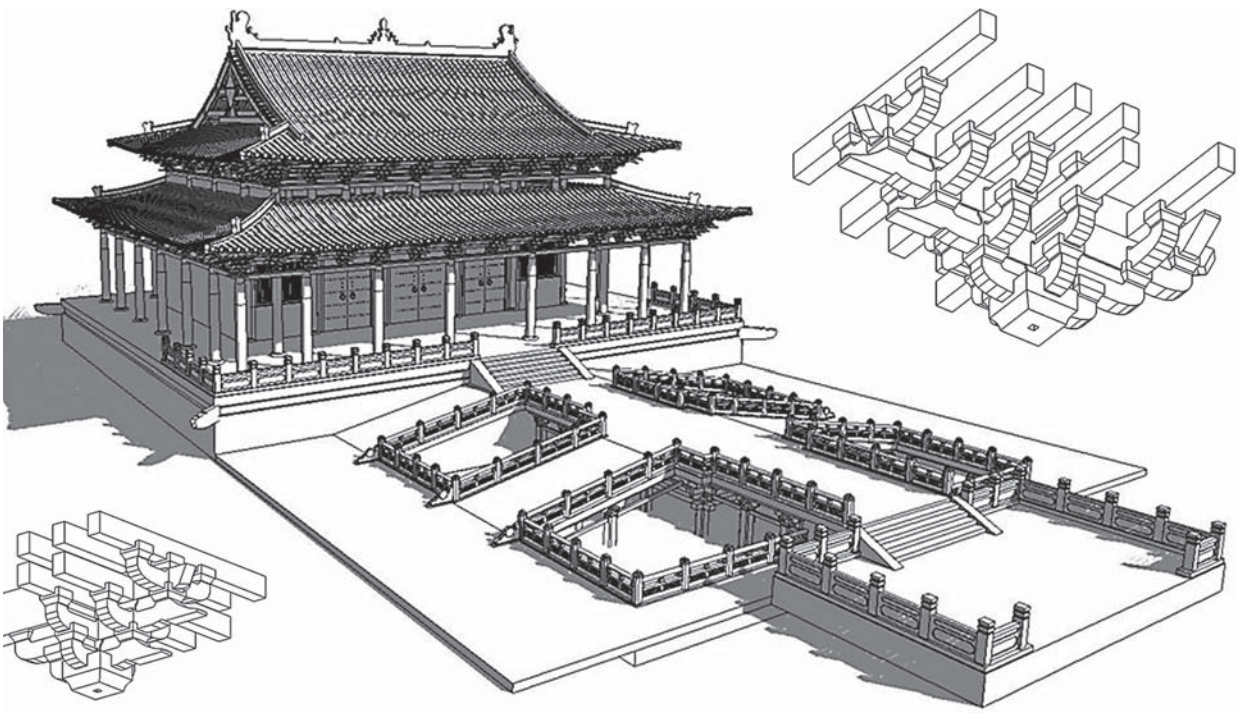

Fig. 5. Information model of the Shengmudian temple, and some of the model's elements.

adaptation option is compiling a new library according to the methodology designed for creating the elements of the *dougong* system (Fig. 6);

– transition to other software. This path is complicated by the use of software for information modeling other than *Autodesk Revit*. If this is the case, the methodology would greatly depend on how creation of an information model and the structured storage of attributive information are organized in the software employed. However, the geometry of the library object is transferred to new software completely and the general content of the attributive parameters remains the same.

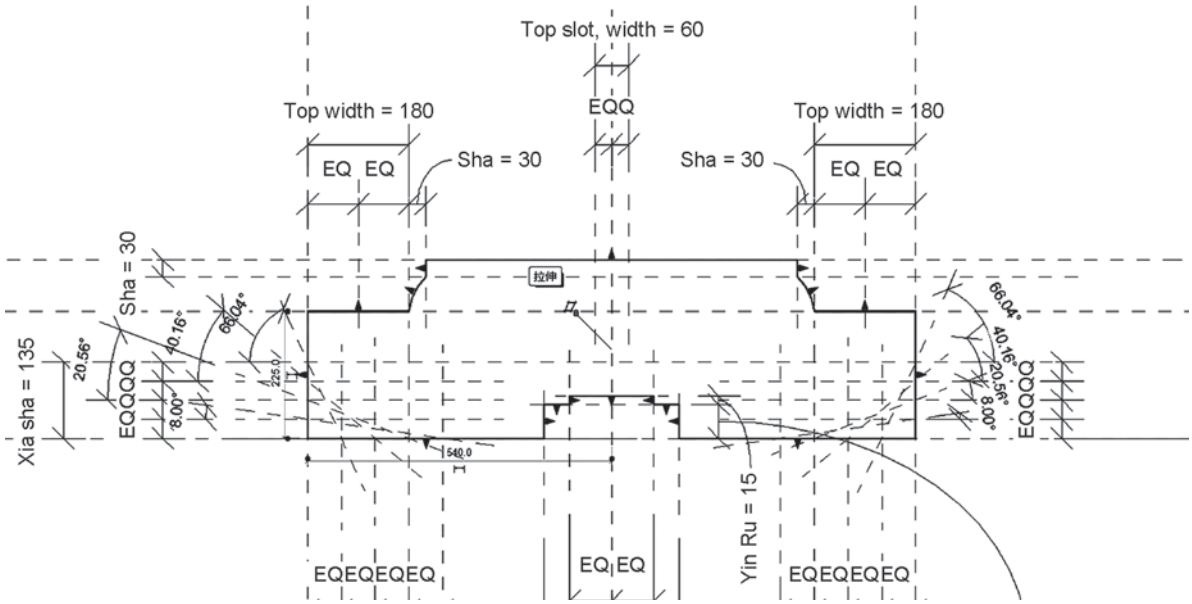

Fig. 6. Geometric parameters of the *hua gong* bracket, used in the process of creating the library of elements of the *dougong* system.

