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A Neanderthal Refugium in the Eastern Adriatic

On the basis of mineralogical analysis of the tephra layer in the Bioče rock shelter in Montenegro, we revise the cultural and population changes in the eastern Adriatic at the Middle to Upper Paleolithic transition. The disappearance of Neanderthals from that region was traditionally attributed to the Campanian Ignimbrite eruption ~40 ka BP. Comprehensive studies at Bioče by the Russian-Montenegrin expedition in 2010–2015 have resulted in a hypothesis that a Neanderthal refugium existed in the Balkans. We list the lithological and stratigraphic characteristics of the Pleistocene sequence of the site and describe four main strata. Petrographic and x-ray phase analyses and scanning electron microscopy suggest that minerals from samples of ground from horizon 1.3 are of volcanic origin. The comparison of tephra from that horizon with those from local sequences in terms of composition, shape, and size of particles reveals similarity with the Y-5 tephra from the main phase of the Campanian eruption, dating to 39.30–39.85 ka BP. In the habitation sequence of Bioče, the tephra layer is inside lithological stratum 1. Artifacts from that layer and from the overlying and underlying ones, judging by technological and typological criteria, belong to one and the same lithic industry—the micro-Mousterian facies of the local Middle Paleolithic. New findings imply that the Campanian Ignimbrite eruption did not cause the disappearance of the culture associated with Neanderthals in the eastern Adriatic.

Keywords: *Eastern Adriatic, Middle Paleolithic, Bioče rock shelter, Campanian Ignimbrite eruption, Neanderthal refugium.*

Introduction

The results of recent dating of complexes belonging to the Middle to Upper Paleolithic transition suggest non-simultaneous disappearance of Neanderthals in various regions of Europe (Higham et al., 2014). Anatomically modern humans, judging by the earliest evidence of their occurrence in these regions, probably co-existed with Neanderthals over a span of 2.6–5.4 thousand years.

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The eastern Adriatic is one of the key regions for study of the Middle to Upper Paleolithic transition process in Southeastern Europe. On the basis of findings at Crvena Stijena in Montenegro, the disappearance of Neanderthals from that region was traditionally attributed to the Campanian Ignimbrite eruption ~40 ka BP (Fedele et al., 2008; Mussi, 2001; Morley, Woodward, 2011; Zilhao, 2006). The most ancient traces of anatomically modern humans in the eastern Adriatic, recorded at Šandalja II in Istria, show a calibrated date of ~32 cal BP (Karavanic, Smith, 2013). Thus, the time gap between the episodes of Neanderthal and modern human populations occurrence in the region could be more than 8 thousand years. Since no transitional complexes have been found in the area from southern Greece (the Kleisoura-1 site on the Peloponnesian Peninsula) to northern Croatia (the Fumane site) (Dogandžić, McPherron, Mihailović D., 2014), and none of the known Middle Paleolithic industries shows features suggesting maturation of the Upper Paleolithic traditions on the local basis, most probably, the hominins with the Upper Paleolithic industry penetrated this region several thousand years after the Neanderthal population had left it.

Comprehensive studies at Bioče in the central part of Montenegro, conducted by a Russian-Montenegrin expedition in 2010–2015 (Derevianko et al., 2017; Pavlenok et al., 2017), provided a new look on the cultural and population dynamics at the turn of the Middle and Upper Paleolithic in the region. The site is located under a rock shelter, at the foot of a massive limestone block, at an elevation of about 40 m above the river edge, at the confluence of the Morača and Mala Rijeka rivers, 20 km upstream from the Podgorica city (Fig. 1, 2). The Morača valley in the neighborhood of the cave has steep shoulders, upright in places. The valley is 350 m wide and 70 m deep, the valley bottom is 250 m wide. The present-day Morača river bed cuts through the valley bottom to a depth of 35 m, thus forming a canyon 30–40 m wide.

In terms of geology, the central Montenegro area belongs to the folded zone of External Dinarides, which is a complex scaly-overlapped structure (Osnovna Geoloska Karta…, 1971). This structure is formed on the continental base owing to southwestern thrust of tectonic plates being carbonate shelf fragments of predominantly Triassic-Cretaceous age. North-eastwards, in the Durmitor block and Internal Dinarides, oceanic crust fragments with numerous ultrabasite massifs, formed by ophiolitic association rocks, are widely developed. The Bioče site is located in the zone of Pre-Karst block thrust over the High Karst block; both are the main structural units of the External Dinarides (see Fig. 1). Both blocks are dominated by limestones, dolomitic limestones and dolomites, including those with flints and interlayers of slated clay rocks and marls. Carbonate rocks, composed mainly of calcite, dolomite, quartz, and argillaceous minerals, are predominantly developed in the neighborhood of the Bioče rock shelter and upstream from the Morača and Mala Rijeka rivers.

In the stratigraphic sequence of the site, whose thickness is more than 5 m, four main lithological strata have been identified (Fig. 3) (Derevianko et al., 2015).

Deposits of stratum 1 include four weakly-differentiable sediment generations (1.1–1.4), formed by medium and light sandy and grussy loams of reddish-brown or dark-brown color. In the middle portion of the stratum, reference level 1.3 in the form of ocher-yellow sandy loam up to 10 cm thick stands out. Stratigraphic units of stratum 1 are saturated by humus, and also rock-debris, to various extents. The projective area of the latter is 30–50 % on the average. According to the results of experimental radiocarbon dating of coal and humus samples, accumulation of stratum 1 deposits proceeded from 32 to 40 ka BP (Derevianko et al., 2017; Pavlenok et al., 2017).

Within stratum 2, three stratigraphic units (2.1–2.3) have been identified. The upper and middle portions of deposits consist of gray-colored sandy loams and uneven-grained gray and gray-brown sands; the lower portion is composed of light loams abundantly saturated with fine rubble-crushed stony material (up to 40–50 % of the projective area). All units of the stratum are characterized by the development of carbonate cementation in the form of foci or horizons up to the state of breccia.

Lithological stratum 3 is composed of heavy reddish-brown loams. The upper portion shows abundant inclusion of fractured grus and rubble, the lower portion shows inclusion of single blocks. Genetically, these deposits are sediments of stratum 4, which experienced intense destruction in subaerial conditions under the influence of external environment agents.

Deposits of stratum 4 consist of two sediment varieties, formed by heavy reddish-brown loams. Its upper portion (horizon 4.1) shows inclusions of medium and large rubbles, lying in the form of nest-like accumulations. In the lower portion of stratum (horizon 4.2), lying on the rock base, detrital material consists of fragments of ultimately weathered intra-cave dripstone crusts and limestone concretions.

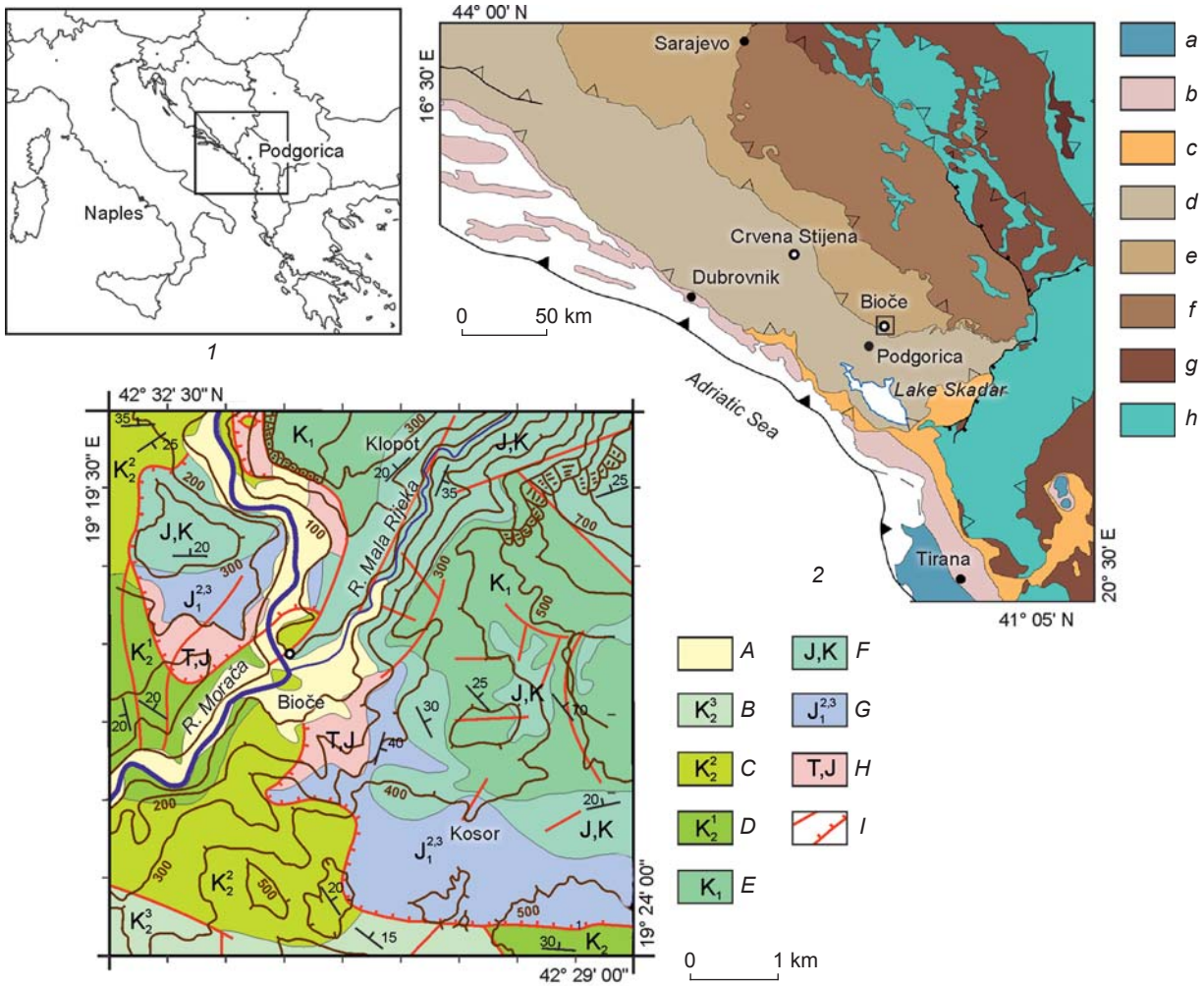

Fig. 1. Schematic map showing location of the Bioče site (*1*), tectonic map (Schmid et al., 2016) (*2*), a fragment of the geological map of the southern part of the Dinar highlands on a scale of 1:100,000 (Osnovna Geoloska Karta…, 1971) (*3*). *a* – Ionian zone; *b* – Dalmatian zone; *c* – Budva-Cukali zone; *d* – High Karst; *e* – Pre-Karst; *f* – Eastern Bosnia-Durmitor; *g* – Drina-Ivanjica; *h* – ophiolitic zone of Central Dinarides. *A* – Holocene-Pleistocene sediments; *B* – grayish-white limestones, dolomitic limestones, and dolomites (the Cenonian Superstage); *C* – dolomites, dolomitic limestones, and limestones (the Turonian Stage); *D* – bitumen limestones, dolomitic limestones, and dolomites (the Cenomanian Stage); *E* – limestones, marly limestones, dolomitic limestones, and dolomites; *F* – reef, massive, and laminated limestones; *G* – limestones, clay shales, and slated marls; *H* – dolomitic limestones, calcareous dolomites, recrystallized limestones with flints; *I* – tectonic deformations.

In stratum 4, no archaeological materials have been discovered.

Lithic industry of stratum 3 is characterized by the use of parallel, orthogonal, or centripetal flaking, rare use of the Levallois technique, and by predominance of longitudinal simple and double-edged side-scrapers. In terms of the main technical and typological indicators, this industry is the closest to the materials of strata XXII–XVIII of the Crvena Stijena site, which were earlier dated to the MIS 5 time; however currently, strata XXII–XX are attributed to the turn of MIS 5 and MIS 4, while stratum XVIII is associated with MIS 3 (Mihailović D., Mihailović B., Whallon, 2017).

In the materials of stratum 2, along with the features relating to the industry of the underlying layer, there were signs of mass detachment of blades and production of elongate points, side-scrapers, and atypical knives on their basis. In its appearance, this industry is mostly similar to that of stratum XVII of Crvena Stijena, earlier dated to substage MIS 5a, and later assigned to MIS 3 (Ibid.).

Lithological stratum 1 contains materials of several habitation episodes, including the Mousterian industry of Charantian type or (according to the regional scale of the Middle Paleolithic) micro-Mousterian facies, which is characterized mainly by radial and orthogonal cores,

Fig. 2. General view of the Bioče rock shelter.

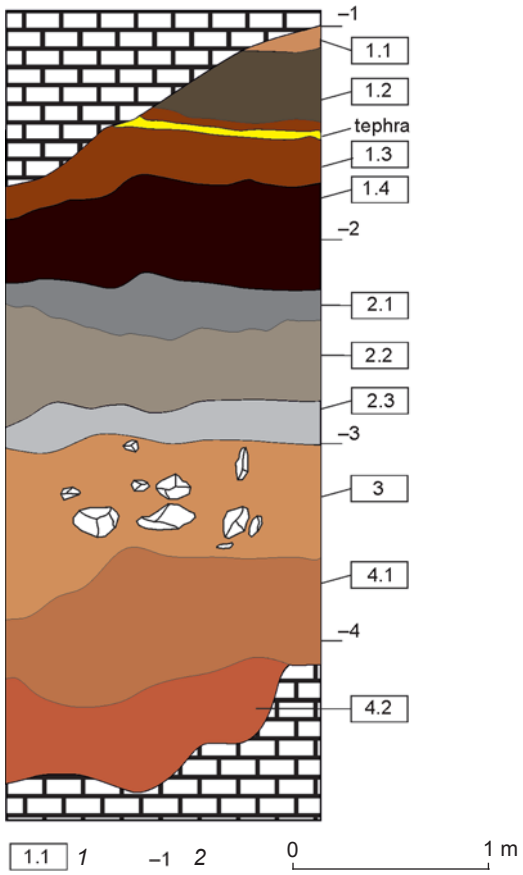

Fig. 3. Structure of the section of Pleistocene deposits at Bioče.
1 – layer number; *2* – bench mark.

small flakes, scaly retouch, microshapes of longitudinal and transverse side-scrapers, as well as those of atypical end-scrapers. The age of such industries in the eastern Adriatic corresponds to the second half of MIS 3, which is consistent with radiocarbon dates of deposits of stratum 1 at Bioče.

Of special interest in the structure of Bioče deposits are tephra remains lying in the middle portion of the reddish-brown light loams of lithological stratum 1 in the form of ocher-yellow sandy loam 8–10 cm thick (reference level 1.3). The loam is weakly sanded (with separate incompetent inclusions of fine grus-rock or gritty size), homogeneous in composition, loose, porous, with a coarsely nut or fine-grained structure. Inversion (overturning) of horizon during mixing with deposits of the host sequence is observed in places, which is typical for fast defluction-solifluction processes.

This horizon of volcanic deposits is apparently related to the Campanian Ignimbrite eruption, one of the largest volcanic events of the Late Pleistocene and the largest one in Europe over the last 100 thousand years. Numerous studies that have determined that the volcanic center was located west of Naples, in the area of the Phlegraean Fields, associate this event with the formation of the Campi Flegrei caldera ~12 km in diameter (Scarpati et al., 2013). The eruption was accompanied by the spewing of a great amount of solid substances (from 49 to 300 km^3 by various estimates) (Civetta et al., 1997; Costa et al., 2012; Scarpati, Sparice, Perrotta, 2014; Fedele et al., 2016; Marti et al., 2016), formation of a thick series of deposits close to the crater, composing the so-called Breccia Museo (Civetta et al., 1997; Fedele et al., 2008; Pappalardo, Ottolini, Mastrolorenzo, 2008), and numerous radial pyroclastic currents, which spread to a distance up to 80 km (Fisher et al., 1993). These currents formed the main volume of eruption material in the Campanian area—volcaniclastic breccias, ignimbrites, and tuffs (Fedele et al., 2008, 2016). The deposits are sufficiently well studied; detailed isotopic, mineralogical, geochemical, and petrological analyses

have provided for the construction of consistent models of magma-chamber evolution (Fulignati et al., 2004; Fedele et al., 2008, 2016; and others).

Furthermore, up to 100 km^3 of eruptive column solid material (Costa et al., 2012; Marti et al., 2016) ~40–45 km high, which was formed during the caldera collapse, were spread by stratospheric flows (predominantly in the east-northeastern direction) to a distance of more than 2 thousand km, and over an area of 2 to 5 mln km^2 (Costa et al., 2012; Smith et al., 2016; Marti et al., 2016). This material formed a widespread tephra layer known as Y-5 or C-13, which serves as a reliable marker in correlation of Mediterranean marine and terrestrial deposits. The last data and models built taking into account variations of composition and distribution of size of glass shards (Smith et al., 2016; Marti et al., 2016) from the distal facies of eruption reveal a more complex propagation of particles of the Plinian and syn-Ignimbrite eruption stages than previously thought (Costa et al., 2012), and explain the reason for anomalously high thickness of tephras in some sections of southeastern Romania (at a distance of more than 1200 km from the volcanic center) (Veres et al., 2013), and at the sites of the Kostenki-Borschevo region (Giaccio et al., 2008).

The age of the main phase of Campanian eruption, which yielded the major part of distal facies materials, is estimated by the $^{39}Ar/^{40}Ar$ isotope method (according to sanidine crystals from proximal and medial facies) as 39.30–39.85 ka BP (Fedele et al., 2008; Giaccio et al., 2017). This definition correlates with the global freezing epoch—the Heinrich event 4 (HE-4), with the Lachamp-Kargopolovo paleomagnetic excursion (Giaccio et al., 2008), the Antarctic Isotope Maximum AIM-8 (Buiron et al., 2012), and Greenland Stadial GS-9 (the beginning 40,121 ka BP, the plateau 39,372 ka BP according to the study of isotopic signature of methane in ice cores) (Guillevic et al., 2014).

Many researchers are of opinion that the Campanian eruption determined the direction of cultural and population development of the last Neanderthals and the first anatomically modern humans in Europe (Fedele et al., 2008; Mussi, 2001; Zilhao, 2006). At a number of multi-stratified sites in Italy, Central and Eastern Europe, tephra layer marks the boundary between cultural layers of the Middle and Initial Upper Paleolithic on the one side and the Aurignacian industries on the other side (Fedele et al., 2008; Hoffecker et al., 2008; Jöris, Street, 2008). On the Balkan Peninsula, it is recorded in the stratigraphic sequence of Crvena Stijena (Morley, Woodward, 2011), Temnata in Bulgaria, and Franchthi in Greece (Morley, 2007). However, if to the east of Balkan range there are known symbiotic transitional industries that can be considered as evidence of cultural contacts between Neanderthals and anatomically modern humans 40–35 ka BP (for example, Temnata and Bacho Kiro in Bulgaria), then to the west of it, there is no such evidence.

The basic argument in favor of disappearance of Neanderthals in the eastern Adriatic as a result of Campanian eruption is a thick horizon of volcanic ash in stratum XI of Crvena Stijena, classified as tephra Y-5 (Morley, Woodward, 2011). The ash horizon is underlain by deposits of stratum XII, for which a radiocarbon date 40,777 ± 900 BP is available (Mihailović D., Mihailović B., Whallon, 2017), with a Middle Paleolithic industry characterized by researchers as Late Mousterian (Basler, 1975), micro-Mousterian (Brodar, 1965), typical Mousterian (Ivanova, 1979), or Mousterian Charantian-like (Kozłowski, 1992). Deposits of stratum X overlying a tephra layer contain remains of a developed Upper Paleolithic industry (Basler, 1975). The represented data, as well as a relative closeness of the eastern Adriatic to the place of eruption, suggest that degradation of vegetation and fauna with subsequent extinction of the Neanderthal population took place in this region, like on the Apennine Peninsula (Mussi, 2001; Zilhao, 2006). Such pattern is consistent with the materials from Mujina Pećina in Croatia, where micro-Mousterian layers obtained AMS- and ESR-dates within 45–39 ka BP (Rink et al., 2002).

Methods and results of the tephra layer study

To study the mineral composition of tephra layer at Bioče, a single averaged sample was selected uniformly throughout the thickness, samples of deposits 10–15 cm below and above the tephra layer were taken, and a sample from the humic interlayer 1.2, which lay 0.5 m above the tephra (Fig. 3). Samples weighing 300–500 g were divided into coarse (> 0.5 mm) and fine (< 0.5 mm) fractions. Coarse fraction composition was classified into several types of debris, whose fragments were assembled into epoxy resin blocks 25 mm in diameter for subsequent study by optical and electron microscopy methods. The same preparations were made from fine fraction weighed quantities. To this end, samples were preliminarily purified from the carbonate component using 5 % hydrochloric acid solution for 1 minute, then non-dissolved residue

was carefully washed and dried out. Next, a weighed quantity was mixed with resin, solidifier was added, and the mixture was poured into an aluminum ring. After solidification of resin, the preparations were ground and polished on fat-based diamond pastes.

X-ray phase analysis of a sample from the tephra layer, purified from the carbonate component, was conducted in the Laboratory of Cenozoic Geology, Paleoclimatology and Mineralogical Indicators of Climate, the Sobolev Institute of Geology and Mineralogy SB RAS, on the X-ray powder diffractometer DRON-4 (radiation CuK_{α}, a graphite monochromator). The diffraction patterns were scanned in the 2θ interval from 3 to 65°, with a step of 0.05°, the scanning time at a point is 4 s, the slit is 0.5 mm.

The polished samples were studied using the Carl Zeiss Axio Scope A1 microscope in reflected light. The mineral composition, details of mineral aggregate structures, and special features of mineral chemical mechanism were studied on the Tescan Mira 3 scanning electron microscope (SEM) equipped with the energy-dispersive spectrometer Oxford X-Max 80 at the Center for Collective Use of Scientific Equipment for Multi-element and Isotopic Studies of the SB RAS, the Sobolev Institute of Geology and Mineralogy SB RAS. Spectrum survey parameters: accelerating voltage is 20 kV, electron beam current is 1 nA, spectrum collection time is 30 s. Subsequent processing of energy-dispersive spectra was conducted in the automatic mode, using the INCA Energy software. The composition of minerals per minals was recalculated following the standard procedure, using the MS Excel software.

Coarse fraction. The composition of coarse fraction (Fig. 4, *A*) is dominated by limestone debris corresponding to material of the rock shelter vault (Fig. 4, *B*). Fragments of intra-cave dripstone carbonate neoformations are also widespread (Fig. 4, *C*). The second most frequent variety of debris consists of bone fragments in good state of preservation, often charred, which are the remains of economic activities of early inhabitants of the site. Fragments of wax flints that served as raw materials for manufacture of stone tools are also widespread (Fig. 4, *E*). These raw materials probably originated from the Upper Triassic-Early Jurassic rocks, which included flint horizons, according to geological map (Fig. 1). Fragments of siltstones and fined-grained sandstones pertain to rare materials in coarse fraction (Fig. 4, *D*). These are obviously the materials from the Early Jurassic sedimentary formations widespread upstream the Morača River. These rocks were also used by humans to manufacture tools.

Fine fraction. Macroscopically fine fraction is a light-colored brownish-yellow, with a gray tint, granular aggregate of sandy-siltstone size. The grains are dominated by tubular and irregular carbonate aggregates, bone fragments, and flint splinters; more rarely, by rounded grains of colorless or yellowish quartz. The yellowish thin-scaled (coarse silt to fine sand) aggregate, at ×200 magnification, shows separate colorless rounded grains of quartz (more rarely, of feldspar), fragments of bone tissue, yellowish limestones, and brownish flints. Noteworthy is the absence of glass particles (shards) of specific laminar, tubular, or Y-like shapes, which are typical of ash deposits. This fact, as well as the presence of well-preserved shards and pumice particles with typical elongate bubbles in the tephra layers of Temnata (Giaccio et al., 2008) and Crvena Stijena (Morley, Woodward, 2011) caves, which correspond to the Campanian event, raised a doubt in the volcanic origin of this horizon. In addition, estimation of the bulk composition by the X-ray fluorescence method has shown the content of P_2O_5 up to 10 wt%, Na_2O 0.4 wt%, K_2O 0.5 wt%, while typical Campanian tuffs are characterized by the content of phosphorus by an order less, and a considerably greater content of alkalis (Civetta et al., 1997; Fedele et al., 2016).

X-ray phase analysis of a fine fraction sample treated with HCl solution has demonstrated the presence of large amount of chlorite ($(Al,Fe,Mg)_6[(Si,Al)_4O_{10}](OH)_8$) and irregular illite ($(K_{0.6–0.85}Al_2[(Si,Al)_4O_{10}](OH)_2$). Quartz ($SiO_2$), K-feldspar ($(K,Na)[AlSi_3O_8]$), and possibly goyazite ($SrAl_3(PO_4)(PO_3OH)(OH)_6$) are present in smaller quantities.

Chlorites and illite belong to clay minerals and are among the most abundant soil components of various types. Their formation is typical of such surface processes as the building of weathering-crust caused by the destruction of primary (high-temperature—magmatic and metamorphic) rock minerals, and the hydration of silicate volcanic glasses.

Obviously, quartz grains from the fine fraction consist mainly of siltstones and sandstone particles that are a result of the disintegration of erogenous rocks and eolian transfer of materials, while the substantially smaller part of them consists of splinters of flint brought by humans. K-feldspar, peculiar to many magmatic and metamorphic rocks, does not belong to typical soil minerals: under conditions of warm climate and sufficient moistening, it is gradually replaced by clay minerals, predominantly illite and kaolinite.

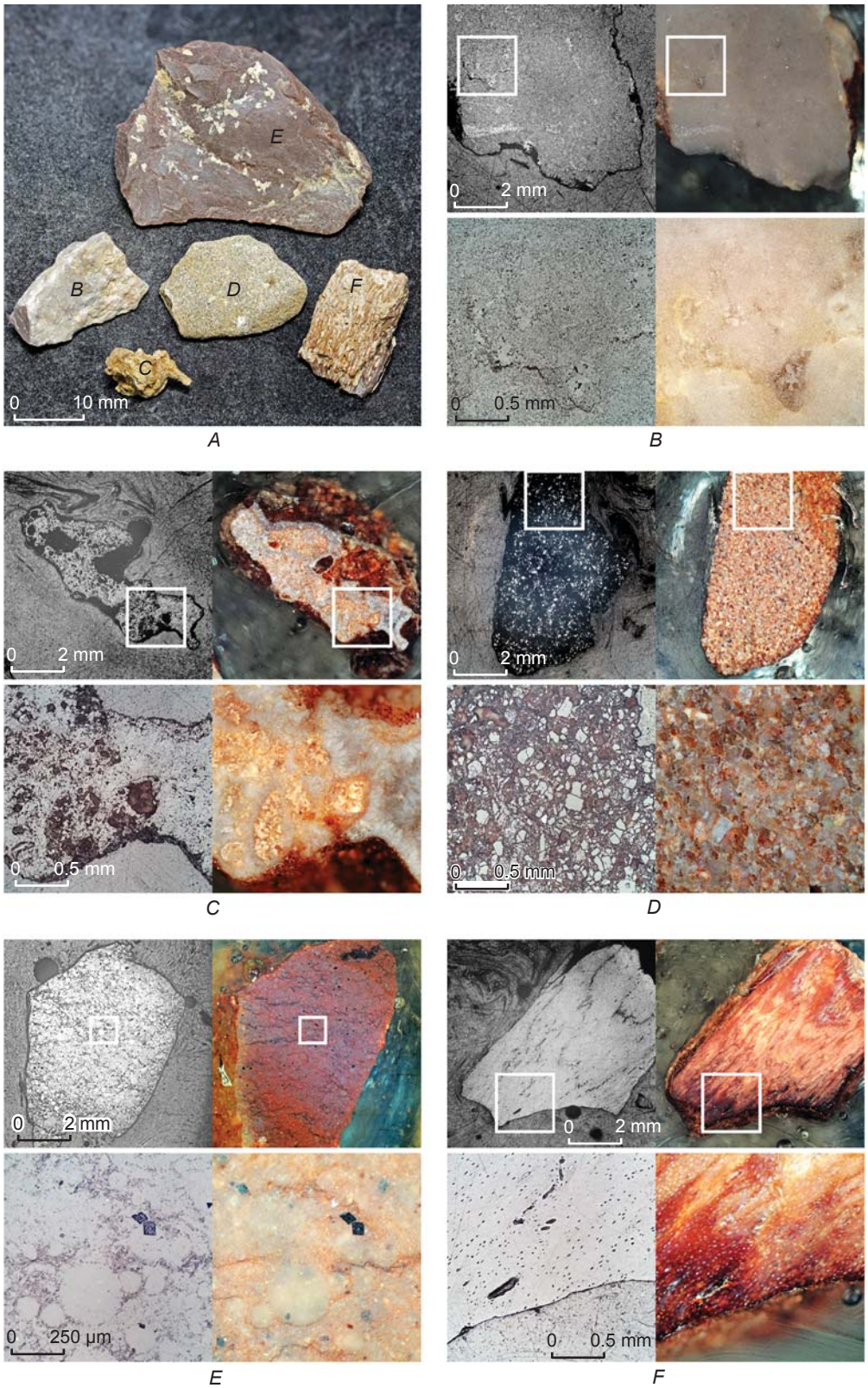

Fig. 4. Main types of fragments in the large fraction from the Bioče tephra layer.
A – general view of typical fragments; *B* – fine-grained pale limestone with recrystallization areas; *C* – carbonaceous fragment of irregular shape—a secondary calcareous crust with cockade-like structure; *D* – fine-grained quartz sandstone with clay-carbonaceous cement; *E* – wax flint with globular structure; *F* – charred bone fragment.

Thus, the presence of a large amount of K-feldspar grains in the sedimentary carbonate formations is not quite typical. The peaks in the X-ray photograph presumably corresponding to goyazite were not confirmed during further study with the use of electron microscopy.

Feldspars. Special attention should be paid to numerous K-feldspar grains discovered in the tephra layer. The grain-size varies from 20 to 470 μm. Fig. 5, A shows elemental areal mapping data laid over the image obtained by SEM. Thus, quartz particles containing a large amount of silicon are tinted with highly-saturated red color, bone fragments rich in calcium are tinted blue, and K-feldspar grains are tinted red and green. These grains are individualized, do not contain mineral or glassy inclusions, and are not in intergrowth with other minerals. Typical features are angular, often weakly elongated shapes, and the presence of reentrant angles (Fig. 5, *B–F*), including crescentic shapes (Fig. 5, *D*, *F*), which are actually not encountered in case of transportation by water or wind. The studied grains are dominated by those rather homogeneous in composition, where variations of main components in the grain are not more than 3–5 mol% of the corresponding minal. The majority of compositions form a compact group with the content of orthoclase minal ($KAlSi_3O_8$) of 51–69 mol% and a small admixture of CaO (0.5–0.7 wt%), which corresponds

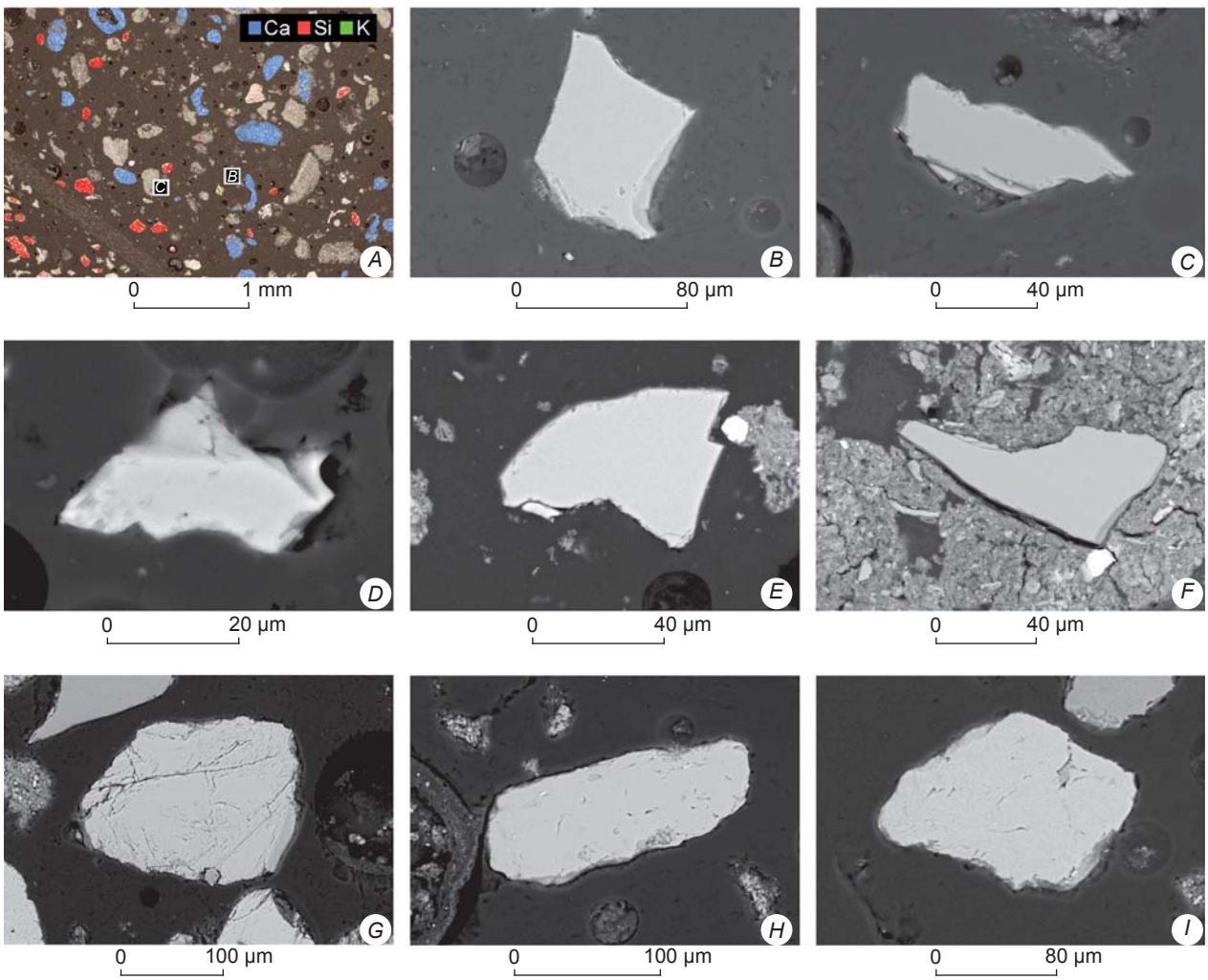

Fig. 5. Back-scattered electron images of a polished samples from the fine fraction of the tephra layer (*A–F*), grains of high-K-feldspars (orthoclase or microcline) of typical (medium- or well-rounded) shape (*G–I*).

A – general view of polished surface with overlaying of results obtained in the element-mapping mode: blue (saturated) color – Ca – bone fragments, red (saturated) color – Si – quartz grains, green color (saturated green touched with red) – K – K-feldspars, bright white grains – Fe oxides and hydroxides, light-gray – clay silicates (chlorite and illite), dark-gray – epoxy resin; *B–F* – fragments of sanidine crystals with typical acute-angled shapes; *G* – from the tephra layer; *H* – from the layer 10–15 cm below the tephra; *I* – from the layer 10–15 cm above the tephra.

to 2–3 mol% of anorthite minal ($CaAl_2Si_2O_8$). The points of compositions with a higher content of Na_2O correspond either to certain areas of zoned crystals or to separate grains. However, it should be considered that all of them are just fragments of larger crystals. Moreover, these grains are also characterized by a relatively high content of calcium (4–6 mol% of An), which allows the studied grains to be assigned to sanidine—a high-temperature modification of K-feldspar with an intermediate composition between albite and orthoclase, with predomination of the latter. Such compositions are typical of fast-crystallizing magmatic effusive rocks.

One of the groups of feldspar grains stands out from the common trend in terms of composition: it shows a very high content of Or minal, which implies a mineral structure corresponding to orthoclase or microcline. Such compositions are typical of feldspars formed in a wide variety of settings: from authigenic (sedimentary) and hydrothermal to metamorphic and intrusive magmatic. Judging by the images obtained by SEM, the surfaces of these grains are very different from those of sanidine in the presence of shagreen and great quantities of microcracks. The shape of the grains ranges from isometric to elongate, with an aspect ratio of up to 1:3. Their size varies from 20 to 165 μm along the long axis. Unlike sanidine, reentrant angles are not typical of them, and they are well rounded (Fig. 5, *G*). It can be assumed that these grains got into the tephra layer either as a result of eolian transfer, or from a secondary collector—siltstones or fined-grained sandstones, whose fragments have also been discovered.

Apart from sanidine and high-K-feldspar, a grain of Na-Ca feldspar (plagioclase, whose composition is consistent with andesine) has been discovered in the tephra layer.

In addition, grains of K-feldspars have been found in the over- and underlying layers. In the underlying layer, two grains have been identified. They are identical to high-K-feldspars in their composition, morphology, and size (Fig. 5, *H*). In the overlying layer, apart from high-K-feldspars (Fig. 5, *I*), three sanidine grains similar to grains from the tephra layer have been found.

The sizes of the feldspar grains were estimated on the basis of 300 grains. 25 grains studied by SEM, and 275 grains visually identified as feldspar grains, according to the degree of transparency, cleavage, and angular shape, were counted. The size was estimated along the long axis under a binocular microscope at ×40 magnification. Generally, the sample is characterized by unimodal distribution, where 71 % of grains are in the range of 90–250 μm (ϕ=3.5–2.0). The distribution is asymmetrical; a shoulder towards smaller grains stands out: about 16 % of the grains are concentrated in the range of ϕ 4.5–3.5 (44–90 μm). Grains larger than 400 μm are single.

Other characteristic minerals. Apart from feldspars, the composition of clinopyroxenes has been also analyzed. In the sample from the tephra layer, they are represented by small (usually less than 100 μm) light-green translucent crystals and fragments. The main composition group of clinopyroxenes from Bioče, in terms of minals (enstatite (En, $MgSiO_3$), wollastonite (Wo, $CaSiO_3$), and ferrosilite (Fs, $FeSiO_3$)) in mol% corresponds to augite having the composition of $En_{36–39}Wo_{47–49}Fs_{13–16}$ with 1.6–5.0, and 0.5–1.4 wt% of Al_2O_3 and TiO_2, respectively. One grain tends towards the diopside composition ($En_{47}Wo_{44}Fs_9$); besides, it is characterized by a low content of TiO_2 (0.3 wt%) and a considerable amount of Cr_2O_3 (0.6 wt%). Three non-titaniferous grains of more ferruginous and low-alumina (0.5–0.8 wt% of Al_2O_3) clinopyroxenes are observed, whose composition can be expressed through the $MgSiO_3$ triangle (enstatite minal, En)—$FeSiO_3$ (ferrosilite minal, Fs) = $CaSiO_3$ (wollastonite minal Wol): $En_{27–34}Wo_{47–49}Fs_{16–25}$.

Also, in the sample from Bioče, grains of moderately titaniferous hornblende, Al-rich chrome spinel, and clay minerals with an increased magnesium content have been found, which indicates a contribution of ophiolitic source to the formation of deposits. The presence of these minerals is explained by the relative closeness of the site to the outcrops of ophiolitic crustal blocks in the central part of the Dinar highlands (see Fig. 1), whose fragments also occur in the Durmitor block.