One of the most likely conversions is the transition to information modeling software types that are well compatible with *Autodesk Revit*, such as *Bentley AECOsim Building Designer*, which effectively imports files in RVT and RFA formats used in *Autodesk Revit*, although in some situations it may be necessary to adjust the element for its convenient use in the new software. The *ArchiCAD* is one of the best known and most widely used software in architecture, which however does not directly import RVT and RFA files. Transferring the elements to the new software can be carried out through the universal and open IFC format, which is not associated with any specific software and which was especially developed for data exchange between information models. Unfortunately, universality has a downside: such data transfer may potentially lead to a loss of quality of library elements, more specifically, to the loss of restrictive and logical relationships and dependencies between the geometric parameters, which again may require adjustment.

If the user chooses to use software types that do not work (partially or completely) according to the requirements of BIM technology, that is, the software for "regular" 3D modeling such as *AutoCAD*, *3ds MAX*, *SketchUp,* and some other kinds, the geometric shape of the object is well transferred from the existing library of elements, but the parametric dependencies and relationships disappear. Yet, the parametric richness of library elements created for BIM can still be used first by setting parameters in the main BIM software, and then transferring the resulting geometric figure to new software. The transfer can be successfully carried out through DWG, DXF, FBX, or SKP formats.

Currently, we may see an active development of Russian tools for information modeling, so in the near future the question about moving to new software types will become a topical issue. So far it is difficult to provide any clear-cut recommendations for such a transition, but surely it will be possible to transfer the information on library elements in IFC format.

As far as viewing the models and their elements is concerned, the situation is simpler, because several free viewers are available, such as *Autodesk NavisWorks*, *Bentley Navigator*, *Tekla BIMsight*, or *Solibri*, which effectively manage this.

Conclusions

Thus, the principles of creating information models of wooden Buddhist temple buildings can be effectively based on BIM technology, applied to immovable objects of cultural heritage. The advantages of information models include the opportunity to monitor and predict the behavior of the objects in their changing internal conditions and under the impact of various environmental factors, to make computer record of objects at any stage of working with them, and to visualize information about the architectural monument, allowing for museum, cultural, and educational activities with less operational load on the monument.

It is also important that a model represents an element in the global information system of immovable objects of cultural heritage, since already now the "internal" information about the building is becoming available

to scholars around the world by means of specialized Internet services. Information models build up a kind of "cultural bridge" between the past and the present, when the libraries of elements, which were created in the process of modeling an architectural monument, can be used for designing modern buildings. This makes the concepts of ancient architecture technologically accessible for new construction projects.

Adaptation of the library of *dougong* elements for wooden Buddhist temples makes it possible to begin a large-scale implementation of information modeling in working with immovable objects of cultural heritage and to create a unified information environment for this purpose. Currently, the software needed for the functioning of such an environment is already available even before the appearance of specialized "historical" software. It was created for the global designing and construction industry, is well adjusted, and is continuing to improve. It includes software for project management as well as a unified environment for working with projects and their integrated use. Such software has a well-organized search of attributive information across information models executed in almost any form and format. The software is designed for working with a large number of operators and regular users.

References

Arkhitektura Vostochnoi i Yugo-Vostochnoi Azii do serediny XIX v. 1971

A.M. Pribytkova, B.V. Veimarn, O.N. Glukhareva, L.I. Duman, A.S. Mukhin (eds.). Leningrad, Moscow: Izd. literatury po arkhitekture i stroitelstvu. (Vseobshchaya istoriya arkhitektury: v 12 t.; vol. IX).

Borodkin L.I., Valetov T.Y., Zherebyatyev D.I., Mironenko M.S., Moor V.V. 2015

Reprezentatsiya i vizualizatsiya v onlaine rezultatov virtual-noi rekonstruktsii. *Istoricheskaya informatika*, No. 3–4: 3–18.

Eastman C., Teicholz P., Sacks R., Liston K. 2011

BIM Handbook. 2nd ed. Hoboken, N.J.: Wiley.

Kozlova T.I., Kulikova S.O., Talapov V.V., Zhang Guanying. 2014

BIM i pamyatniki derevyannoi arkhitektury. *Istoricheskaya informatika*. No. 2/3, pp. 50–73.

Ma Bingjian. 2003

The Construction Technology of Chinese Ancient Architecture. Beijing: SciencePress. (In Chinese).

Mainicheva A.Y., Kulakov A.N. 2015

Tserkov Vladimirskoi Bogomateri v Bratske: Arkhitekturnye osobennosti v etnokulturnom kontekste Sibiri XVII–XVIII vv. *Gumanitarnye nauki v Sibiri*, vol. 22 (2): 80–85.

Minert L.K. 1983

Pamyatniki arkhitektury Buryatii. Novosibirsk: Nauka.

Novyi vzglyad na traditsionnuyu yaponskuyu arkhitekturu s pomoshchyu ArchiCAD. 2008

URL: http://openbim.ru/events/news/20081204-1237.html (Accessed December 20, 2016).

Talapov V.V. 2015a

O nekotorykh zakonomernostyakh i osobennostyakh informatsionnogo modelirovaniya pamyatnikov arkhitektury. In *Arkhitektura i sovremennye informatsionnye tekhnologii: Mezhdunarodnyi elektronnyi nauchno-obrazovatelnyi zhurnal AMIT*. No. 30. URL: http://www.marhi.ru/AMIT/2015/2kvart15/talapov/abstract.php (Accessed December 20, 2016).

Talapov V.V. 2015b

Tekhnologiya BIM: Sut i osnovy vnedreniya informa-tsionnogo modelirovaniya zdaniy. Moscow: DMK-Press.

Talapov V.V. 2016

O nekotorykh printsipakh, lezhashchikh v osnove BIM. *Izvestiya vysshikh uchebnykh zavedeniy: Stroitelstvo*, No. 4. Novosibirsk: pp. 108–114.

Talapov V.V., Zhang Guanying. 2016

Informatsionnoye modelirovanie pamyatnikov arkhitektury na primere drevnekitaiskoi sistemy dougun. Novosibirsk: Izd. Novosib. Gos. Univ. arkhitektury, dizaina i iskusstv.

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Cranial Injuries in the Late Bronze and Early Iron Age Population of the Shnogh River Basin, Armenia

Excavations at Late Bronze and Early Iron Age cemeteries in the Lori Region of Armenia have yielded 123 human skeletons. In this study, we describe traumatic injuries to crania from the Shnogh River basin, dating to 1300–1000 BC, with a view to reconstructing aspects of social and natural environment. The occurrence of traumas is moderately high (15.6–23.7 %) and varies between groups. Frequency of cranial trauma in males was higher than in contemporaneous populations of the Sevan Basin and the Shirak Plain, but it is unlikely to have resulted from warfare. We describe one case of decapitation. Five crania evidence surgical intervention, and three of them show healing.

Keywords: *Armenia, Late Bronze Age, Early Iron Age, cranial traumas, trepanation.*

Introduction

Analysis of characteristic lesions of the skull and postcranial skeleton can provide indirect evidence about social relationships in ancient societies (Rokhlin, 1965: 62–63; Buzhilova, 1995: 100; Khudaverdyan, 2005: 59–64; 2014b; Dobrovolskaya, 2009; Ortner, Putchar, 1981: 72–85). The patterns and localities of fractures are indicative of the social circumstances related to the emergence of particular types of traumas. Therefore, skeletal samples are an independent source of data for historical reconstructions made during complex archaeological research.

In the second half of the 2nd millennium BC, an irrigation system already existed in Armenia; and both viticulture and horticulture were widespread. The development of weaponry (from the dagger to the long bronze and iron swords and other types of armor) points to violent conflicts for territory and booty between different tribes (Martirosyan, 1964: 83–84; 130, 194–198; Areshyan, 1974). Studying skeletal samples for evidence of trauma is thus necessary to confirm the participation of a particular individual or group in military conflicts.

In this study, we describe the skeletal lesions we have detected in the burials of the 13th–11th centuries BC from the Shnogh River basin (Lori Region, Armenia).

Materials and methods

This study employs skeletal samples from the cemeteries of Bover (n = 40), Bageri Chala (n = 32), Bartsryal (n = 40), Karakotuk (n = 6), and Tekhut (n = 6) that were obtained in 2006–2014 during excavations by the Institute of Archaeology and Ethnography of the National Academy of Sciences of the Republic of

Armenia, led by S.G. Hobosyan*. The examination of the 124 skulls (59 male, 26 female, and 39 of unidentified sex) has shown that lesions are typical of both adults and subadults of this archaeological population. The excavations at Bageri Chala, Bartsryal and Bover cemeteries are now finished; thus this study may be considered a summary as regards the samples from those sites. The less numerous materials from the Karakotuk and Tekhut cemeteries were used as comparative data.

Injuries to the cranial vault (compression fractures, sharp-force wounds) and facial skeleton (nasal-bone fractures, lesions of the maxilla and mandible) were identified. Their descriptions include localization, pattern, form, and size of the injury; presence of inflammation; and other features seen in the affected area. Fractures were recorded as single (the line of fracture can be traced, irrespective of the character of the fracture plane—transverse, complete or incomplete) or numerous (more than two per individual).

The methods of bioarchaeological reconstruction, based on the achievements of forensic medicine, make it possible to detect:

1) The weapon or other object used to cause the trauma. A sharp weapon (stabbing, cutting, or chopping) leaves characteristic lesions on bones, which are indicative of the transverse section and mechanism of action of the weapon. Incisions, furrows, and scratches emerge during the slip of the weapon along the bone's surface. Lesions from penetration wounds (e.g. into the cranial cavity) are in the shape of a truncated cone. The surfaces of blunt objects can be of the following types: wide and flat (prevailing or restricted), spherical, cylindrical, conical, faceted, or indefinite in shape;

2) Position of the individual causing the trauma, and of his victim;

3) Consequences of the trauma: whether it was fatal, or whether there is evidence of healing of the injury. The differential diagnosis of pre-mortem injuries is related to detecting changes in the ends or margins of lesions in the form of the callus or smoothening of the bone's margins. Healed perforated cranial fractures accompanied by penetration of the vault fragments into the cranial cavity are characterized by a smoothening of the external and internal plates, a fusion of separate fragments with neighboring bone, and a retraction of the central part of the lesion;

4) How long the individual lived for after being injured, and how successful the healing was. We were following the recommendations of A. Galloway (1999: 250–252) for diagnosis and determination of the time of the trauma;

5) Methods of surgical intervention: clearing for removal of bone fragments, scraping of purulent-molten bone tissue. In the cases of healing after a surgical intervention, the perforation has relatively flat outlines of oval or round shape, with smooth and round (sometimes thin) margins. Classification of wounds according to the trepanation method: a) scraping, b) cutting, c) boring and cutting, d) excision of the fragment (Lisowski, 1967).

*These skeletal samples are stored at the Cabinet of Anthropology of the Institute of Archaeology and Ethnography NAN RA.

Description of traumas

In the Bageri Chala sample, evidence of trauma was observed in 7 out of 32 individuals studied (14 male, 9 female, 6 subadults, and 3 of unidentified sex).

Burial 8. Male, 20–29 years. Possible penetrating crushing injury of the right parietal (20 × 11 (?) mm). A radiating fracture was observed, but no signs of necrosis or healing.

Burial 9. Male, 40–49 years. There were mechanical breaks of the occipital (left side) on the skull base; the left mastoid process and mandibular condyle were damaged. The injuries were perimortem, and undoubtedly point to decapitation incurred when the individual was in an upright position (Manchester, 1983: 63). Linear breaks of the mastoid and condyle provide evidence that the blow was inflicted from behind (in the tangent direction), most likely by a right-hander.