Discussion

Comparison of sanidine and clinopyroxene grain compositions. Phenocrysts of sanidine, more rarely those of clinopyroxene, plagioclase, and dark-colored minerals, which cumulatively comprise up to 3–6 vol% of the rock, are commonly observed in the scoria deposits and trachyte-phonolitic lithoclasts from the proximal and medial facies of the Campanian eruption (Scarpati, Sparice, Perrotta, 2014). Sanidine forms rather large crystals—up to 4–5 mm along the long axis, its composition varies greatly depending on the eruption phase, and even on a separate impulse (Pappalardo, Ottolini, Mastrolorenzo, 2008; Fedele et al., 2008; 2016). Such large crystals cannot be

transferred over long distances; therefore they are widespread only in the deposits of the Campanian Plain and its immediate surroundings. At the same time, smaller crystals and their fragments can be transferred over large distances; they are even observed in the most distant locations of tephra—on the Russian Plain (Giaccio et al., 2008).

According to comparison of the composition-point distribution of studied sanidine grains from the Bioče tephra layer to the data of the temperature dependence of mineral formation in the albite-anorthite-orthoclase ternary system (Ribbe, 1983) (Fig. 6), the majority of studied sanidine grains from Bioče (apart from high-potassium compositions) were formed at temperatures of 700–900 °C, with subsequent fast cooling, and did not transform into orthoclase-albite aggregate, which is typical of intrusive magmatic rocks and forming in the same range of compositions during slow cooling. Obviously, these grains appeared as a result of volcanic events that were contemporary with the accumulation time of this horizon, or destruction and eolian scattering of more ancient alkaline volcanic rocks relatively close to Bioče. Since it has been impossible to find information about the chemical composition of sanidine from the distal facies of the Campanian eruption, the obtained results were compared to the available data on the proximal and medial facies (Pappalardo, Ottolini, Mastrolorenzo, 2008; Fedele et al., 2008; 2016). According to the petrological models, the melt composition changed regularly from differentiated to a more primitive one with a higher K/Na ratio (Fedele et al., 2016), which affected the composition, of not only produced rocks, but also minerals, including feldspars. The early and intermediate stages of eruption (near (proximal) and distant from the eruption center (medial) facies) are characterized by rather high sodium sanidine $Or_{61–66}$ containing an An component equal to 3–5 mol%; and for the late stage, $Or_{77–85}$ compositions and 2–3 mol% of the An component (Fig. 6).

Grains from Bioče, which are sanidines in their composition, correspond to the early stages of intermediate eruption phases, and are closest to the lower part of the Welded Grey Ignimbrite (WGI) facie, which prevails in volume among the Campanian Plain deposits pertaining to this eruption.

The composition of studied clinopyroxene grains is also in good agreement with the data obtained from proximal and medial deposits (Fedele et al., 2016). The grain $En_{47}Wo_{44}Fs_{9}$ from the Bioče sample can be compared to the high-magnesia clinopyroxene $En_{43–47}Wo_{46–48}Fs_{6–10}$, similar to diopside, for which xenogenic origin is implied. The main group of clinopyroxene compositions from the Campanian Plain deposits $En_{32–39}Wo_{47–49}Fs_{13–20}$ is consistent with the range $En_{36–39}Wo_{47–49}Fs_{13–16}$ of the Bioče site.

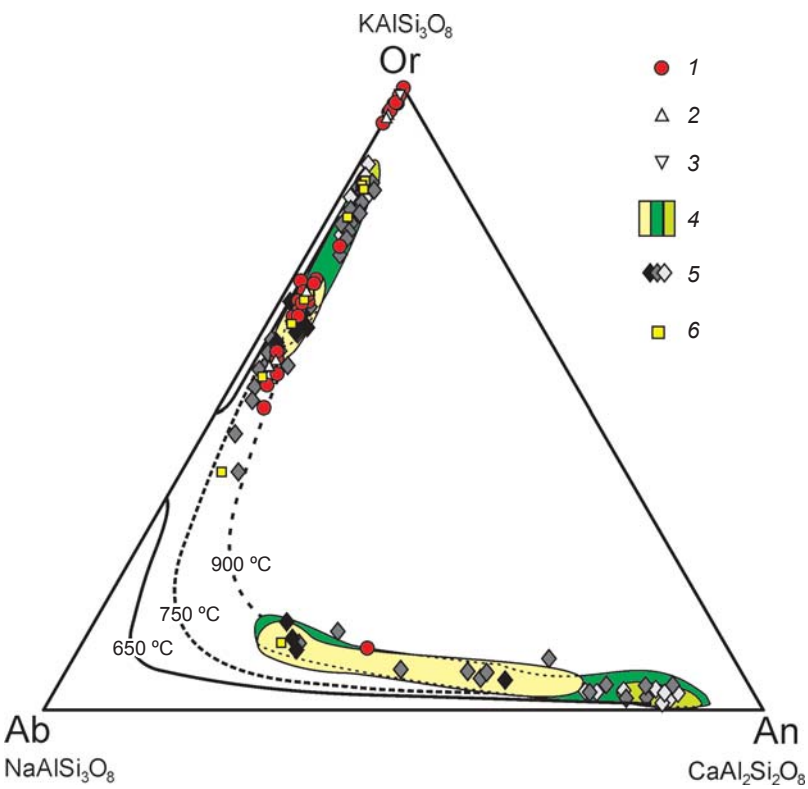

Fig. 6. Composition of feldspar grains from the Bioče tephra layer as compared to proximal (Breccia Museo) and medial pyroclastic deposits of the Campanian Ignimbrite eruption (Pappalardo, Ottolini, Mastrolorenzo, 2008; Fedele et al., 2008; 2016). Isotherms after (Ribbe, 1983).
1 – tephra layer at Bioče; *2* – 10–15 cm over the tephra layer at Bioče; *3* – 10–15 cm under the tephra layer at Bioče; *4* – Breccia Museo (Campi Flegrei), from differentiated to more primitive; *5* – medial tephras from the surroundings of Campanian plateau, from differentiated to more primitive; *6* – distal tephras from stratum XI of Crvena Stijena.

Comparison of grain size. Analysis of the size distribution of tephra particles is also an important method for determining the tephra's source, geographical abundance of ashfalls relating to various stages of eruptions. Detailed studies of the sizes of glassy ash particles from horizon XI of Crvena Stijena were conducted by M. Morley and J. Woodward (2011).

Fragments of sanidine crystals from Bioče are 20–100 μm in size, which generally corresponds to the expected size of ash particles [Ibid.] for this territory, taking into account that many of these grains could have been included in the glassy groundmass replaced by hydrous clay minerals as a result of hydration.

Thus, the composition of the studied grains clearly confirms the volcanic origin and alkali composition of the initial melts.

This fact, and also the characteristic shapes and sizes of fragments when comparing this layer to the regional stratigraphy, allow us to assign these volcanic products to Y-5 tephra.

Conclusions

In the habitation sequence of Bioče, the tephra layer lies inside lithological stratum 1, in stratigraphic unit 1.3. It has been established that artifacts from these deposits, as well as from the underlying (1.4) and overlying (1.2 and 1.1) ones, judging by the main technological and typological characteristics, belong to one and the same lithic industry—the micro-Mousterian facies of the local Middle Paleolithic. The cores of this industry are dominated by radial cores for the detachment of small flakes. Orthogonal shapes are typologically and quantitatively close to them. Longitudinal cores are the most abundant among the monofrontal single-platform cores. Products of Levallois technology and narrow-face cores are observed. Flakes prevail among the spalls. Blade-blanks are rare. Microforms are most typical for the toolkit. The inventory is dominated by side-scrapers, most frequently longitudinal, more rarely transverse. Another mass group consists of atypical end-scrapers. Atypical knives form the third category in terms of quantity. Pointed and combination shapes are relatively scanty.

The materials from key eastern Adriatic sites with micro-Mousterian industries, such as Crvena Stijena (Mihailović D., Mihailović B., Whallon, 2017) and Mujina Pećina (Rink et al., 2002), until recently, in the absence of data on the age and type of Bioče tephra deposits (Đuričić, 2006), were considered evidence of a large time-gap between the episodes of Neanderthal population and the occurrence of modern humans in the region. However, according to the results of recent studies of the upper part of the Bioče deposits, the Campanian Ignimbrite eruption apparently did not interrupt the development of the Neanderthal culture in the eastern Adriatic. Consequently, this territory could have been a Neanderthal refugium in Southeastern Europe. This version is supported by materials from the Velika Pećina cave in Dalmatia, where several Mousterian habitation levels were recorded, aged about 32–35 ka years (Karavanic et al., 2014).

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Ushbulak—A New Stratified Upper Paleolithic Site in Northeastern Kazakhstan

We present the findings of excavations at the stratified site of Ushbulak, discovered during a joint Russian-Kazakhstan research project in 2016. The site is located in the Shilikty Valley, northeastern Kazakhstan, at the junction of routes connecting southwestern Central Asia, southern Siberia, and northern China. On the basis of stratigraphy, chronology, and technological evidence, we identify three technological complexes, relating to the Metal Ages (stratum 1), Final Upper Paleolithic (strata 2–4), and Initial Upper Paleolithic (strata 5.2–7). Focusing on the principal markers of the Initial Upper Paleolithic in the region, we conclude that finds from strata 5.2–7 belong to the southern Siberian-Mongolian variant of the Initial Upper Paleolithic, as evidenced by the uni- and bidirectional parallel volumetric blade core reduction, tool types, and absolute chronology. The tool kit includes mostly endscrapers, heavily retouched blades, and truncated-facetted or notched implements. Particularly diagnostic types include waisted blade, blade with a ventrally retouched distal edge, beveled point, backed blade, stemmed implement with a sharp tip, stemmed endscraper, and burin-core. Two AMS-dates from stratum 6 date this layer to ca 36,180 ± 730 and 41,110 ± 302 BP. The closest known parallels to the industry of the lower strata of Ushbulak are finds from horizon UP2 of Kara-Bom in the Russian Altai. Our results suggest that Ushbulak strata 5.2–7 correlate with the Initial Upper Paleolithic industries of the Altai (Denisova Cave), northern China (Luotoshi), and Mongolia (Tolbor-4 and -21).

Keywords: *Central Asia, Kazakhstan, Initial Upper Paleolithic, lithic industry, cores, blades, tool kit.*

Introduction

Kazakhstan is located in a vast territory connecting several large historically and culturally significant regions: southwestern Central Asia to the south, Siberia to the north, northern China to the east, and Eastern Europe to the west. At the same time, Kazakhstan and southwestern Central Asia belong to the broader region of Central

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Asia. This region is characterized by specific geographic conditions under which an extreme continental and arid climate favors erosion over the accumulation of sediments, which, in turn, makes the detection of stratigraphically intact Paleolithic archaeological sites very difficult. In Kazakhstan, such sites are thus very few and the period is mostly represented by surface finds. This scenario applies not only to the early stages of the Paleolithic, but also to the Upper Paleolithic, a period when population density increased sevenfold and humans settled in all regions of the continent, including the extreme North (Pitulko et al., 2012). Upper Paleolithic artifacts have been recorded *in situ* at several localities in Kazakhstan such as Maibulak and Chokan Valikhanov (Taimagambetov, Ozhereliev, 2008; Fitzsimmons et al., 2017), in southern Kazakhstan. In central and northern Kazakhstan, several stratified Upper Paleolithic sites (Batpak-7, Ekibastuz-15, and Ekibastuz-18) are known. However, these either remain in the early stages of excavation, or their stratigraphic position indicates cultural heterogeneity (Merz, 1990; Taimagambetov, Ozhereliev, 2009).

In the eastern part of Kazakhstan, despite its proximity to the Russian and Mongolian Altai (areas abundant in Paleolithic sites), stratified Upper Paleolithic assemblages were essentially unknown until recently. Over 20 localities containing archaeological remains attributable to the Late Middle and Upper Paleolithic (Zaisan-1–3, Bukhtarma-1–5, Kozybai-1–2, Espe-1–3, and others) are represented by surface assemblages of artifacts, whose number rarely exceeds 100 items (Derevianko, Petrin, Zenin, et al., 2003; Taimagambetov, Ozhereliev, 2009; Derevianko et al., 2016; Shunkov et al., 2016a). The exceptions to this rule are Shulbinka and Bystrukha-2 (Petrin, Taimagambetov, 2000; Derevianko, Petrin, Zenin, et al., 2003). However, in the representative assemblage from Shulbinka (4177 spec.), approximately one third of the finds were collected from the surface, while the rest of artifacts found in a stratified context are believed to be mixed. Typologically, the artifacts can be divided into three complexes: the Middle Paleolithic (Mousterian), Initial Upper Paleolithic, and Final Pleistocene/Holocene (Petrin, Taimagambetov, 2000; Taimagambetov, Ozhereliev, 2009). A small assemblage (14 spec.) from Bystrukha-2 was recovered from a clear stratigraphic context defined by AMS-date generated on bone sample—ca 29 ka BP. This site can be attributed to the Initial Upper Paleolithic (Derevianko, Petrin, Zenin, et al., 2003; Rybin, Nokhrina, Taimagambetov, 2014).

Reconnaissance conducted by the joint Russian-Kazakhstan Expedition in 2016 in the Shilikty Valley, northeastern Kazakhstan, revealed a new stratified site of Ushbulak, whose archaeological assemblages represent various stages of the Upper Paleolithic (Shunkov et al., 2016a, 2016b; Shunkov et al., 2017).

Site description

The Ushbulak site is located in the eastern part of the Shilikty Valley (Zaisansky District of the Eastern Kazakhstan Region) (Fig. 1). The valley is approximately 80 km long and 30 km wide. The transverse profile of this intermontane depression is roughly symmetric, while the longitudinal profile is asymmetric. The valley is surrounded by mountain ridges: Manyrak to the north, Saur to the east, and Tarbagatai to the south and west.

In the course of reconnaissance conducted by the Russian-Kazakhstan Expedition in 2016 in Ushbulak, in the upstream area of Vostochny creek (1500 m asl), numerous Upper Paleolithic artifacts (approximately 1.5 thousand specimens) were collected from the waterway's channel. Excavations further revealed several

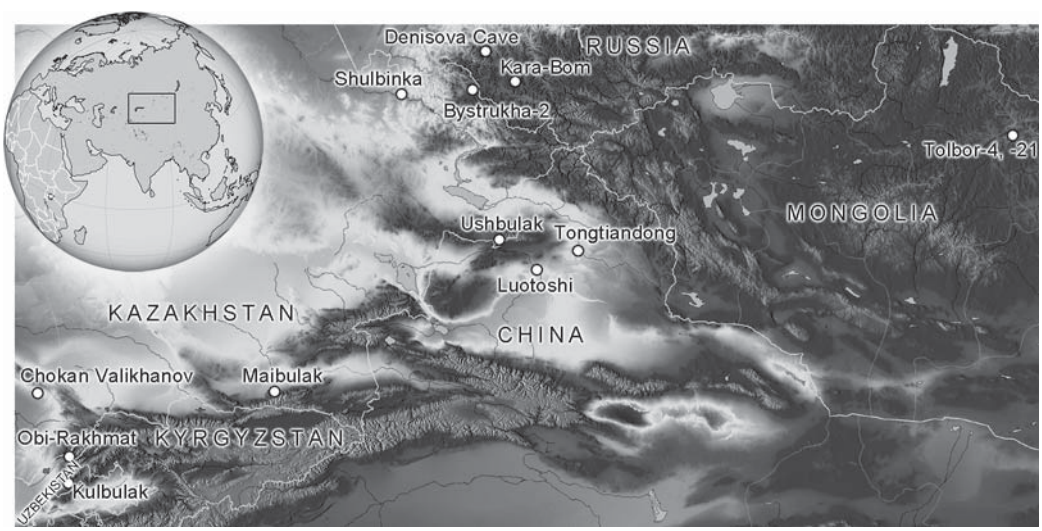

Fig. 1. Principal sites with Initial Upper Paleolithic features in northern Central Asia.

stratified archaeological complexes attributable to the Initial Upper Paleolithic through the Metal Ages.

In 2016, on the left bank of the Vostochny, near its source, a trench was laid down perpendicular to the slope, and several test pits were made on both banks downstream (Fig. 2) (Shunkov et al., 2016b, 2016c; Derevianko et al., 2017). In 2017, we conducted two excavations totaling 10.5 m^2 in the upper and lower portions of the trench (Anoikin et al., 2017; Pavlenok et al., 2017). Roughly eight lithological strata, including seven layers with cultural material, were identified in the sediment profile, with a total depth of approximately 7 m.

Stratigraphy

The composite stratigraphic profile represents sequences recorded in excavations 1 and 2 (Fig. 3, *A*). Excavation 1 is located near a baulk on the left bank of Vostochny creek, its depth being 3.5 m (Fig. 3, *B*). Excavation 2 was laid down next to the narrow side of excavation 1, near the base of the left side, and was excavated to a depth of 2.7 m, 1.2 m below the water level (Fig. 3, *C*) (Pavlenok et al., 2017).

The following sediments were recorded in the section (from top down):

Stratum 1. A humic horizon of modern soil 0.15–0.20 m thick, with a horizon of blackish-brown sandy loam 0.20–0.25 m thick. Roughly ninety percent of the area is damaged by rodent activity.

Stratum 2. Light gray sandy loam abounding in grus (angular, coarse-grained fragments) and gravel. Roughly eighty percent of the area has been disturbed by rodent activity. The stratum is composed of three horizons corresponding to different dynamic phases of deluvial and proluvial processes. Thickness, 1.0–1.2 m.

Stratum 3. Light sandy and clay loams, pale yellow and grayish-brown in color, with grus and sand. The stratum is composed of three horizons corresponding to different dynamic phases of deluvial and proluvial processes. Thickness, 1.2–1.4 m.

Stratum 4. Fine-grained sand and ochroid and yellowish-brown sandy loam overlying a thin layer of fine gravel and grus mixed with sandy loam. The stratum contains two horizons of similar proluvial sediments formed by a temporary stream in the area of active sedimentation. Thickness, 0.2–0.5 m.

Stratum 5. Heavy light gray sandy loam abounding in grus, proluvial-slopewash. The stratum contains two horizons. The lower of the two distinguished by a significantly higher frequency of iron staining. Thickness, 0.4–0.6 m.

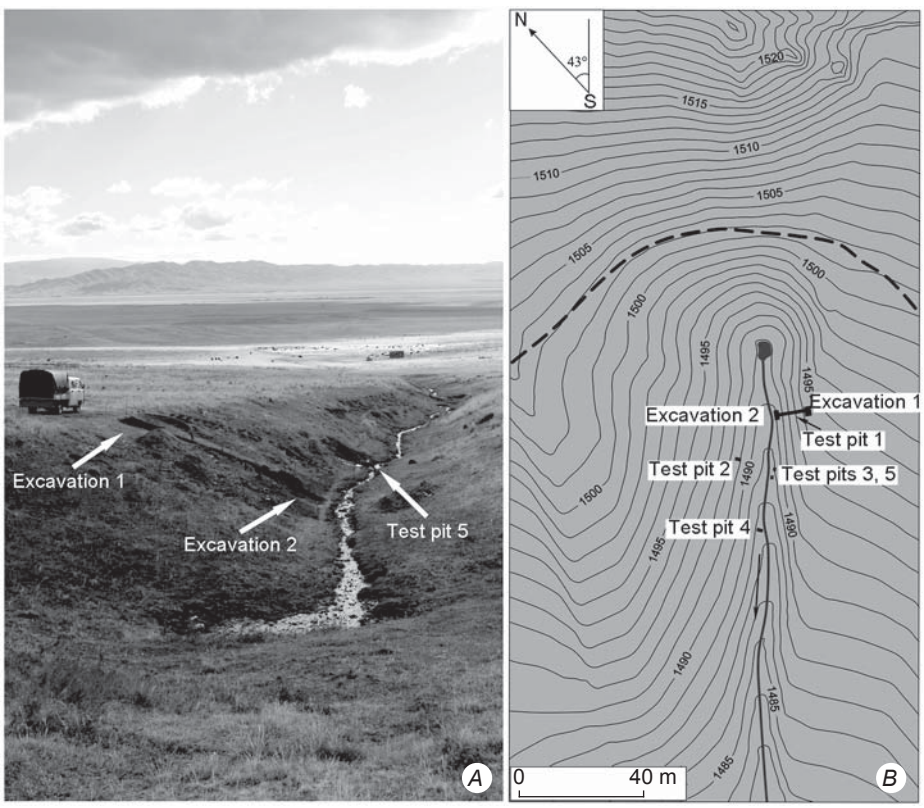

Fig. 2. Northeastern view of Ushbulak (*A*) and plan of the site (*B*).

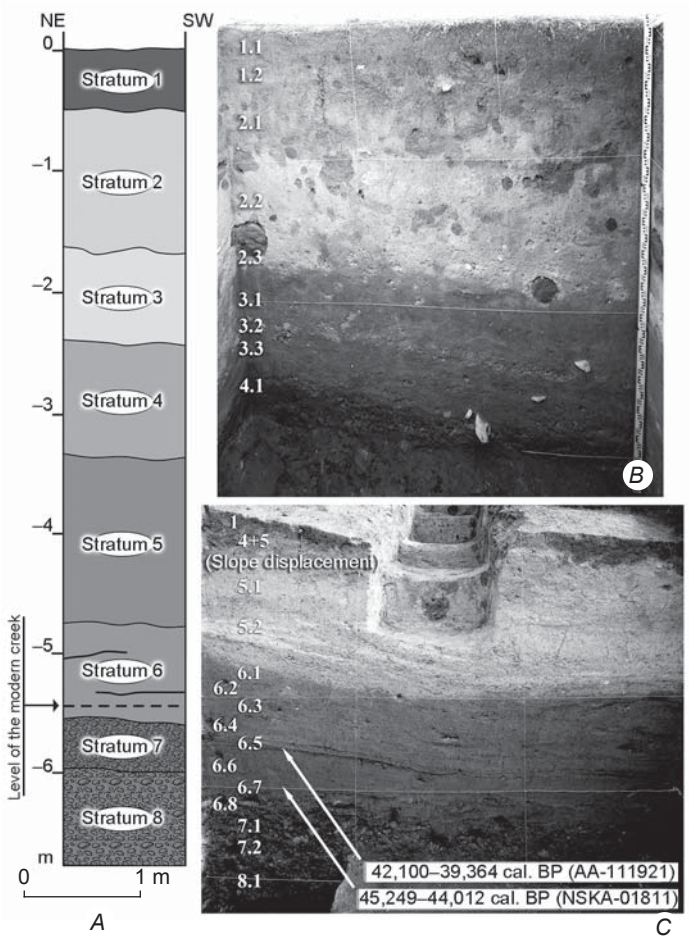

Fig. 3. Stratigraphic sequences of the main lithological strata at Ushbulak (*A*), and northeastern walls of excavations 1 (*B*) and 2 (*C*).

Stratum 6. On the basis of changes of lithology and the distribution of artifacts, this stratum was subdivided into eight horizons falling in two sequences. The upper sequence (horizons 6.1–6.5) consists mostly of proluvium/slopewash. It is composed of a heavy, gray sandy loam with admixture of grus. The lower portion of the sediment displays thin and short lens-like inclusions of light, humic clay loam, blackish-brown in color. The upper sequence is 0.4–0.5 m thick. The lower sequence (horizons 6.6–6.8) is formed by alluvial sediments from a shallow, slow-running stream with a relatively stable hydrological regime and low channel erosional activity. The sequence consists of gray clay loam, which becomes plastic when moist. Its lower portion contains lenses and thin layers of coarse-grained sand, reddish-ochroid in color. The lower sequence is 0.3–0.4 m thick.

Strata 7 and 8 are represented by a sequence of coarse proluvial debris.

Stratum 7. Gravel and grus mixed with porous sand and clay loam infill, reddish and brown in color. The gravel particles are large or medium sized, randomly oriented, and both densely and regularly distributed. Based on changes in the clay-rich component in the infill and the larger size of gravel particles in the bottom section of the stratum, we established two horizons in this layer. Thickness, 0.3–0.5 m.

Stratum 8. Multicolored sediment composed of grus and gravel, with sporadic boulders and an infill of sand and clay loam. Coarse gravel prevails. Based on an increase of the clay component in matrix and a color change in this feature, the increase of gravel particle size, and the appearance of boulders towards the bottom of the layer, this stratum is separated into two horizons. Excavated thickness, 0.8 m.

Scientific analyses

AMS-dating. Two radiocarbon dates are available for stratum 6. One of them is 36,180 ± 730 BP (AA-111921: 42,100–39,364 cal BP at 95.4 %; date modeled in OxCal v. 4.3.2, using IntCal13 atmospheric curve). This was generated on charcoal from the middle portion of the stratum (horizon 6.5) by the University of Arizona AMS Facility (Tucson, USA). The other one was released by the Center of Cenozoic Geochronology (Novosibirsk, Russia) on small bone fragments from the lower portion of the stratum, and is dated to 41,110 ± 302 BP (NSKA-01811: 45,249–44,012 cal BP at 95.4 %; date modeled in OxCal v. 4.3.2, using IntCal13 atmospheric curve) (Fig. 3, *C*).

Petrographic analysis. Judging by the analysis of artifacts from the upper complex (strata 1–4), tools were made of various rocks, mostly low-quality, from sources in the immediate vicinity of the site. These consisted of effusive rocks, slates, quartzite, granitoids, coarse-grained sandstone, and aleurite. Siliceous rocks form less than 30 % of the assemblage from these layers.

The petrographic analysis of artifacts indicates marked differences in the criteria used for selecting raw material between the early and later habitation stages. In the assemblage from the lower complex (strata 5.2–7), artifacts made of local siliceous rocks (chert) of high quality form the largest share of objects (95 %). In some cases, silicified alevrolite and tuff were also utilized. Judging by the cortical surfaces of artifacts, most of the items in this layer were fashioned from larger nodules or, less frequently, on pebbles. Modern exposures of similar siliceous rocks represented by large boulders are located 10 km from the site, in the Ak-Su River gorge, running

along the southern slope of the Saur ridge. Siliceous pebbles can also be found in the channels of the Chagan-Obo and Uidene rivers, 8–10 km from the site.

Fauna. In 2016–2017, over 300 unidentifiable fragments of bones belonging to middle-sized ungulates (horse/argali size) were collected from various strata of the site. Most fragments are from 1–2 to 2–5 cm long. Rare identifiable remains, represented primarily by teeth or their fragments, were found in strata 2, 3, 6, and 7. Species composition is similar in all the strata. The assemblage includes argali (*Ovis ammon*), Siberian ibex (*Capra sibirica*), and kulan (*Equus hemionus*). Undifferentiated equid remains (*Equus* sp.) probably also belong to the kulan. No remains of small mammals were found (Shunkov et al., 2016c; Anoikin et al., 2017; Pavlenok et al., 2017).

Table 1. **Composition of lithic industries from Ushbulak, spec.**

Category/group	Stratum							Total	Surface collection
	1	2	3	4	5.2	6	7		
Core-like:	–	2	1	4	–	12 (0.5)	33 (1.5)	52	38 (2.9)
cores	–	–	1	2	–	7 (58.3)	25 (75.8)	35	24 (63.2)
core-like shatters	–	–	–	1	–	5 (41.7)	7 (21.2)	13	12 (31.6)
flaked pebbles/nodules	–	2	–	1	–	–	1 (3.0)	4	2 (5.3)
Byproducts of core trimming:	2	7	4	18	3	560 (21.9)	461 (20.7)	1056	137 (10.5)
cortical flakes	–	–	1	1	–	43 (7.7)	27 (5.9)	72	22 (16.1)
secondary flakes	1	–	–	2	2	232 (41.4)	89 (19.3)	326	47 (3.6)
flakes from the core's hinge	–	–	–	–	–	30 (5.4)	14 (3.0)	44	–
flakes from the core's front	–	–	–	–	1	13 (2.3)	4 (0.9)	18	9 (0.7)
ridged flakes	–	–	–	1	–	11 (2.0)	20 (4.3)	32	4 (0.3)
half-ridged flakes	–	–	1	1	–	111 (19.8)	118 (25.6)	232	23 (1.8)
natural lateral flakes	1	1	–	2	–	34 (6.1)	79 (17.1)	121	4 (0.3)
lateral flakes	–	4	–	7	–	57 (10.2)	84 (18.2)	152	19 (1.5)
rejuvenation core tablets	–	2	2	4	–	25 (4.5)	20 (4.3)	49	7 (0.5)
plunging flakes	–	–	–	–	–	4 (0.7)	6 (1.3)	10	2 (0.2)
Blades (width, mm):	1	1	–	3	5	720 (28.1)	713 (32.1)	1443	575 (43.9)
≥60	–	–	–	–	–	–	1 (0.1)	1	2 (0.3)
40–59	1	–	–	–	–	16 (2.2)	38 (5.3)	55	34 (5.9)
20–39	–	–	–	1	3	429 (59.6)	461 (64.7)	894	387 (67.3)
12–19	–	1	–	2	2	275 (38.2)	213 (29.9)	493	152 (26.4)
Bladelets and microblades	2	9	2	3	–	169 (6.6)	79 (3.6)	264	8 (0.6)
Blade flakes (length, mm):	–	2	1	3	1	89 (3.5)	46 (2.1)	141	62 (4.7)
large (≥50)	–	1	–	1	1	38 (42.7)	24 (52.2)	65	39 (62.9)
medium (30–49)	–	1	–	1	–	47 (52.8)	18 (39.1)	67	23 (37.1)
small (≤29)	–	–	1	1	–	4 (4.5)	4 (8.7)	9	–
Flakes (mm):	7	14	4	23	6	1008 (39.4)	891 (40.1)	1953	489 (37.4)
large (≥50)	–	1	–	4	–	39 (3.9)	110 (12.3)	154	105 (21.5)
medium (30–49)	4	3	–	13	5	178 (17.7)	253 (28.4)	456	161 (32.9)
small (≤29)	3	10	4	6	1	791 (78.5)	528 (59.3)	1343	223 (45.6)
Fragments and shatters	16	14	6	28	4	1525	775	2368	168
Chips	–	–	–	–	–	949	104	1053	–
Total	28	49	18	82	19	5032 (100)	3102 (100)	8330	1477 (100)

Note. Percentages, indicated in parentheses, were calculated only for assemblages represented by statistically significant samples. The share of each category is % from the total number of well-represented types (without fragments, shatters or chips). The share of each group within a category is % from the total number of artifacts of the respective category.

Archaeological remains

Within the site's stratigraphic sequence, we identified two complexes of artifacts: the upper (strata 1–4) and lower (strata 5.2–7) assemblages (Fig. 3, *A*). Lithic artifacts from the upper portion total 177 specimens, including debitage pieces—fragments and shatters (Table 1). The majority of artifacts (8153 spec.) were found in the lower portion of the sequence (Table 1).

Stratum 1 contained 28 lithic artifacts, most of them debitage pieces (16 fragments and pieces of shatter, and 12 flakes), 12 potsherds dating to the Metal Ages (one of them bears incised horizontal lines), and 28 bones of Holocene animals. The lithic industry from strata 2 and 3 (49 and 18 spec., respectively) includes a narrow-fronted core for microblades and bladelets (Table 2). In terms of large detached products, flakes dominate the assemblage, while the proportion of blades is insignificant. The presence of microblades and bladelets is indicative of the Final Upper Paleolithic. Typological criteria (flake, blade with discontinuous lateral retouch, and flake with unifacial retouch) also support this attribution (Table 3). Lithic artifacts from stratum 4 (82 spec.) are concentrated mostly in the upper portion of the sediment. Cores consist of parallel cores with a wide flaking surface, and single-platform cores with one flaking surface for triangular products and bladelets (see Table 2). Flakes are most numerous among the category of detached pieces. The only tool found in the assemblage is a tablet-like implement with a pointed tip formed through discontinuous stepped retouch (see Table 3). Based on stratigraphic position, stratum 4 would appear to be earlier

Table 2. **Core-like pieces from Ushbulak, spec.**

Group/type	Stratum				Total	Surface collection
	3	4	6	7		
Radial:	–	–	–	–	–	2
with two flaking surfaces	–	–	–	–	–	2
Parallel with a wide flaking surface:	–	2	6	22	30	11
single-platform with one flaking surface for blades	–	–	–	3	3	–
single-platform with one flaking surface for bladelets	–	1	–	–	1	–
single-platform with one flaking surface for flakes	–	1	–	1	2	2
double-platform bidirectional with one flaking surface for blades	–	–	2	4	6	7
double-platform bidirectional with one flaking surface for blades with displaced platforms	–	–	4	12	16	2
double-platform bidirectional with two flaking surfaces for blades	–	–	–	1	1	–
double-platform with two flaking surfaces and conjugate platforms for blades	–	–	–	1	1	–
Multidirectional for flakes	–	–	1	–	1	2
Parallel narrow-fronted:	1	–	–	2	3	3
single-platform with one flaking surface for blades	1	–	–	1	2	1
double-platform with one flaking surface for bladelets	–	–	–	2	2	2
Subprismatic	–	–	–	–	–	1
Burin-cores	–	–	–	1	1	2
Microcores:	–	–	–	–	–	6
narrow-fronted single-platform with one flaking surface	–	–	–	–	–	2
subprismatic	–	–	–	–	–	1
wedge-shaped (blanks)	–	–	–	–	–	3
Core-like fragments	–	–	5	7	12	9
Flaked pebbles/nodules	–	–	–	2	2	2
Total	1	2	12	34	49	38

Table 3. **Tools from Ushbulak, spec.**

Group/type	Stratum					Total	Surface collection
	2	4	5.2	6	7		
1	2	3	4	5	6	7	8
Sidescrapers:	–	–	–	3 (7.7)	–	3	2 (5.0)
single	–	–	–	1 (2.6)	–	1	1 (2.5)
transverse	–	–	–	1 (2.6)	–	1	1 (2.5)
diagonal	–	–	–	1 (2.6)	–	1	–
Endscrapers:	–	–	–	9 (23.1)	28 (30.1)	37	7 (17.5)
on blades	–	–	–	8 (20.5)	16 (16.5)	24	4 (10.0)
double on blades	–	–	–	–	2 (2.1)	2	–
carinated on blades	–	–	–	1 (2.6)	2 (2.1)	3	–
on blades with a trimmed base	–	–	–	–	1 (1.0)	1	1 (2.5)
on blade-flakes	–	–	–	–	3 (3.1)	3	2 (5.0)
angle	–	–	–	–	3 (3.1)	3	–
ogival	–	–	–	–	1 (1.0)	1	–
Beveled points with trimmed base	–	–	–	–	1 (1.0)	1	–
Stemmed implements with a sharp tip	–	–	–	1 (2.6)	–	1	–
Implements with a sharp retouched tip	–	–	1	1 (2.6)	–	2	–
Chisel-like implements	–	–	–	1 (2.6)	–	1	–
Truncated blades	–	–	–	1 (2.6)	9 (9.3)	10	2 (5.0)
Truncated-facetted implements	–	–	–	–	2 (2.1)	2	1 (2.5)
Knives:	–	–	–	1 (2.6)	–	1	5 (12.5)
with retouched working edge	–	–	–	1 (2.6)	–	1	2 (5.0)
with utilization retouch	–	–	–	–	–	–	3 (7.5)
Burins:	–	–	–	3 (7.7)	1 (1.0)	4	3 (7.5)
angle	–	–	–	1 (2.6)	1 (1.0)	2	2 (5.0)
angle retouched	–	–	–	1 (2.6)	–	1	–
transverse	–	–	–	1 (2.6)	–	1	1 (2.5)
Bifacially worked implements	–	–	–	–	–	–	3 (7.5)
Planes	–	–	–	–	–	–	1 (2.5)
Perforators/borers	–	–	–	1 (2.6)	2 (2.1)	3	1 (2.5)
Spur-like implements	–	–	–	4 (10.3)	5 (5.2)	9	–
Notched implements:	–	–	–	3 (7.7)	14 (14.4)	17	2 (5.0)
with retouched encoches	–	–	–	3 (7.7)	14 (14.4)	17	2 (5.0)
Denticulates	–	–	–	1 (2.6)	1 (1.0)	2	2 (5.0)
Combination implements:	–	–	–	–	3 (3.1)	3	1 (2.5)
sidescraper + knife	–	–	–	–	–	–	1 (2.5)
sidescraper + retouched encoche	–	–	–	–	–	–	–
endscraper + retouched encoche	–	–	–	–	1 (1.0)	1	–
bec + retouched encoche	–	–	–	–	1 (1.0)	1	–
truncated flake + retouched encoche	–	–	–	–	1 (1.0)	1	–
Stemmed implements	–	–	–	–	3 (3.1)	3	–
Waisted blades	–	–	–	–	1 (1.0)	1	–
Blades with trimmed distal part	–	–	–	2 (5.1)	–	2	3 (7.5)

Table 3 (end)

1	2	3	4	5	6	7	8
Backed bladelets	–	–	–	–	2 (2.1)	2	–
Flakes with ventral trimming	–	–	–	–	–	–	2 (5.0)
Blades with heavy retouch	–	–	–	8 (20.5)	21 (21.6)	29	5 (12.5)
Blades with irregular retouch	1	–	–	12	51	63	8
Flakes with regular retouch	–	–	–	5	23	28	–
Flakes with irregular retouch	2	1	–	5	35	43	8
Hammerstones	–	1	–	–	–	1	–
Fragments of implements	–	–	1	2	1	4	2 (3.4)
Total	3	2	2	63 (100)	203 (100)	272	58 (100)

Note. Percentages, indicated in parentheses, were calculated only for assemblages represented by statistically significant samples. The share of each category and group is % from the total number of typologically distinct items.

than strata 2 and 3; however, owing to the paucity of finds in this level, it is impossible to assess their chronological attribution with higher precision.

The Paleolithic assemblage from strata 5.2–7 is represented by materials spanning the complete technological cycle of flint knapping, including tested nodules, cores, blanks, core-trimming elements, waste, and finished tools (see Table 1).

The principal reduction technique employed in this assemblage was the detachment of blades from parallel and subparallel bidirectional volumetric cores. Two-thirds of cores are of this type (see Table 2). This category consist of double-platform, subprismatic nuclei with one flaking surface for bidirectional reduction (Fig. 4, *1–3*, *5*), including those with a wide flaking surface and opposing striking-platforms oriented at different angles (semi-tourné). Some single-platform and single-fronted cores in the final stage of reduction could also have been used for bidirectional knapping at earlier stages. Three morphologically distinct cores exhibit knapping from the narrow face. All display the same reduction technique, which included shaping and rejuvenation of striking-platforms from the flaking surface. This normally resulted in ridged or half-ridged flakes, which ensured regularity, convexity of the flaking surface, and standardization of cores. Some rejected cores were used as hammerstones, as evidenced by zones of microflaking on their lateral sides.

Blades, including bladelets and microblades, constitute the most representative category of artifacts among the detached pieces (see Table 1). Microblades were probably removed from small cores or core-burins. However, most microblades in the assemblage represent unintended debitage that, most likely, resulted from preparation of working edges of cores. About 80 % of elongated flakes demonstrate traces of longitudinal and bilongitudinal faceting of dorsal surfaces (in equal proportions).

Blades are characterized by planar striking-platforms (57 %) and thoroughly prepared flaking zones (69 %). The following techniques of preparation can be observed on flaking zones: direct (32 %) or indirect (20 %) reduction of the striking-platform, employed separately or jointly (11 %); overhang reduction (17 %) and pecking, applied separately (11 %) or in combination with reduction (6 %).

Most flakes have longitudinal faceting on dorsal faces (52 %) and plane striking-platforms (56 %). Half of the recovered flakes show no traces of preparation on the flaking zones, while the other half were prepared using the same techniques employed for detachment of blades. Correlation analysis of cores suggests that most flakes were byproducts of core trimming, i.e., preparation and rejuvenation of striking-platforms, lateral or initial ridges. The fact that flakes with some remnant cortex on their dorsal surfaces are more numerous than blades with a similar feature, also underscores the technical character of the former.