Burial 10. Female, 20–29 years. Signs of a healed blunt-force injury on the left parietal. The lesion was oval in shape (13 × 8 mm). The trauma was followed by an inflammation of the affected area.

Burial 15. Adolescent male, 16–18 years. Signs of two traumatic lesions in the skull. In the right side of the frontal bone, a linear fracture was detected. Its length outside the orbit was 58 mm, and inside the orbit, 11 mm. The trauma was ante-mortem, and the diploë was closed throughout the fracture line. This suggests that the individual lived for one and a half years after receiving the injury. No signs of surgical intervention were observed. In the left parietal (closer to the coronal suture), a successfully healed blunt-force injury was detected (6.5 × 8.0 mm).

Burial 18. Male, 30–39 years. Evidence of an incomplete surgical intervention was observed in the right parietal. The size of the wound on the external surface was 23.7 × 18.5 × 9.5 × 8.2 mm. A fracture line radiated from the lesion. The injury was lethal to the individual.

Burial 22. Subadult, 8–9 years. Two penetration wounds on the left parietal. The surgery was carried out ante-mortem. The locations of the incisions were clearly visible. The first incision was located close to the sagittal suture (2 × 15 × 2 (?) × 15 (?) mm). The size of the second wound was 16 × 9 × 16 (?) × 9 (?) mm. No signs of inflammation around the wounds. The edges of the incisions were straight, sharp, and displayed no signs of healing.

Burial 28. Male, 40–49 years. A small elongated depressed fracture was observed in the right parietal (16 × 6 mm). This was probably a result of a healed blunt-force trauma. The injury had healed successfully, though there was an inflammation in the affected area.

In the sample from Bover (40 individuals: 19 males, 8 females, 2 subadults, and 11 individuals of unidentified sex), signs of trauma were detected in 8 skeletons.

Burial 7. Male, 30–39 years. A round depression of the outer bone table (33.5 × 27.0 mm) was observed on the frontal bone. Inside the lesion, there were manifestations of inflammation, which probably led to healing of the injury.

Burial 10. Male, 50–59 years. Ante-mortem blunt-force trauma of oval shape was observed on the occipital bone (supposedly 12.0 × 5.5 mm). The injury had successfully healed.

Burial 13. Male, 30–39 years. Signs of two traumatic lesions were detected on the skeleton. A round blunt-force injury healed long before death could be seen in the right parietal (size 42.0 × 35.5 mm, depth 1.5 mm). No signs of necrosis. In the sacrum, a transverse fracture was observed, which had occurred as a result of a fall on the buttocks. Manifestations of healing of the bone were detected.

Burial 27. Female, 20–29 years. Signs of two non-penetration successfully healed wounds were observed on the right parietal (28.0 × 20.0 × 5.5 and 8 × 8 mm).

Burial 35. Male, 40–49 years. Blunt-force ante-mortem trauma was detected on the left parietal (16 × × 15 mm).

Burial 41. Male, 40–49 years. An injury caused by a chopping weapon in the tangential direction (24 mm) was detected on the left parietal. There were signs of an acute inflammatory response, which probably led to the death of the individual.

Burial 44. Male, 40–49 years. Signs of three traumatic lesions were detected. An oval depressed fracture (26 × 16 mm), which only affected the outer table of the vault, could be seen on the right parietal. The two other lesions were on the frontal bone: an elongated lesion on the left of the metopion (16 × 4 mm), and a non-penetrating depressed fracture (8 × 3 mm) some 37 mm from the first lesion. There were no signs of inflammation in either case. Apparently, both injuries were caused during the same encounter.

Burial 51. Female, 30–39 years. Blunt-force trauma of the nasal bones was found.

In the sample from Bartsryal cemetery (38 individuals: 19 males, 6 females, 3 subadults, and 10 of unidentified sex), signs of trauma were detected in 9 cases.

Burial 1. Male, 40–49 years. Oval aperture on the left side of the frontal. Its size on the outer table was 9 × 3 mm, on the inner table 7.0 × 4.5 mm. The contours of the aperture were irregularly shaped, and asymmetrical. Such a perforation, even if small, can lead to the infiltration of infectious agents inside the cranial cavity. Six or more incisions (3 to 10 mm in size) were detected in the affected area. The individual apparently died from general sepsis, caused by an active necrosis stimulated by the infection of the cranial cavity, shortly after being injured.

Burial 9. Individual of unidentified sex, 20–29 years. Quadrangular wound on the lateral side of the right parietal (12.0 × 10.0 × 12.8 × 5.5 mm). A surgical cleaning was carried out after the injury was caused. Healing was not complicated by inflammation.

Burial 12. Male, 30–39 years. Three traumatic lesions. A part of the right supra-orbital margin (16.5 mm), close to the lateral half of the lateral orbital margin, was cut off. Blunt-force traumas on the right parietal and on the right side of the occipital. Manifestations of healing were present.

Burial 22. Male, 50–59 years. An ante-mortem trauma (3 × 4 mm) was detected on the mandible, just above the mental eminence, at the level of the medial incisors. A small fracture line could be seen on the right side of the lesion. There was a local inflammatory response in the affected area.

Burial 34. Male, 50–59 years. Successfully healed depressed fracture of the frontal bone.

Burial 45. Subadult, 8–9 years. Probable gross crushing injury of the frontal bone, just beyond the frontal eminences. This trauma may have been a cause of the death of that individual.

Burial 57. Male, 30–39 years. A healed injury was detected in the right supra-orbital area: a round lesion (11.0 × 11.5 (?) mm) on the temporal line, near frontotemporal point. Despite successful healing, there were manifestations of a local inflammatory response. A healed blunt-force trauma suffered long before death (14.5 × 9.0 mm) was detected on the left parietal.

Burial 60. Male, 20–29 years. Blunt-force trauma (13 × 14 mm), healed long before death, on the left parietal.

Burial 67. Male, 20–29 years. Non-penetrating successfully healed oval injury on the right side of the frontal.

From 6 individuals of the Karakotuk sample (3 male, 2 female, and 1 individual of unknown sex), only one showed manifestations of trauma.

Burial 10. Male, 30–39 years. Successfully healed blunt-force (?) trauma (18.8 × 7.0 mm) on the left parietal, suffered long before death. The healing was successful, despite a local inflammatory response.

From 6 individuals of the Tekhut sample (2 male, 1 female, and 3 individuals of unknown sex), only one showed manifestations of trauma.

Burial 9. Male, 30–39 years. Rhomboid trepanation on the right parietal, 14 × 13 × 7 (?) × 9 (?) mm. Manifestations of inflammation were detected inside the lesion.

Discussion

On the basis of the results of the present study, it is possible to assess the prevalence of different types of trauma in individual cemeteries, and in the studied region in general. Lesions with the bone reaction due to a healing process were observed in 19 individuals (15 male, 3 female, 1 adolescent). Lethal traumas were described for 4 male skulls and 1 subadult skull. Three of the males had suffered traumas during the fourth decade of life, and one at the age of 20–29.

What does the pattern of prevalence of traumatic lesions tell us about the social conditions in those past populations? There are facial traumas: a healed fracture of the nasal bones (Bover, burial 51, female, 30–39 years), a lesion of the mandible (Bartsryal, burial 22, male, 50–59 years) and of the supra-orbital area (Bartsryal, burial 12, male, 30–39 years; burial 57, male, 30–39 years). The nasal-bones trauma was caused by a blow from the left, thus the woman probably stepped back and right in trying to avoid the blow. The mandibular injury was a result of a blow to the face, to the area of the anterior teeth. The supra-orbital traumas were caused by contact blows from the right. This means that the men were not able to react to the blows.

Another type of trauma is the depressed blunt-force injuries to the center of the frontal bone or to its right or left sides (Bartsryal: burial 34, male, 50–59 years; burial 67, male, 20–29 years; Bover: burial 7, male, 30–39 years; burial 44, male, 40–49 years). In one case, a weak blow, caused by a right-hander standing in front of the injured, led to the emergence of a fracture line (Bageri Chala, burial 15, male, 16–18 years; Fig. 1). In all cases, signs of a healing process and the absence of an inflammatory reaction suggest that the injuries were suffered long before death.

Two other types of traumatic lesion are found on the parietal and occipital bones. Healed fractures of the parietals were observed in 9 male and 2 female individuals. In 4 male skulls (Bageri Chala, burial 28; Bover, burial 13, 44; Bartsryal, burial 12) and 1 female skull (Bover, burial 27), depressions of the outer table of the right parietal were detected. In 5 male (Bartsryal, burial 57, 60; Bover, burial 35; Karakotuk, burial 10; Bageri Chala, burial 15) and 1 female (Bageri Chala, burial 10), the lesions were found on the left side of the skull: the blows were delivered from the right. In one case, an elongated incision (24 mm) caused by

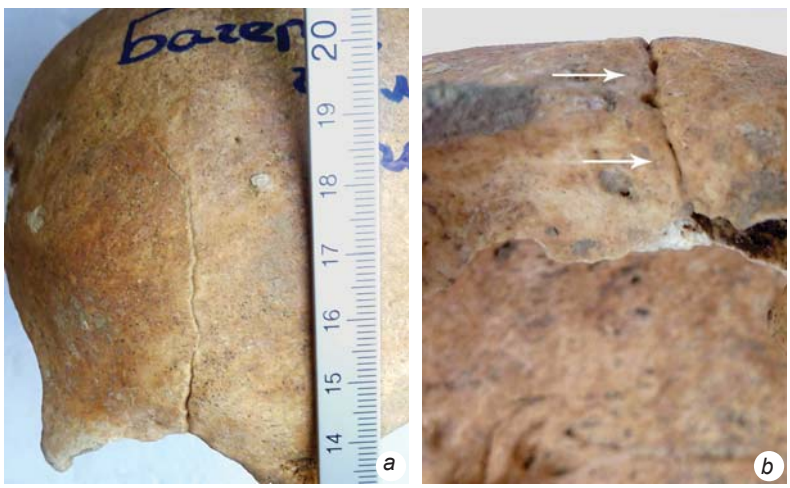

Fig. 1. Fracture line on the right side of the frontal bone (Bageri Chala, burial 15). *a* – outer surface; *b* – orbital surface.

Fig. 2. Sharp-edge incision on the skull (Bover, burial 41).

Fig. 3. Depressed fracture of the parietal bone (*a*) and transverse fracture of the sacrum (*b*) (Bover, burial 13).

Fig. 4. Skull-base (*a*) and mastoid process (*b*) with signs of decapitation (Bageri Chala, burial 9).

a weapon with sharp cutting edge was observed on the left parietal (Bover, burial 41, male, 40–49 years; Fig. 2). The attacker was standing behind the victim; the latter was able to react to the attack, and tried to avoid it. Depressed lesions on the occipital bone were found in 2 male skulls (Bover, burial 10; Bartsryal, burial 12).

The next type is penetration wounds (perforating fractures). A penetration wound exhibiting bone-reaction due to healing was observed in one individual (Bartsryal, burial 9), and without signs of healing in three individuals. Injuries of the same type on the frontal bone were detected in 2 individuals (Bartsryal, burial 1, female, 40–49 years; burial 45, subadult, 8–9 years). The pattern of the injuries suggests that sharp, straight blows were delivered to the frontal bones by a small object. The attacker was standing face to face with the victim. A young man (Bageri Chala, burial 8) displayed an oval aperture on the right parietal, with no signs of inflammation or healing.