Byproducts of core trimming in this assemblage (see Table 1) include cortical and secondary flakes, as well as ridged and half-ridged flakes. A small series of rejuvenation core tablets were also found. Plunging flakes, which are the outcomes of unsuccessful reduction whereby the core base was lost (usually together with the opposite platform), can also be tentatively attributed to the category of byproducts. The lack of large cortical flakes suggests that most cores were reduced elsewhere, i.e. outside the excavated portion of the site.

Comparison between striking-platforms on blades and on flakes provides important information. Frequencies of platform overhang and striking point in blades (22 % and 15 %, respectively) and in flakes (24 % and 17 %, respectively) are virtually the same. Byproducts of core trimming and tool blanks were possibly detached using the same technique, and with similar hammerstones. Without experimentation using local raw material, it is difficult to identify the type of hammerstone used in production. However, in experiments reproducing the

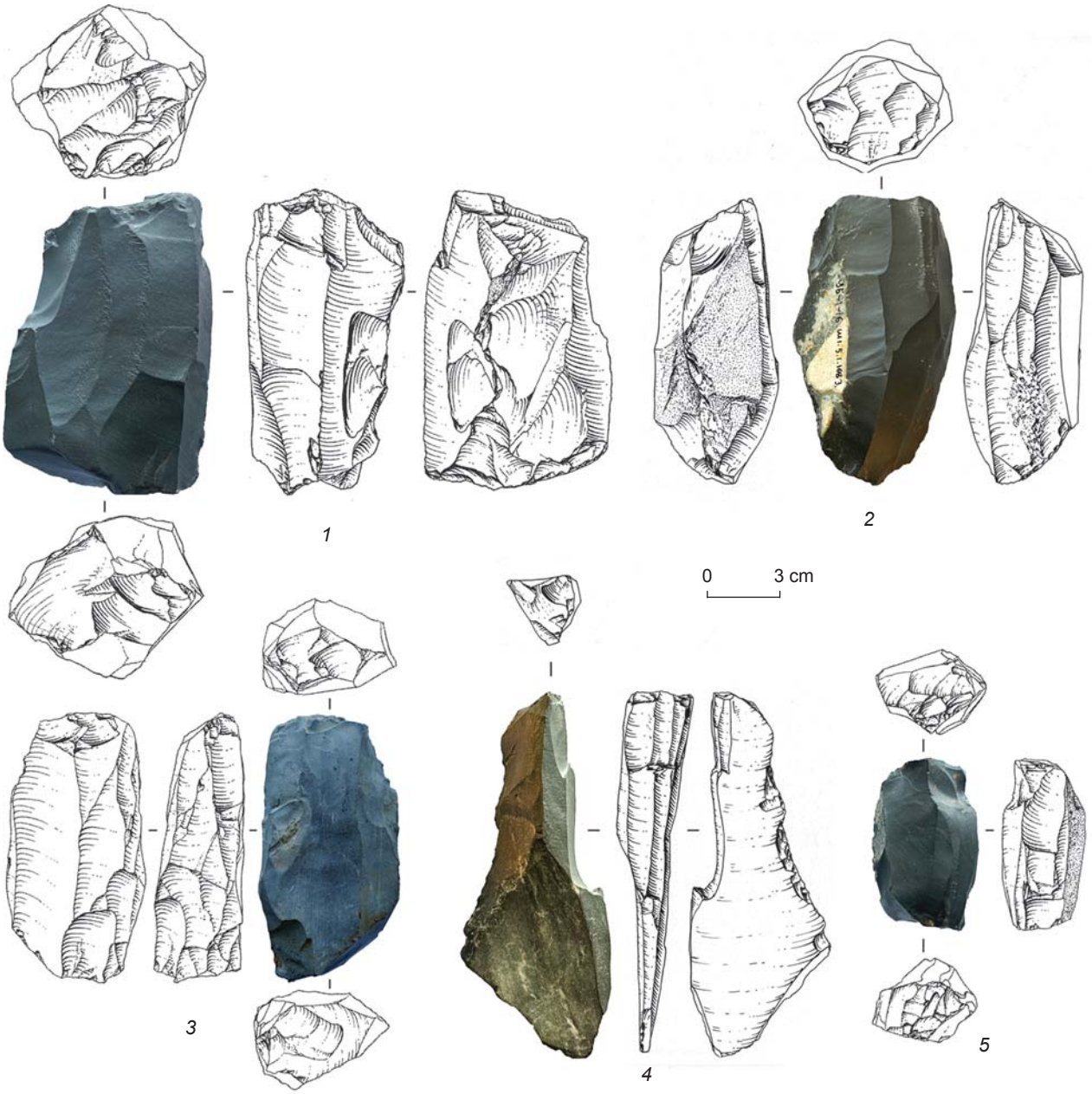

Fig. 4. Cores from the Ushbulak lower strata.

Initial Upper Paleolithic tools from Mongolia (Tolbor-15, horizons 5–7), similar frequencies resulted from using a hammerstone whose hardness was close to that of the raw material (Kharevich et al., 2017).

The tool kit from strata 5–7 includes 268 implements, most of them flakes exhibiting irregular or semi-irregular retouch (50 % of all tools) (see Table 3). Typologically distinct tools (133 spec.) demonstrate the developed Upper Paleolithic component (see Table 3). Endscrapers constitute the most numerous category of implements (28 %, hereinafter, percent of all typologically distinct tools). The most frequent are endscrapers on large blades (Fig. 5, *1*, *4*, *5*), including carinated endscrapers and an endscraper with a trimmed base (Fig. 5, *5*), as well as double endscrapers on narrow, medium-sized blades (Fig. 5, *7*). Intensively retouched blades (22 %) and implements with retouched notches (13 %) are common finds. Truncated and truncated-facetted implements (9 %) (Fig. 5, *2*), perforators, and large spur-like tools (9 %) also form a distinct group. Burins with transverse and angular forms are few in number. On angular burins, removal of the burin spall was prepared through retouching of the blank's longitudinal edge (Fig. 5, *10*). The assemblage also contains weakly retouched points (Fig. 5, *8*).

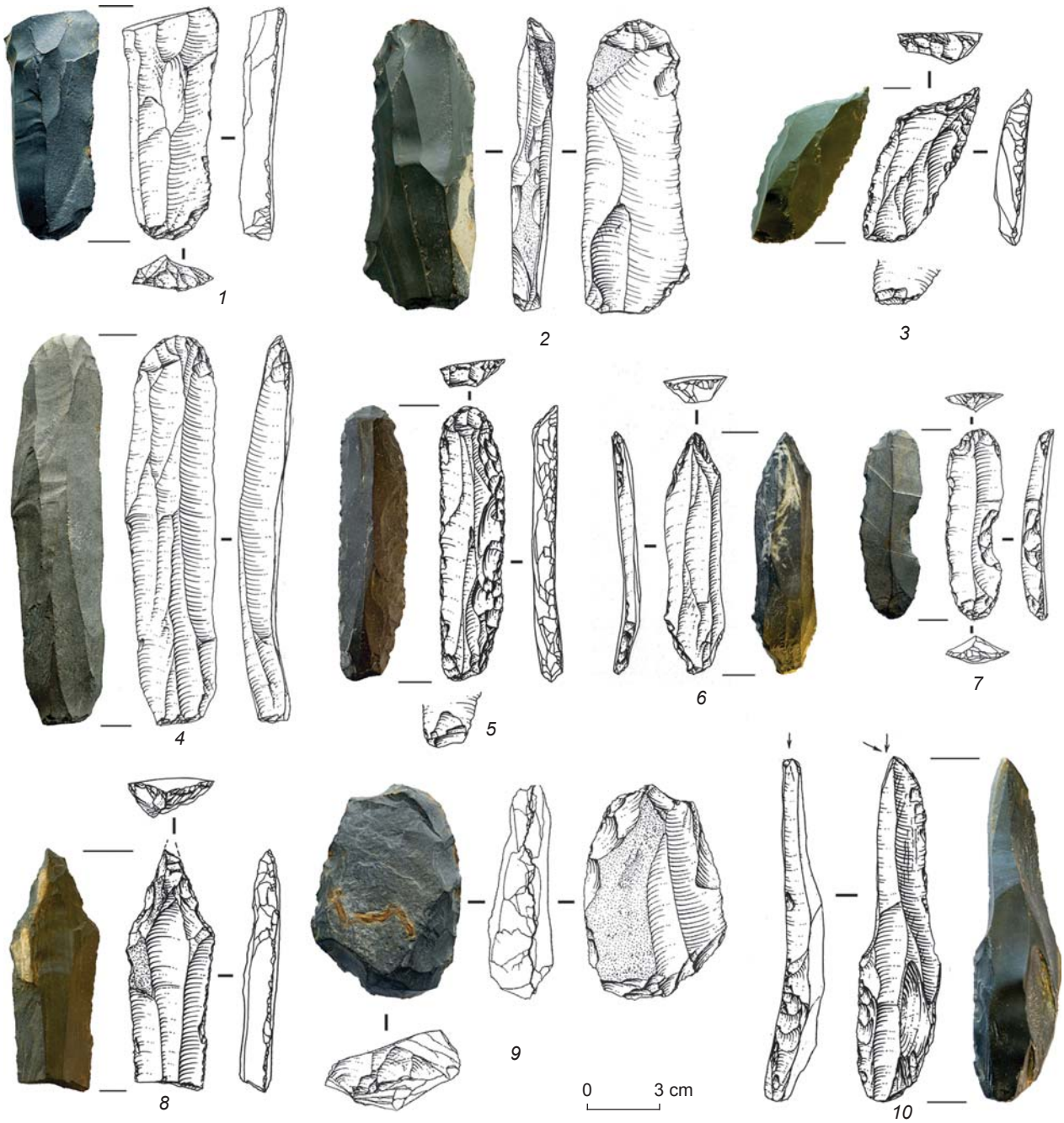

Fig. 5. Tools from the Ushbulak lower strata.

Sidescrapers are scarce and indistinct, and one of these demonstrates bifacial retouch (Fig. 5, *9*).

Solitary diagnostic artifacts form an important element of the tool kit. This group of tools includes one waisted blade, several implements with ventrally retouched proximal edge including a beveled, heavily retouched point (Fig. 5, *3*), an endscraper (Fig. 5, *5*), an implement with a sharp tip (Fig. 5, *6*), a stemmed endscraper, blades with ventrally retouched distal sections, and blades with distal ends blunted through retouch. The assemblage from stratum 7 contains a burin-core. Two more burin-cores were collected from the surface in close proximity to the excavated area (Fig. 4, *4*). Stratum 6 contained a small talc tablet with traces of artificial polishing in some places (Shunkov et al., 2019).

The presence of the above mentioned diagnostic tool types and characteristic features of the primary reduction process (such as the absolute predominance of double-platform blade cores for bipolar reduction; the prevalence of blades, including those whose length exceeds 20 cm;

and the wide use of pecking for preparation of flaking surface) makes it possible to correlate the lower complex with the Initial Upper Paleolithic.

Nearly all artifacts collected from the surface can probably be also attributed to this period (see Tables 1–3). Ninety-nine percent of these objects were recovered from within the stream channel. Their nearly-identical technique, tool types, and raw material link them reliably with strata 6 and 7. Additionally, analysis of geomorphological situation nearby the site has demonstrated that the Vostochny in its upper reaches is actively eroding precisely these strata.

Discussion

Finds from the upper strata of Ushbulak are few, so their interpretation and chronological attribution must remain tentative. The assemblage from Holocene sediments of stratum 1 contains a potsherd decorated with incised horizontal lines, which likely dates to the Metal Ages. Based on the presence of microblades and bladelets, strata 2–4 most likely correlate with the late stages of the Upper Paleolithic.

Within Kazakhstan, the Final Paleolithic industries of Ushbulak have the closest parallels in the late complex of Shulbinka (Petrin, Taimagambetov, 2000) and in the upper complex of Angrensor-2 (Taimagambetov, Ozhereliev, 2009). In the Russian Altai, analogs can be found in Late Upper Paleolithic assemblages from Kaminnaya and Iskra caves, as well as from the open-air sites of Ust-Karakol, Ust-Sema, Srostki, and others (Derevianko, Petrin, Zenin et al., 2003; Markin, 2007).

Archaeological remains from the lower strata of Ushbulak are chronologically and typologically related to industries of the Initial Upper Paleolithic. In western Central Asia, the Middle to Upper Paleolithic transition is best represented by the Obi-Rakhmat sequence, which shows an evolving tradition spanning the period 80–35 ka BP (Krivoshapkin, Kuzmin, Jull, 2010; Vandenberghe et al., 2014). In these industries, primary reduction is characterized by mass production of blade blanks, including microblades. The tool kit at Obi-Rakhmat is dominated by retouched blades (including a pointed variant) and sidescrapers. Diagnostic tools include burin-cores, truncated-facetted implements, and small, heavily retouched points. Burins and endscrapers are relatively rare (Derevianko et al., 2001; Krivoshapkin, 2012).

In the Russian Altai, the formation of the Upper Paleolithic traditions began ca 50 ka BP (Derevianko, 2011; Derevianko, Shunkov, 2004). The earliest manifestation of these traditions was recorded at Denisova Cave. In strata 11.1 and 11.2 in the Eastern Gallery and in the lower portion of stratum 11 in the Central Hall dating to 50–45 ka BP (Douka et al., 2019), semi-volumetric blade cores and Levallois cores were found in association with tools bearing traces of ventral trimming on the proximal ends, beveled points, and numerous personal ornaments made of organic materials and semiprecious stones (Prirodnaya sreda…, 2003; Derevianko, Shunkov, Markin, 2014).

However, the closest parallels to the lower strata of Ushbulak are finds from horizon UP2 of Kara-Bom (44–43 ka BP) (Derevianko et al., 1998; Rybin, 2014). These materials closely match Ushbulak from all relevant criteria, from the raw material and primary reduction technique to the composition of tool kit (which includes highly diagnostic tools) (Rybin, 2014). The main distinction between these two sites is the absence of Levallois technique in Ushbulak assemblage—although some flakes from the lower portion of stratum 7 and from those recovered in surface collection demonstrate certain "Levallois"-like features. The absence of evidence of Levallois technology at Ushbulak can probably be explained by the relatively small size of the excavated area (4.5 m^2).

In northern Mongolia, similar industries, dating to 43–35 ka BP, belong to the southern Siberian-Mongolian variant of the Initial Upper Paleolithic (Tolbor-4 and -21, and others) (Derevianko et al., 2007; Rybin, 2014, 2015). In these assemblages, primary reduction is characterized by the prevalence of volumetric and semi-volumetric flaking, combined with sporadic use of Levallois technique. In such contexts, mass production of large blades was based on the use of subprismatic double-platform cores with single flaking surfaces and parallel flaking. Uni- and bidirectional flat and narrow-fronted cores were less important for blade creation. Upper Paleolithic implements dominate these tool kits, with endscrapers on blades being most numerous. Another important feature in Siberian-Mongolian assemblages is the presence of several diagnostic artifacts, such as burin-cores, beveled points, points with thinned bases, backed point-bladelets, implements with traces of ventral retouching on the distal edge, bifaces, stemmed tools, and personal ornaments (Rybin, 2014).

The channel for the initial eastward spread of Upper Paleolithic traditions to Mongolia and Trans-Baikal region, ca 45 ka BP, was apparently the Russian Altai (Derevianko, Shunkov, Markin, 2014; Rybin, 2014). This dissemination is believed to have followed several routes, one of which passed via the Mongolian Altai and Dzungaria, along the northern boundary of the Gobi Altai and the Great Lakes Depression to the Selenga basin (Rybin, 2014).

In the Dzungarian Basin in northwestern China, Initial Upper Paleolithic elements are known so far only from one artifact assemblage, a surface-collected assemblage from the site of Luotoshi. This material is characterized by combination of Levallois flake production and subprismatic blade technology with utilization of double-

platform bipolar and narrow-fronted cores. The tool kit at Luotoshi consists of numerous retouched blades, spur-like implements, sidescrapers, endscrapers, and denticulate and notched tools. It also includes bifaces, beveled points, points with a thinned transverse edge, implements with ventrally retouched distal end, and burin-cores (Derevianko et al., 2012). Finally, this assemblage contains many radial cores, which, alongside diagnostic Middle Paleolithic forms such as sidescrapers and notched-denticulates, suggests a considerable share of Final Middle Paleolithic elements. The presence of Middle Paleolithic sites in this area is further evidenced by finds from Tongtiandong Cave, situated 200 km southeast of Luotoshi. The industry from the lower cultural horizon of the cave, AMS-dated to ca 45 ka BP, contains Levallois and radial cores, heavily retouched sidescrapers, and elongated points, including those of the Mousterian variety. This assemblage corresponds to the late stages of the Middle Paleolithic (Xinjiang…, 2018).

Conclusions

Ushbulak, situated between the Russian Altai and Dzungaria, is a stratified Initial Upper Paleolithic site of the southern Siberian-Mongolian variant. Key sites from this period in the Altai (Denisova Cave and Kara-Bom) are situated 400–450 km north of Ushbulak, and the Chinese site of Luotoshi lies 100 km to the southeast. Other known stratified Upper Paleolithic sites in Kazakhstan, dating to 40–30 ka BP (Maibulak and Chokan Valikhanov), are located in the piedmont of the Tian Shan, 800–900 km southwest of Ushbulak. Geographically and typologically, these assemblages resemble those of Kulbulak and Shugnou, and are usually considered to belong with the Upper Paleolithic industries of western Central Asia (Taimagambetov, Ozhereliev, 2009; Ranov, Kolobova, Krivoshapkin, 2012).

The fact that Ushbulak is stratified and its lower units have yielded a rather large samples of lithics makes it the most significant Upper Paleolithic site in eastern Kazakhstan. Future excavations, detailed analysis, and interpretation of finds will allow us to reconstruct the principal trends in the evolution of the local Upper Paleolithic, to evaluate and assess its links with specific human populations, and to trace their migration routes across Kazakhstan and Central Asia.

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Archaeological Findings on Suchu Island (Excavation Area I, 1975)

This study describes the finds from dwelling B excavated in 1975 on Suchu Island, near Mariinskoye, Khabarovsk Territory. Lithics, ceramics, portable objects of art, and ritual artifacts (the total of 11,574 items) are housed at the Institute of Archaeology and Ethnography SB RAS. Excavations in area I have been carried out since 1972 in an extension of dwelling B, which had been partially unearthed previously. In 1975, 252 m² were cleared, finishing the works in excavation area I. Stratigraphic and planigraphic methods were used to reconstruct the layout of the dwelling and the space outside it. A morphological classification of the lithics was undertaken, ceramics were studied with a binocular microscope, and the chronology of all finds was evaluated. Some of these date to the Middle Neolithic (Malyshevo and Kondon cultures, and the Belkachi complex), some to the Late Neolithic (Voznesenovskoye culture) and Final Neolithic, some to later periods, such as the Bronze Age, Early Iron Age, or the Middle Ages. Lithics include tools and debris. Ceramics, objects of art, and ritual items mostly represent the middle stage of the Malyshevo culture. Two burials, dating to the Neolithic and the Early Iron Age, were found inside dwelling B. They were arranged after the dwelling had been abandoned, and they are especially relevant to cultural and historical reconstructions, since ancient burials are very rare in the region, and not a single one dating to the Neolithic was known until the present time.

Keywords: *Amur basin, Suchu, Neolithic, dwellings, artifacts, interdisciplinary approach.*

Introduction

In 1975, studies of the ancient dwelling on Suchu Island, near Mariinskoye, in the Khabarovsk Territory, were continued*. Excavations in area I, conducted since 1972 (Okladnikov, Medvedev, Filatova, 2015), have been carried out in the depression that is an extension of dwelling *B*, which had been revealed and partially unearthed previously (Okladnikov, 1973, 1980; Medvedev, Filatova, 2016). The excavation area is 252 m² (Fig. 1, *A–E*), designations of grids continued the system of previous years: numerical ones, from south to north (from 37 to 55), and alphabetical ones, from line A westward to X. To establish stratigraphy, two baulks were left (Fig. 1, *F*, *G*).

*The excavations in 1975 were carried out by A.P. Okladnikov (head of expedition), V.E. Medvedev (head of party), M.D. Brilliant, V.N. Kopytko, A.K. Konopatsky, and a group of students of the Khabarovsk State Pedagogical Institute.

The discovered artifacts were recorded on layer-by-layer plans (Fig. 1, *A–D*). In total, 11,574 items of lithics (2079), ceramics (9260), household items (198), and objects of art and cult have been found. These studies have completed the stationary works in excavation area I on Suchu Island.

We have studied the earlier undescribed archaeological materials obtained in 1975 (lithics, ceramics, objects of art, and ritual items), and also field documents (list of finds, diaries, drawings). Methods of stratigraphy and planigraphy (dwellings and space between the dwellings), morphotypology (lithics), binocular microscopy (ceramics), and cultural chronology (ceramics, objects of art and cult) were used.

Stratigraphy

The north-south brow along line H (Fig. 1, *F*). Layer 1 (ca 15–20 cm thick) is a tight dark brown soil with an admixture of sand. Layer 2 (10–15 cm) is a friable (less tight than layer 1) brown soil. Layer 3 (ca 10–15 cm) is tighter than layer 2, dark brown; it is a buried soil. Layer 4 (15–20 cm) differs from the overlying strata in its light yellow color; its upper boundary is smooth, and the lower one is wavy; enriched in sand; separate stones are encountered. Layer 5 (20–40 cm) is darker than layer 4, and lies almost horizontally, only slightly lowering towards the center and wedging out towards the edges. Layer 6 (40–90 cm) is an extension to layer 5, though significantly darker in color (dark brown); sometimes, separate rather large pieces of coal occur. Layer 7 (40–100 cm) is considerably lighter than two overlying ones, but also wedges out towards the edges (walls of the dwelling pit). Layer 8 (20–25 cm) is darker, almost black, loose in places; separate pieces of coal occur. Layer 9 is a grayish-yellow sandy loam interlayer overlying a yellow bedrock sandy loam near the pit wall. Layers 10–12 form the filling of the lower part of the foundation pit; this is a dark yellow sandy loam (layers 10, 12) separated in the middle by a coaly (without coal pieces) earth lens (layer 11) ca 10–15 cm thick.

The east-west baulk along line 46 (Fig. 1, *G*). In its content, it is similar to the above baulk. A wavy upper sand layer was drifted down from above along the ravine. A brown soil is recorded below it (layer 2). Deeper, a dark brown soil (layer 3) is noted, which was formed at the place of an old horse stable (?) of the 19th century; below it, there is a dark yellow sandy loam (layer 4), and a yellow soil (layer 5). The reference horizon (layer 6) is a buried soil at the place of the already covered pit of a Neolithic dwelling; it wedges out towards the pit's edges, and becomes thicker with the slope of its surface. A sequence of ancient filling lies below. Layer 7 is composed of loose light brown sandy loam. Layer 8 is darker, since it is enriched in humus. Possibly it was formed as a result of wooden roof collapse. Layers 7 and 8 wedge out towards the pit walls. The upper part of the pit wall near the baulk edge is overlapped by a loose dark yellow sandy loam (layer 9), which probably slipped down from the collapsed roof of the dwelling.

Dwelling *B*

The pit of the dwelling (Fig. 1, *E*) was let into light yellow fine-grained bedrock sand to a depth of 3.0 m from the modern daylight surface. The dwelling itself was arranged as an amphitheater: its walls went down to the floor through five ledges in the western part, and six in the eastern one. The floor's area is about 8.2 m^2. Here, hearth stones and pieces of charcoal were found on the native soil. The height of the first (counting from low to high) ledge with a horizontal surface is about 40 cm. The second also has a horizontal surface, an upright wall, and a height of about 45 cm. The third ledge is a flat level surface ca 1 m wide. Its wall is about 35–40 cm high, steep, indistinct in places. The fourth ledge is rather well-defined. Its feature is the presence of protrusions and "niches". The maximum width of the ledge is ca 1.5 m, the wall height is ca 40 cm. In the southern part, the last wall merged with the wall of the fifth ledge. In the fifth ledge, there were two cup-shaped depressions up to 1.0 m in diameter and, presumably, a hearth pit ca 35 cm deep, with upright walls and a flat bottom. In the southern part, the fifth ledge merged into the sixth one. The dwelling showed seven "niches", especially dug in its stepped walls to a depth of 0.3 to 1.5 m.

The architectural features of dwelling *B* are generally identical to those recorded during excavations of other residential buildings on the island (Derevianko, Medvedev, 2002; Okladnikov, Medvedev, Filatova, 2015; Medvedev, Filatova, 2016, 2018a). However, this dwelling, rounded in plan view, is one of the largest (up to 16 m in diameter) and deepest (about 3 m from the modern surface). As noted above, its distinctive feature is the presence of protrusions that served probably as some sort of bunks and/or shelves,

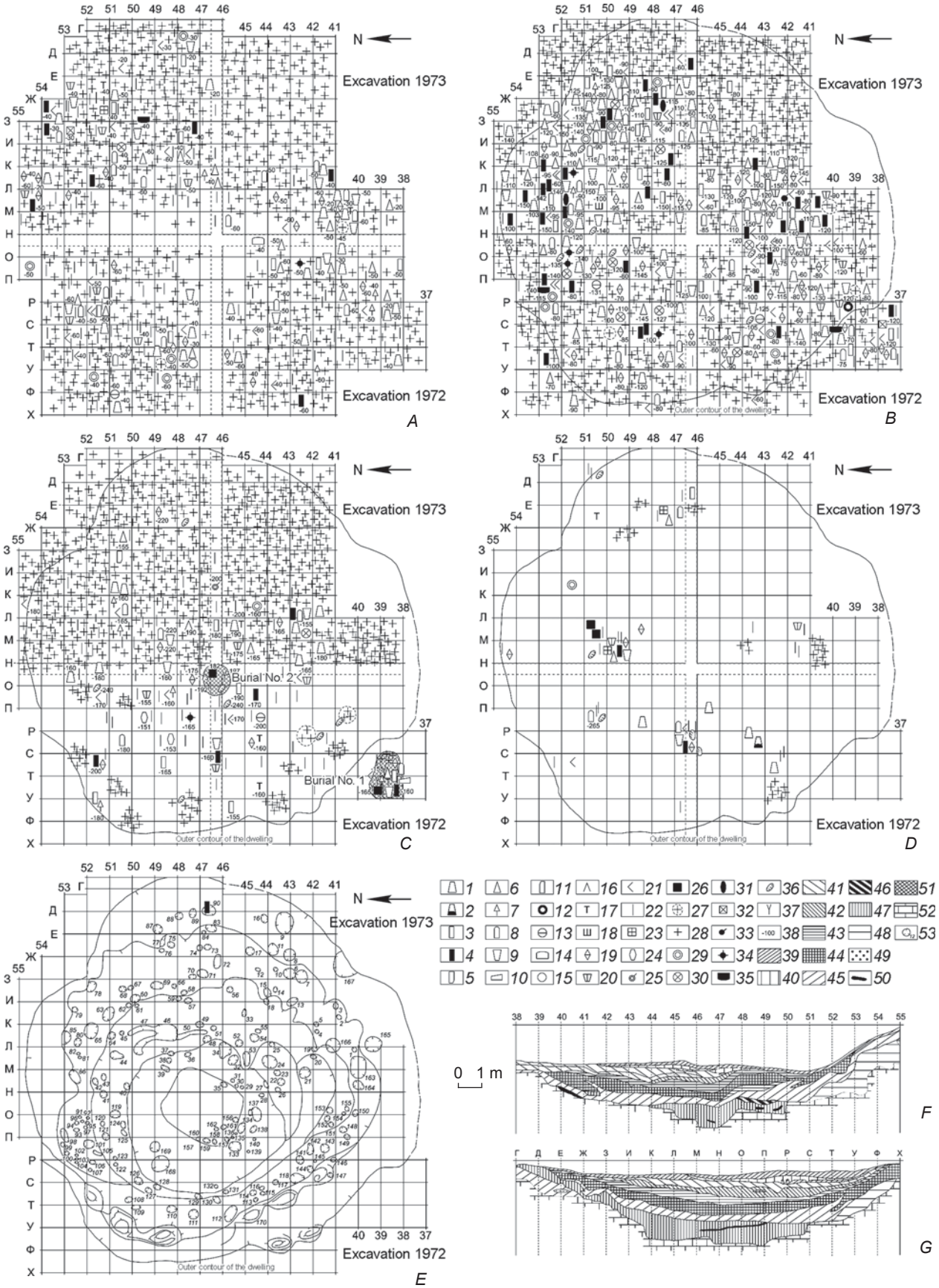
Excavation 1973
Excavation 1972
Outer contour of the dwelling
Burial No. 2
Burial No. 1
A
B
C
D
E
F
G
0 1 m

Fig. 1. Plans of a part of excavation area I (1975) at the levels of upper layer (*A*), filling of dwelling (*B*, *C*), above and on the floor (*D*), native soil (*E*), and sections of the baulks along lines H (*F*), 46 (*G*).

1 – an adze, an axe, a heavy-duty tool; *2* – a chisel; *3* – a knife; *4* – a knife-shaped blade; *5* – an inset; *6* – a dart, an arrowhead; *7* – a borer; *8* – an end-scraper, a side-scraper; *9* – a combination tool; *10* – a saw; *11* – a percussive tool; *12* – a mace; *13* – a lead weight; *14* – a stone with a hole; *15* – a hammerstone, a crutch; *16* – a burnisher (stone); *17* – a whetstone; *18* – a polishing-slab; *19* – a blank of tool; *20* – a core, a core-shaped item; *21* – a core-shaped spall; *22* – a flake; *23* – a pebble with spalls; *24* – a stone item; *25* – a pendant (stone); *26* – a vessel (fragmented); *27* – an accumulation of ceramics; *28* – ceramics; *29* – a spindle whorl; *30* – a clay item; *31* – a ceramic rod; *32* – a ceramic stamp; *33* – a burnisher (ceramic); *34* – a clay figurine, craft; *35* – a pendant (ceramic); *36* – a stone; *37* – bones, teeth; *38* – a depth from the modern daylight surface; *39* – dark brown sandy loam; *40* – brown soil; *41* – dark brown ground (buried soil); *42* – light yellow sandy loam; *43* – yellow ground; *44* – deep-brown ground (buried soil); *45* – light brown sandy loam; *46* – dark, almost black soil; *47* – grayish-yellow sandy loam; *48* – rather loose dark yellow sandy loam; *49* – calcined sand; *50* – an accumulation of coals, carbon-bearing interlayer; *51* – filling of burials; *52* – native soil; *53* – a pit.

and also "niches" where various domestic appliances could be placed.

Noteworthy is the pit noted in grid 38, 39/C, T. A large gray spot was cleaned out, and a darker one on top of it, a coaly-sooty oval, oriented with its long axis along the east-west line. A pit 42–45 cm deep, partially filled with coaly-sooty material, was under this spot. Below, in gray filling in the west part of the pit, a broken red-burnished vessel decorated with imprints of retreating spatula, a carnelian knife-biface, and small flint flakes were found; in the middle part, fragments of another red-burnished vessel were revealed. A crushed bowl, four miniature vessels, a knife-like blade, flakes, a flinty arrowhead, a borer, and an end-scraper were found 10–12 cm lower. In the pit's filling, small splinters of burned bones, obviously remains of a Neolithic burial made according to the cremation ritual, were recorded.

Another incineration was revealed in grid 45, 46/H, O. At a depth of 170–200 cm from the modern daylight surface, under a tight coaly layer containing charcoal pieces, a lens of dark coaly soil oval in plan view was found. It is a cup-shaped pit filled with black, tight earth. A burned-out piece of birch with birch-bark, chipped and burned stones, a fragment of obviously human loose bone, and pieces of a human mandible 40–45 cm from it, were found here. Also, fragments of vessel with imprints of finger cushions, typical of the Poltse culture of the Early Iron Age, were discovered in the pit. A burial made according to the incineration rite was performed in the dwelling filling, most probably ca 2 ka BP.

In the excavation area, 169 pits were revealed, the vast majority of which proved to be within the dwelling (Fig. 1, *E*). These are mainly rounded or oval-shaped in plan view, small (10–15 cm) or medium (20–40 cm) in size, and are from rather shallow (5–10 cm) or medium (20–40 cm) to rather deep (60–70 cm). These holes are predominantly from the posts that constituted the support base of the dwelling's structure. Larger pits (from 50 cm to 1 m in size, and from 20–30 to 60–70 cm in depth) that can be assigned to the household are also noted.

At a level of 60 cm from the modern surface, in some places, the outer native-soil contour of the dwelling pit showed up; therefore, the finds discovered above this level were marked at the first plan (Fig. 1, *A*). The upper layer was predominantly a humic black soil. Artifacts were uniformly distributed throughout the entire area. Finds discovered deeper than 60 cm from the surface were marked in the second and third layer-by-layer plans (Fig. 1, *B*, *C*). The bulk of these finds were contained in layers 7–9.

Lithics

In total, there are 2082 lithic artifacts in the collection from the 1975 excavation area (Table 1, 2; Fig. 2)*.

The lithics discovered within the dwelling pit consist of the primary reduction materials (1531 spec.), instruments (19 spec., including debris), and tools (396 spec., including debris and blanks). The distribution of the artifacts by layers has demonstrated that the bulk of finds originate from the upper (986) and lower (400) parts of the filling, and also from the upper layer (478). A rather small number of items (85) have been found above the floor, immediately on the floor, or in the pits.

The lithics discovered outside the dwelling consist mainly of the primary reduction materials (99), a small quantity of instruments (2), and tools (32, including debris and blanks). The distribution of finds by layers is roughly the same. Noteworthy are lithic artifacts from the Neolithic burial. In total, 78 items were discovered there, ⅔ of which are the materials of primary reduction.

*A special study is devoted to description of the lithics discovered in excavation area I in 1975 (Medvedev, Filatova, 2018b).

Table 1. **Lithics from the dwelling**

Type of lithics	Upper layer (above 60 cm*)	Upper part of filling (61–150 cm)	Lower part of filling (151–250 cm)	Above the floor, on the floor, and in the pit (No. 90) of the dwelling	Total
1	2	3	4	5	6
Primary reduction materials					
Core	3	4	1	1	9
Microcore	5	6	3	3	17
Core-shaped fragment	15	37	12	2	66
Flake	261	543	190	22	1016
Blade	4/2	21/8	1/2	3/0	29/12
Chopped pebble	1	2	1	4	8
Splinter	78	149	119	28	374
Total	369	770	329	63	1531
Instruments					
Hammerstone	1/0/0	–	–	–	1/0/0
Hammerstone-anvil	1/0/0	–	–	–	1/0/0
Burnisher	–	1/0/0	1/0/0	–	2/0/0
Grindstone	3/1/0	4/1/0	3/0/0	0/1/0	10/3/0
Grinding slab-anvil	1/0/0	–	–	–	1/0/0
Polishing slab	–	1/0/0	–	–	1/0/0
Total	7	7	4	1	19
Tools					
Dart	0/3/0	1/11/0	0/4/0	–	1/18/0
Arrowhead	2/6/0	12/6/3	10/3/0	2/0/0	26/15/3
Knife	7/4/3	13/11/6	3/4/1	1/2/0	24/21/10
Inset	–	–	1/0/0	–	1/0/0
Axe	0/1/0	4/4/2	–	–	4/5/2
Adze	6/13/2	10/19/3	8/1/0	3/1/0	27/34/5
Chisel	–	–	–	1/0/0	1/0/0
Adze-shaped side-scraper tool	1/0/0	4/0/0	–	–	5/0/0
End-scraper	15/1/7	23/0/21	9/0/6	2/0/3	49/1/37
Side-scraper	1/0/0	3/0/0	1/0/0	–	5/0/0
Borer	3/0/3	4/0/2	3/0/0	–	10/0/5
Point	–	1/0/0	–	–	1/0/0
Combination tool	9/1/0	10/0/0	2/0/0	2/0/0	23/1/0
Lead weight-anchor	–	–	1/0/0	–	1/0/0
Lead weight	0/1/0	0/1/0	0/1/0	–	0/3/0
Mace	–	0/1/0	0/1/0	–	0/2/0
Percussive tool	–	–	–	1/0/0	1/0/0
Stone with a hole	0/1/0	–	–	–	0/1/0
Retouched blade	–	5/1	1/0	–	6/1
Retouched flake	12/0	27/1	4/0	3/0	46/1
Total	102	209	64	21	396

Table 1 (end)

1	2	3	4	5	6
Non-utilitarian items					
Ring pendant	–	–	0/1/0	–	0/1/0
“Male-female” sculpture	–	–	0/2/0	–	0/2/0
Total	0	0	3	0	3
In all	478	986	400	85	1949

Note. The first digit is the number of intact pieces, the second digit is the number of fragments, and the third digit is the number of blanks.

*From the modern surface.

Table 2. **Lithics from the space between dwelling and from the burial in the dwelling filling***

Type of lithics	Above 60 cm	61–100 cm	Burial	Total
Primary reduction materials				
Core-shaped fragment	1	1	3	5
Flake	18	10	28	56
Blade	1	–	4	5
Splinter	7	4	22	33
Total	27	15	57	99
Instruments				
Grindstone	–	–	0/2/0	0/2/0
Total	0	0	2	2
Tools				
Dart	–	–	0/1/0	0/1/0
Arrowhead	–	–	1/0/0	1/0/0
Knife	–	0/2/0	2/1/0	2/3/0
Saw	–	–	1/0/0	1/0/0
Axe	1/0/0	–	–	1/0/0
Adze	1/1/0	1/1/0	–	2/2/0
End-scraper	–	1/0/2	1/0/5	2/0/7
Side-scraper	–	1/0/0	–	1/0/0
Borer	1/0/0	–	1/0/0	2/0/0
Combination tool	–	–	2/0/0	2/0/0
Retouched flake	1/0	–	4/0	5/0
Total	5	8	19	32
In all	32	23	78	133

*See note to Table 1.

Ceramics

The ceramic collection from the excavation area contains 9261 items: vessels (19 spec. have been reconstructed) and fragments thereof (9044), and also clay articles (198). Ceramics have been discovered in the upper layer of the excavation area, in the upper and lower parts of the filling, under the floor and on the floor of the dwelling, and also in the space outside it. The recovered ceramic pieces have been attributed mainly to the Middle (Malyshevo, Kondon, and Belkachi cultures), Late (Voznesenovskoye culture), and Final Neolithic periods. There are some specimens from the Bronze Age, the Early Iron Age, and the Middle Ages, as well as fragments that cannot be identified with Amur pottery.

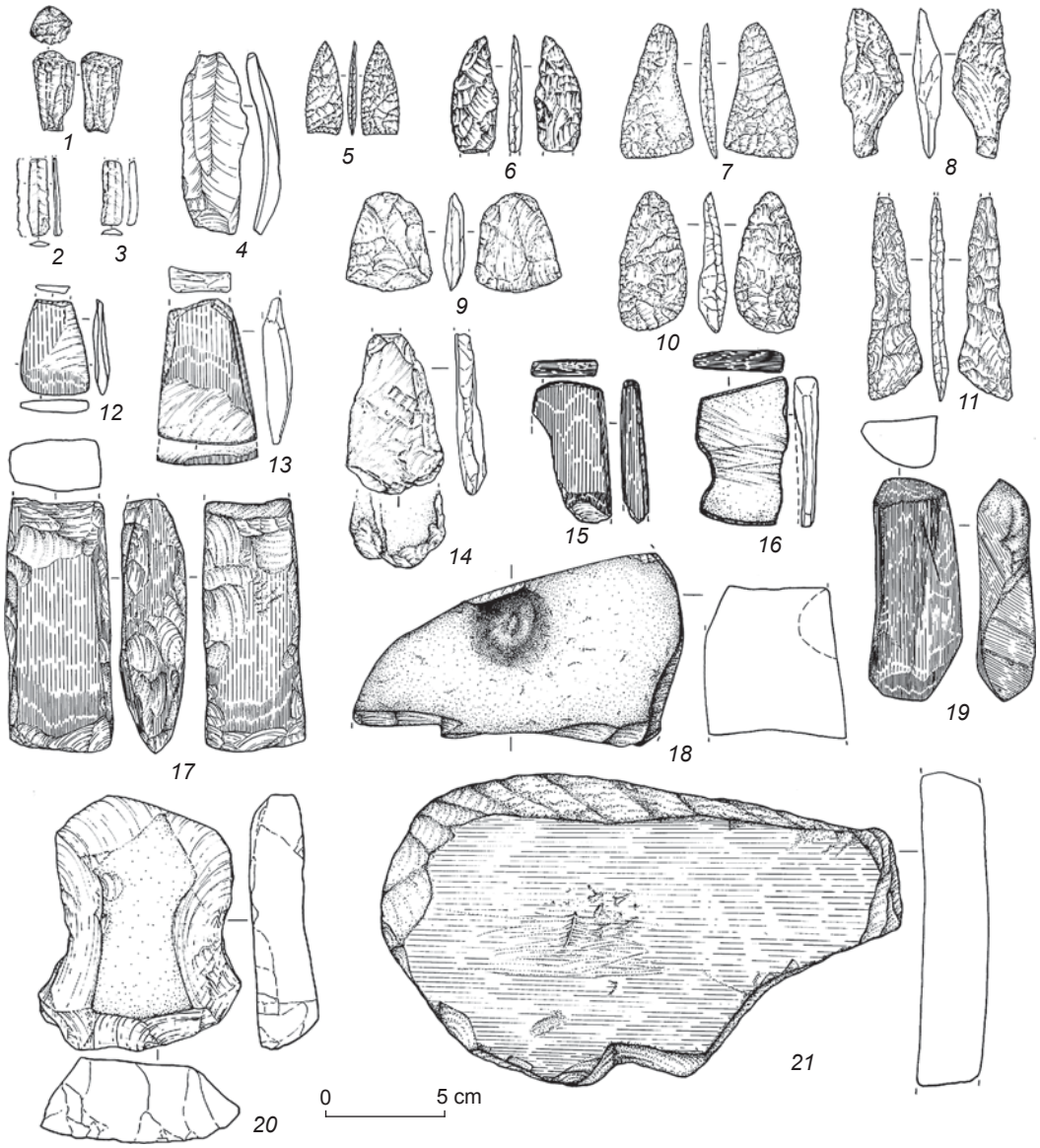

Fig. 2. Stone tools.
1 – a core; *2–4* – knife-shaped blades; *5* – an arrowhead; *6–8*, *10* – knives; *9* – an end-scraper; *11* – a combination tool; *12–14*, *17* – adzes; *15*, *16* – burnishers; *18* – a stone with a hole; *19* – a grindstone; *20* – a side-scraper tool; *21* – a grinding slab-anvil.

The Malyshevo culture (Fig. 3, *1–18*) is represented by 7527 items: 13 vessels (reconstruction), 358 upper and 35 lower parts, 4 side pieces, 875 rims, 5749 walls, and 493 bottoms. These items have been found in the upper layer (2439), in the upper (3663) and lower (975) parts of the filling, above the floor (25) and on the floor (350) of the dwelling, in pits (42), and also in the Neolithic burial (33). The ceramic paste of fragments is mainly rather dense and tempered with grog. Vessels were shaped using base-, base-and-body, or body-and-base shaping methods, as well as coil-ring technique. There are items with and without necks, with open and closed shapes, and ranging from miniature to large in size. The rims of the vessels are straight or folded out- or inwards; upper cuts are rounded, pointed, flattened, or beveled. Almost all bottoms are flat; only one pointed-bottom vessel is recorded (Medvedev, 2017: 157, fig. 1).

The surfaces of ready items were rubbed, smoothed, burnished, possibly covered with engobe, “smoked”, and painted red from outside and/or inside. The vessels varied in color from light (yellow, reddish, orange, or light brown) to dark (dark brown or dark gray, nearly black) tones, which shows that the firing mode was oxidizing. Ornamentation consists of deepened and convex relief, or flat decoration patterns. The basic

technical and decorative elements are comb imprints with two to five cogs, and imprints of retreating spatula (angular and bracket-like). There are also imprints of variously shaped cogged wheels, finger and nail imprints, appliquéd fillets (straight, wavy), incised lines and grooves, and various scratches and pricks. Separate elements form various motifs and simple or complex ornamental compositions. Some pieces (1228 spec., or 16.3 %) are not decorated. There are household (with carbon deposits) and ritual (including painted) ceramics. Also, burnishers (nine intact ones and three fragments) and their blanks (131 and 8), spindle whorls (five intact and four fragments) and their blanks (12 and 21) from vessel walls (Fig. 3, *8*, *10*, *12*, *15*) have been found. The majority of ceramics show consistent technological, morphological, and decorative features, and in general represent a single complex in the developed stage of pottery tradition. At the same time, two separate groups of ceramics can be identified. The first (101 spec.) is composed of the so called Boisman ceramics, with specific ornamentation. The second group (198 spec.) shows pottery pastes with inclusion of freshwater mollusk shells.

The Kondon culture (Fig. 3, *19–25*) is represented by 436 items: 8 upper and 3 lower parts, 11 rims, 319 walls, and 95 bottoms. These items have been found in the upper layer (184), in the upper (188) and lower (45) parts of the filling, above the floor (2) and on the floor (16) of the dwelling, and in the pit (1). Most pieces (335 spec., or 76.8 %) are not decorated. The ceramic paste of fragments is mainly dense, "rigid", and tempered with sand and grus. Vessels were shaped using base-, base-and-body (mainly), body-, or body-and-base (very rarely) shaping methods, as well as coil-ring, coiling (more rarely), and probably patch technique. The average thickness of rims, walls, and bottoms is 0.6–0.8 cm. Owing to the state of preservation of the Kondon ceramics, we cannot precisely characterize their shapes and sizes; it can be only assumed that these are vessels of closed type, with or without necks, in small, medium, or large sizes. The rims are slightly folded outward, with a rounded or flattened cut. The surfaces of items were rubbed, smoothed, covered with engobe, and "hardened". The ceramics were fired in the redox environment; their colors are brown, dark brown, or dark gray.

All vessels are of household type: soot and sometimes heavy carbon deposits can be observed on the inner side. Three groups can be distinguished with respect to decoration. The first group is characterized by comb imprints (with three to five cogs) and pricks along the cut and exterior surface of the rim, comb imprints (with five to seven and nine cogs), and figured stamp imprints (rhomboids, ovals) on the body; the second group by straight rows of comb imprints (three to five cogs) along the mouth cut, below it, and on the body; and the third one by comb imprints with three to four cogs along the mouth cut, and by combinations of horizontal and vertical imprints of comb and/or figured stamp (rhomboids, ovals) on the body. Two unornamented wall fragments of different vessels are blanks of spindle whorls. One more fragment of the near-bottom part was rejuvenated into a side-scraper. The Kondon ceramics is consistent in their technological features. In terms of chronology, this is most probably the end of the late stage.

The Belkachi complex (Fig. 3, *26–28*) consists of 139 items: 4 upper parts, 21 rims, and 114 walls (including two near-bottom ones). The items have been found in the upper layer (42), in the upper (79) and lower (11) parts of the filling, and on the floor (7) of the dwelling. The paste is predominantly dense and tempered with grus. Vessels were shaped using coil-ring technique. The vessels are open or closed, with slightly marked necks, medium and large in size. The rims are straight, slightly folded out- or inwards, with appliquéd fillets. They are decorated with oblique rows of cogged-wheel imprints or multi-cogged comb imprints, arranged parallel to each other or forming "herringbones" or a net. The walls of vessels are covered with vertical cord imprints. Surfaces of ready items were rubbed, "smoked", and covered with engobe. Some fragments show carbon deposits on their inner and outer surfaces. This is most probably the ware for cooking, food storage, and eating. The household use of pottery is also indicated by the fact that one sherd of a vessel wall was used as a burnisher. As mentioned earlier, the Belkachi complex can be attributed to northern migrants (Okladnikov, Medvedev, Filatova, 2015: 60, 63). Localization of ceramics predominantly in the upper layers confirms the previous idea that these migrants came to Suchu Island later than the Malyshevo people.

The Voznesenovskoye culture (Fig. 3, *30–32, 35, 36*) is represented by 773 items: 4 vessels (reconstruction), 72 upper and 8 lower parts, 80 rims, 539 walls, and 70 bottoms. These items have been found in the upper layer (185), in the upper (316) and lower (198) parts of the filling, above the floor (2) and on the floor (64) of the dwelling, in the space between dwellings (2), and also in the Neolithic burial (2). The ceramic paste is from dense to very loose. Using binocular microscopy, it has been established that freshwater mollusks served

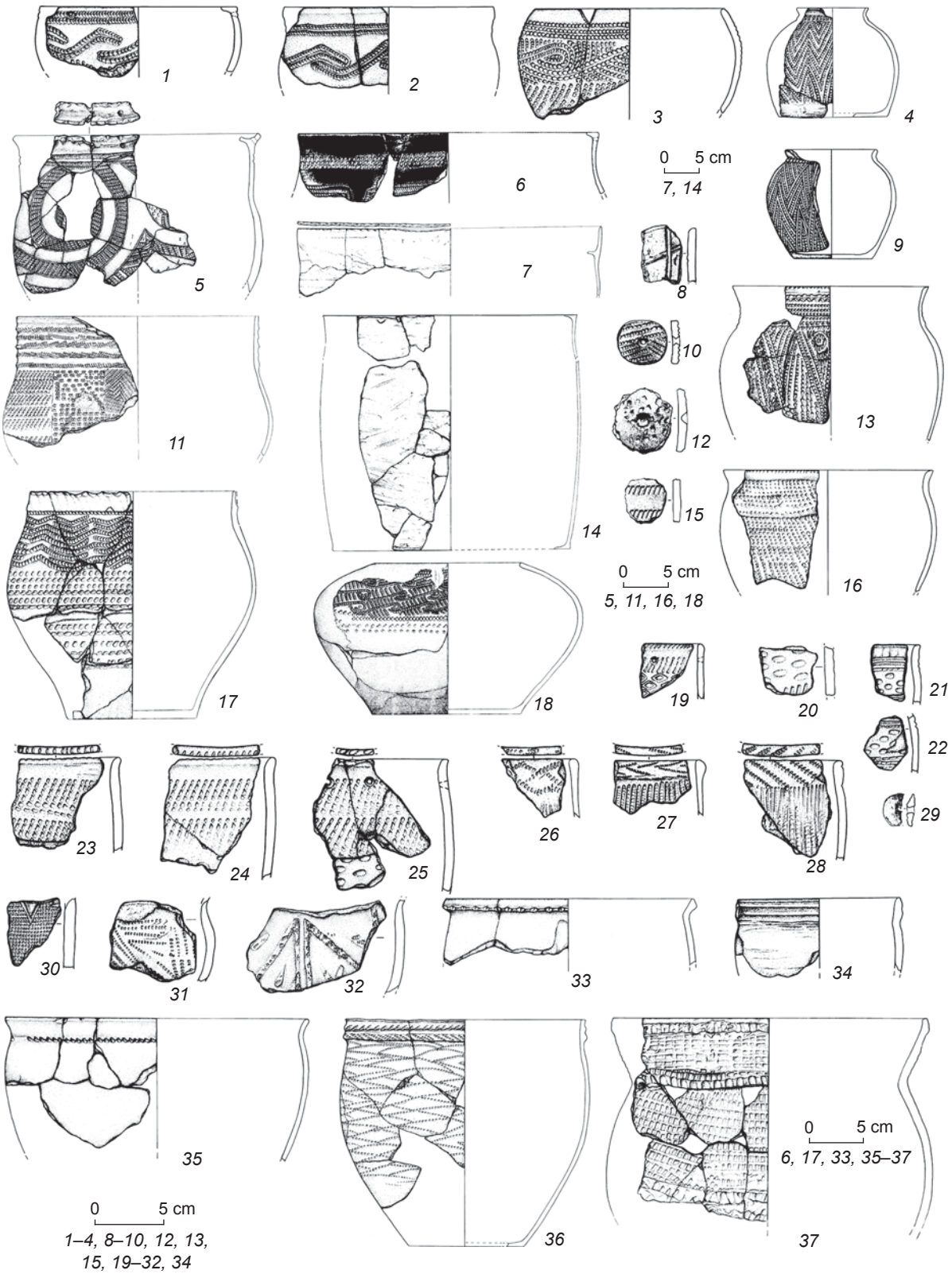

Fig. 3. Ceramics.

1–7, *9*, *11*, *13*, *14*, *16–28*, *30–37* – vessels (reconstruction) and their parts; *8* – a burnisher; *10* – a spindle whorl; *12*, *15* – blanks of spindle whorls made from walls of vessels; *29* – fragment of a spindle whorl.

1–18 – the Malyshevo culture; *19–25* –the Kondon culture; *26–28* – the Belkachi complex; *29*, *33*, *34* – the Final Neolithic type; *30–32*, *35*, *36* – the Voznesenovskoye culture; *37* – the Poltse culture.

as admixture in "loose" specimens. The vessels were shaped mainly using base-and-body, or more rarely base-, or very rarely body-and-base shaping methods, with coil-ring technique. There are vessels with or without necks; open and closed; small-, medium-, and large-sized. The rims are folded outwards, straight or bent inwards (more rarely), with beveled, rounded, pointed, or flattened mouth cuts. Bottoms are flat. Surfaces of ready items were rubbed, "smoked", more rarely burnished, and covered with engobe. The color of potsherds shows that ceramics were fired in the redox environment.

All ceramics are classified as household utensils. Often, significant soot or carbon deposits are observed on the inner and/or outer surfaces. 429 specimens (55.5 %) are not ornamented. There are two groups of vessels. The first group includes specimens ornamented along the body with vertical comb zigzags and incised spirals. They are made of dense paste without organic admixture. The paste of the second group is loose, tempered with considerable amounts of freshwater mollusks. These ceramics are subdivided into three basic subgroups in terms of decorative characteristics. The first subgroup shows the presence of smooth fillets along the outer rim's surface, a vertical and/or horizontal zigzag, parallel oblique lines forming angles and triangles; the second subgroup shows fillets cut with flutes and covered with imprints of stepping comb or cogged wheel in the form of "herringbones" or parallel rows along the outer surface of the rim; the third subgroup shows fillets with or without cuts by flutes, covered with imprints of comb, scratches, or incised lines ("cannelures") along the outer surface of the rim; the body is smooth. The diversity of the ceramics allows a conclusion to be drawn about possible repeated waves of migration by the Voznesenovskoye people, starting from the middle stage and ending by the late and final stages of the culture's development.

The Final Neolithic type (Fig. 3, *29*, *33*, *34*) includes 288 specimens: 20 upper and 3 lower parts, 18 rims, 219 walls, and 27 bottoms, as well as a fragment of a spindle whorl. These items have been found in the upper layer (41), in the upper (122) and lower (60) parts of the filling, above the floor (15) and on the floor (47) of the dwelling. Three specimens (an upper portion and 2 walls) were recovered from the Neolithic burial's filling. The paste of the sherds is often dense or more rarely rather loose, tempered with river mollusk shells. The items have closed shapes, with or without (few) necks, and are mostly medium or large in size. Small specimens have been recorded more rarely. The vessels were shaped using coil-ring technique, and also base-, base-and-body, or body-and-base methods. The rims are folded outwards, mouth cuts are skewed outwards or inwards, flattened or rounded. Bottoms are flat. The surfaces are well-smoothed and covered with engobe. The colors of the ceramics vary from light to dark brown, gray-brown, gray and dark gray, and dark orange, which suggests redox firing conditions.

The vast majority of items (260 spec., or 90.3 %) are not ornamented. Only rims are decorated: either with an appliquéd rib extending in the middle or in the lower portion of the outer part of the rim, or with an appliqué having one or two flutes forming polished fillets. The household purpose of the ceramics is evidenced not only by soot and carbon deposits on the surfaces of the sherds, but also by the fact that one rim-fragment was used as a burnisher. The Final Neolithic pottery is a uniform complex with similar characteristics. Its relatively small amount suggests the brevity of the functioning (apparently in the first quarter of the 2nd millennium BC) of the settlement during this Neolithic stage.

Noteworthy are several potsherds from the excavation area that are not identified with the Neolithic Amur assemblages. These have some resemblance to the Middle Neolithic pottery of Sakhalin Island in terms of their technology (admixture of shells) and decoration (rope and cord imprints, linear incisions) (Vasilevsky, 2008: 376, fig. 100, *2*, *3*).

Apart from the described Neolithic pottery, later ceramics have also been recorded (88 spec.). Four sherds of rims and nine fragments of walls of various vessels, ornamented with imprints of three- and six-cogged comb, bracket-like and rectangular impressions, oval pricks, incised grooves, and appliquéd straight fillets, probably pertain to the Bronze Age. These sherds have been found in the upper layer of the excavation area and in the upper part of the dwelling's filling.

Two vessels (reconstruction) and 67 fragments of Poltse pottery belong to the Early Iron Age (Fig. 3, *37*). The vessels are closed, with necks, medium or large in size. The rims are folded outwards, mouth cuts are rounded. There is a specimen with a typical saucer-shaped rim. The bottoms are flat, with flanges. The majority of items are decorated with straight or wavy appliquéd fillets, finger or textile impressions, comb imprints, or incised grooves.

The Middle Ages are represented by several unornamented fragments of wheel-turned gray clay pottery belonging to the Jurchen culture of the 11th–13th centuries. Another two sherds (a rim and a

handle) pertain to the ethnographically contemporary period. These are not ornamented, and are covered with glaze.

Thus, the majority of the described ceramics (81.3 %) correlate with the Malyshevo pottery tradition (the developed stage) of the Middle Neolithic. These finds are related mainly to dwelling *B*, which determines the dwelling's cultural and chronological attribution. However, the context of the occurrence of certain ceramics indicates that the foundation pit of the Malyshevo dwelling may have been used by people from other non-contemporaneous archaeological cultures. This suggests permanent migrations by human communities that visited the island, starting from the earliest stages of the Middle Neolithic and up to the ethnographically contemporary period. Some migrants were of different origin with respect to the population of the region under study, and had different points of exit: continental Asia and Pacific islands.

Objects of art and cult

The collection of objects of art and cult (Fig. 4) comprises various items made of burnt clay (34 spec.) and stone (3 spec.). Clay items include three-dimensional zoo-, ornitho- and anthropomorphic images (four intact ones and seven fragments), ten discoidal items of churinga type decorated with concentric circles, spirals, meander, and masks; an ornamented ball and a smooth small ball, phallic rods (three splinters), and a pendant blank. Also, three ornamenting tools in the form of cogged wheels, and four small vessels from the burial are included here. Stone items are fragments of two hybrid (gynandromorphic) "male-female" sculptural representations, and a piece of a ring-pendant made of white jade (Medvedev, Filatova, 2018b: 80, fig. 5, *4*, *11*). All of these belong to the Malyshevo culture. Many of these finds were earlier described in detail

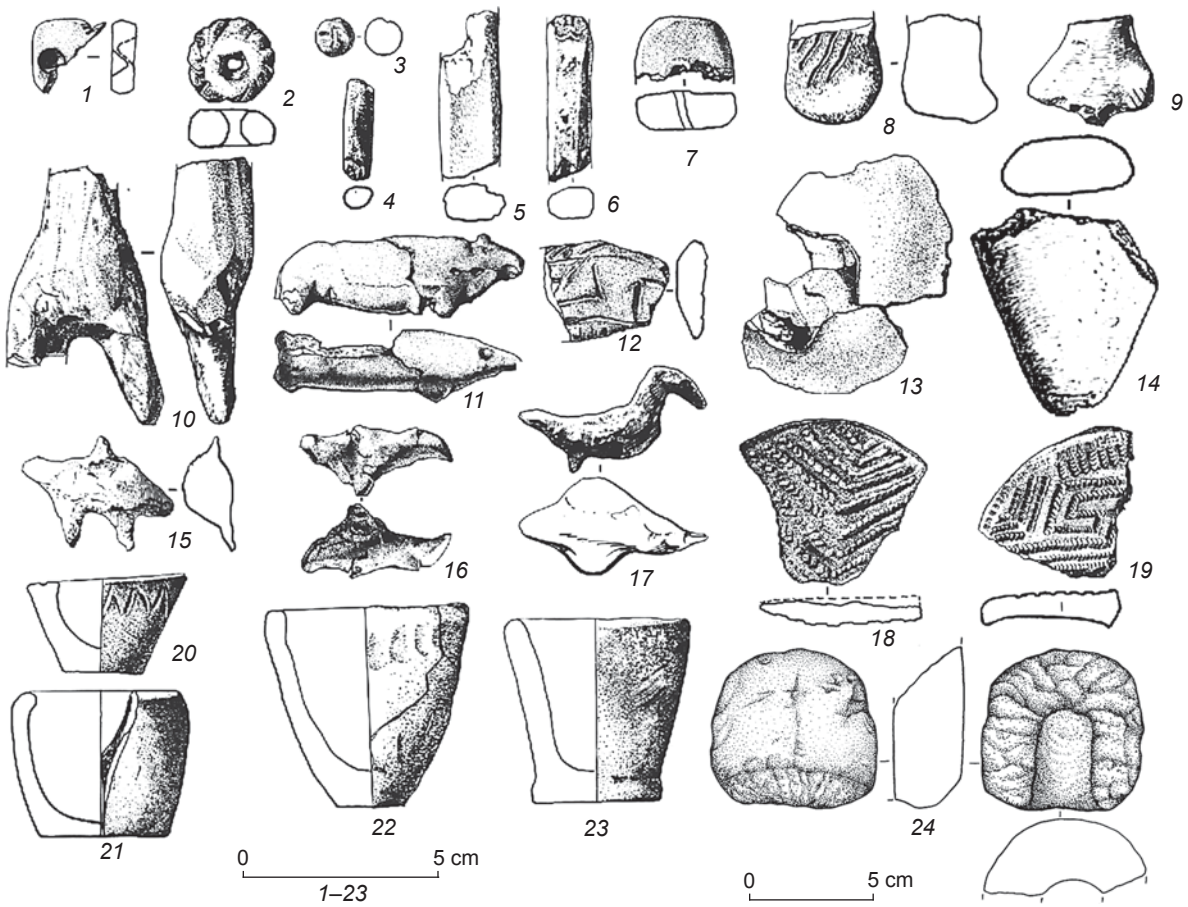

Fig. 4. Objects of art and cult of the Malyshevo culture.
1 – a blank for a pendant; *2* – a stamp; *3* – a ball; *4–6* – ceramic rods; *7–11*, *13–17*, *24* – sculptural representations (*7–10*, *13*, *14*, *24* – anthropomorphic, *11*, *12*, *15* – zoomorphic, *16*, *17* – ornithomorphic); *12*, *18*, *19* – churingas; *20–23* – small vessels from the Neolithic burial.
1–23 – ceramics; *24* – a stone.

in special publications (Derevianko, Medvedev, 1996: 218–219; Medvedev, 2000, 2002, 2009, 2011).

Conclusions

The results of comprehensive study of the excavation materials from an ancient dwelling on Suchu Island (excavation area I, 1975) are presented for the first time. In the excavation area embracing the depression of half-dugout dwelling *B*, the cultural layer (predominantly, sandy-loam) above the pit floor reached 3 m. The foundation pit with a round shape in plan view, with a maximum diameter of 16 m, was deepened by more than 1 m into bedrock sand. The dwelling arrangement has no fundamental differences from other Neolithic residential buildings of Suchu and the Amur basin. It also has a well-pronounced foundation pit—an underground part, where people stayed during the cold season. A large number of pits from the posts constituting the support-base of the dwelling's structure are located along the walls and at other dwelling-places. Earthen sleeping ledges arranged along the walls are common in the majority of Lower Amur Neolithic dwellings. At the center of the half-dugout, there was a hearth.

At the same time, dwelling *B* has certain distinctive features. Despite its large size (about 260 m^2 along the outer contour), the floor proper was a flat round-square area of slightly more than 8 m^2 at the center of the half-dugout. All remaining space around it was occupied by five or six steps arranged in the manner of an amphitheater. These ledges, often blurred and smoothed, probably served as bunk beds and shelves for the inhabitants of the dwelling. At several places, there were pits dug on the steps, as some sort of "niches". As for the appearance of the half-dugout, its shape obviously resembled a strongly truncated or flattened pyramid.

Lithics, ceramics, objects of art, and ritual items were found at the site. The earlier undescribed archaeological materials were studied using several methods: morphotypology, binocular microscopy, and cultural chronology. The recovered ceramic pieces have been mostly attributed to the Middle (Malyshevo and Kondon cultures, and the Belkachi complex), Late (Voznesenovskoye culture), and Final (Final Neolithic type) Neolithic periods. There are also items belonging to later times (the Bronze Age, the Early Iron Age, and the Middle Ages); ceramic specimens untypical of the Amur archaeological cultures have been noted. Morphotypological analysis of the lithics has demonstrated the presence of various tools and hunting/fishing instruments, as well as primary reduction materials. Cultural and chronological analysis suggested the attribution of rather unusual objects of art and cult primarily to the Malyshevo (the developed stage) cultural tradition.

Noteworthy are two recorded burials that were arranged inside dwelling *B* after it had been abandoned (in the Neolithic and in the Early Iron Age). Data on ancient burials, almost unknown in the region (not a single one dating to the Neolithic was known until the present time), as well as all the materials obtained in the excavation area, are especially relevant for reconstruction of the cultural and historical processes that took place in the Amur basin in the Middle Neolithic and later.

Two radiocarbon dates have been obtained for dwelling *B*: 4380 ± 40 BP (SOAN-1280) and 4650 ± 55 BP (SOAN-1281) (Orlova, 1995: 226). This allows its attribution to a time no later than the end of the 3rd millennium BC.

Acknowledgements

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Burial with a Chariot at the Tabyldy Cemetery, Central Kazakhstan

This article describes a high-ranking burial at the Tabyldy cemetery in the Shetsky District of the Karaganda Region, Kazakhstan. The mound was encircled with a stone enclosure and marked a double burial of horses with discoid cheek-pieces and metal staples, symbolizing a chariot. Funerary items include a bronze knife-dagger, a goad-head, a metal pendant from a plate twisted 1.5 times and overlaid with gold, paste beads, tubular beads, and potsherds. A detailed description of these items is provided. The cheek-pieces resemble those of the Staroyuryevo type. Their position on the skulls of the horses suggests a reconstruction of the harness. On the basis of new finds, the evolution of the cheek-pieces is proposed. The reconstructed severe bits were made by interweaving metal staples with leather strips. This innovation, securing better driving, was the reason why later cheek-pieces had no studs. A comparative analysis of the burial rite and funerary items suggests an Early Alakul attribution. The fact that the horses' heads were oriented to the northeast, like those of the buried humans (judging by the places where the bottoms of ceramic vessels were concentrated), evidences the influence of the Early Timber-Grave (Pokrovsk) culture. The AMS date and its 1 SD limits point to the late 18th to early 17th century BC, suggesting the Nurtai stage of the Alakul culture in Central Kazakhstan.

Keywords: *Central Kazakhstan, Bronze Age, Early Alakul culture, chariot harness, discoid cheek-pieces, bits.*

Introduction

The subject of chariot driving, which became widespread in the first centuries of the second millennium BC over the vast territory of the Volga-Don region, Ural-Volga region, southern Trans-Urals, and Northern Kazakhstan, has been studied for a long time, and has its own large historiography. Yet, each new site with the evidence of chariot use, especially if it is located in a peripheral zone where chariot traditions were not so pronounced, for example in Central Kazakhstan, is always of interest. Until recently, only six cheek-pieces were known from this area. These cheek-pieces included five, which were grooved, made of the tubular bones of large animals, which were split lengthwise, found at the cemeteries of Sattan (Evdokimov, Varfolomeev, 2002: Fig. 3, *8*) and Maitan (Tkachev A.A., 2002: Pt. 2, 177), and at the settlements of Myrzhik and Ikpen I (Kadyrbaev, Kurmankulov, 1992: Fig. 145, *6*; Tkachev A.A., 2002: Pt. 1, fig. 13, *1*), and one segmented cheek-piece carved of elk antler, found at the necropolis of Ashchisu (Kukushkin I.A., 2007: Fig. 4, *1*). Several double burials of horses imitating chariot teams have been registered. To date, 12 cheek-pieces and 15 double burials of horses have been discovered. One of the sites where chariot symbolism is especially pronounced has been investigated at the Tabyldy cemetery.

Description of materials discovered at the site

The Tabyldy cemetery is located in the Shetsky District of Karaganda Region in Central Kazakhstan, 90 km

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Fig. 1. Location of the Tabyldy cemetery.

southeast of the city of Karaganda, 10 km northeast of the village of Taldy. The site is located on the right bank of the Taldy River (Fig. 1). Nineteen structures were visually recorded on the burial field. In 2018, one of the largest earthen kurgans (No. 3) of the necropolis was investigated.

The diameter of the kurgan is 13.2 m; its height is 0.57 m. A ring-shaped enclosure of slabs set on their edge and protruding up to 0.5 m above the present-day surface was found in the mound floor. The mound also had a ring-shaped ditch (Fig. 2).

A double burial of horses was discovered after removing the soil in the northeastern section of the ground under the mound, at a depth of 0.3 m*, placed with their backs to each other and oriented to the northeast. Bridle sets in the form of two pairs of discoid cheek-pieces with metal staples, which were placed on the heads of harness horses, were unearthed *in situ* on the horses' skulls. The cheek-pieces were at different heights relative to each other.

*The "northern"** horse*: two almost identical discoid cheek-pieces made of horn with inserted studs were found on the horse's skull.

Cheek-piece No. 1, right, upper, with obverse (front) side up. It has a rounded disc with a diameter of 9.4 cm and a triangular plate with two projecting edges, cut in the same plane. Its total length with the disc and triangular plate is 11.5 cm. The thickness of the surviving part of the item reaches 0.7 cm. The disc has a central snaffle hole with a diameter of 0.8 cm, and four holes for inserting studs with a diameter of 0.8 cm, set in the form of a cross in relation to the triangular plate (Fig. 3, *1*). Two conical-cylindrical studs with height reaching 1.4 cm and diameter reaching 0.7 cm survived (Fig. 3, *2*). Three small mounting holes with a diameter of 0.3 cm were drilled in a row at the base of the triangular plate. The front side of the disc is decorated with small triangles cut around the central hole and with two bands containing inscribed circles along the edge of the disc, which were filled with small triangles with their vertices pointing towards each other.

Cheek-piece No. 2, left, lower, with back side up. It has a rounded disc with a diameter of 8.5 cm and triangular plate with two projecting edges. The total length with the disc and triangular plate is 11.2 cm.

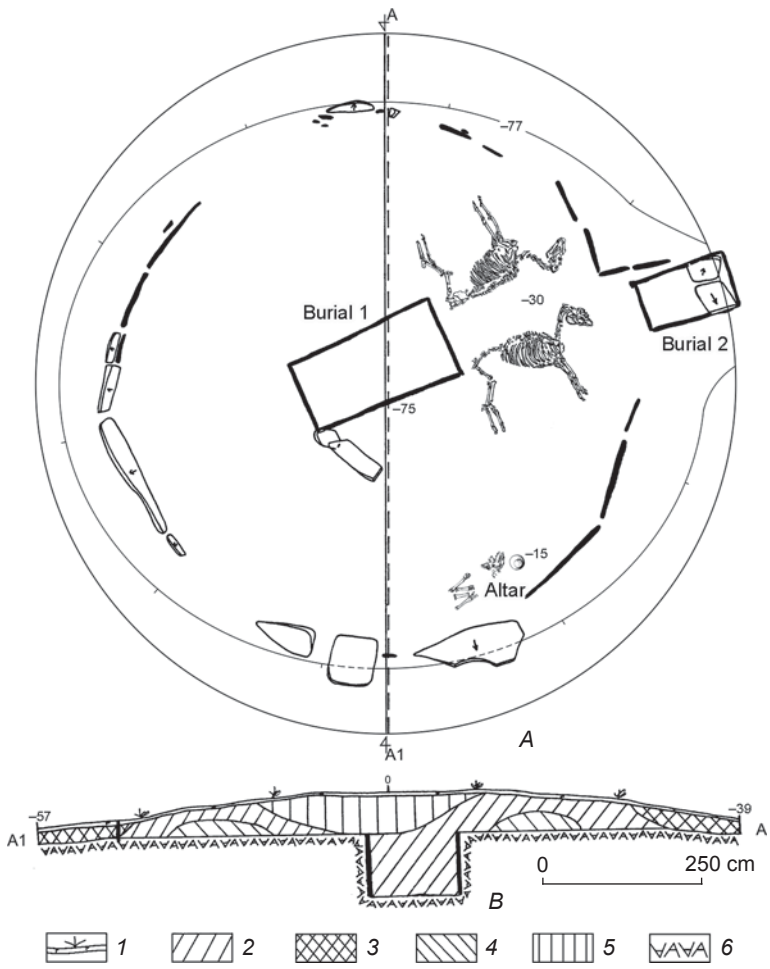

Fig. 2. Ground plan (*A*) and cross-section (*B*) of kurgan 3 of the Tabyldy cemetery.

1 – sod; *2* – light gray layer with inclusion of crushed stone; *3* – brown layer; *4* – gray layer with inclusion of crushed stone; *5* – dark brown layer; *6* – sterile soil.

*Hereinafter, the paleozoological definitions were provided by Dr. P.A. Kosintsev (Institute of History and Archaeology of the Ural Branch of RAS).

**The horses were conventionally divided into "northern" and "southern" according to their location at the burial site.

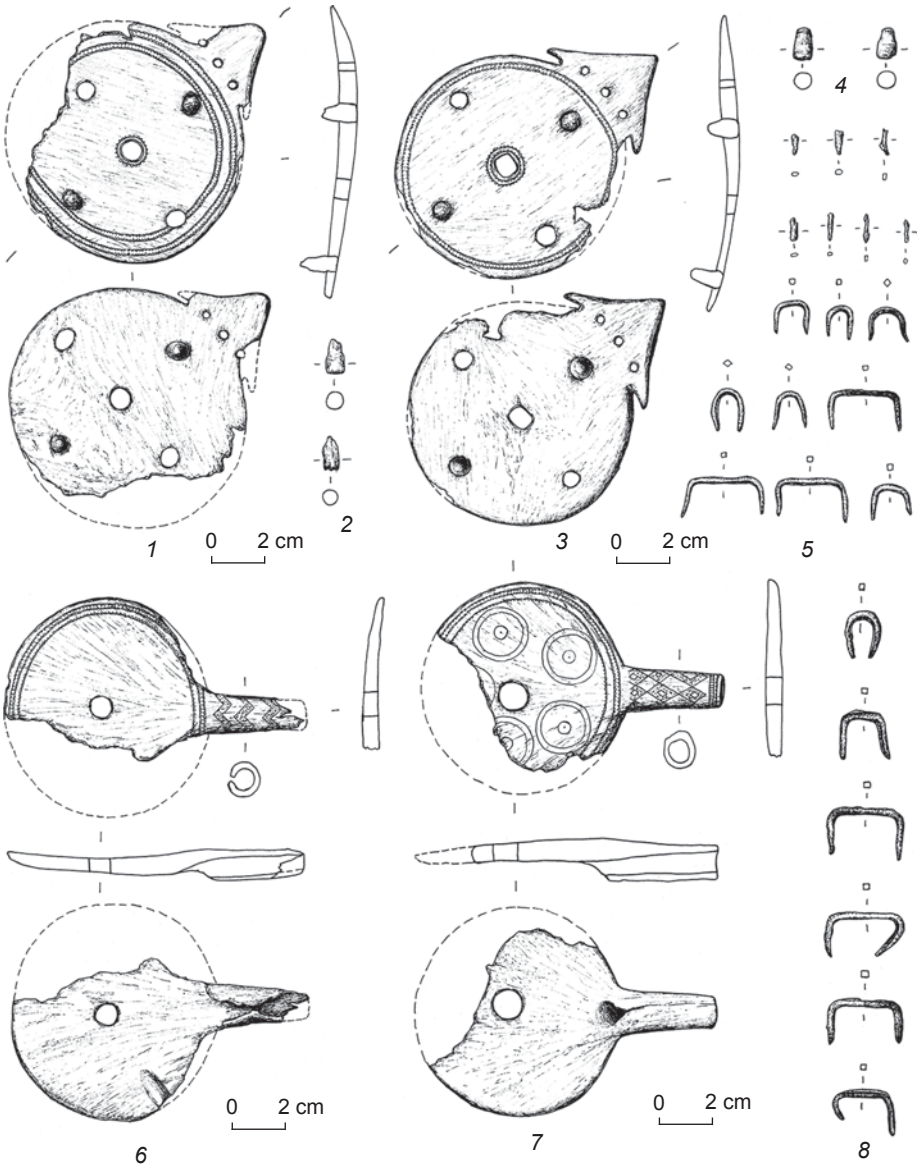

Fig. 3. Sets of bridle elements.
1, *3*, *6*, *7* – cheek-pieces made of horn; *2*, *4* – bone studs; *5*, *8* – metal staples and rods.

The thickness of the surviving part of the item reaches 0.6 cm. A central snaffle hole of subrectangular shape in plan view, with rounded corners measuring 0.9 × 0.7 cm, and four holes for inserting studs 0.8 cm in diameter, set in the form of a cross in relation to the triangular plate, were made in the disc (Fig. 3, *3*). Two conical-cylindrical studs up to 1.2 cm high and 0.6 cm in diameter (Fig. 3, *4*) were found. Three small holes 0.3 cm in diameter were drilled in a row at the base of the triangular plate. On the front side, the disc is decorated with two rows of small triangles carved around the central hole, and one band filled with two rows of small triangles pointing with their vertices towards each other along the edge of the item. A cluster of nine metal staples of various sizes, tetrahedral in cross-section, quadrangular and horseshoe-shaped in plan view, with slightly pointed ends, and seven small pin rods, oval, rounded, and quadrangular in cross-section, were found on the disc (Fig. 3, *5*).

The "southern" horse: two almost identical discoid cheek-pieces of unique design were found on the horse's skull.

Cheek-piece No. 1, right, lower, with front side up. It has a rounded disc with a diameter of 8.3 cm. A hollow tube with a diameter of 1.5 cm, cut together with the disc from the same piece, is in place of the triangular plate. Studs are not part of the design. On the back (working) surface of the disc, a hole corresponding to the cavity in the tube is visible. The total length with the disc and tube is 11.6 cm. The thickness of the surviving part of the disc reaches 0.8 cm. A central snaffle hole with a diameter of

0.8 cm was made in the disc. The front side of the cheek-piece is decorated along the outer edge, with three bands of small triangles directed with their vertices towards each other. The hollow tube is decorated with three bands of horizontal zigzag bands filled with dots (Fig. 3, *6*).