Severe traumas are characterized by lesions of mixed type that involve several parts of the skeleton (Fig. 3). A male (Bover, burial 13) exhibits signs of a healed fracture in the form of a round depression on the right parietal. The injury shows no manifestations of the complicated process of healing, such as inflammation or osteomyelitis. After receiving a strong blow to the skull, the man probably fell onto his buttocks.

The decapitation caused by a sharp blow from a chopping weapon to an individual (Bageri Chala, burial 9; Fig. 4) points towards a direct aggression. Decapitation was also observed in two individuals from contemporaneous cemeteries from the Sevan Basin area (Khudaverdyan, 2014a).

The prevalence of skull lesions in the studied samples is highest at Bartsryal, where it is found only

in males (23.7 %). In 7 cases the injuries displayed manifestations of healing, and no such manifestations in one case. Peri-mortem injuries were observed in 2 individuals: on the frontal bone (burial 1), and on the mandible, just above the mental eminence (burial 22). These males died shortly after being injured, from general sepsis, caused by an active necrosis stimulated by the infection of the cranial cavity. Two individuals that died at the fourth decade of life (burial 12, 57) displayed various lesions in the right supra-orbital area, caused by a weapon with a sharp, probably cutting, edge. In 5 cases (burial 12, 34, 57, 60, 67) blunt-force traumas on the vault were observed. Two of these skulls (burial 34 and 67) exhibit healed injuries on the frontal bone, either in the center of the bone or with a deviation to the left. These traumas were caused by an attacker standing face to face with his victim. Traumatic lesions on the left parietal were found in 2 individuals (burial 57, 60), and on the right parietal in one individual (burial 12). The later also displayed signs of trauma in the occipital region. These injuries were caused from behind by right-handers.

The prevalence of skull traumas at Bover is 20 %. They are found mostly on the male skulls, and usually these are blunt-force traumas of the vault. The injuries were observed on frontal bone (burial 7, 44; both male), on parietal bone (burial 13, 35, 44, males; burial 27, female), and on occipital bone (burial 10, female). There are reasons to suppose that in all cases a similar weapon was used. This could have been the butt of an axe, mace, or staff. One individual (burial 41) displayed signs of a chopping blow to the parietal area. Some injuries were caused during frontal encounters (traumas of frontal bone and face), while others were caused from behind (parietals and occipital area).

The prevalence of skull traumas at Bageri Chala is 15.6 %. Signs of healing were detected in 3 cases. Depressed blunt-force lesions were observed in 3 male skulls (burial 10, 15, 28). The depressions are quite small; thus the blows were caused by relatively light objects. After the injuries were caused, inflammatory response began in the affected areas. These were probably the results of domestic accidents typical of various social groups. On the right side of the frontal bone of a young man (burial 15), there is a fracture line caused by a straight-contact blow.

At Karakotuk, only one case of cranial injury was detected: trauma of the left parietal, healed long before death (burial 10, male, 30–38 years). The injury was inflicted from behind by a right-hander.

Another type of skull lesion can be considered the result of trepanation. Surgical interventions of this type were observed in 4 individuals: two males, one subadult (8–9 years), and one individual of unknown sex. They have pre-mortem apertures on the parietal bones (Khudaverdyan, 2016).

It is well-known that some types of trepanations are the results of surgery carried out in order to heal cranial injuries. A small fragment of the right parietal bone displaying a penetration wound, and human teeth were found in burial 9 at Bartsryal. These remains belonged to a mature individual. The aperture is quadrangular in shape. The surgery was probably carried out for therapeutic purposes. The wound was surgically cleaned to remove bone fragments. Margins of the aperture are sharp, at some places round, the inner and outer tables of the bone are fused. Scraping of the affected bone-tissue finally led to healing. This individual lived for one and a half years after the surgery.

A rhomboid aperture was detected on the right parietal of the 30-to-39-year-old male from the burial 9 of the Tekhut sample. There are signs of an inflammatory response in the area of trepanation. Our study shows that this individual suffered from acute mastoiditis (purulent inflammation of mastoid tissue). This pathology is usually a complication of acute purulent inflammation of the middle ear, but can also be a result of a trauma or sepsis generated by staphylococci, streptococci, viruses, or fungi. We can assume that this surgery was done for a therapeutic purpose.

Another individual (Bover, burial 7, male, 30–39 years) displays specific lesions of the outer table of the frontal bone in the form of a round depression (Fig. 5). Such traumas with surface lesions of the outer table and, partially, diploë, can be a result of a gross crushing injury. There are signs of inflammation inside the lesion. The pattern of the demarcation surrounding the injury and the presence of trace-like scars might suggest that there were some attempts of surgical intervention, namely the scraping of the purulent-molten bone tissue. Also, the possibility of a surface trepanation cannot be excluded. Examples of such surgical procedures are found quite often, and previous workers have hypothesized that in some cases it could be related to a physical test of an individual when passing from one social category to another (initiation, marriage, bearing, mourning, etc.) (Mednikova, 2001: 125). Though it is well-known that medical aspects of trepanation closely intertwine with its ritual meanings, there are numerous observations showing that it can be considered as a method of initiation or transformation as well (Mednikova, 2001: 128–131; Khudaverdyan, 2011).

An 8–9-year-old child (Bageri Chala, burial 22) was subjected to a trepanation, which was performed using the crosscut or linear section method (Standards…,

1994: 160; Verano, 2003). Two penetration wounds were detected on his left parietal: one in the sagittal suture area, another closer to the temporal bone. There are no clear manifestations of inflammatory response. The edges of the wound are straight, sharp, without signs of healing. Porotic hyperostosis near pterion, mastoiditis, and the brain abscess were detected in this subadult as well. Porotic hyperostosis is usually thought to be associated with iron-deficiency anemia, which develops during the chronic course of the infectious and parasitic diseases. The abscess could have emerged because of an acute purulent otitis. But in this particular case, there is not enough evidence to derive firm conclusions regarding medical aspects of the surgery.