Cheek-piece No. 2, left, upper, with back side up. It has a rounded disc with a diameter of 8 cm. A hollow tube with a diameter of 1.3 cm, cut together with the disc from the same piece, is in place of the triangular plate. Studs are not part of the design. On the surface of the disc, a hole corresponding to the cavity in the tube is visible. The total length with the disc and tube is 11.5 cm. The thickness of the surviving part of the disc reaches 1 cm. The disc has a central snaffle hole with a diameter of 1.1 cm. The front side of the cheek-piece is decorated along the outer edge with three bands of small triangles directed with their vertices towards each other. The surface of the disc is decorated with a compass ornamental decoration in the form of three concentric circles with a dot in the center. The hollow tube is decorated with chains of lozenges inscribed into each other; the space between the lozenges is filled with dots. At the end of the tube, a drawing in the form of small triangles and a vertical ladder can be seen (Fig. 3, *7*). A cluster of six staples of different sizes, tetrahedral in cross-section, quadrangular and horseshoe-shaped in plan view, with pointed ends (Fig. 3, *8*), was found in the immediate proximity of the cheek-piece.

In the southeastern sector at a depth of 0.15 m, an altar was discovered. A ceramic vessel turned upside down (Fig. 4, *6*) was located there; a little further from the vessel, a cow skull oriented with its facial side to the northeast and four metapodia were found (see Fig. 2).

The unearthed enclosure of rounded shape in plan view, with a diameter of 8.5 m, consisted of slabs up to 0.75 m high, set on their edge in the sterile soil. The southern part of the enclosure fell in an outward direction;

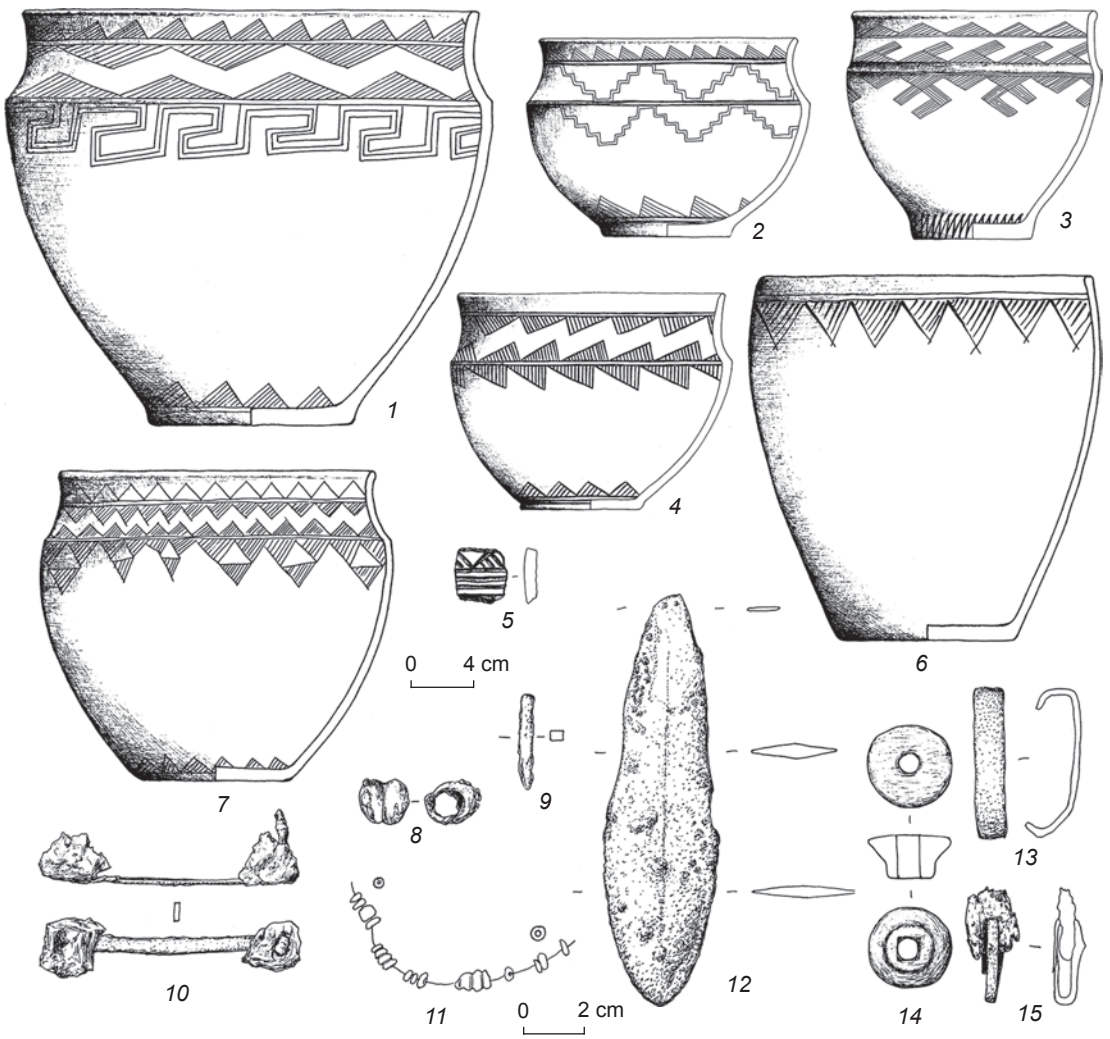

Fig. 4. Material evidence.
1–7 – pottery; *8* – pendant in the form of a plate twisted 1.5 times; *9* – goad-head; *10*, *13*, *15* – staples; *11* – regular and tubular beads; *12* – knife-dagger; *14* – mushroom-shaped pommel.

the northern part was mostly absent. On the northeastern side, two vertically set slabs preserved from an additional structure, adjoined the enclosure. The upper edges of the end plates of a rectangular-shaped stone box protruding 0.15 m above the sterile soil were found in the central part of the space inside the enclosure. The box measuring 2.45 × 1.44 × 1 m and oriented along the NE-SW line was made of four massive granite slabs. In the process of removing the filling of the grave, individual fragments of slabs remaining from the broken cover were found in the upper layers of the filling. A goad-head (Fig. 4, *9*) and a metal pendant in the form of a plate twisted 1.5 times and overlaid with gold leaf (Fig. 4, *8*) were discovered in the southeastern corner, at a depth of 0.4 m. Fragments of five vessels (Fig. 4, *1–5*), a metal staple (Fig. 4, *15*) holding a wooden fragment, and a flattened staple that held together the crack on a ceramic vessel (Fig. 4, *13*) were found on the bottom along the northeastern end wall of the box. Fragments remaining of what might have been the wooden structure of the burial chamber were found the northeastern part of the burial, mostly at a depth of 0.5–0.6 m.

A metal knife-dagger in a wooden case (Fig. 4, *12*) was discovered on the bottom of the central part of the grave, near the southeastern longitudinal wall. Metal and paste beads, tubular beads (Fig. 4, *11*), and bones belonging to two individuals were scattered throughout the rest of the area. According to the place where the fragments of vessels, usually placed at the head, were concentrated, the buried persons were oriented with their heads to the northeast.

A stone box of rectangular shape measuring 1.5 × 0.9 × × 0.7 m, built of four massive slabs and oriented along the NE-SW line was unearthed in the additional structure adjacent to the enclosure to the northeast, at a depth of 0.25 m from sterile layer. Slabs of the cover were located on the east side of the burial.

Individual human bones were found on the bottom in the center of the grave, and a partially broken ceramic vessel (Fig. 4, *7*), mushroom-shaped pommel made of horn (Fig. 4, *14*), and elongated metal staple with wooden fragments on the ends (Fig. 4, *10*) were discovered at the northeastern wall.

Discussion

Investigation of the large kurgan at the Tabyldy cemetery of the Bronze Age have revealed an elite funeral complex with chariot paraphernalia, which contained a central high-ranking burial performed according to the rite of inhumation in a stone box, and an adjacent structure. A specific feature of the kurgan was the presence of a pair of graves of harness horses symbolizing a chariot team with the stone box acting as the chariot in the area under the mound. This burial was obviously intended to emphasize that the deceased had belonged to a tribal military aristocracy originally associated with an elite community of chariot warriors. The location of the animal skeletons corresponds to representations of horses with chariots in rock art (Novozhenov, 1994: Fig. 77), which suggests that the petroglyphs and burial complex originated in the same chronological period, if not at the same time. The presence of bone remains of two individuals in the burial, as well as a bronze knife-dagger, goad-head, and female jewelry indicates that this was a double burial of the representatives of different sexes. The additional altar in the form of the skull and limbs of a cow, accompanied by a vessel placed upside down is noteworthy. Judging by the bottoms of the ceramic vessels, which have retained their original position in the grave, and orientation of the paired horses, the deceased were oriented to the northeast, which was typical of the traditions of the Timber-Grave culture (Kuzmina et al., 2012: 9). This conclusion is also supported by the orientation of the burial found in the additional structure along the SW-NE line.

Funerary items include a bronze knife-dagger, metal and paste beads, pendant in the form of a plate twisted 1.5 times and overlaid with gold leaf, a goad-head, staples, and pommel made of bone.

The bronze knife-dagger has a weakly expressed tang, slightly noticeable side indentations, and leaf-shaped blade. According to typological characteristics, it is completely similar to the daggers of the second type (according to A.D. Degtyareva), known among the Sintashta, Petrovka, Pokrovsk, Abashevo, and Potapovka antiquities; according to its morphological features, it is close to the stereotypes of the Circumpontian metallurgical province (Degtyareva, 2010: 104). The Tabyldy dagger shows the greatest resemblance to the knives from the Sintashta I (Gening V.F., Zdanovich, Gening V.V., 1992: Fig. 146, *2*) and Stepnoye VII cemeteries (Kupriyanova, Zdanovich, 2015: Fig. 54, *3*) from the southern Trans-Urals.

Pendants in the form of a plate twisted 1.5 times as a type of head adornment appeared quite early and were widely used in the complexes of different cultures and chronological periods from Transylvania to the Altai in the north, and to Iran in the south (Avanesova, 1991: 53). In Central Kazakhstan, they appear among materials from the Nurtai, Bozengen, and Aktobe II cemeteries (Tkachev A.A., 2002: Pt. 1, fig. 71, *24*, *25*; 96, *5*, *6*, *16*, *18*, *26*; 121, *9*). Paste (faience) beads were no less widespread. According to the latest data, they were imported in huge quantities from Egypt, where their mass production has been established (Likhter, Usmanova, 2017).

The mushroom-shaped pommel with a through hole, made of horn, is of interest. Similar items are known from the materials of the Central Kazakhstan cemeteries of Bozengen (Tkachev A.A., 2002: Pt. 1, fig. 96, *9*, *12*)

and Tanabai (Kukushkin I.A., Dmitriev, 2018: Fig. 3, *31*), and can be interpreted as tops of goads (Tkachev V.V., 2007: 30, 193).

Two staples holding the remains of wooden items (possibly vessels) have been found. During drying, cracks appeared in the walls of vessels. Metal staples were used for fixing defects which appeared. One of the fragments of a vessel had a pronounced flattened rim.

The pottery assemblage included six completely reconstructed vessels: five pots of the Alakul type, stepped in profile view, and one large vessel of closed jar-like shape. Ornamental décor on all the pots appeared in three zones—the neck, body, and bottom part. Its specific elements were chains of triangles directed with their vertices towards each other; variations of meanders and pyramids were less common. A rocker stamp decorated the bottom of one of the vessels; this stamp is more typical of the Early Alakul pottery of Northern Kazakhstan (Zdanovich G.B., 1988: Fig. 25, 27, 43). Drawings were made by incision and smooth stamping.

Several discussions have followed the large-scale studies of material evidence originating from the sites with chariot-related attributes, which have been carried out in Kazakhstan over recent decades. The greatest controversy concerns the reconstruction of the strap head harness and ways of placing the cheek-pieces on the horse's head, which the structural features of the horse harness depended on. The reconstruction of the position of cheek-pieces was figuratively called "the problem of 90 degrees", and was analyzed in great detail in a special study by A.N. Usachuk (2010). After reviewing in detail all known reconstructions, he came to the conclusion that there were various ways of attaching and arranging the cheek-pieces in the system of a strap head harness (Ibid.: 245, 255).

Two discoid cheek-pieces, which were a part of a strap head harness, were located on each of the heads of the Tabyldy harness horses. This is a very rare case. On the territory of the Urals-Kazakhstan region, over a hundred cheek-pieces have been found (Chechushkov, Epimakhov, 2010: 185), but as a rule they were located not even near the skulls of the animals (Cherlenok, 2004). Grooved cheek-pieces lay on a horse's skull in enclosure 29C of the Maitan cemetery in Central Kazakhstan (Tkachev A.A., 2014: 658). One cheek-piece was found on the half-destroyed skull of a horse in burial 62 of the Khripuny cemetery in Western Siberia (Matveev, Volkov, Kostomarova, 2007: 110, 112). In the Middle Volga region, cheek-pieces on the horse's skull occurred in the burial of kurgan 5 at the cemetery near the village of Komarovka (Alikhova, 1955: 96). Finally, a pair of discoid cheek-pieces with inserted studs was discovered on the skull of one of two horses in a ritual burial in the fortified settlement of Oarța de Sus in Transylvania (Romania) (Boroffka, 1994: 60; Penner, 2004).

The cheek-pieces on the skulls of the two horses from the Tabyldy cemetery were paired, but were structurally significantly different from each other. It should be emphasized that the head harness with cheek-pieces was neatly placed on the heads of the horses in such a way that they appeared to be in working condition (Fig. 5, *1*, *2*).

The discovery of the cheek-pieces directly on the sculls of the horses and their specific location make it possible to offer a reconstruction of the strap head harness. Notably, the cheek-pieces on the heads of both horses were oriented in the same direction and were parallel to each other. They were tightly fixed in this position on the straps of the head harness, which then was arranged on the heads of the animals. Moreover, the plates were placed in a horizontal position, which indicates the method not only of location, but also of fastening on the horse's head. Had the bridle implied the location of the cheek-pieces with plates directed up, the plates would have been directed towards each other. Respectively, had the cheek-pieces been placed with the plates down, the plates would have been oriented in opposite directions.

During the archaeological process, each pair of cheek-pieces turned over simultaneously to one side. This suggests the presence of bits fastened to the snaffle holes, which were pulled by the fallen cheek-pieces (front side down), which were probably weighted with metal staples. This is indicated by accumulation of metal staples on the back of one of the cheek-pieces; the staples of the other cheek-piece were found in its immediate proximity. Interestingly, the sharp ends of the staples were not bent on both sides inwardly by the fastening method, but protruded outwardly. In such a way they could not have been used for fastening straps to each other. In our opinion, staples with sharp ends were interweaved into leather bits as with manufacturing horsewhips, which even in our days are tightly woven of thin leather straps cut from a specially processed goat or calf skin. Obviously, the presence of such studs on the bits made it possible to better control the horse and subsequently completely abandon the use of studs on the cheek-pieces. Since some of the staples were horseshoe-shaped, we can assume a rounded cross-section of the woven bits (Kukushkin I.A., 2018: 65–66). It is doubtful that an ordinary strap was used as bits, since in this case there would have not been a reliable fastening of staples during use. The experiments of using staples with sharp points in bits might have started as early as the Sintashta time. For example, staples similar in shape and size were found next to the lower jaw of one of the horses in burial 2 of the Bolshaya Sintashta flat-grave burial ground (Gening V.F., Zdanovich, Gening V.V., 1992: 113). Generally, staples of distinctive design with unbent sharpened ends have often been found among the materials from the burial sites of chariot cultures. Most likely, once the idea of using studs on cheek-pieces

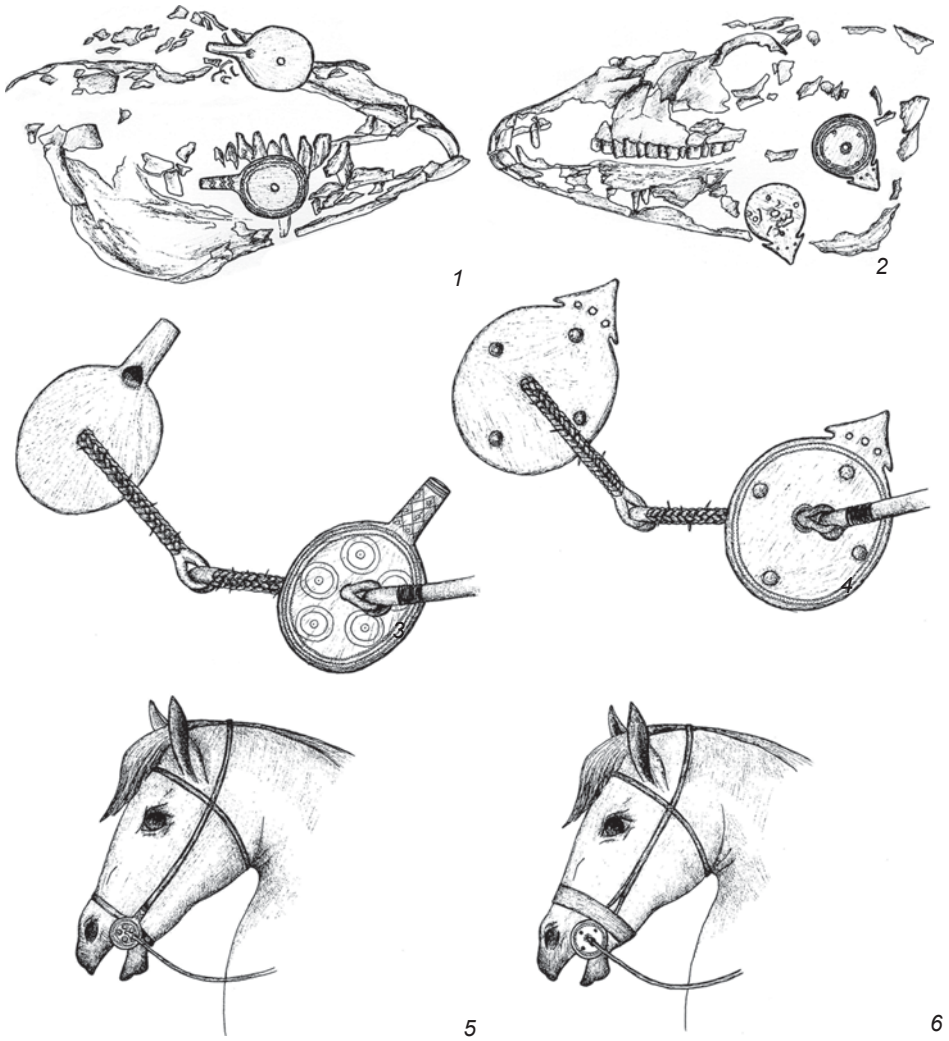

Fig. 5. Reconstruction of the horse harness system.
1, *2* – location of cheek-pieces on the conventionally displayed skulls of horses; *3*, *4* – reconstruction of the bits; *5*, *6* – reconstruction of the head harness.

appeared, it was with time successfully transferred to the bits, but using small metal studs as the means of pain-inflicting action on the horse (see Fig. 3, *5*, *8*)*.

The appearance of bits studded with metal staples was probably associated with the adjustments made to the system for controlling two horses, which pulled a draw cart. Accumulations of staples, as noted above, were found only on the back of one of the cheek-pieces of the "northern" horse and near the cheek-piece of the "southern" horse, which in a pair of harnessed horses implies increased control during the left or right turn. Such local accumulations of staples point to increased functions of only one part of the bits: the left part for the "northern" horse and the right part for the "southern" horse. In our case, when the straps of head harness were placed on the "southern" horse, the bridle could have twisted and the cheek-pieces switched places, or they were initially laid upside down. However, another option is possible. Given the relatively large number of staples, we can assume that they were evenly distributed along

*It is curious that probably one of the earliest methods of taming wild horses has survived until this day among the Kazakhs. In order to tame a 3–4–5 year old horse, a horse with the needed characteristics is selected from the herd, caught with a lasso, knocked to the ground, and its legs are tied. Then, the extremely sensitive corners of its lips are rubbed with intensive friction until they start to bleed, thereby virtually cutting them. After this painful procedure, a bridle and saddle are put on the animal. The pain is so great that a wild horse, which has grown freely in the steppe herd and has never walked under a saddle, becomes controllable and begins to execute the rider's commands given by the reins (informant T.S. Tuleuov, the Head of the Center for Preservation of Historical and Cultural Heritage of the Karaganda Region).

the entire length of the bits. A tear occurred during natural decomposition of organic material, and the leather bits, when these were drying, probably shrank and were pulled toward one of the cheek-pieces. This assumption can only be verified experimentally. Be that as it may, the system of controlling a pair of harnessed horses fundamentally changed after the invention of severe bits: now the system was based not on the impact of studs located on cheek-pieces, but on severe bits equipped with metal studs.

The "northern" horse. It is assumed that the cheek-pieces were attached with the plate to the noseband in a horizontal position through the three linearly located holes in the base of the triangular plate. The bifurcated cheek (crown) piece was fastened possibly with loops to the two projecting edges, according to their design features. This strap was pulled in the opposite direction of the hooks in the triangular plate. Most likely, the strap of the noseband overlapped the triangular plate and partially the cheek (crown) piece. Indirect evidence in favor of this assumption is the absence of decorations on the triangular plate: it was hidden and did not need to be decorated (Fig. 5, *6*). Were the plate visible, it would have had some ornamental décor just as the disc; such plates occurred among the materials of, for example, the Ashchisu (Central Kazakhstan) and Novonikolskoye (Northern Kazakhstan) cemeteries. The suggested reconstruction involves the blockage of the excessively free motion of the disc and plate, which would become movable relative to the axis of the small mounting holes in the process of using the cheek-pieces in the operating mode. In this case, the conditions leading to possible flaring, loosening of fasteners, and risks of other types of mechanical damage would be eliminated.

The "southern" horse. The presence of through sockets on the cheek-pieces, as well as their location on the horse's skull, correspond to a horizontal connection of the cheek (crown) piece through the hole in the tube with the noseband; these two pieces might have been stitched together (Fig. 5, *5*). Other methods were hardly possible. Judging by the use of severe bits equipped with metal studs, cheek-pieces served as strap distributors for the head harness of the horse. This is confirmed by the absence of studs in this pair of cheek-pieces.

With the emergence of severe bits of this type, the need for studs on cheek-pieces disappeared, since they became an extra duplicating element in the system of controlling horses. Therefore, there were two studs on each cheek-piece of the "northern" horse, and not four. The ubiquitous transition from the severe cheek-pieces to severe bits was probably the reason for the disappearance of studs on cheek-pieces in the chariot tradition of the Alakul culture.

The items found in the Volga-Don region at the sites of the Pokrovsk type, such as Staroyuryevo (Pryakhin, 1972), Staritskoye (Dremov, 1991: Fig. 1, *12*), Filatovka (Sinyuk, Kozmirchuk, 1995: Fig. 9, *1*, *2*), Selezni I, II (Moiseev, 1996: Fig. 2, *1*; Pryakhin, Moiseev, Besedin, 1998: Fig. 11, *4*, *5*), Uvarovka II (Mikhailova, Kuzmina, 1999: Fig. 17, *1*), and Borodaevka II (Usachuk, 2000: 131, Fig. 13, *3*, *4*), show similarities to the cheek-pieces on the "northern" horse. These items are similar in the size (rather large) and shape of the disc, linear arrangement of small mounting holes along the base of the plate, presence of inserted studs, two projecting edges on the plate, which implies a similar system of design and functioning of horse harness. However, for example, the triangular shape of the plate with hooks was more typical of the southern Urals items and possibly reflects the interaction of cultures in the Timber-Grave–Alakul contact zone (Tkachev V.V., 2004: 27; Chechushkov, Epimakhov, 2010: 190). It is interesting that, according to the main morphological features, the closest cheek-piece to the Tabyldy cheek-pieces (large disc and triangular plate with projecting edges cut in the same plane) was discovered during the study of the Mirny IV settlement in the southern Trans-Urals, which yielded Alakul, Petrovka, and Timber-Grave pottery (Chemyakin, Epimakhov, 2004: 106, 108, fig. 1, *3*). Probably the most striking similarity of all four Tabyldy cheek-pieces with the items of the Pokrovsk type is manifested by the presence of embossed carved ornamentation applied along the outer edge of the items and around the central hole, on the "front" side of the discs. In the decoration, preference was given to concentric circles which formed narrow bands filled with small triangles. Noteworthy are the parallels between the Tabyldy and Alakul cheek-pieces of rounded shape with four through holes for inserted studs, and distinctive ornamentation of the disc from the Ilekshar I cemetery in Western Kazakhstan (Tkachev V.V., 2003). An example of the influence on the part of Western chariot traditions is a discoid cheek-piece that shows the features of the Volga-Don bone-carving tradition from the Late Sintashta Kamenny Ambar-5 cemetery in the southern Trans-Urals (Usachuk, 1999; Epimakhov, 2005: 161, fig. 31, *4*; Bochkarev, Kuznetsov, 2013: 66).

Scholars have already mentioned a rather distinct demarcation of two large areas where the traditions of chariot driving were spread—the Volga-Don region and Urals-Kazakhstan region (Pryakhin, Besedin, 1998: 33). The analysis of the Tabyldy cheek-pieces has shown that, according to their main features they tend to show similarities with the Volga-Don bone-carving tradition of the Pokrovsk (Early Timber-Grave) culture. It differs significantly from the Petrovka (Early Alakul) tradition of the southern Urals and Northern Kazakhstan, which typically had segment-shaped cheek-pieces with monolithic studs, checkered arrangement of additional holes on the plate, and absence of ornamental decoration on the front side of the disc. An exception are individual cheek-pieces of the Alakul type found at the Alakul (Salnikov, 1952: 57) and Novonikolskoye (Zdanovich,

1985: 115, fig. 4) cemeteries, with decorated discs (in one case, the plate is decorated) and without studs. Further research will likely expand the collection of cheek-pieces of this type. At least, the unpublished materials from the Bayansha necropolis (Northern Kazakhstan) and fragment of a cheek-piece found in the Alakul layer of Shibaevo I (Nelin, Usachuk, 2004) are promising. The materials from Central Kazakhstan include eight cheek-pieces, including a grooved cheek-piece (Sattan cemetery) with ornamentation on the disc and even on the plate, which can be considered as an argument in favor of the assumption that the Western groups of the Timber-Grave population might have participated in the cultural genesis of the Alakul population of the region.

Conclusions

The cheek-pieces discovered at the Tabyldy cemetery, typical of the Volga-Don bone-carving tradition, as well as the remains of chariot horses and people, oriented to the northeast, and the Alakul-type pottery are probable evidence of a mixture of two cultural traditions associated with the Early Alakul and the Early Timber-Grave population, which inhabited the territory of Central Kazakhstan at the Nurtai stage of the Alakul culture. This process can be seen from the finds originating from a number of burial complexes with chariot attributes and other materials reflecting the worldview traditions of the Timber-Grave community (for example, the Kyzyltau cemetery) (Kukushkin I.A., Dmitriev, Kukushkin A.I., 2019). Apparently, during this period, the studs on the cheek-pieces, which were needed for strict control of horses harnessed to a chariot, were replaced by strict bits with small metal studs. In the future, cheek-pieces traditionally continued to be used; but in the system of the head harness of horses they performed only the functions of strap dispensers (Epimakhov, Chechushkov, 2004: 42–43), often decorated.

The evidence from the Tabyldy cemetery, in our opinion, belongs to the Nurtai stage of the Alakul culture of Central Kazakhstan (Kukushkin, Dmitriev, 2018: 36). This conclusion is confirmed by the absolute AMS-date of the main burial in kurgan 3, which was established at the Poznan Radiocarbon Laboratory (Poland): the second half of the 18th to first half of the 17th century BC (3390 ± 35 BP: 1σ (68.2 %)—1737–1641 cal BC, 2σ (95.4 %)—1862–1612 cal BC).

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Objects of Portable Art from a Bronze Age Cemetery at Tourist-2

This article introduces an unusual complex of anthropomorphic and zoomorphic artifacts from a Bronze Age cemetery at the Tourist-2 settlement, situated in the center of Novosibirsk. Given their context, motifs, and style, they were apparently ritual artifacts. Human-like, animal-like, and bird-like figures limn mythological ideas. They are so unusual that we may speak of a separate style. Despite being very different, all the figurines have common features, both artistic and iconographic. They are generally rather realistic, showing similar features such as tattoo. Yet they are stylized and share certain conventions attesting to an established canon. All these characteristics, as well as the context, suggest that the representations belong to a single style that we tentatively refer to as "Krokhalevka" style—a distinct variety of Siberian native ritual art. In our view, this style is autochthonous, originating from local Neolithic art under a marked influence of adjacent Early and Middle Bronze Age cultures, such as Okunev, Karakol, Samus, Krotovo, and Odinovo. Judging by the motifs and manner, the "Krokhalevka" tradition might have affected Kulai art, especially repoussé.

Keywords: *Art, Bronze Age, anthropomorphic images, zoomorphic images, Krokhalevka archaeological culture.*

Introduction

Anthropomorphic and zoomorphic representations of small sizes, made in various techniques using various materials, were common among the ancient population of Eurasia. Such items were a part of the semantic system, and reflected the worldview of the indigenous population. Owing to their special sacred value, objects of portable art have been found very rarely in closed archaeological complexes. One of the sites, the materials of which substantially enrich the collection of movable art from the southwestern Siberia, is a cemetery of the Bronze Age discovered in 2017 at the territory of the Tourist-2 settlement in the city of Novosibirsk. The site is located on the elevation of a floodplain terrace on the right bank of the Ob River 1.3 km north of the mouth of the Inya River (Fig. 1). This site has been studied since 1990, and was fully explored in 2017 during the rescue works on the area of over 0.6 ha (Basova et al., 2017). Since the purpose of these works was complete investigation of the Tourist-2 settlement, it was unpractical to register the cemetery with the state guard and assign it an individual name.

In total, 21 burials of the Bronze Age have been discovered. Owing to intensive use of the territory

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generated by industry in the present-day city, no structures above the ground have survived at the cemetery. Grave pits were sub-rectangular or oval. Single male, female, and children's burials, as well as burials with several skulls or with bones of various individual, have been identified. Burials were performed according to the inhumation rite. In one case, the deceased was wrapped in birch-bark, and a few bones (including the skulls), which were found in the grave, were burned. The deceased persons were buried in the extended position on their backs with their heads to the north. Two children's burials were similar in their layout to those of adults. Ornamental compositions of the pottery collection (flat-bottomed dishes with pseudo-textile motifs found in the graves was comparable to pottery of the Krokhalevka appearance (Molodin, 1977: Pl. LXIV, 1; LXVI, 3, 4)), grave goods, and funeral rites indicate that the cemetery must have belonged mainly to the carriers of the Krokhalevka archaeological culture. The analysis of funeral practices and accompanying goods from this burial site would merit a separately published treatment. In this article, we will consider the objects of portable art, which were discovered in three adult male burials.

Description of the objects of portable art

Belt buckle (burial 1). This item is flat, elongated, and of trapezoidal shape expanding upwards. Standing anthropomorphic figures (Fig. 2) are represented on the front surface. The length of the artifact is 9.3 cm; its width is 6.3, and its thickness is 0.3 cm. Its material is burl. The tripartite vertical composition of standing human images of gracile physical constitution consists of the central frontal figure and two side profile figures symmetrically turned to the central figure with their backs. The upper left part of the item was damaged: only the legs have survived from the lateral figure, but it must have been similar to the right figure; the central anthropomorphic image was also partly damaged. Two symmetrically located fish (pike?) heads, protrude and join to the extremities of the anthropomorphic figures at the base of the item.

The trunk and extremities of the central figure were marked with deep, sometimes through openings partly duplicated on the back of the item. The body is narrow and long; it ends with relatively short thin legs slightly turned at the knees and joined together at the level of the feet which were practically left unmarked. The shoulders

Fig. 1. Location of the Tourist-2 settlement.

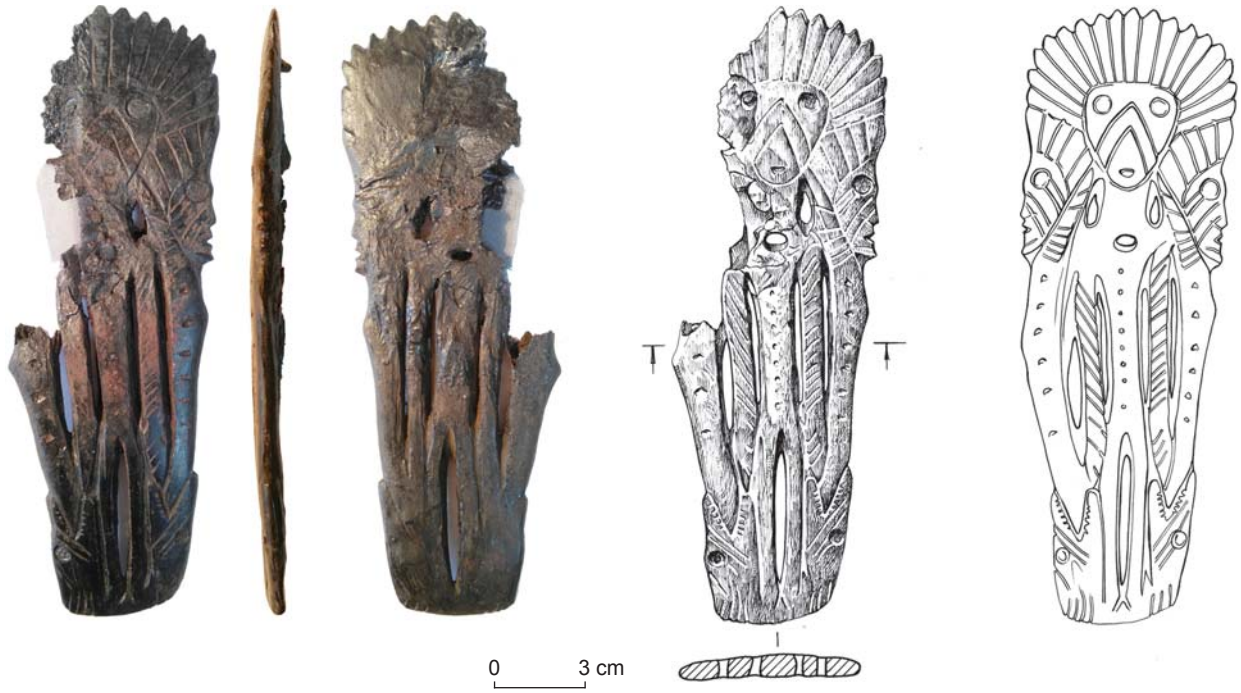

Fig. 2. Belt buckle with anthropomorphic representations (burl).

are narrow and weakly expressed. The arms are straight, disproportionately long; they reach the level of the knees. At the bottom, their contour slightly widens; the pointed ends of the hands touch the lower jaws of the fish. A mask of a sub-triangular shape is depicted above the long neck with engraved lines. Large round eyes were made by shallow drilling with a tool with flat working edge. They are widely spaced and were located in the upper corners of the mask. The rounded contour of the mouth is weakly expressed. Two pairs of parallel diagonal lines of a "tattoo" extend from the area of the nose, which was not shown, to both sides of the "mouth". Straight engraved lines diverge from the upper contour of the mask in a fan-like manner; carved denticulate protrusions were formed between their ends. This gives certain reasons to interpret this element as a headdress made of feathers, or sun rays. A chain of miniature rounded impressions appears on the body along the vertical axis, and frequent oblique incisions were made on the arms.

The face depicted in profile looks more realistic, and its features were carefully modeled: protrusion of the eyebrow ridges, straight nose, open mouth, and pointed chin were rendered in relief. The lower jaw and neck were emphasized by scraping/shaving. The round eye was made by the same tool as eyes in the central figure. The slanting lines of the "tattoo" were supplemented by parallel paired lines extending from the eye. Straight lines representing the headdress extend radially from the semicircular contour of the face. Unlike the central image, these lines descend to the level of the neck, where the distance between them is significantly reduced. The body of the figure is narrow and extremely stylized; small angular ledge is present at the level of the chest. The body gradually narrows downward passing into the lower extremities inscribed into the open jaws of the fish.

Images of fish (pike?) heads, symmetrically located in the lower part of the item on both sides of the legs of the central figure and turned vertically upward, were made using engraving technique in the same stylistic manner. They are shown with open mouths; jaws are long, narrow, and pointed; teeth were rendered by small incisions. The eyes are round; paired slanting lines of the "tattoo" were carved between the eyes and mouth. Vertical parallel notches were made at the base of the heads.

Just below the neck, the central figure has an oval hole with a diameter of 0.5 cm. Another hole, oval in shape and measuring 1.2 × 0.5 cm, is located between the neck and head of the side figure.

Apparently, we have a belt buckle with the lower oval hole intended for fastening the buckle to the belt, and the upper hole for threading the fixing cord. It should be mentioned that according to its manufacturing technique, the buckle is similar to horn pendant found in burial 310 at the cemetery of Sopka-2/4 B, C of the Krotovo culture (Molodin, Grishin, 2016: Fig. 169, *26*).

Onlay (burial 1). This item of sub-rectangular shape was made of a plate of mammoth ivory. It is convex along the longitudinal axis, with carefully processed rounded edges bearing a symmetrical wavy contour (Fig. 3). Round holes outlined by engraving are located in the

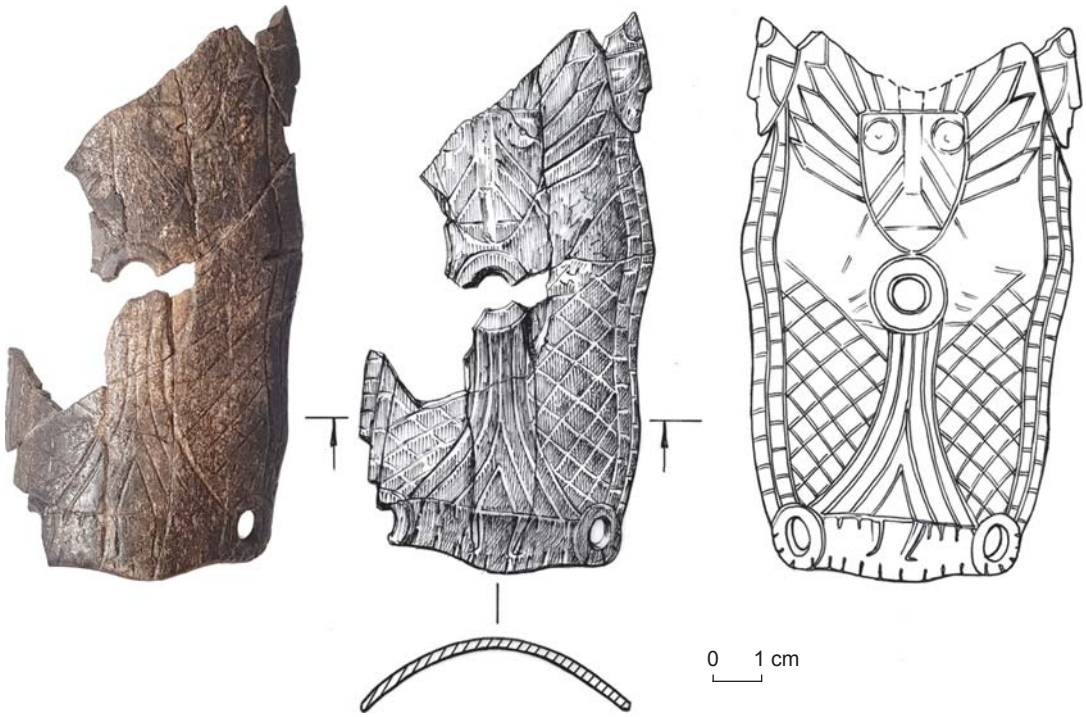

Fig. 3. Onlay with anthropomorphic representation (mammoth ivory).

corners and precisely in the center of the item. The entire external surface was carefully polished and was intensely covered with engraved lines, while the internal surface was only slightly polished and retained the natural structure of split tusk. The item has been preserved in fragments. Its length is 11.7 cm; width is 6.0 cm, and thickness is 0.3 cm.

The subject of the engraved representation parallels the image of the mask on the belt buckle described above. An anthropomorphic figure is in the center of the composition. A mask of sub-triangular shape with the engraved denticulate ornamental décor, radially diverging rays of the headdress of feathers as on the buckle described above, was depicted in the upper part of the item. Its chin rests on the hole in the center of the artifact. The eyes can be barely discerned. The contour of the mouth was not marked. Two pairs of parallel diagonal lines of the "tattoo" extend down on both cheeks from the area of the nose, which is not shown. The lower part of the gracile anthropomorphic figure is depicted as a long skirt in the form of forked bird's tail. The arms are not shown. In the upper part of the item, on the right, there is a profile image of a realistic face, the features of which were modeled more carefully: straight nose, round eye, nasolabial folds, two pairs of lines of the "tattoo" were rendered in relief. The parallel with the subject on the belt buckle described above suggests that this character must have had a headdress and symmetrically located profile image of the face on the left, but these parts of the artifact have not survived.

Paired bands with transverse notches, which enclose the central image in a kind of frame are depicted along the sides of the item. A mesh-like ornamental décor reminiscent of beaver's tail as its style was made between the bands and central figure.

The onlay was found in the same complex with the belt buckle described above, tightly adjoining it in a single spatial orientation and partially covering it. These artifacts were discovered with their decorated sides up. Moreover, the images of anthropomorphic figures were located "head to tail": the mask on the onlay was in the area of the legs of a anthropomorphic figures on the belt buckle. The convex onlay lying on the flat belt buckle became deformed and has survived in a fragmented state.

Partial anthropomorphic figure (burial 5). This artifact was made of elongated ivory flake and represents a sculptural image of a human face (Fig. 4). According to the classification proposed by S.V. Ivanov (1970: 26), this is a high relief intended for viewing from the front (as opposed to the so-called sculpture in the round). The item has elongated diamond-like shape, flat-convex cross-section, and slightly curved profile. The longitudinal edges are rounded, subparallel to the long axis, and gradually narrow from the line of the eyes to the lower and upper parts of the figurine. The length of the item is 143.8 mm; its width in the area of the head is 36.7 cm; width in the middle part is 35.1 cm, and width in the lower part is 16.7 mm; thickness is 22.7, 17.6, and 7.3 mm respectively. The volume of the sculpture is 34.86 cm^3.

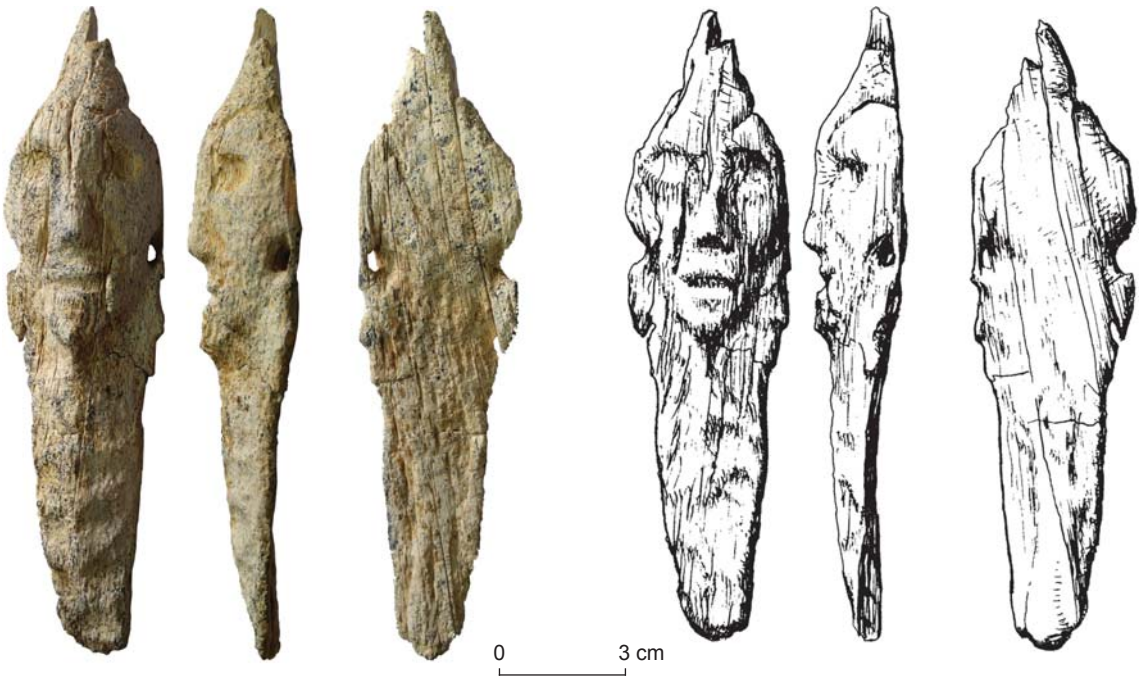

Fig. 4. Partial anthropomorphic figure (mammoth ivory).

The high relief of the human's head conveys the facial features, which make it possible to recognize a Caucasian. The general outline of the face is diamond-shaped. The eyes are open, widely set, of ellipsoid shape, 8.7 and 7.2 mm in diameter. The forehead is slightly convex; the nose is straight and voluminous, with the rounded base; recessed nasal-labial folds are evident; the chin is pointed. The mouth is half open, slightly asymmetrical, and wedge-shaped in profile. Two bi-conical openings, oval in shape (4.13 and 2.09 mm in diameter), are at the base of the nasal septum at the longitudinal edges of the artifact. With a considerable degree of certainty, we can speak of a pointed headdress. The head was set on a fairly long shaft (stylized body), on which two rows of rounded indentations 7.5–11.0 mm in diameter, which may be the elements of ornamental décor, are clearly visible.

Belt buckle with anthropomorphic representation (burial 5). Its obvious position in the burial *in situ* next to the left forearm of the person undoubtedly indicates that the belt was placed into the grave in unbuckled way, which has been repeatedly observed in the materials of the contemporaneous Odinovo culture (see (Molodin, 1994)). The item is flat, double-sided (Fig. 5). Only the head was rendered in a realistic manner. While the item was not very thick, it was carefully treated like a sculpture in the round. Two profile images were executed with greatest care, although the front view is also quite discernable, despite a certain degree of stylization. The male was depicted with open mouth and full lips shown in relief. The most careful treatment was given to large round eyes emphasized by engraving. The nose is slightly upturned and voluminous; a tattoo is clearly shown on both sides in the form of slanting little lines in relief. Slanting lines render long hair. A large round ring into which the waist belt was threaded, crowns the head of the figure. A pointed spike-clamp may possibly imitate a pointed headdress. At the top and bottom, the body of the buckle has two large oval holes for its attachment to the belt. The length of the artifact is 19.6 cm; width is 4.9 cm, and thickness is 0.9 cm. The material is burl and resin.

Figure of a bird (burial 6). The product is flat and single-sided. The figure was made in a realistic manner (Fig. 6). The bird was depicted in the heraldic pose, frontally, with its wings spread. The head is turned to the left. The beak was broken off, but apparently it was small in size. Horizontal lines and notches on its chest, wings, and tail rendered the bird's feathering. Judging by the exterior view, the image was based on the saker falcon (*Falco cherrug J.E. Gray*, *1834*), representative of the local ornithological fauna, daytime predator of the *Falconidae* family of the *Falconiformes* order*. An oval hole was on the chest of the figure. Apparently, this item was either sewn on clothing or was suspended using this hole. In the grave, it lay in the center of the chest of the deceased. The length of the item is 8.9 cm, width is 5.8 cm, and thickness is 0.3 cm. The material is bone.

Anthropomorphic figure (burial 6). This is profile, double-sided, and flat (Fig. 7). The head and upper body

*Identified by the ornithologist A.V. Meidus.

Fig. 5. Belt buckle with anthropomorphic representation (burl, resin).

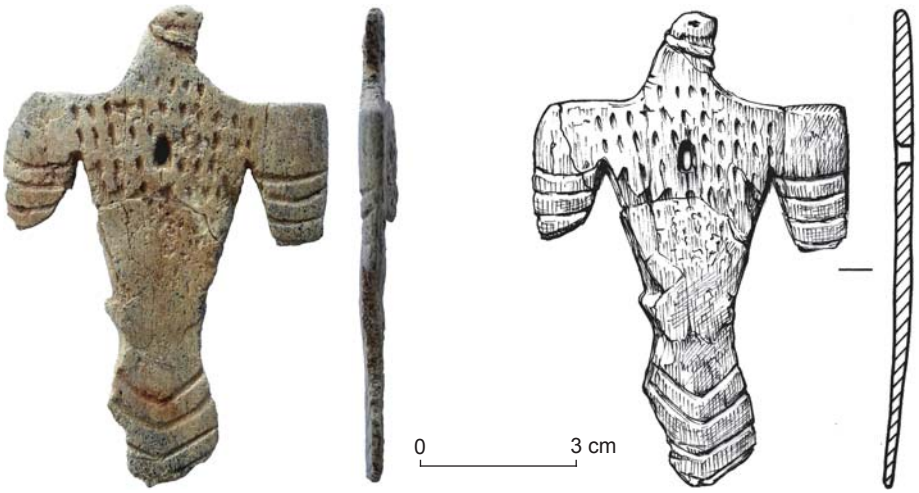

Fig. 6. Image of a bird (bone).

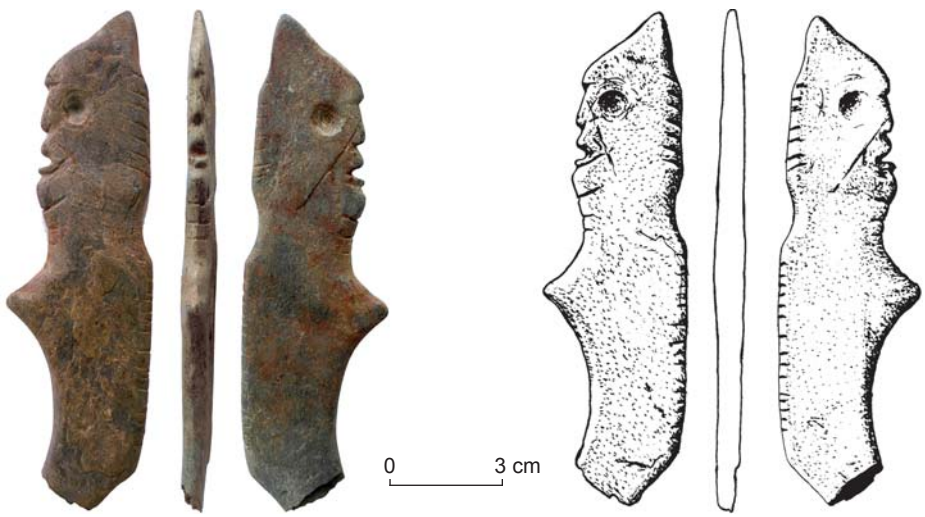

Fig. 7. Anthropomorphic figure (slate).

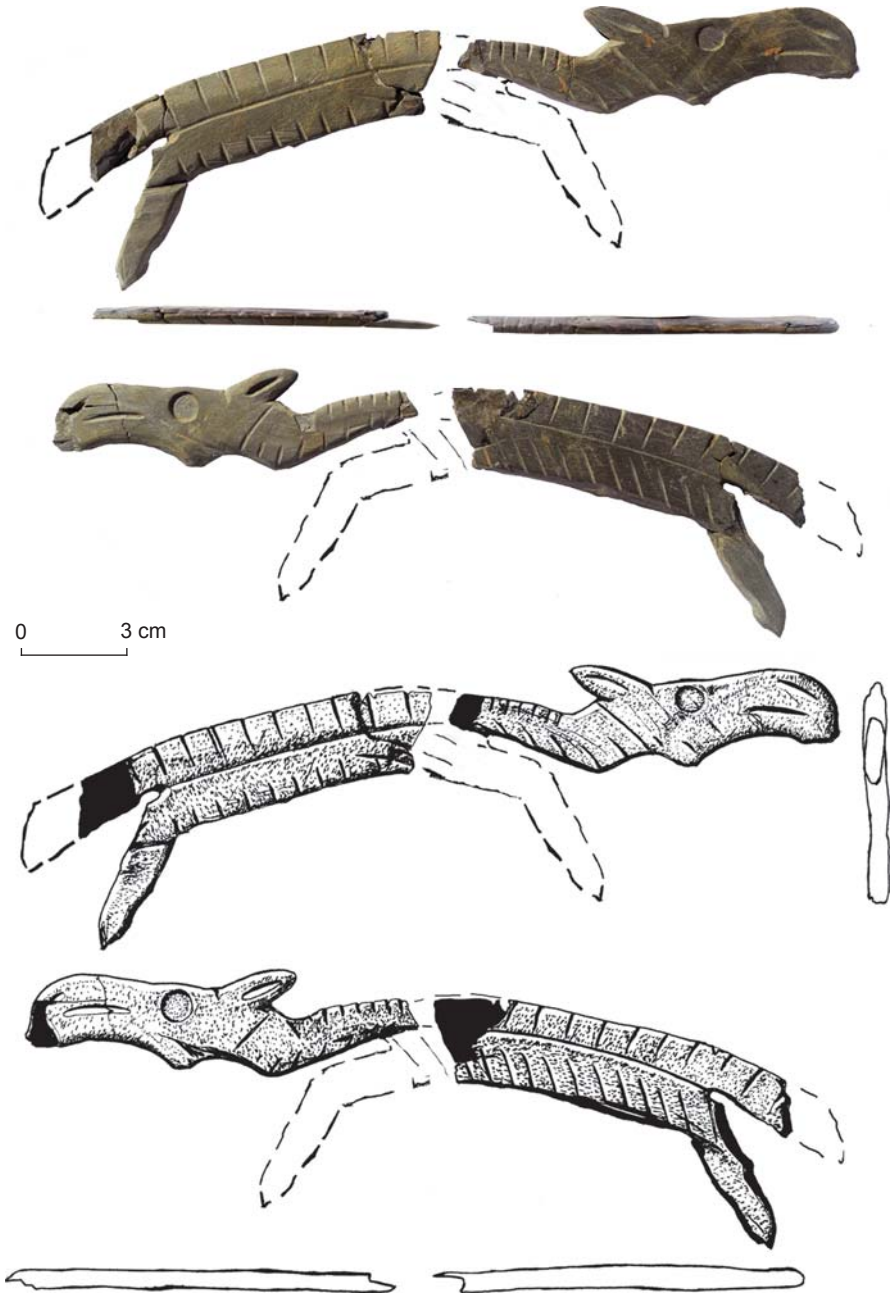

Fig. 8. Elk representation (slate).

of a person (probably male) are represented. The head wearing pointed headdress was depicted in a realistic manner. Part of the body and possibly the arm are expressed in a stylized way. The head was processed like the sculpture in the round, although owing to the specific properties of the raw material, it is perceived as two profile images. The front view is also perfectly discernable. The man is depicted with his open mouth; full lips are emphasized in relief. The nose is small and straight. Drilling from the opposite directions created round eyes. The hair is shown with symmetrical slanting notches. On one side, the notches were made on the chin, which suggests the presence of a beard outlined by a grove in relief. Slanting lines (probably a tattoo) go down from the nose. Several horizontal notches were made on the neck under the chin. The body of the person is covered with parallel horizontal lines on its narrow end. Their rhythm with equal and unequal intervals suggests the presence of a calendar system, especially since this object was clearly of non-utilitarian purpose. The length of the artifact is 12.7 cm; width is 3.8, and thickness is 0.4 cm. The material is slate.

Figure of an elk (excavation pit, grid 101/364). The item was broken into two fragments. The figure is flat, double-sided, and was gracefully made in a realistic manner (Fig. 8). Elongated oval ears were executed with great care. Drilling with a tool with a flat working edge resulted in large round eyes on long muzzle. Arcuate notches rendered its nose and mouth. Two parallel lines descending from the base of the nose to the protrusion under the throat (dewlap on the neck) are barely visible near the eye (as in the masks described above). The body is elongated compared to the limbs, which might have been caused by the size, shape, and material of the blank. Slanting and vertical carved lines on the figurine could indicate both animal hair and conventionally rendered ribs ("skeletal" style). The latter suggestion is supported by the length of the notches, their general orientation towards the longitudinal line dividing the body in half, and the very presence of that line. The figure retained one hind limb; the lower part of which was broken off, but not lost. An oval hole was partially preserved between the leg and body. The length of the artifact (as a whole) is 22 cm; width (along the body) is 2.9 cm, and thickness is 0.4 cm. The material is slate.

Pictorial parallels and interpretation of representations

Tri-partite compositions of anthropomorphic figures, as the composition on the buckle from burial 1, are common among ancient representations of Siberia. The most archaic variants can be seen on the petroglyphs of the Okunev culture in the Middle Yenisei River region. A large composition of that kind is present at the Shalabolino rock art site, where a large "sun-headed" mask was depicted in the center, and gracile profile anthropomorphic figures were represented to the left and to the right of the central image (at the edges of the plane), with the only difference that the figures did not have multiple rays, but high pointed and loop-shaped headdresses (Pyatkin, Martynov, 1985: Fig. 68). Anthropomorphic figures with masks have been found on the walls of the Proskuryakov Grotto in the eastern spurs of the Kuznetsky Alatau, where they were more compactly arranged in a row (Esin, 2010: Fig. 14, *3*). The central Okunev mask is flanked by anthropomorphic figures at the Ashpa rock art site in Khakassia (Leontiev N.V., Kapelko, Esin, 2006: Fig. 23, *1*). We can observe numerous combinations of several anthropomorphic figures wearing various masks both on the Samus pottery and on the walls of the burial chambers of the Karakol culture in the Altai (Esin, 2009: Pl. 1, Fig. 57, 76, *7*; 98, *8*; 106, *2*, etc.; Kubarev, 2009: Fig. 13, *4*; 33, 41, 106, etc.). An interesting composition of the Bronze Age appears at the Maya rock art site in Yakutia, where masks were placed above the spread arms of the central masked image; the right mask had the headdress with multiple rays (Okladnikov, Mazin, 1979: Pl. 52). Similar images sometimes occur on the Samus pottery (Esin, 2009: Pl. 1, fig. 93, 128), Karakol paintings (Kubarev, 2009: Fig. 13, *1*; 14, 33, 95; 121, *7*), and at the Sagan-Zaba rock art site of the Bronze Age on Lake Baikal (Okladnikov, 1974: 73, pl. 7). In our case, disproportional long arms of the central figure can be explained by the presence of some pointed objects in place of the hands, resembling leaf-shaped "fans" in the hands of the Karakol anthropomorphic figures (Kubarev, 2009: Fig. 139, *1–3*).

Despite the identical eye design, "tattoo" motifs, and framing of multiple rays, the heads of the central and side figures were depicted in different styles. In addition to the view, they differ in the degree of realism manifested by the images. In addition, they have different outlines of the facial part. Framing of multiple rays is typical of many masks known from the steles, petroglyphs, and pottery of the Okunev culture (Vadetskaya, Leontiev, Maksimenkov, 1980: 63, fig. 8, *6*, *7*; Leontiev N.V., Kapelko, Esin, 2006: Fig. 5; 7, *6*; 20, *1*, *3*). The figures under consideration are also related to the Okunev images by the manner of executing rounded eyes, lines of the "tattoo", and pictorial features of mask outlines.

Relatively recently, "sun-headed" characters were identified at the Tom rock art site (Miklashevich, 2011: Fig. 4–6). They also appear on the Samus pottery (Esin, 2009: Pl. 1, fig. 135, *1*, *2*). Drawings of the Early to Middle Bronze Age on stone slabs of funeral structures of the Karakol culture in the Altai Mountains (Kubarev, 1988: 31, fig. 19) show great similarity in terms of rendering the headdress of feathers. Thus, a human figure with rays or feathers adjoining his head and horizontal line made with red paint on the face, separating its lower part from the upper part, appears on slab No. 1 from kurgan 2 at the Karakol cemetery. Generally, the figure, depicted in outline, is graceful and elegant, which brings it closer to the central figure on the buckle under discussion. Some similarity between the central figure on the buckle is also observed in the anthropomorphic image on a bone plate found in the grave at the Korablik I kurgan in the northeastern Altai Territory (Grushin, Kokshenev, 2004: 42, fig. 4, *1*), particularly in the headdress (or representation of hair) in the form of rays or feathers, half-open mouth, and bands on the face, made by carved lines.

Profile images of anthropomorphic masks with open mouths, rounded eyes, and a distinguished nose area appear on stone sculpture from the settlement of Samus-4 (Esin, 2009: 453, pl. 3, 6, 7), sculptures of the Okunev culture (Vadetskaya, Leontiev, Maksimenkov, 1980: 145, pl. XXXVI, 35–37; XLVIII, 96; LIV, 138, 141), and Karakol petroglyphs of Beshozek (Savinov, 1997: Fig. 6, *b*). However, these images practically lack the headdress of feathers, which points to the uniqueness

of the images on the buckle from the cemetery at the Tourist-2 settlement. The headdress might have been depicted in highly stylized manner in the form of a "crest" in anthropomorphic sculptures from the sites of Samus IV and Karakan (Borodovsky, 2001; Esin, 2009: Fig. 45, *1–3*), and was more realistically shown in a profile figure with the predator mask on a slab of a stone box from burial 5 at the Karakol cemetery (Kubarev, 1988: Fig. 45).

Another feature of the anthropomorphic figures on the buckle from Tourist-2 is the presence of pronounced neck, which is not typical of the above images in the petroglyphs of the Altai and Khakass-Minusinsk Basin. At the same time, this feature is an integral part of the majority of anthropomorphic figures with masks appearing on the Samus pottery (Esin, 2009: Fig. 28). The neck is also emphasized in the characters on the petroglyphs of the Baikal region and Lower Angara region (Okladnikov, 1974: Pl. 4–10, 25, 26; Zaika, 2013: Pl. 112, *4*, *5*, *7*, *8*, *10*, *13*, *14*, *16*; Pl. 119, *1*, *5*, *16*).

Paired, sometimes symmetrical, placement of mythical predators appears on the Okunev petroglyphs (Studzitskaya, 1997: Pl. II, fig. 1; Leontiev N.V., 1997: Fig. 1). On statues and steles, they usually also occupy the lower position (Leontiev N.V., Kapelko, Esin, 2006: Fig. 103, 111, 140, 143, 157, 159, 194, 277, 282). Lateral "sun-headed" anthropomorphic figures on the buckle from the cemetery at Tourist-2 seem to grow out of the open mouths of predatory fish. The subject of devouring or throwing up of anthropomorphic characters, "sun-headed" masks, or solar symbols by mythical predators is well represented on the petroglyphs of the Okunev culture (Ibid.: Fig. 47, 102, 194, 208, 222, 226, 282, 288; Savinov, 2006: Fig. 16, *2*; 17, *1*, *2*; 19, *2*; Studzitskaya, 1997: 255–256, pl. I, fig. 1, 2; Tarasov, Zaika, 2000: Fig. 1, 4). This fact, along with the aggressive nature of the chthonic images, suggested some scholars to regard them as the embodiment of the generative principle, to consider them as demiurges—creators of the Universe and lords of the three worlds (Pyatkin, Kurochkin, 1995: 72; Pyatkin, 1997; Savinov, 1997: 202–203; Tarasov, Zaika, 2000: 187–188). In this context, the images on the belt buckle from burial 1 may reflect the ideas of the ancient inhabitants of the Ob region concerning the universe. The vertical model of the world order is clearly visible: heads of the figures, which are framed by the "sun" plumage, can be associated with the upper realms; trunk and arms, with the middle-earthly world; while the images of predatory fish and lower limbs of anthropomorphic images joined to them, with the lower level of the universe (underground/underwater world). Along with this, we can observe here a more archaic, horizontal principle of world order, syncretically inscribed into the general subject. The frontal anthropomorphic figure symbolizes the center of the universe, while the side figures may indicate the binary spatial opposition: south/east–north/west.

Another distinctive aspect of images on the belt buckle is realistic style of anthropomorphic images, and their naturalistic manner of execution. Apparently, while solving the problem of the visual rendering of abstract meanings, and harboring ideas about the world order and about spirits/deities, the ancient artist used the images of costumed characters (performers of rituals and mythological scenes) who modeled them. The practice of portraying costumed masked figures (participants in the rituals) was widespread in the Karakol funerary paintings and Okunev petroglyphs (Kubarev, 2009: Fig. 128–130, 134–137, 139, 209; Leontiev N.V., Kapelko, Esin, 2006: Fig. 15, *5*, *6*; 20, *1*; 23; Lipsky, Vadetskaya, 2006: Pl. XVI, XIX–XXII).

The anthropomorphic figure made of mammoth ivory reveals a certain similarity with the bone mask from burial 677 at the Sopka-2 cemetery in the Om River region in the Baraba forest-steppe (Molodin, 2001: 58, fig. 37, *3*). Here, the face is also shown in frontal view; eyes and mouth are rendered with oval indentations; the mouth is half-open; there is a cone-shaped headdress on the head. This item has special loops with rounded holes for attaching to clothing (Ibid.: 103). The artifact from the Tourist-2 cemetery also has rounded holes for fastening. Such images of head and face were typical of the Neolithic to Early Metal Age in both Western and Eastern Siberia (Ibid.). Notably, according to the stylistic and iconographic features, the head of the figure from mammoth ivory shows a striking resemblance to the realistic masks of sculptures and miniature pestle-like figures, which E.B. Vadetskaya united into a separate group of anthropomorphic images of the Okunev culture (Vadetskaya, Leontiev, Maksimenkov, 1980: 48–49, fig. 4, II). Moreover, one of the masks in relief from that group is crowned with the cone-shaped pommel (Ibid.: Pl. LIV, fig. 141). The material from which the figure was carved corresponds to the tradition of using bone remains of the paleofauna in the bone carving of the Late Bronze to Early Iron Ages, which was widespread in the southwestern Siberia and especially in the north of the Upper Ob region in the vicinity of Novosibirsk (Borodovsky, 1987; 1997: 104–111).

The practice of representing partial anthropomorphic figures without limbs (usually the lower) was widespread in the art of geographically close cultures of the Chalcolithic to Early Bronze Age, and in later periods. These include pestle-like sculptures, "small idols" in petroglyphs, and wedge-shaped anthropomorphic figures on ceramic vessels (Savinov, 1997: 204). The figures of "small idols" have been found in burials in the Altai (Grushin, Kokshenev, 2004: Fig. 4, *1*), Angara region, and Baikal region (Studzitskaya, 2006: Fig. 1, 8–10, 12; 2011: Fig. 11, 13; Okladnikov, 1976: Pl. 64, *1*).

Another interesting object of portable art that was found in the cemetery at Tourist-2 is a flat bone figure

of the bird in heraldic form from burial 6. What we have here is an indisputable evidence of the emerging heraldic interpretation of the image of the predatory bird already in the Early to Middle Bronze Age, which in itself can hardly be overestimated. A similar pictorial tradition appeared almost simultaneously in the 6th–5th centuries BC in the objects of movable art of the Volga-Kama region, Urals, and Western Siberia, where it was further developed and reached its peak in the Early Middle Ages (Chemyakin, Kuzminykh, 2011: 70–71, pl. 1–19). The stylistic similarity of our find with a bronze bird figurine from the Usa River (Southern Urals) (Kosarev, 1984: 187, fig. 25, *14*) can be observed.

In the movable art of the earlier periods in Siberia, ornithomorphic images were usually represented by bone or stone figurines of waterfowl (Kosarev, 2008: 91–92). An exception is a stylized frontal image of a bird on a Chalcolithic vessel found in the settlement layer at the Borovyanka-7 cemetery (Omsk region) (Chemyakin, Kuzminykh, 2011: 47, fig. 1). The find from burial 6 under discussion is the earliest known "heraldic" image of a predatory bird appearing in the small plastic art in Siberia. Based on the sources available today, it marks the initial stages of the emergence of this artistic tradition, which developed (both in its form and apparently in its contents) in subsequent cultures.

Sculptures of elk have widely appeared in Eurasia since the Neolithic (Kosarev, 1984: 194). This image also dominated the cave art of the taiga inhabitants of Siberia. A realistic bone figurine of elk found at the Elovka settlement (Tomsk region of the Ob) (Ibid.: 191, fig. 2) shows remote similarities to the image of the elk discovered at Tourist-2. The pommels of bone spoons, rod-staffs, and pendants in the form of elk heads have been regularly found at the Neolithic sites of the Baikal and Angara regions (Studzitskaya, 2011: 39–49, fig. I). Almost complete elk figurines carved from bone were found in a Serovo burial at the Bazaikha site (Okladnikov, 1950: Fig. 90).

Emphasized round eyes, specific features of rendering the head part of the elk figurine (ears pressed to the head, robust upper jaw, marked line of the mouth, dewlap on the neck, etc.) from the cemetery at the Tourist-2 settlement have close parallels in the petroglyphs of the Angara style in the south of Central and Western Siberia (Sovetova, Miklashevich, 1999: 55–59, pl. 2, 3, fig. 5) and are almost identical to the representation of the elk head from a Neolithic burial at the Bazaikha site.

Anthropomorphic items from burials 5 and 6 might have had a utilitarian purpose during the life of their owners. Two stylized facial outlines in the upper part of bone rods, which with a certain degree of probability could have been used by the carriers of the Kitoy culture as piercing tools/hairpins, and a bone-piercing tool crowned with the representation of a human head from a Serovo burial near the village of Anosovo on the Angara River (Studzitskaya, 2006: Fig. 1, 8; 2011: Fig. II, 13, 7) can be mentioned as examples. Stone boot-shaped item/whetstone with the anthropomorphic pommel found in the vicinity of Tomsk, which can be correlated with the Samus culture (Esin, 2009: 111, pl. 8), and the Okunev small sculpture from the vicinity of the Charkov Ulus in Khakassia (Leontiev N.V., Kapelko, Esin, 2006: 9, fig. 121), which, with some imagination, can be interpreted as a fishing sinker (Zaika, 1991: 33), can be considered to be the stone items of that category.

According to their stylistic and iconographic features, profile double-sided representations of the human face on these items are similar both with each other and with both the side figure on a buckle from burial 1 and with the "small idol" from burial 5 (in profile view). Each of them has large round eyes, a straight nose, and a half-open mouth; forehead, lips, neck, and chin are more or less pronounced; diagonal lines of the "tattoo" are shown. The outline of the face is emphasized with a semicircle, and the lines of hair/feathers are also adjacent to it at the side on anthropomorphic figure on the buckle from burial 5 and the side character of the multi-figured composition from burial 1.

Distinctive facial features find numerous parallels in stone movable art of the Samus culture, as well as Okunev and Karakol petroglyphs mentioned above. Pointed hats are typical of the anthropomorphic figures in Okunev cave paintings, but the headdress is higher there (Kubarev, 2009: Fig. 135, *4–6*; 136, *1*, *2*). Frontal masked figure on a slab from the cemetery near the village of Ozerny (Ibid.: Fig. 13, *4*; 147, *7*) has the headdress of comparable size. Ring-shaped/loop-shaped headdresses have been found among the Okunev images, but they are more typical of the Karakol profile anthropomorphic figures (Ibid.: Fig. 130, *1*, *3–11*; 131, *1*). In ritual scenes, these masked characters convey the images of spirit-deities.

Conclusions

The objects of portable art found in the burials on the territory of the Tourist-2 settlement are unique both individually and as a general set, although they share a common tradition of rendering individual details of anthropomorphic and zoomorphic imagery. Considering the circumstances of their discovery, as well as the subject-oriented and iconographic features of representations, these artifacts should be attributed to the category of sacred objects associated with cultic practices. Despite the different nature of the artifacts, they are united not only by the close proximity of the burials, but also by the common pictorial traditions employed while representing the characters.

Anthropomorphic images may have realistically reproduced the appearance of real characters. Their

common ethnic and social affiliation may have been emphasized by a similar style of tattoo. However, the faces of the figures are distinguished by stylization and certain conventionality—the ancient artist was clearly guided by the established pictorial canons when he was creating the images, and used stylistic and graphic techniques that were typical of the indigenous artistic traditions. The style is well distinguishable; it is clear and recognizable. The general principles of executing anthropomorphic and zoomorphic images can be observed using the example of rendering eyes, which are identical in our elk figurine and in a number of masks not only in terms of their shape, but also in technical parameters of execution.

Theriomorphic and ornithomorphic figures may reflect totemic and animistic views rooted in the Neolithic and are very common for the ancient population of the forest-steppe zone of Siberia. Anthropomorphic imagery may reflect the cult of the ancestors and early forms of shamanism. Multi-figured composition from burial 1 has a more sophisticated semantic content; it illustrates the basic concepts of worldview and mythological nature.

The works of portable art found at Tourist-2 fully comply with the artistic tradition of the Early to Middle Bronze Age in the southwestern Siberia. However, distinctive nature of the complex of finds and their archaeological context suggest that they may represent the previously unknown "Krokhalevka" style in fine art of the peoples of Siberia, which reflects certain autochthonous traditions in spiritual culture. The authors of this study are aware that both attribution of the described items and suggestion concerning a special "Krokhalevka" style are debatable. The proposed name of the style given by the archaeological context of the finds requires additional discussion and argumentation, especially when discovering new objects of portable art of the Middle Bronze Age in the southwestern Siberia. This may well become a topic for a separate study.

The style, which can be preliminarily designated as the "Krokhalevka" style, might have emerged on the local Neolithic basis. However, judging by the well-known visual parallels, its development happened with the noticeable influence of the territorially close Okunev, Karakol, Samus, Krotov, and Odinovo cultures of the Early to Middle Bronze Age. Taking into account the common subject matter and stylistic correspondences with the examples of the Kulai cultic casting, it should be assumed that the "Krokhalevka" pictorial traditions undoubtedly stood at the origins of the Kulai art, which found its clear expression in the objects of metal movable art (Chindina, 1984: Fig. 18, 7, *10*; Chemyakin, 2013: Fig. 1, *49*; Yakovlev, 2001: 212; Esin, 2009: Fig. 72, *2–5*; Polosmak, Shumakova, 1991; Leontiev V.P., Drozdov, 1996: Fig. 5; Kosarev, 2003: 256, fig. 56, 58; 257, fig. 60), and individual iconographic details, which found their further development in Siberia in the cultures of the Middle Ages (Soloviev, 2003: Fig. 45, 108, *a*; Kardash, 2008: Fig. 7, *1*; Trufanov, Trufanova, 2002: Fig. 1; Oborin, Chagin, 1988: 61, 173, Fig. 148; Zaika, 1997: 99, Fig. I, A, 2, *7*).

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The Use of 3D-Modeling for Reconstructing the Appearance and Function of Non-Utilitarian Items (the Case of Anthropomorphic Figurines from Tourist-2)

This article presents the results of study of an Early Bronze ivory figurine from Tourist-2, using 3D-scanning with various technical parameters. The aim of the study was to test the new non-invasive methods of structured light 3D-scanning, with an accurate assessment of morphometric characteristics. In addition, use-wear analysis was employed to evaluate the previously unknown features relating to function. As a result, the original appearance of the figurine, the manufacturing technique, and iconographic characteristics were reconstructed. A series of transverse sections and the evaluation of the center of mass, combined with previously known features, suggest that the figurine was a personal ornament sewn onto clothing. For comparison, two flat anthropomorphic sculptures (a buckle made of burl, and a shale figurine) from the same burial complex were analyzed. Longitudinal sections suggest that, despite morphological and technological differences and the fact that various raw materials had been used, the iconographic style of all items is one and the same.

Keywords: *Bronze Age, Krokhalevka culture, anthropomorphic sculpture, iconographic style, 3D-modeling, use-wear analysis.*

Introduction

The development of archaeological science in recent years is determined by mainstreaming new methods and technologies. 3D-modeling, which can be used both as an independent research tool and in concert with conventional methods, occupies a prominent place in this process. One of the main and undeniable advantages of using 3D-modeling of archaeological artifacts as a part of scanning (as compared to trace-drawing, photography, and photogrammetry) is the possibility of the relatively quick creation of high-quality scale models. However, the use of this method is not limited to visualization, and offers many new opportunities for obtaining verifiable results.

First efforts to study artifacts by means of digital models were made as early as the end of the 20th century (Wood, Chapman, 1992; Levoy et al., 2000). Since then, modeling with the use of structured-light 3D-scanners has become a widespread tool for visualization and study of historical and cultural values (Mcpherron, Gernat, Hublin,

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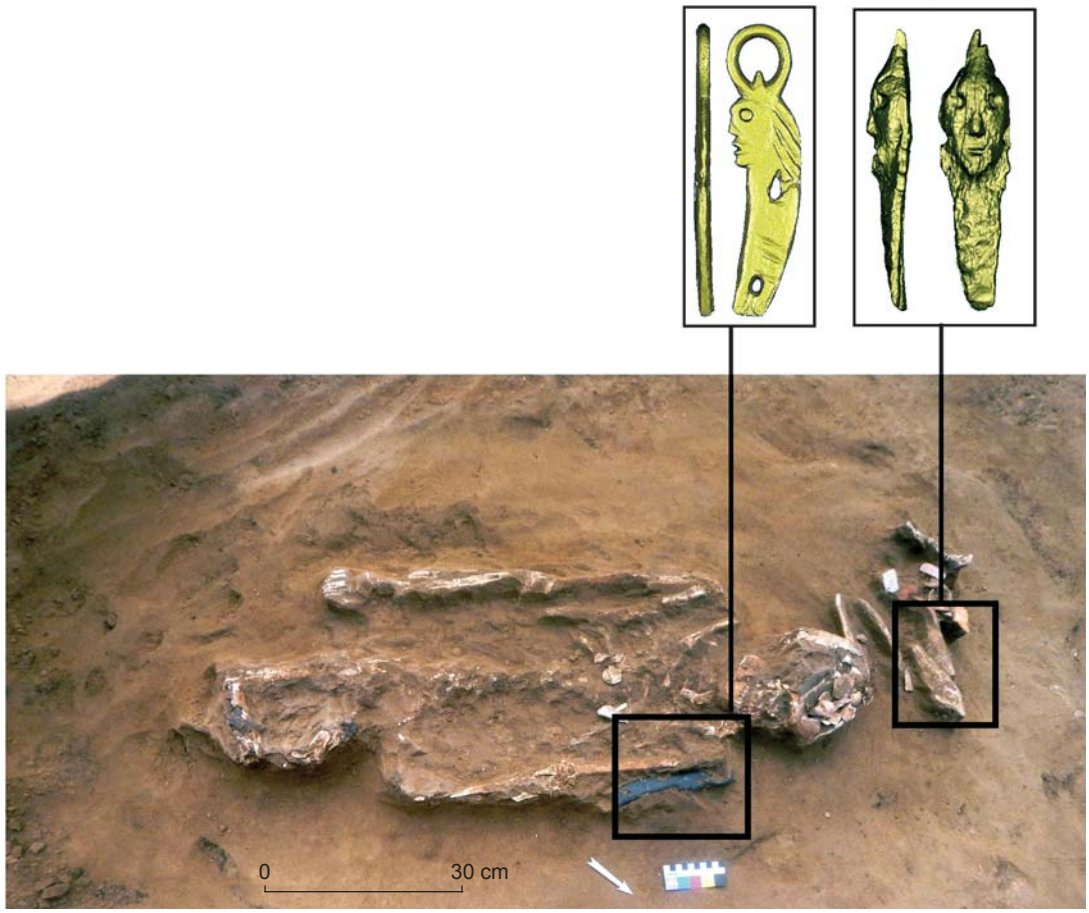

Fig. 1. Location of anthropomorphic figurines in burial 5.