Signs of curative craniotomy done using the crosscut method were detected on the right parietal of a male (Bageri Chala, burial 18, Fig. 6). This individual did not survive the surgery. Pathological markers found on his postcranial skeleton (osteoarthritis, spinal pathologies, etc.) reflect response to a specific stress, and are related to certain physical activities. These imply a lifestyle involving intense physical labor. Manifestations of tuberculosis were also detected on the skeleton. These lesions are found on the sternum and in vertebral bodies (tubercular spondylitis). Bone tuberculosis usually emerges as a result of a hematogenous metastasis from a primary locus located in the lung or other part of the body.

Similar crosscut trepanations were previously observed on the skulls from cemeteries in Anatolia (Chavlum, Ikiztepe) (Erdal Y.S., Erdal O.D., 2011) and in Dashkesan District of Azerbaijan (Kirichenko, 2007).

In our study, we have also documented symbolic trepanations. The pattern of lesions suggests that the cuts were not a result of violence, but rather were made intentionally in strictly defined areas of the skull (frontal and parietal bones). Females were subjected to ritual trepanations along with males. On the skulls of 16 males (Bageri Chala, burial 8, 9, 11, 15, 16, 18, 23, 30; Bartsryal, burial 60, 76; Bover, burial 6, 28, 30, 35, 44, 49), 11 females (Bageri Chala, burial 4, 5, 10, 25; Bartsryal, burial 3, 19, 84; Bover, burial 42), and of one individual of unknown sex (Bover, burial 45), healed incisions from 2 to 14 mm long were observed on the parietal bones. Some of these lesions are quite deep, while others only slightly affect bone-surface. Similar scars were found on the frontal bones of three male individuals and one female (Bageri Chala, burial 27, 28; Bover, burial 41, 51). Symbolic trepanations were practiced in the tribes of the Bronze and Early Iron Ages in the Sevan Basin (Khudaverdyan, 2010). One of the important symbolic meanings of the surface

Fig. 5. Surface lesions on the skull (Bover, burial 7).

Fig. 6. A skull with signs of a pre-mortem trepanation (Bageri Chala, burial 18).

trepanation may have been a transition from one social group to another (initiation, joining a male union, marriage, bearing, etc.) (Mednikova, 2001: 128–131).

Conclusions

Summing up, our analysis of injuries on the cranial samples from the populations of the Late Bronze and Early Iron Ages leads us to the conclusion that the prevalence of traumatic lesions was moderately high in the studied samples. The comparison of the

frequency of cranial traumas between the samples from cemeteries in the Shnogh River basin (present study) and contemporaneous burial grounds in the Sevan Basin and Shirak Plain (Khudaverdyan, 2014b) has shown that the frequency was higher in the former. Most of the injuries are blunt-force traumas of the vault. The fractures were in most cases healed long before death. Traumas are prevalent in males, but are also found in females. A similar pattern is seen in synchronous Armenian skeletal populations. This is quite a predictable result: males, as the most active part of the population, were more often participating in conflicts, protecting their settlements from enemy troops, etc. Lethal injuries were found in 4 male and 1 subadult individuals. The comparative analysis has shown the differences in the prevalence of traumatic lesions between the studied samples. While the prevalence is moderate at Bageri Chala (15.6 %), it is increased at Bover (20 %) and Bartsryal (23.7 %). The difference in trauma-prevalence reflects social differences between the populations.

The osteological samples collected and studied to date provide evidence that the population of the Shnogh River basin was not militarized, despite the high frequency of injuries in males*. The prevalence of transhumance and nomadic herding in the economy of this population, combined with agriculture, attracted small militarized groups that were coming into that area with a view to cattle-theft and robbery. In some cases, we cannot exclude occasional manifestations of aggression that were not a result of large-scale warfare. Items of weaponry are almost never found among grave goods in the studied cemeteries, unlike contemporaneous sites in the Sevan Basin and Shirak Plain (Martirosyan, 1964: 76–85; Torosyan, Khnkikyan, Petrosyan, 2002: 30–40). The graves of warriors are almost indistinguishable in the communal burial grounds, as they are placed alongside the graves of herders and farmers, and only differ in the abundance of grave goods and the presence of armor (Areshyan, 1974). Thus, the analysis of the traumatic lesions found on the skeletons of the people buried at the cemeteries of the Shnogh River basin dated to the 13th–11th centuries BC provides the strongest evidence of their peaceful lifestyle.

Another finding worth noting is the presence of a center of medical trepanation in the Lori Region. People of the Late Bronze and Early Iron Ages possessed all the necessary knowledge and skills to carry out such sophisticated surgery. The fact of successful (healed) trepanation is itself of principal importance for us, as it confirms the possibility of successful cranial surgery in the studied populations (Khudaverdyan, 2015; 2016). The population of the Shnogh River basin was also practicing symbolic trepanations: superficial manipulations only slightly affecting the cranial vault.

*High frequency of trauma in a group attacked by enemies should not be confused with a similarly high frequency in a militarized group (see (Buzhilova, 1995: 100)).

References

Areshyan G.E. 1974
O rannem etape osvoyeniya zheleza v Armenii i na Yuzhnom Kavkaze. *Istoriko-filologichesky zhurnal*, No. 2: 201–203.

Buzhilova A.P. 1995
Drevneye naseleniye: Paleopatologicheskiye aspekty issledovaniya. Moscow: IA RAN.

Dobrovolskaya M.V. 2009
Travmaticheskiye povrezhdeniya na skeletnykh ostankakh lyudei iz kurgannykh nekropolei Srednego Dona. In *Arkheologiya Srednego Dona v skifskuyu epokhu: Trudy Donskoi arkheologicheskoi ekspeditsii IA RAN, 2004–2008 gg.*, V.I. Gulyaev (ed.). Moscow: IA RAN, pp. 186–197.