2009; Counts, Averett, Garstki, 2016). For the study of artifacts of the Bronze and Iron Ages, 3D-modeling is already used as a conventional method (Karasik, Smilansky, 2008).

3D-modeling is widely used in the study of petroglyphs. Analysis of 3D-models allows not only the documenting and storing of items, but also the obtaining of new information as a result of the discovery of earlier invisible drawings, stratification of images superimposed on one another, and determination of their application technologies (Grimaud, Cassen, 2016; Devlet et al., 2017; Zotkina, 2019; Zotkina, Kovalev, 2019).

A special area for using new technologies is the study of unique non-utilitarian items. No generally accepted protocol for the study of these items has been created so far owing to differences in their morphology and functions (Counts, Averett, Garstki, 2016; Grosman et al., 2017; Morris, Peatfield, O'Neill, 2018). The most spectacular example of such research is the establishment of the functions of masks from the Levantine Neolithic assemblages, which resulted in a conclusion about the post-mortem type of these items (Grosman, Ovadia, Bogdanovsky, 2014).

This article presents the experiences of the first Russian archaeological study aimed at reconstructing, on the basis of 3D-scanning methods, technological and experimental use-wear analyses, the appearance, function, manufacturing technique, and iconographic characteristics of anthropomorphic figurines.

Study materials

The object of our study is an ivory anthropomorphic figurine from burial 5 of Tourist-2 (Novosibirsk), a cemetery from the Early Bronze Age (Basova et al., 2017). In order to perform cultural and stylistic interpretations, we involved two other anthropomorphic figurines from this burial complex: a buckle made of burl (a tree growth with deformed wood grains) found in the same burial, and a shale figurine from burial 6*.

*See the location of site, description and representations of the anthropomorphic figurines under consideration in the article by N.V. Basova, A.V. Postnov, A.L. Zaika, and V.I. Molodin, in this issue of the journal.

In the burial, at a depth of 0.8 m below the daylight surface, the skeleton of a 40–45-year-old man was found, in an extended supine position, with his head towards the north. The small bones of feet and hands were absent. Northwest of the skeleton, a fragment of the right side of the mandible of a 20–25-year-old man (definitions made by a Junior Researcher of the IAET SB RAS, M.S. Kishkurno) was recorded. Between this fragment and the skull of the adult man, there was an accumulation of artifacts, including two polished stone knives, flakes, beaver's incisors, bone items, and the anthropomorphic figurine to be analyzed (Fig. 1). The artifact under study had been partially destroyed, owing to natural fracturing and exfoliation of the tusk over its cone-like structure. During conservation and restoration works, the find was glued together, though small surface areas near the head proved to be lost. A buckle made of burl was lying parallel to the humerus of the full skeleton (Fig. 1). The third figurine under consideration was located in grave 6, just above the pelvic bones of a buried adult man (Ibid.).

Study methods

All three anthropomorphic figurines from the Tourist-2 burial complex were subjected to 3D-scanning with the use of structured-light technique (Fig. 2). The method consists in projecting the sets of light strips onto a scanned item, using a video projector, wherein the light strips are recorded by high-precision digital cameras. On the basis of transformations of a strip sample with the use of software, a 3D-grid of the item's surface is calculated.

A Thor Drake 3D-scanner with a resolution of 0.15 mm and accuracy of 3D-point (root-mean-square deviation) of 0.04 mm was used for 3D-scanning of the ivory anthropomorphic figurine (model No. 1). 3D-models of two other items were obtained using a Rangevision Pro 5M 3D-scanner. The resolution for the burl buckle (model No. 2) is 0.1 mm, and for the anthropomorphic shale figurine (model No. 3) 0.04 mm; the 3D-point accuracy is 0.03 and 0.018 mm, respectively.

The 3D-scanning process comprises two steps: photographing and superimposition of 3D-images to form a single model (Chistyakov et al., 2019). 50 and 70 3D-images, about 1.2–1.5 mln points in each, were produced for models No. 2 and No. 3, respectively. Markers, i.e. special marks determined by software during scanning, were used in order to partly automate superimposition of 3D-images. The Thor Drake 3D-scanner employs a slightly different projection principle that consists in applying a grid and producing 3D-images with a higher rate, but a smaller number of points in each. Consequently, creation of a model of equal quality requires a greater number of photos. 3757 3D-photos, 2000–5000 points in each, were taken for model No. 1. After combination of images, we obtained polygonal 3D-models with the following parameters: No. 1 – 972,848 polygons, No. 2 – 1,292,650 polygons, and No. 3 – 3,194,026 polygons.

Subsequent processing of models was carried out with Autodesk Netfabb and Meshmixer software. This provides for the following: first, to fill empty areas in a 3D-model automatically on the basis of interpolation of coordinates of the area end-points, thus reconstructing the initial surface approximately; second, to rectify errors of the polygonal model, such as self-intersections, small spines, islets, etc. All manipulations with models (determination of the item's center of mass and cross-section, calculation of volume) were performed by this program.

The geometric point of applying the total gravitational force acting on the particles of a body at any position of the latter in space is called center of gravity. The center of gravity of a solid in a uniform gravitational field coincides with the position of its center of mass. Calculation of the center of gravity of a 3D-model is conducted assuming that it is a uniform body. In such a case, the center of gravity will be the geometric center of the model (barycenter or centroid). The barycenter's coordinates are calculated as the arithmetic mean of the coordinates of all the 3D-model's points, or by the method of partitioning into a finite number of parts: for example, tetrahedrons. The last method is suitable, since each triangle of the polygonal model's surface will correspond to a tetrahedron face, while the fourth apex will lie normal to this polygon; the coordinates of the center of volume for each part are calculated from the apex's coordinates (Ponarin, 2009: 36). The total body volume equals to the sum of the component volumes:

$$V = \sum V_i .$$

Coordinates of the body center of gravity are determined from the following formulas:

$$x_c = \left(\sum v_i \; x_i\right)/v,$$
$$y_c = \left(\sum v_i \; y_i\right)/v,$$
$$z_c = \left(\sum v_i \; z_i\right)/v,$$

where x_i, y_i, z_i are coordinates of the centers of gravity of the components (Targ, 1986: 38–39).

Reconstruction of the missing elements of model No. 1 was performed by the method of mirror reflection of the corresponding elements (taking into account an assumption concerning the symmetry of these elements) and partial sculpting using the Autodesk Meshmixer software package. The integrated study included experimental use-wear and technological analyses of the anthropomorphic sculptures. To reconstruct ancient technologies for processing of raw materials, several

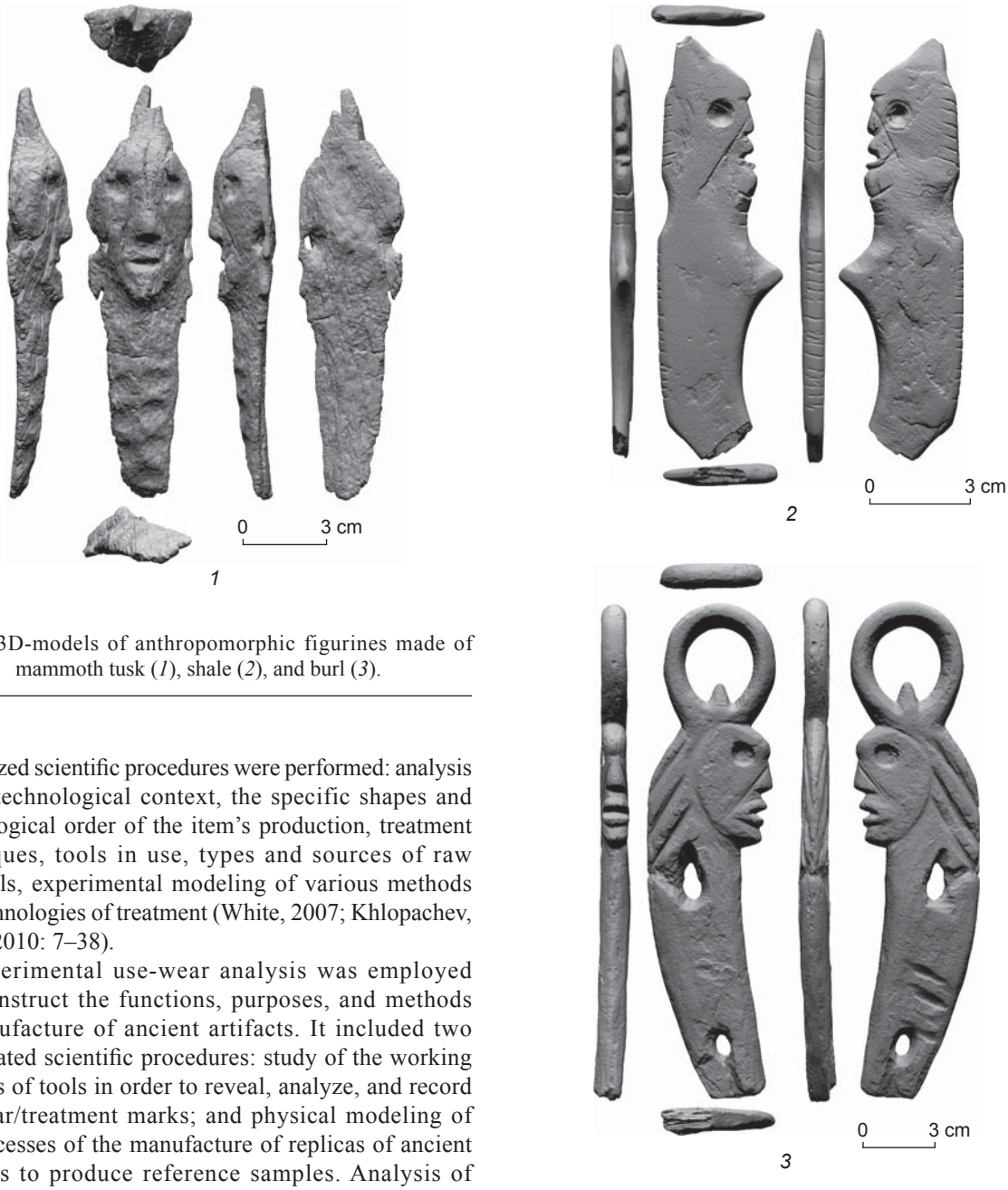

Fig. 2. 3D-models of anthropomorphic figurines made of mammoth tusk (*1*), shale (*2*), and burl (*3*).

specialized scientific procedures were performed: analysis of the technological context, the specific shapes and technological order of the item's production, treatment techniques, tools in use, types and sources of raw materials, experimental modeling of various methods and technologies of treatment (White, 2007; Khlopachev, Girya, 2010: 7–38).

Experimental use-wear analysis was employed to reconstruct the functions, purposes, and methods of manufacture of ancient artifacts. It included two interrelated scientific procedures: study of the working surfaces of tools in order to reveal, analyze, and record the wear/treatment marks; and physical modeling of the processes of the manufacture of replicas of ancient artifacts to produce reference samples. Analysis of traces was carried out at low (×7–45) magnification, using the binocular microscope Altami CM0745-T with oblique illumination. Photographic fixation of them was performed by a Canon EOS 5D Mark IV mirror chamber with Canon EF 100mm f/2.8L Macro IS USM and MP-E 65mm F2.8 1-5X Macro lenses, and a tripod mount with manual focus adjustment. Photographs with focusing in the entire area of one frame were obtained with the Helicon Focus program. Interpretation of various categories of traces included experimental data from the published sources (Khlopachev, Girya, 2010: 39–101; Heckel, Wolf, 2014; Steguweit, 2015; Hein, 2018) and the results of our own experimental observations. The employed study model was tested by the authors in the analysis of bone artifacts from the Paleolithic sites of Altai (Shunkov, Fedorchenko, Kozlikin, 2017; Derevianko et al., 2018).

Results of the study

We have determined the state of preservation of the analyzed ivory anthropomorphic figurine to be satisfactory. Use-wear analysis has shown that treatment and wear marks on the artifact are not fully preserved, as they were deformed owing to exfoliation over tusk growth cones because of drying and surface erosion.

Nevertheless, certain reduction in the informational value of this item didn't preclude our performing all the scientific procedures required to establish the purpose and production technology of the artifact.

The analysis of treatment marks, morphometric and raw-material features of the ivory anthropomorphic sculpture suggests a rather specific technological order aimed at producing elongated, massive spalls. Source raw materials were obviously found in the fossil condition, since the last woolly mammoths (*Mammuthus primigenius*) disappeared from the major part of Siberia at the end of the Late Pleistocene (MacDonald et al., 2012). In the Early Metal Age in Western Siberia, the mammoth tusk could have been acquired in the bank exposures of river valleys (Borodovsky, 1995; Borodovsky, 2012: 33).

Treatment of fossil ivory raw materials was stagially preceded by releasing the tusk dentin body from the surface cement layer. The next stage was production of the initial base spall. Traces of primary treatment on the artifact's surfaces have been lost, owing to strong modification of its morphology at the subsequent stages of manufacture of the anthropomorphic figurine. The morphometric parameters (massiveness and large length) and special features of the artifact's orientation relative to the tusk's laminated structure suggest that the blank probably had a rod-like shape and a wide V-shaped cross-section. Such morphology points to production of an elongated spall by deep longitudinal cutting out or adzing, with subsequent breaking of a pre-wetted tusk (Khlopachev, Girya, 2010: 29).

The reduction variant under consideration could have been implemented both along the predetermined grooves and without them. In the last case, the role of grooves initiating the process of producing elongated rod-like blanks could have been played by deep longitudinal cracks on the tusk's surface, which were typical of the fossil ivory. According to data from A.P. Borodovsky, heavy-duty metal tools were widely used for the primary treatment of mammoth tusks in the Bronze and Early Iron Ages (1997: 108–109). During detachment of elongated spalls from the tusk body, a system of wedges and levers was obviously employed.

At the next stage, blank surfaces were treated by slicing, probably in a wetted state as well. Traces of slicing with a metal tool with a relatively straight blade are preserved on the ventral side of the item (Fig. 3, *2*). At ×10–45 magnification, they have the appearance of lengthy, winding furrows going diagonally relative to the long axis of the artifact. Slicing was used to level the surface and to shape the outlines of the face and headdress.

The next stage of manufacture of the anthropomorphic figurine involved fashioning the facial features using various tools. Both eyes are rendered by blind holes carved with a tool with a U-shaped blade, such as an oval chisel (Fig. 4). The type of the mouth's cross-section suggests that is was shaped with the same tool with a V-shaped cross-section that had been used for treatment at the previous stage (Fig. 5).

A metal knife with a sharp-pointed blade was likely also used for the subsequent manufacture of two

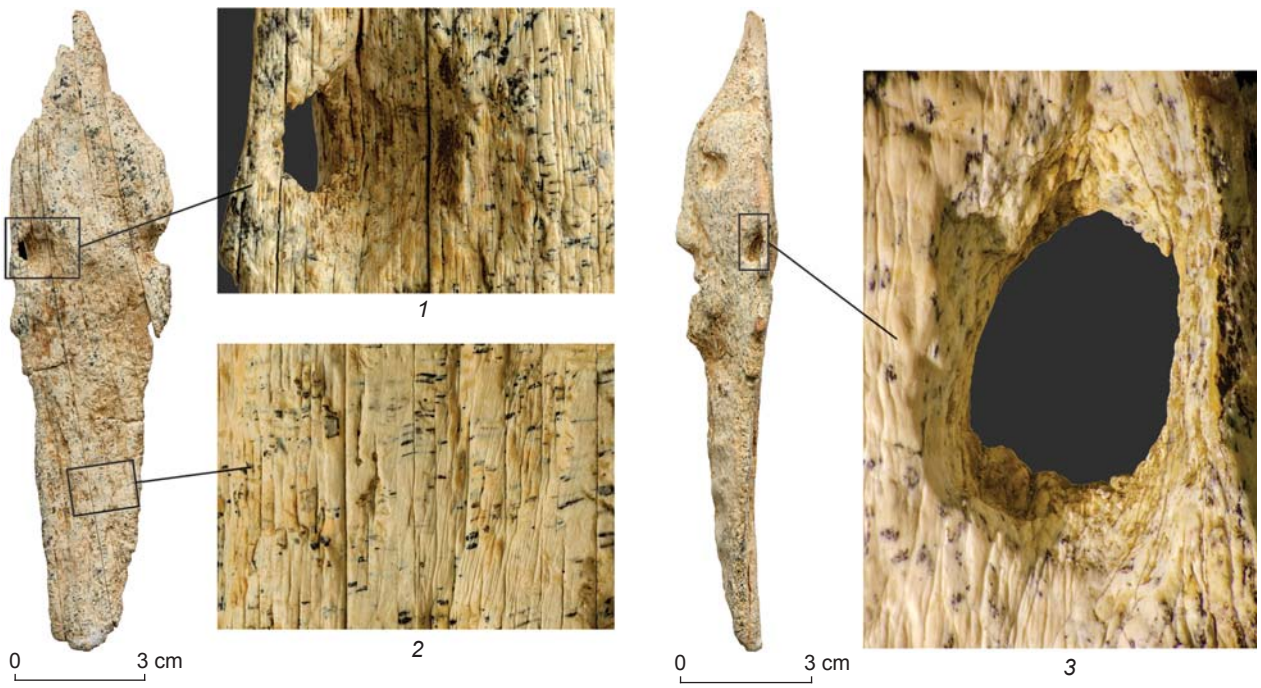

Fig. 3. Shaping of biconical through holes from the rear (*1*) and face (*3*) sides, and marks of slicing on the artifact's surface (*2*).

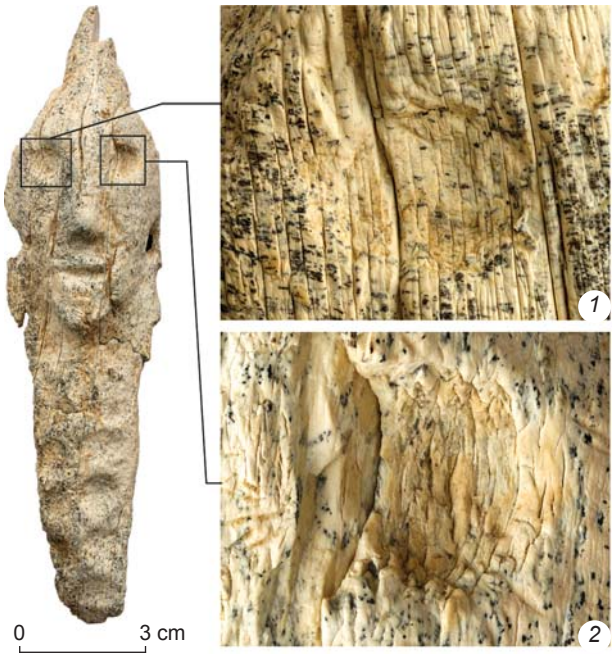

Fig. 4. Shaping of eyes using a tool with a U-shaped blade.

Fig. 5. Face of the sculpture: shaping of nose and mouth.

biconical holes at the edges of the item, one of which is fully preserved. Inside this hole, marks typical of cutting through are recorded (see Fig. 3, *1*, *3*). First, a through hole in the form of a wide oval truncated cone was formed on the ivory blank on its ventral side. Then, it was broadened on the opposite side in the reverse direction. There are no traces of leveling the hole's passage by additional boring.

The state of preservation of the sculpture's surfaces gave no means of revealing use-wear traces inside the holes. Nevertheless, owing to the use of 3D-modeling tools, consistent data regarding the functions of the analyzed artifact were obtained. With the help of the 3D-model we made a longitudinal section, which let us see the profile of the intact right hole (Fig. 6, *2*). Such a visualization can be obtained only by 3D-modeling, using scanning or photogrammetry.

The use of 3D-modeling offered the possibility of determining the item's center of gravity, which is visualized in the form of red circle on the model (Fig. 6, *1*). It is located below symmetrical side holes (an intact and a fragmented), equally spaced from these. Such a position of the center of mass, coinciding with the center of gravity, ensured the stability of the sewed-on sculpture, though the elongated item was attached to the clothing at two points only. During wearing, the upper part of the figurine could not incline forward. The physical properties of the item guaranteed its strictly vertical position. This fact is an additional argument for the high-class skill of the artisan who manufactured this figurine and provided for its comfortable use.

The employed method of mirror reflection allowed the missing parts of the analyzed sculpture to be reconstructed, including the left hole for fastening (Fig. 7). 0.7 % of the item's volume was replenished. As a result of reconstruction, measurements of drilled holes and their comparison became possible (Fig. 8, *2*). The axes of these holes intersect at the point corresponding to the longitudinal plane of the sculpture's symmetry (Fig. 8, *1*). Such a direction is typical for the items that were attached to the clothing by two relatively thin straps or threads (Dayet et al., 2017: 642–643; Fedorchenko, 2018: 120).

Discussion

Ivory was one of the most in-demand organic fabricating materials, and was exceptionally widely used in Northern Eurasia to create various formal tools, personal ornaments and objects of art, starting in the Early Upper Paleolithic (Petrin, 1986: 82; Makarov, 2013; Pitulko, Pavlova, Nikolskiy, 2015; Sinitsyn, 2016; Shunkov, Fedorchenko, Kozlikin, 2017; Krivoshapkin et al., 2018). In the Holocene, the developed technologies of ivory-treatment continued their existence in the Siberian Arctic, as indicated by materials from the Mesolithic site on Zhokhovo Island in the East Siberian Sea and from the Rodinka Neolithic burial in the Lower Kolyma region (Girya, 2015; Kistenev, 1992).

Some of the most vivid examples of the manufacture of ivory anthropomorphic figurines in the Late Bronze Age in Siberia are recorded in the Glazkovo culture's

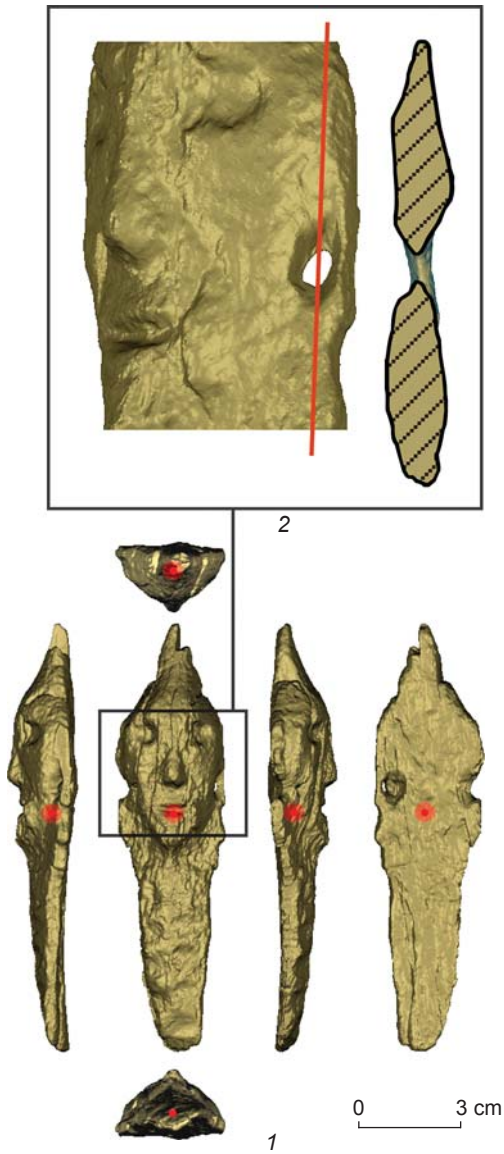

Fig. 6. Position of the figurine's center of mass (*1*) and a longitudinal section demonstrating biconical drilling (*2*).

burial complexes in Cis-Baikal region: the cemeteries of Ust-Uda (burial 4 and 6), Semenovsky (burial 4); Bratsky Kamen (burial 1), and Novy Kachug (burial 1) (Okladnikov, 1955: 285–287). Taking into consideration the object of our study, of special interest are two flat ivory figurines from the Ust-Uda cemetery that represent images of a man and a woman. Four biconical holes are shaped in each of the humeral and femoral parts of these figurines (Ibid.: 286–287, fig. 139–140). The position of the figurines in the thoracic and abdominal regions suggest that these were attached to clothing. Another two flat ivory anthropomorphic figurines were discovered in the Late Bronze Age burial in the mouth of the Koda River, in the Northern Angara region (Drozdov, 1974). Later examples of ivory treatment in Western Siberia are recorded in the materials of the Ust-Polui sanctuary of the Early Iron Age in the mouth of the Ob River, and at the early medieval sites of Verkhne-Aksenovo-2, Sopka-1, and Kipo-Kulary (Borodovsky, 1997: 104–111; Borodovsky, 2012). In certain areas of the Siberian North, the mammoth-tusks are used as a fabricating material up until the present day (Fedorov, 2017).

The first publication devoted to excavations of the Tourist-2 cemetery emphasizes that the iconography of the artifacts discovered therein is typical of the Early and Middle Bronze Age cultures of Western Siberia (Okunev, Samus, Krotovo, Karakol, Odinovo, Elunino), manifestations of which are observed in the forest-steppe zone between the Irtysh and Yenisei rivers (Basova et al., 2017). For this reason, the range of analogs for the analyzed artifact is rather wide. From our point of view, the closest item is a sewed-on one-sided anthropomorphic plate (or buckle) found in an Early Bronze Age burial from the Korablik I cemetery, in northeastern lowland Altai (Grushin, Kokshenev, 2004: Fig. 4, *1*). According to Y. F. Kiryushin and S.P. Grushin, this artifact is unique (2007: 25). Indeed, it does not have full analogs; however, the flat bas-relief image en face makes the proposed comparison quite appropriate.

Noteworthy is one more detail of all three analyzed anthropomorphic figurines from Tourist-2: namely, the pointed headdresses. Researchers repeatedly mentioned the occurrence of ray-like pointed headdresses on sacral images of the cultural and chronological stratum under consideration, which are especially typical of petroglyphs (see, e.g., (Kubarev, 1988: 36–37, 63), but are also observed on the Okunev ceramics (Pauls, 1997: Fig. 4) and portable objects of art (Grushin, Kokshenev, 2004: Fig. 4). The representations of tight-fitting caps (similar to the modern Svane caps) are inherent in the stone, metal, and bone sculptures of this period (Molodin, 2015). In view of the above, it may be cautiously suggested that pointed headdresses are typical of the Krokhalevka culture. Meanwhile, as we can see, images of "sun-headed" anthropomorphs (Basova et al., 2017: Fig. 2), an expression of epochal symbolism, are also usual in this culture. Pointed headdresses, though infrequent, are still encountered in the Okunev engravings (Lipsky, Vadetskaya, 2006) and, exceptionally, in the portable art of the Early Bronze Are in the Cis-Baikal region (Bazaliysky, 2007; Bobrov, 2015).

One more special feature of at least two of the figurines under consideration is the representation of long hair, which is most typical of the items made in the style of Okunev "Abakan plates" that depicted women with unfastened hair (Kovalev, 1997; Khavrin, 1997), and also with nose tattoos (Savinov, 2015). These obviously epochal features allow the concerned artifacts to be

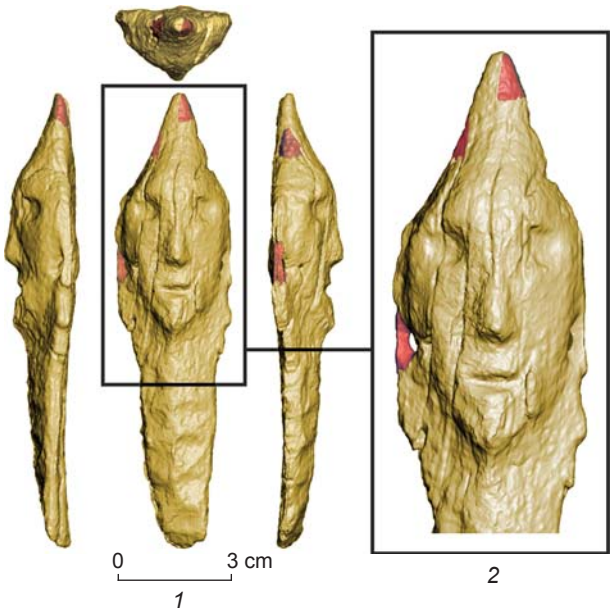

Fig. 7. Reconstruction of the initial appearance of the ivory anthropomorphic figurine.

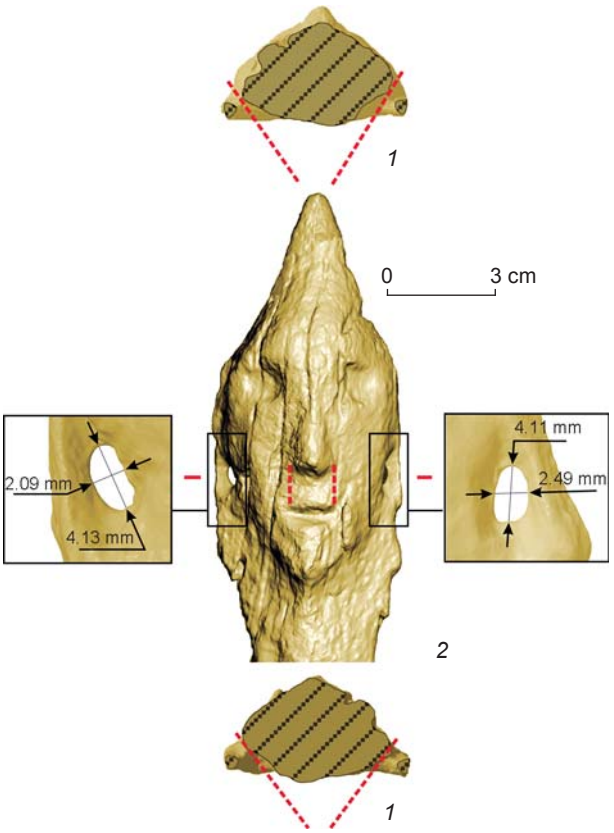

Fig. 8. Direction of the axes of symmetrical holes (*1*), and metric parameters of the existing and reconstructed holes (*2*).

included into a single circle of the Early to Middle Bronze Age cultures of Western Siberia.

Apparently, the iconography of all three figurines under consideration is very similar. Men with rounded eyes and massive noses, wearing pointed headdresses, are depicted. They are shown with open mouths, and full lips are performed in relief. To demonstrate the iconographic similarity, we obtained longitudinal sections in a relative scale, while working with 3D-models (Fig. 9).

Judging by the archaeologically intact vessels in the burials of the Tourist-2 cemetery, the site belongs to the Krokhalevka culture (Basova, 2018). Meanwhile, the complex is comparable exclusively to textile ceramics (Molodin, 1977: Tabl. LXIV, 1; LXVI, 3, 4).

Conclusions

The combination of 3D-modeling tools and technological and experimental use-wear methods has demonstrated their efficiency in the reconstruction of the technique of manufacture, function, and cultural and chronological interpretation of a unique ivory anthropomorphic sculptured image. In our opinion, 3D-modeling is an indispensable tool for the following scientific procedures:

1) Reconstruction of the initial appearance of an artifact. The symmetry of separate parts of the item to be reconstructed is an essential prerequisite. Such an approach is also used in reconstruction of the initial appearance of paleontological and anthropological remains (Freidline et al., 2012);

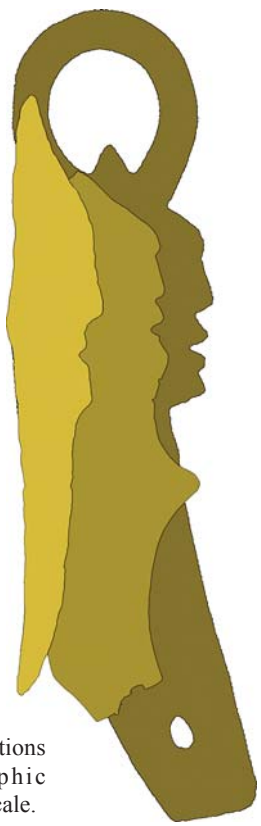

Fig. 9. Longitudinal sections of the anthropomorphic figurines on a relative scale.

2) Non-invasive manipulations, in order to obtain sections and projections of artifacts;

3) Various metric and geometric calculations, such as determination of the main and specific metric parameters, volume (with the possibility of subsequent calculation of the mass, with the known density of raw materials), and center of mass. In the case of analysis of archaeological materials, the 3D-scanning method shows clear advantages over others, since it offers the possibility of accurate measurements of models and further verification of them.

As a result of comprehensive research, it has been established that all the morphological and technological characteristics of the ivory anthropomorphic figurine testify to its usage as a peculiar ornament to be sewn onto clothing:

1) the plano-convex shape of the sculpture intentionally fashioned by the artisan;

2) the presence of similarly-sized and symmetrically-located holes;

3) an artificially preset direction of the axes of drilled holes: diagonal relative to the artifact's cross-section, the axes intersect at the point corresponding to the longitudinal plane of symmetry of the figurine;

4) the position of the item's center of mass, which ensured that the wearing of it on clothing was comfortable.

The stylistic features of all three anthropomorphic images show their common iconographic style. The discovery of two figurines in one grave, and the rare and valuable fabricating material from which they are manufactured, are indicative of the exclusive social status of the buried man. The shaping type of holes, and the position of the geometric center of mass on the studied ivory item, argue for the life-time use of this artifact. In our opinion, in the event of its manufacture for the burial rite, careful observance of the requirements for the center-of-mass position was not a functional or technological necessity.

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Ceramic Protomes of Horses from Late Bronze to Early Iron Age Sites in the Southern Taiga Zone of Siberia

This study introduces ceramic protomes of horses from the southern taiga zone of Siberia: specifically, from the Middle Irtysh region (Novotroitskoye I) and the Angara region (Strelkovskoye-2). These artifacts are part of a cross-cultural phenomenon. The analysis of their decorative elements suggests that they represent bridles. Close resemblance to Assyrian reliefs showing bridled horses makes it possible to identify the main details of Middle Eastern horse trappings, such as a bridle, a head-rope, and a breast-collar. Also, Siberian specimens display indirect parallels to the archaic classic tradition of using horse protomes in ritual ceremonies. The most important factor behind the appearance of ceramic horse protomes in the southern taiga zone of Siberia was the adoption of horse-breeding and eventually horse-riding, as evidenced by Late Bronze to Early Iron Age bits, cheek-pieces, and parts of harness from the same region. In the early first millennium BC, horse protomes become a common iconographic marker throughout Eurasia. They were a typical feature of Early Iron Age art, a prestigious symbol widely used in rituals, possibly associated with bronze casting.

Keywords: *Late Bronze Age, Early Iron Age, transition, southern taiga zone, Siberia, protomes, ritual items, animal style.*

Introduction

In the Late Bronze to Early Iron Ages in Eurasia, protomes were commonly used as artistic elements of figurative decoration on various items, including rhytons, furniture, various jewelry, elements of weaponry (handles, pommels, crossbars), and sculptural adornment of architectural details (columns). Protomes were widespread in ancient Eastern (Persian) and Greek art from the 7th–6th to the 3rd–2nd centuries BC.

Long use of protomes in the first millennium BC as one of the most expressive details of decoration on various items and structures was one of the factors of their spread over a vast territory, including Central Asia and Siberia. Among such artifacts from these regions, noteworthy are quite numerous "horse-headed" stone staffs of the Bronze Age, as well as isolated metal socketed pommels from various regions of Kazakhstan, Urals, and the forest-steppe region of the southwestern Siberia (Kovtun, 2012: 96, fig. 1; Molodin, 2014: 87, fig. 1, 2). In the material evidence of the Early Iron Age, items in the form of horse heads occur among the horn artifacts (Arzhan-1, Berezovka, Kyzyl-kul) from Central Asia and isolated bronze pommels from

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Ciscaucasia (Kantorovich, 2016). Ceramic protomes of the Late Bronze to Early Iron Ages from the southern taiga zone of Siberia, including the Middle Irtysh region (Novotroitskoye I) and Lower Angara region (Strelkovskoye-2) stand out among these items.

Material and methods

One of ceramic horse-shaped protomes comes from the Omsk Region. This artifact was discovered in the settlement of Novotroitskoye I, belonging to the Krasnoozerka culture, which existed in the transition period from the Late Bronze to the Early Iron Ages. The site is located 40 km north of the city of Omsk, on the terrace of the right bank of the Irtysh River (Fig. 1, *1*). This settlement was investigated by A.Y. Trufanov in 1980–1982 and 1984. The habitation time of Novotroitskoye I was quite reliably established by the parallels with the Krasnoozerka evidence from Chicha-1 dated by the radiocarbon method. For example, the date of 2336 BP was obtained for dwelling 10 (zone IVa; excavation 10) where the Krasnoozerka pottery was predominant (84 %). Judging by the calibrated values of that date, V.I. Molodin dated the dwelling to the 9th century BC (2008: 163; Molodin, Parzinger, 2009: 72). According to J. Schneeweiβ, it was abandoned closer to the end of the 10th century BC, but not later than the third quarter of the 9th century BC (2007: 34). Notably, the appearance of the Krasnoozerka pottery from dwelling 10 corresponds to the part of dishware from Novotroitskoye I that suggests a relatively late age for the site in the series of the dynamically developing Krasnoozerka antiquities in the forest-steppe Irtysh region (Abramova, Stefanov, 1985: 121, 122). The dating of Novotroitskoye I is confirmed by two bronze double-bladed arrowheads found in the settlement: an asymmetric-rhombic one with a hidden socket and a stud (Fig. 2, *1*), and a long-socketed one of the Novocherkassk type (Fig. 2, 2), as well as by a cheek-piece with a mushroom-shaped head and three holes in the same plane (Fig. 2, *3*). Considering that the first arrowhead and cheek-piece belong to the Arzhan-Chernogorovo antiquities, and the second arrowhead belongs to the Novocherkassk antiquities, and taking into account the radiocarbon dates of Arzhan-1 (Evraziya…, 2005: 97, 98), the site can be dated to the late 9th to early 8th century BC.