Erdal Y.S., Erdal O.D. 2011
A review of trepanations in Anatolia with new cases. *International Journal of Osteoarchaeology*, vol. 21: 505–534.

Galloway A. 1999
Broken Bones: Anthropological Analysis of Blunt Force Trauma. Springfield: Charles C. Thomas Publisher, Ltd.

Khudaverdyan A.Y. 2005
Atlas paleopatologicheskikh nakhodok na territorii Armenii. Yerevan: Van Aryan.

Khudaverdyan A.Y. 2010
Pattern of disease in 2nd-1st millennium BC necropolis from Lchashen, Armenia. *Anthropologie* (Brno), vol. XLVIII/3: 239–254.

Khudaverdyan A.Y. 2011
Trepanation and artificial cranial deformations in ancient Armenia. *Anthropological Review*, vol. 74 (1): 39–55.

Khudaverdyan A.Y. 2014a
Decapitations in Late Bronze Age and Iron Age sites from Sevan region (Armenia). *Journal of Siberian Federal University. Humanities and Social Sciences*, vol. 7 (9): 1555–1566.

Khudaverdyan A.Y. 2014b
Trauma in human remains from Bronze Age and Iron Age archaeological sites in Armenia. *Bioarchaeology of the Near East*, No. 8: 29–52.

Khudaverdyan A.Y. 2015
Trepanirovannye cherepa iz pogrebeniy epokhi pozdnei bronzy i rannego zheleznogo veka s territorii Armenii. *Vestnik arkheologii, antropologii i etnografii*, No. 2 (29): 115–127.

Khudaverdyan A.Y. 2016
Trepanation in the Late Bronze Age and Early Iron Age in Armenia. *Homo: Journal of Comparative Human Biology*, No. 67: 447–461.

Kirichenko D.A. 2007
O trepanatsii cherepa v drevnosti. *Azərbaycan arxeologiyası və etnoqrafiyası*, No. 1: 63–67.

Lisowski F.P. 1967

Prehistoric and Early Historic trepanation. In *Diseases in Antiquity*. Springfield: Charles C. Thomas, pp. 651–872.

Manchester K. 1983

The Archaeology of Disease. Bradford: Bradford Univ. Press.

Martirosyan A.A. 1964

Armeniya v epokhu bronzy i rannego zheleza. Yerevan: Izd. AN ArmSSR.

Mednikova M.B. 2001

Trepanatsii u drevnikh narodov Evrazii. Moscow: Nauch. mir.

Ortner D.J., Putchar W.G.J. 1981

Identification of Pathological Conditions in Human Skeletal Remains. Washington: Smithsonian Inst. Press. (Smithsonian Contributions to Anthropology; No. 28).

Rokhlin D.G. 1965

Bolezni drevnikh lyudei: Kosti lyudei razlichnykh epokh – normalnye i patologicheski izmenennye. Moscow, Leningrad: Nauka.

Standards for Data Collection from Human Skeletal Remains: Proceedings of a Seminar at the Field Museum of Natural History. 1994

J.E. Buikstra, D.H. Ubelaker (eds.). Fayetteville. (Arkansas Archaeol. Survey Research Ser.; No. 44).

Torosyan R., Khnkikyan O., Petrosyan L. 2002

Drevniy Shirakavan (rezultaty raskopok 1977–1981 gg.). Yerevan: Gitutyun. (In Armenian).

Verano J.W. 2003

Mummified trophy heads from Peru: Diagnostic features and medicolegal significance. *Journal of Forensic Sciences*, No. 48: 525–530.

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AN SSSR – USSR Academy of Sciences

BAR – British Archaeological Reports

CREP – Cercle de Recherches et d'Etudes Préhistoriques

GIM – State Historical Museum (Moscow)

IA RAN – Institute of Archaeology, Russian Academy of Sciences (Moscow)

IAE SO RAN – Institute of Archaeology and Ethnography, Siberian Branch of the Russian Academy of Sciences (Novosibirsk)

IEA RAN – Institute of Ethnography and Anthropology, Russian Academy of Sciences (Moscow)

IGEM RAS – Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry, Russian Academy of Sciences (Moscow)

IIFF SO AN SSSR – Institute of History, Philology and Philosophy, Siberian Branch of the USSR Academy of Sciences (Novosibirsk)

IIMK RAN – Institute for the History of Material Culture, Russian Academy of Sciences (St. Petersburg)

IYALI KarNTs RAN – Institute of Language, Literature and History, Karelian Research Centre, Russian Academy of Sciences (Petrozavodsk)

KMAEE – "Archaeology, Ethnography and Ecology of Siberia" Museum, Kemerovo State University (Kemerovo)

KNTs UrO RAN – Komi Research Center, Ural Branch, Russian Academy of Sciences (Syktyvkar)

KSIA – Brief Communications of the Institute of Archaeology, Russian Academy of Sciences

KSIIMK – Brief Communications of the Institute for the History of Material Culture

MAE RAN – Peter the Great Museum of Anthropology and Ethnography (Kunstkamera), Russian Academy of Sciences (St. Petersburg)

MarNIIYALI – V.M. Vasilyev Mari Research Institute of Language, Literature and History (Yoshkar-Ola)

MIA – Materials and Investigations on Archaeology in the USSR

MIKVAE – Materials and Investigations of the Kama-Vyatka Archaeological Expedition

MVD – Ministry of Internal Affairs

NAN RA – National Academy of Sciences of the Republic of Armenia

NGU – Novosibirsk State University (Novosibirsk)

ONTI PNC RAN – Scientific and Technical Information Division, Pushchino Scientific Center, Russian Academy of Sciences (Pushchino)

RASK – Regional Archaeology Student Conference

SAI – Collection of Archaeological Sources

SPbGU – Saint Petersburg State University (St. Petersburg)

TuvNIIYALI – Tuva Research Institute of Language, Literature and History (Tuva)

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