At the Novotroitskoye I settlement, four dwellings and the extensive space between them have been excavated over a total area of 1170 m^2. A ceramic horse protome was found in the pit of dwelling 2, which was investigated in 1981 (see Fig. 1, *2*). The area of the dwelling structure was about 80 m^2; the depth of the pit from the level of subsoil was 0.2 m. The entrance to the dwelling was not clearly visible. Judging by the planigraphy of the finds and the "gap" in the line of holes from the posts, the

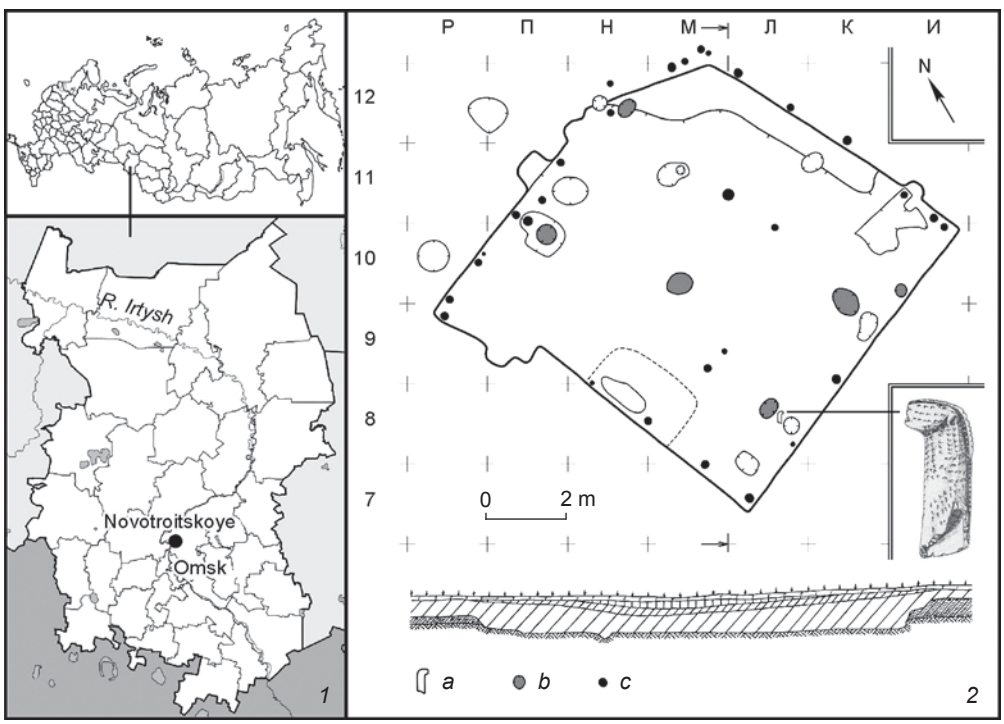

Fig. 1. Location of the Novotroitskoye I settlement (*1*) and plan of the dwelling where the ceramic protome was discovered (*2*).
a – protome; *b* – spot of burnt soil (fireplace); *c* – hole from a post.

entrance was likely located in the western wall near the northwestern corner. The ceramic protome was discovered at the southern wall of the pit, closest to the southwestern corner, between the oval fireplace (50 × 40 × 15 cm) and a large vessel dug into the ground. The protome lay 10 cm above the subsoil level. The height of the item is 19 cm (Fig. 3, *1*); its width is different in different areas, measuring 62 mm at the base, 57 mm at the lower end of the mane, and 53 mm at the level of the ears. The artifact is hollow. The outer diameter at the upper opening of the protome (mouth) is about 43 mm; the inner diameter is about 30 mm. The wall thickness at the base of the neck ranges from 8.3 mm in the front to 12.8 mm in the back; near the edge of the muzzle, it measures 5.1 mm in the lower (neck) part, and 7.8 mm in the upper part. Holes for the ears and eyes were apparently made with the same tool 3.5 mm in diameter (Fig. 3, *2*). Since various types of archaic representations have long been used as a reliable source on the exterior appearance of ancient horses (Kovalevskaya, 1977: 132), we should give a fairly detailed description of the protome from Novotroitskoye I. The head of the horse is represented markedly short relative to the neck; it looks heavy, and has rounded outlines. The ears are small and pointed, but were quite prominently emphasized in relief. The neck is too long, compared to the natural proportions of a real horse. The mane is rendered by a low notched ridge (Fig. 3, *2*), which may correspond both to natural features of horses of the Central Asian origin, and to a special short "brush-like" haircut or a plait made in the upper part of the mane. The latter variety of horse mane design occurs in various Assyrian reliefs (Fig. 4, *3*, *4*). It is also possible that the notched ridge, extending to the frontal part of the head, represents a long headband typical of the Early Iron Age. As a part of our interpretation, we should mention the shape of the ears on the protome, which is quite consistent with the Scythian-Siberian artistic tradition.

The ornamental decor on the ceramic protome from Novotroitskoye I may be divided into several bands. The first band is on the muzzle of the protome; the second is on the neck; and at least three more neck bands can be distinguished. One band of imprints in the lower part of the neck zone is located in the perpendicular direction, and another one is inclined relative to other bands. These various parts of the decoration can be correlated with the elements of horse trappings. For instance, several lines of imprints along the head from the muzzle to an ear may correspond to the bridle; two bands of imprints on the neck, perpendicular to

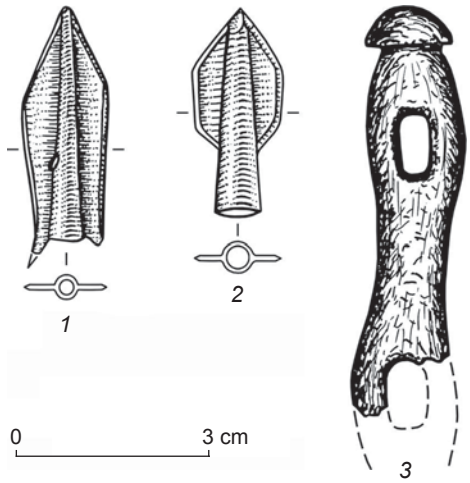

Fig. 2. Dating items from Novotroitskoye I.
1 – bronze arrowhead with a stud; *2* – bronze long-socketed arrowhead; *3* – fragment of a three-hole cheek-piece made of horn.

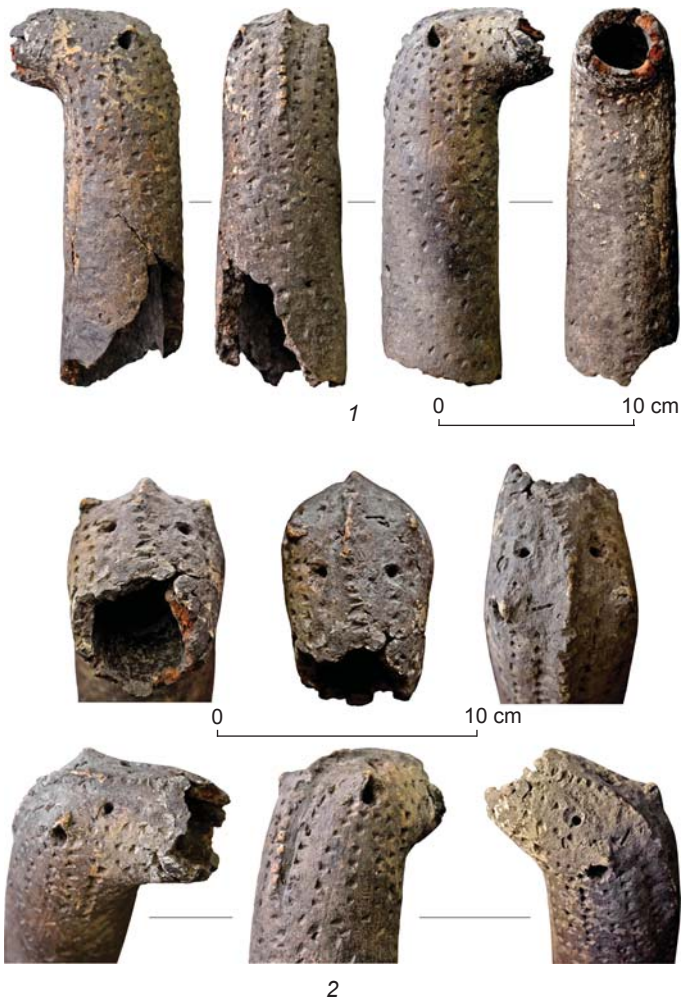

Fig. 3. Ceramic protome from Novotroitskoye I.
Photo by A.Y. Trufanov.
1 – general view; *2* – modeling of the protome's head.

each other, may correspond to richly decorated head-rope or to ribbons of a special loop—*nauz* tassel, which served not only as a decorative element of the reins, but also as an additional device for their attachment. The band of imprints, located at an angle to the two described above, can be correlated with the breast-collar (Fig. 4). In such an interpretation, the ornamental decor clearly resembles the images of richly decorated horse head harness on the contemporaneous Assyrian reliefs (8th–7th centuries BC) (Assiriya…, 2016: 155, 175, 188, 189) (Fig. 5). It should be emphasized that judging by the palace ceremonial reliefs, this type of the Middle Eastern bridle existed with both two- (Fig. 5, *1–3*) and three-hole (Fig. 5, *4*; Fig. 6) cheek-pieces. The latter variety, as mentioned above, has been discovered at the Novotroitskoye I settlement.

Our interpretation of the ornamental decor on the ceramic protome as a representation of the Middle Eastern bridle is supported by an interesting parallel: a ritual metal horse protome from Greece (900–700 BC) made in a geometric style (Betancourt, 1973: 213). The size of this artifact is 6.6 × 3.2 cm. The protome reproduces the main elements of a bridle, including the headband and the breast-collar (Fig. 7). This equipment shows a clear similarity to the bridle appearing on the relief from the palace of Ashurbanipal in Nineveh (see Fig. 5, *1*, *2*). Richly decorated horse head harness is represented on a number of Assyrian reliefs of palace architecture (see Fig. 5, 6). Currently, the Middle Eastern tradition of decorating horse bridles, including the horse's breast-collar and other elements, is still preserved in the Maghreb countries (Fig. 8).

Several more items similar to the ceramic protome from Novotroitskoye I were found at the Strelkovskoye-2 settlement, in the Lower Angara region (Fig. 9, 10). This site is located on the right bank of the Angara River, 4 km northeast of the village of Strelka, in the Yeniseisky District of the Krasnoyarsk Territory (Fokin, 2004: 486; 2009: 166). Despite the fact that the attribution of the complexes from this site to specific Early Iron Age populations inhabiting the southern taiga belt of the Yenisei Siberia still requires additional argumentation (Fokin, 2016: 7), these ceramic items are quite comparable to our protome from Novotroitskoye I. Initially, they were described as a series (4 spec.) of similar tubular objects with zoomorphic images (Fokin, 2009: 166) and were correlated with the cultural layer of the Early Iron Age, containing traces of bronze casting. The radiocarbon date of 2220 ± 105 BP (SOAN-5486) obtained for dwelling 4, taking into

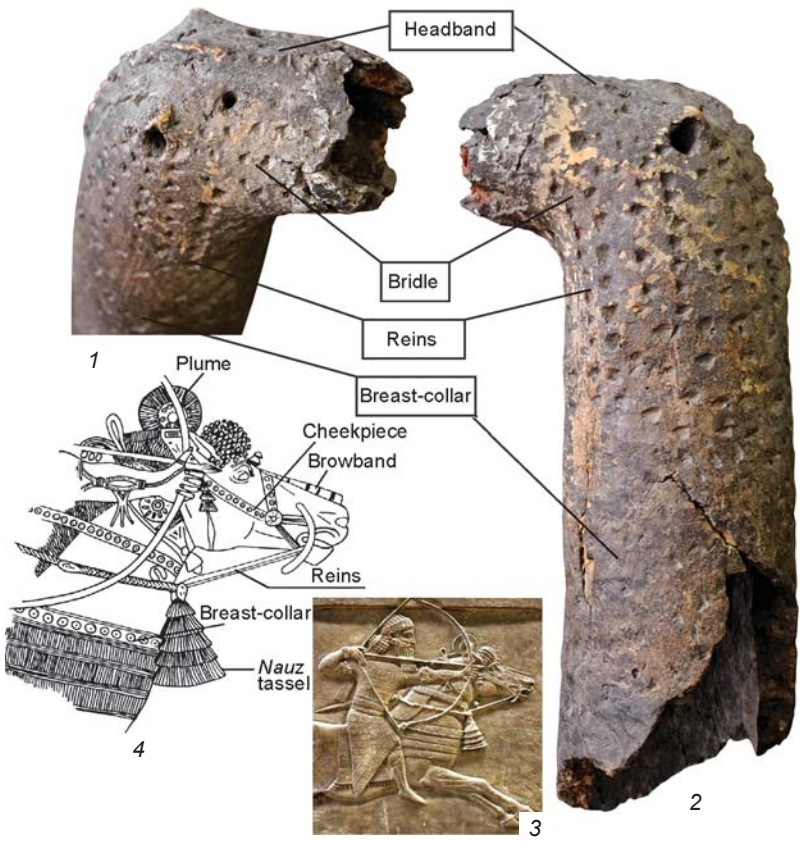

Fig. 4. Representation of bridle elements on the protome from Novotroitskoye I (*1*, *2*) and on bas-relief from the palace of Ashurbanipal in Nineveh, British Museum, No. 124875 (*3*, *4*).

account the calibration, corresponds to a wide chronological range of 541–16 BC; although the researchers of the site have narrowed this range to the 3rd–2nd centuries BC (Ibid.). At that time, the foraging economy in the Lower Angara region was supplemented by cattle-breeding (Mandryka, 2018: 43). Nevertheless, the calibrated values of the radiocarbon date and the similarity between the ceramic items from Strelkovskoye-2 and horse protome from Novotroitskoye I suggest the possibility of giving these items the earlier date. In addition, it should be mentioned that the materials from Strelkovskoye-2 included individual artifacts from the Bronze Age (Fokin, 2009: 166). The analysis of the genesis of settlement complexes in the Lower Angara region has shown that these emerged on a local basis in the Early and Late Bronze Age (Mandryka, 2018: 30). It is equally important that cultural communities from a number of regions of Siberia, including those of Western Siberian origin, apparently participated in the cultural genesis of the southern taiga population inhabiting this region at various periods (Ibid.: 38). Therefore, we have every reason to consider the ceramic protomes from the southern taiga zone of the Middle Irtysh and Lower Angara regions in a wide temporal and cultural context as a manifestation of a certain common artistic tradition of the Late Bronze to Early Iron Ages.

Fig. 5. Assyrian equipment of chariot horse and saddle horse (after (Assiriya…, 2016: 155, 175, 188, 189)).
1, *2* – relief of a war chariot from the northern palace of Ashurbanipal in Nineveh; *3* – fragment of a bas-relief from the palace of Sargon II in Khorsabad; *4* – image of a rider from Nineveh.

Results and discussion

The exterior design of the horse protomes from Strelkovskoye-2 has the following features. The head on the surviving artifact is quite short. The ears were modeled with small protrusions (see Fig. 9). The neck is long, as in the fragment of another tubular object (see Fig. 10, *2*). If we ignore the artistic stylization of horse heads in Siberian artifacts, these items can be correlated with representations of horses with the so-called "swan necks", which were widespread in toreutics from the Metal Ages up to the Early Middle Ages in southwestern Siberia and the Far East. The mane on one protome was rendered by a thin notched ridge (see Fig. 10, *1*). Ornamentation on all ceramic tubular items from Strelkovskoye-2 was interpreted by their discoverers exclusively in the context of their visual similarity to the decor on

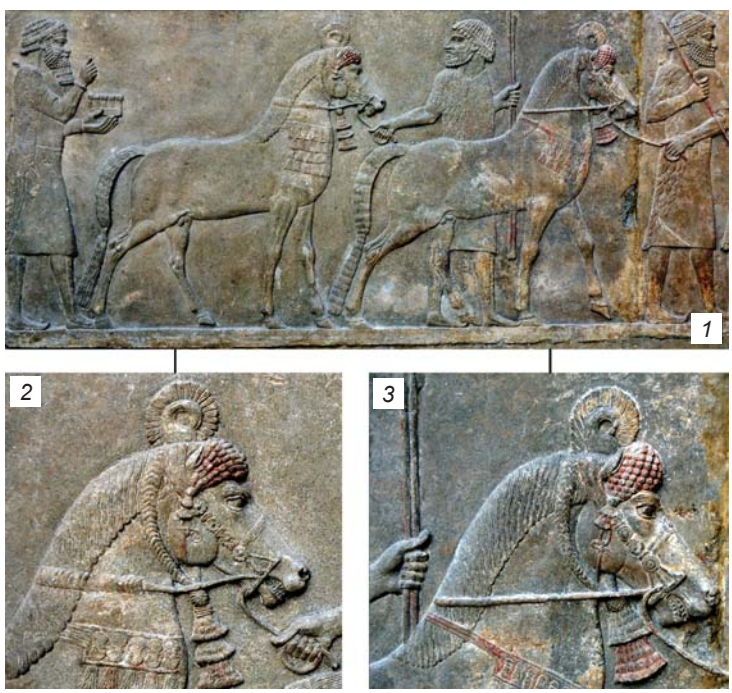

Fig. 6. Relief with horses and tributaries of Sargon II (from the palace in Khorsabad, the Louvre, Paris). *Photo by A.Y. Trufanov*.
1 – general view; *2*, *3* – heads of bridled horses with three-hole cheek-pieces.

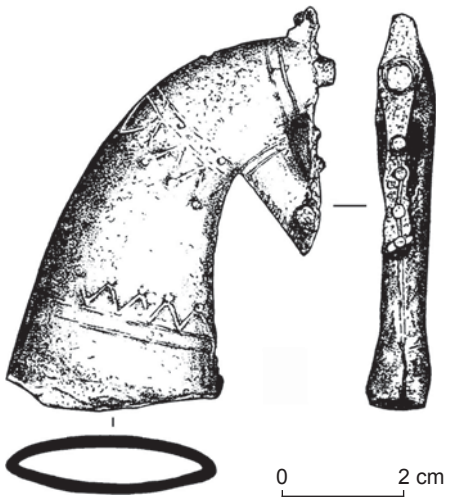

Fig. 7. Protome in geometric style from Greece, made of lead (Betancourt, 1973).

Fig. 8. Horse bridle with the breast-collar and *nauz* tassel (Morocco).

Fig. 9. Ceramic protome from Strelkovskoye-2 (Lower Angara region).

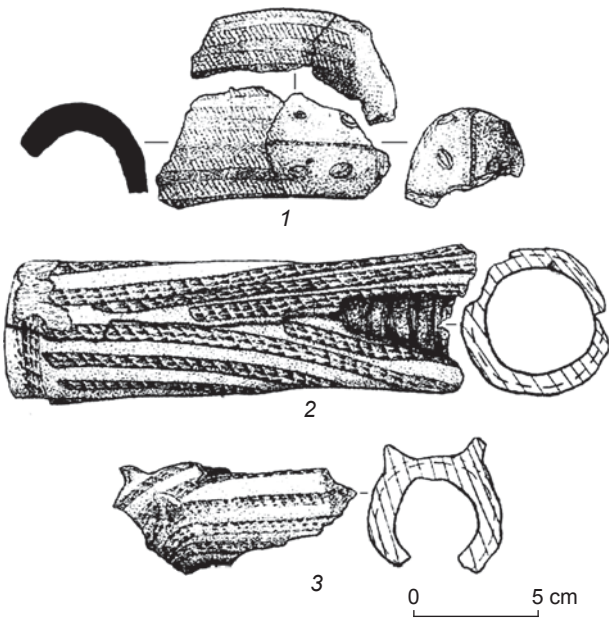

Fig. 10. Fragments of ceramic protomes from Strelkovskoye-2 (Fokin, 2009: 167, fig. 2).

ceramics of the Early Iron Age (the Kamenskoye-Makovskoye and Tsepan circles). Nevertheless, there is a certain compositional similarity between the arrangement of ornamentation on the protomes from Novotroitskoye I (Middle Irtysh region) and Strelkovskoye-2 (Lower Angara region); although in the latter case, the continuous decoration cannot be divided into individual elements of horse equipment, as it is possible to do for the item from Novotroitskoye I. The mane in the form of a notched low ridge was reproduced only on one artifact from Strelkovskoye-2 (Fokin, 2009: 167, fig. 2). Exactly this detail makes it close to the Novotroitskoye I item. Notably, despite the similarity of ceramic horse protomes from the Middle Irtysh region (Novotoritskoye I) and

Lower Angara region (Strelkovskoye-2), they also show obvious differences. First of all, the artifact from Novotroitskoye I conveys the richest details in reflecting the features of horses' exterior appearance, and possibly of the bridle reproduced in the ornamentation. Most likely, these less clearly-expressed features preconditioned the difficulties in interpreting the image on the artifacts from Strelkovskoye-2 (Fokin, 2004, 2009).

Another issue is the purpose of the items under study. The assumption that tubular artifacts from Strelkovskoye-2 decorated the end of some stick wrapped in a bundle of straw requires a more detailed discussion. Imprints of grass on the inner surfaces of these items (Fokin, 2004) are apparently associated with the insulating layer of the blank on which the specific clay item was shaped. A similar technique was recorded on the protome from Novotroitskoye I. A certain similarity is manifested in the circumstances of discovering the protomes from the Middle Irtysh region (Novotroitskoye I) and Lower Angara region (Strelkovskoye-2). All of these were found on the territory of dwelling complexes with obvious traces of bronze-casting (splashes of bronze, fragments of crucibles and of smelting ladles). Such a context may well justify the interpretation of the cult-ritual purpose of these horse protomes. The hypothesis concerning the emergence of the horse cult in the Middle Bronze Age in the forest-steppe Ob-Irtysh region was proposed quite a long time ago (Kiryushin, 1987; Kiryushin, Grushin, 2009). In addition to this, we should also consider the paleo-economic factor. For example, in the forest-steppe Irtysh region, for the Krasnoozerka people, whose complex subsistence strategies were dominated by hunting, cattle-breeding also played a prominent role. Importantly, the protome from the Omsk region of the Irtysh (Novotroitskoye I) was discovered at a settlement located on the banks of a wide river floodplain suitable for cattle-grazing. The use of horses was crucial for such economic activity. Moreover, in the southern taiga zone of the Irtysh region, after the decline of the Andronovo-type cultures of the Bronze Age in Western Siberia, cattle-breeding mostly took the form of horse-breeding (Kosarev, 1981: 229), since this specialization of animal husbandry was best adapted to local harsh climatic conditions. In addition, the presence of horse bones in the osteological samples of the Late Bronze Age in the northern territories of Western Siberia has long been considered a sign of using horses in rituals. This practice was preserved among the Khanty and Mansi up to the ethnographically modern period (Ibid.). In the material complex of the Bronze Age in the Middle Irtysh region, the attributes of ritual activities could well have included both metal pommels and ceramic protomes (Molodin, 2014: 87, Fig. 1, 2). The parallels among the materials from other, remote regions of Eurasia are not accidental, since the population of the southern taiga zone of Siberia in the Late Bronze to Early Iron Ages was involved in common cultural and historical processes on the Eurasian continent (Mandryka, 2018: 43).

Conclusions

When discussing the reasons for the emergence of ceramic horse protomes of the Late Bronze to Early Iron Ages in various southern taiga territories (Middle Irtysh and Lower Angara regions) of Siberia, a number of paleo-economic, cultural, and historical factors should be taken into account. Starting from the first third of the first millennium BC, crucial changes took place in horse-breeding in Eurasia. First of all, horse-riding started to play an independent role, while the role of chariots significantly decreased. Second, there was a further development of horse equipment, and particularly of the elements of the bridle set. This process was reflected not only in metalworking, but also in bone-carving. Elements of bridles (bits, cheek-pieces, fittings) of that time form an innovative material complex that testifies not only to the improvement in horse-riding, but also to the rapid evolution of devices intended for this method of transportation (rein and harness design). This process is reflected in an increased general technological capacity, including the development and amplification of foundry equipment (ability to cast copper bits with one-piece mouth rings) and the process of cutting raw horn materials for manufacturing cheek-pieces, tubular beads, and headbands. Third, from the early first millennium BC, the area of horse-breeding rapidly expanded, not only in the latitudinal, but also in the meridional direction. Certain prerequisites for this in the southern taiga zone of Siberia resulted from landscape and climate changes, and from the spread of the mixed economy in the Late Bronze to Early Iron Ages (Kosintsev, Stefanov, 1989). Ceramic horse protomes appeared there precisely in such conditions. This fact testifies primarily to the replication of these items in Eurasia in a specific archaeological period. The scale of their territorial distribution may be considered a cultural and chronological marker. The modeling of the mane is represented most clearly on the ceramic protomes described above. It differs significantly from the design appearing on stone staffs and metal pommels with horse representations from the Bronze Age, and reveals close similarities to the traditions of mane design in the Early Iron Age. No less important is the fact that the ceramic protome from the forest-steppe Irtysh region (Novotroitskoye I) belongs to a small group of artifacts on which the bridle was shown in sufficient detail. This element was reproduced extremely rarely on such items in the initial stages of the Early Iron Age. And last, if we take into account the cult purpose of ceramic protomes of the Late Bronze to Early Iron Ages from

the Middle Irtysh and Lower Angara regions, it is quite possible to consider them as further evidence for the early integration of the horse's image into ritual practices and attributes of the population inhabiting the southern taiga zone of Siberia.

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"Portrait" Medallions from the Kazym Hoard

We describe so-called portrait medallions and plaques with similar representations from a hoard found near Kyzym, the Beloyarsky District of the Khanty-Mansi Autonomous Okrug–Yugra in the summer of 2014. We introduce 17 artifacts cast of bronze and differing in shape and technological level. These fall into two groups in terms of quality. The principal questions addressed in the article are where, by whom, and based on which prototypes the Kazym artifacts were made. To resolve them, we analyze similar artifacts, including silver medallions representing a Parthian king and found in northwestern Siberia, and a series of bronze items from various sites in the Surgut and the Lower Ob region. These parallels, like the presence of numerous "Sarmatian" bronze mirrors in the Kazym hoard, point to the period between the late 1st century BC and the 1st or 2nd centuries AD. The results suggest that the "portrait" medallions and other bronze plaques depicting anthropomorphic characters are local replicas of imported prototypes. This testifies, firstly, to stable trade links with ancient civilization centers in the beginning of the Christian era, and secondly, to the absorption of certain elements of foreign traditions by the local culture.

Keywords: *Medallion, portrait, Siberia, Kazym, hoard, imitation.*

Introduction

In 2014, an amateur survey in the Beloyarsky District of the Khanty-Mansi Autonomous Okrug–Yugra (KhMAO–Yugra) resulted in the discovery of two accumulations of metal items. Some of these items were set out on-line at the treasure-hunting sites, with short cover letters. Several artifacts from this hoard were described, and a preliminary analysis was made of them (Baulo, 2016; Shulga, Oborin, 2017; Fedorova, 2018).

Finders reported that the items were discovered on a small island at the confluence of the Ob and the Kazym (right tributary of the Ob), on a low ridge covered with coniferous trees and surrounded by a bog and an oxbow lake. The accumulations of artifacts were not associated with any traces of an archaeological site or a contemporary Khanty sanctuary. Hence these artifacts can probably be attributed to intentional deposits that are often referred to in literature as hoards. The two deposits were discovered at a depth of 20–25 cm, about 30 m from each other.

The first hoard was placed in a wooden container, possibly a wooden bucket (its round bottom, hollowed-out from solid wood, was preserved) covered on the inside with birch-bark. The bucket contained about 200 artifacts, including bronze mirrors of the Sarmatian type and cast plaques with various images. Next to the bucket, a set of 34 Early Iron Age bronze items was found, which had been cast in northwestern Siberia: anthropomorphic

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images and masks, a bird-like image, a flat ring bearing two animal images, and arrowheads. The production location of two pick-axes (chekans) from the set cannot be determined. The second hoard had been placed in a burnt ceramic pot. It contained over 30 bronze items, including "Sarmatian" mirrors, round and rectangular buckles, bird-like figurines, and an image of a standing beaver. The age estimates for the found items, both local and imported, suggest that all three groups of artifacts were buried at the same time, and represent a single collection.

The largest category of goods from both hoards is that of the so-called mirrors, or discs, which, according to A.S. Skripkin, have their closest parallels in the archaeological complexes of the Sarmatian cultures in the Southern Urals, or Asian Sarmatia in his definition (1990: 197). B. Nezabitovska-Vishnevska analyzed the mirrors of identical shape from the Gornoknyazevsk hoard (see (Fedorova, Gusev, Podosenova, 2016: 13–33), and argued that such mirrors were widespread over eastern Europe and Asia. According to her, similar products have been reported from the Sargat culture, Sarmatian culture, and even India and Pakistan (Nezabitovska-Vishnevska, 2017: 102). Notably, similar mirrors were collected in the basins of the Kazym, Lyapin, and Severnaya Sosva rivers, and formed a large collection in the Khanty-Mansiysk Museum. The mirrors were transported to the Ob basin by the Sargat culture's representatives prior to the 4th century AD (Pristupa, Starodumov, Yakovlev, 2002: 10–13). Such a detailed analysis of the attribution of "Sarmatian" mirrors, which are beyond the scope of this paper, is important for understanding the chronological ranges of the Kazym complex and the area of distribution of this rich collection of imported goods over the Ob region. The proposed age estimates for the mirrors point to the period from the turn of the eras to the 4th century AD; while the areas where the mirrors were found indicate the southern trade route, through which these goods might have been transported to the Kazym basin.

In 2018, one of the present authors published a paper addressing the available information on the hoards of the Early Iron Age and Middle Ages in Western Siberia: their composition, methods of burial, attribution of goods, and dating of collections (Fedorova, 2018). Four groups of hoards were identified, with varying contents and attributions. The Kazym hoard was attributed to group 2 (the Early Iron Age, turn of the eras), together with the Istyatskaya, Suzgun, and Gornoknyazevsk hoards. These can be undoubtedly regarded as real hoards intentionally buried without any association with cult sites. The hoards show special packing and the dominance of imported goods, including those from distant areas. Some of them contained local imitations of imported goods. Obviously, the hoards of group 2 emerged owing to extension of the contacts of the local population to distant regions, which led not only to the accumulation of imported goods, but also to the translation of new ideas into the local culture ready to accept such significant changes (Ibid.).

Description and analysis of the collection

The collection of the so-called portrait medallions or plaques from the two hoards includes 17 specimens. Plaques 1 (Fig. 1, *1*) and 3 (Fig.1, *3*) were found in a burnt pot, others in a "bucket". All of them were cast bronze items.

1. Plaque 7.2 cm in diameter (Fig. 1, *1*). This bears an image in high relief on the front. The back is plain, the horizontal loop is underfilled. The plaque is edged with a fillet ornamented with pseudo-twisted cord. The obverse shows a head-and-shoulders portrait of a person with a round face, large almond-shaped eyes, a straight, prominent nose, and small mouth. On the neck, there is a sophisticated adornment, probably a torque. The open-fronted clothing is decorated with convex rhombuses along the sleeves and neckline. The head is topped with a sophisticated headgear with a diadem (?) bearing adornments hanging to the shoulders: close to the ears, there are relief herring-bone decorations; lower, there are pendants ending with three short strings of beads with large round beads at the ends. Two holes made during casting are to the left and right of the head. Their purpose is unclear; probably, these are hanging-loops to attach the plaque to a garment or something else.

2. Plaque 4.4 cm in diameter (Fig. 1, *2*). This bears an image in high relief on the front. The back is plain. The plaque is round, and has a small hanging-loop on top. The plaque is edged with a fillet ornamented with pseudo-twisted cord. The obverse bears head-and-shoulders portrait of a man. The face is round. The eyes are large, prominent, almond-shaped, with round pupils. The nose is straight and prominent; a moustache or nasolabial folds are shown under the nose; the mouth is small. Thick hair simulating curls is topped with a headgear of the headband type. Indistinct adornments, possibly temple pendants, hang to the shoulders. The open-fronted clothing, also indistinct, is decorated with convex rhombuses. The neck is provided with something like a torque.

3. Plaque 6 cm in diameter (Fig. 1, *3*). This bears an image in high relief on the front. The back is plain, with a horizontal loop in the upper part. A part of the plaque close to the right shoulder is missing; the area also shows fractures, possibly made during casting. The plaque is edged with a fillet ornamented with pseudo-twisted cord. The obverse bears a head-and-shoulders portrait of a man, with his arms folded on the chest. The face is oval, the curled hair is shown on the forehead, the hair at the sides is plaited, ending with curls, reaching to the shoulders. The eyes are almond-shaped, the pupils are rendered

with depressions. The nose is straight and broad; the open mouth is considerably large. The torque on the neck is depicted with "pearls". The clothing is open-fronted; at the neckline, it is decorated with two edges, ornamented with round pits, the ends of the sleeve are decorated in the same way.

4. Plaque 5.5 cm in diameter (Fig. 1, *4*). This bears an image in high relief on the front. The back is plain, with a horizontal loop in the upper part. The plaque is edged with a fillet ornamented with pseudo-twisted cord. Several small fragments are missing. The obverse bears a head-and-shoulders portrait of a man; the iconography of the portrait is similar to that of the images described above. The ornaments on the garment are also similar. The only difference is that the background around the character is decorated with round punched nodes.

5. Plaque 4.3 cm in diameter (Fig. 2, *1*). This shows areas of metal underfilling. The image is made in high relief on a flat background. The reverse bears a semi-round loop with the remains of a woolen cord. The plaque is edged with a fillet ornamented with pseudo-twisted cord. The obverse shows head-and-shoulders portrait of a man. The top part of the image slightly protrudes above the plaque's circle. The curly hair of the character is bound with a band or some headgear. Hanging temple adornments, each in the form of a stem with rounded ends, reach the shoulders. The decoration on the left side is hardly discernible because of a casting defect. The eyes of the character are large, almond-shaped, with convex ovoid pupils. The eyebrow-arches gradually turn into the prominent nose, under which long mustaches are shown. The chin is prominent; possibly the artisan wanted to represent a short curly beard. The neck of the man is decorated with a torque. The clothing is open-fronted, edged with "pearls", followed by two lines: the first one consisting of meander-like pattern, the second of "pearls". Ornamentation with "pearls" is also present on the shoulders.

6. Plaque 10.5 cm in diameter (Fig. 2, *2*). The image is made in high relief on a flat background. There is a hanging-hole on top of the plaque. Noteworthy is the unusual and poor decoration of this plaque as compared with the others. The plaque is edged with a fillet decorated with groups of three parallel incisions. A head-and-shoulders portrait is in the center of the plaque. It is framed with a plain fillet; the background bears deep round punch-impressions, sometimes penetrating ones. The head of the character is shown with a haircut, possibly imitating curls. There are also plaits reaching the shoulders, the former ending with triple curls or pendants. The face is rounded, the arched eyebrows adjoin the prominent nose. The eyes are large, almond-shaped, with round pupils. The nasolabial folds are shown, the mouth is rendered with an arched depression. The neck decoration is indiscernible. The clothing is shown schematically.

Fig. 1. Bronze round "portrait" medallions.

It can be seen that the clothing is open-fronted. The shoulders are ornamented with lines of rectangular "pearls"; the same pattern is shown inside the sleeves.

7. Plaque 7 cm in diameter (Fig. 2, *3*). The image is made in high relief on the flat background, with scratches of post-casting working. The reverse side is provided with a small hanging loop. The plaque is edged with a fillet in the form of pseudo-twisted cord. The fillet shows a hole drilled from the reverse. In the center, there is a head-and-shoulders portrait of a character.

The head is shown with a haircut imitating curls bound by a band; the plaits end with pendants in the form of three strings of beads hanging to the shoulders.

The face is oval; the eyes are large and almond-shaped, with round pupils. The arched eyebrows adjoin the prominent nose; the mouth is indistinct. The neck is long and bears a three-fold torque. The clothing is open-fronted, its edges and sleeves are decorated with lines of convex rhombuses with round depressions in the center. The shoulders show later graffiti (a fish and a bird).

8. Plaque 5.7 × 4.7 cm in size (Fig. 3). This shows low-quality casting. The plaque's shape follows the outlines of the head-and-shoulders anthropomorphic image, which is atypical for the series under study. The lower edge is uneven and has a hole drilled from the obverse.

Fig. 2. Bronze round "portrait" medallions.

Fig. 3. Plaque in the form of a head-and-shoulders anthropomorphic figure.

Fig. 4. Plaque with an anthropomorphic half-length figure.

The reverse shows a small loop with the remains of a woolen cord. On the obverse, the image relief is low; the reverse is plain. The head of the character is rounded; the hair is shown in the form of double plaits. The eyes are large and almond-shaped; the nose is broad and flat; the mouth is rendered with an ovoid depression. The neck is decorated with a double torque. The clothing is open-fronted, the neckline and shoulders are decorated with round "pearls". The lower portion of the chest indistinctly shows the folded arms.

9. Plaque 3.8 × 2.9 cm, ovoid in shape (Fig. 4). This is cast along the outline of the anthropomorphic half-length image. The plaque shows casting-defects: underfilling along the edges, holes in the middle portion; the framing pseudo-twisted cord is hardly visible at certain portions of the plaque's edge. The obverse bears an image of a bearded character, in low relief; his haircut is not shown. The beard is depicted in a stylized manner, with vertical incisions. The eyes are large and almond-shaped; the nose is broad and almost flat. The large mouth is shown with an arched depression. A thick torque is depicted on the neck. The clothing is rendered poorly because of the low-quality casting; yet it is obviously open-fronted, decorated with lines of "pearls" along the neckline and sleeves.

10. Plaque 2.6 × 1.7 cm in size (Fig. 5, *1*). The image on the obverse is made in low relief, on the flat background. The back is plain and has a punched-out hole for attachment in the upper part. The rectangular casting appears to be an integral piece, not cut out of the round plaque; the more so, as the head-and-shoulders image is exactly inscribed into a rectangle. The upper edge is decorated with a fillet, imitating a line of "pearls". The character's face is rounded, the ears are protruding, the eyes are large and almond-shaped, the nose is broad and flat, and the mouth is shown with an oval depression. The hair is parted in the middle, and plaits reach the shoulders. An indistinct image of a torque consisting of four parts is depicted on the neck. The clothing is open-fronted; the collar is decorated with a line of duck-shaped depressions, the shoulders by round depressions.

11. Plaque 3.5 × 3.6 cm in size, rounded in shape (Fig. 5, *2*). This is a failed casting, with considerable underfillings. The plaque bears a head-and-shoulders image in low relief, the reverse is plain. The head of the character protrudes over the pseudo-twisted cord framing the plaque. There is a round depression on the forehead; possibly the artisan attempted to cast a hole. The head is rounded, the plaited hair melts into the cord. The eyes are large and almond-shaped; the nose is broad; the mouth is rendered with an arched (with down-turned ends) depression. The neck shows something like a torque. The clothing is probably open-fronted, but owing to the low-quality casting the details are indiscernible. The clothing is completely covered with convex diamond motifs.

Fig. 5. Small bronze plaques.

12. Plaque 3.8 × 3.5 cm in size (Fig. 5, *3*). This is a failed casting. At the bottom, underfillings are recorded; at the top, to the left of the image, there is a hole. The plaque is subrectangular in shape, with rounded corners. The image is made in low relief, very indistinct in details. The long edges show an indistinct line of "pearls". The back is plain. The head of the anthropomorphic character is ovoid, the hairstyle is unclear and resembles plaits reaching the shoulders. The round eyes are poorly seen, the nose is hardly visible, the mouth is ovoid. The neck decorations are also indiscernible. The clothing looks like open-fronted; the indistinct edging runs along the shoulders and sleeves, the ornamental motifs are hardly visible.

Fig. 6. Plaque in the form of a bird with anthropomorphic head.

Fig. 7. Round, open-worked plaque in the form of a hoop and a cross-shaped figure.

Fig. 8. Belt buckle (?).

13. Plaque 4.1 × 3.1 cm in size (Fig. 5, *4*). This is similar to the one described above, but the casting-quality is even worse. Under- and overfillings are noted at the sides. The edging shows an indistinct line of "pearls". The back is plain. The obverse shows a head-and-shoulders anthropomorphic image in the center. The head is ovoid; the hair is in the form of plaits reaching the shoulders. The eyes are round, the nose is not detailed, and the mouth is oval. The neck is decorated with something like a torque. The clothing seems to be open-fronted, with no clear ornamentation.

14. Plaque 3.2 × 3.1 cm in size (Fig. 5, *5*). This is a failed casting, underfillings are visible from all sides. The back is plain. The obverse shows a shoulder-high anthropomorphic image in low relief. The face is round, the eyes are almond-shaped, the nose is straight, the mouth is hardy visible. Details of clothing, hair, and adornments are not elaborated.

15. Plaque in the form of a bird with an anthropomorphic head (Fig. 6), 3.1 × 3.1 cm. The quality of casting is good; the casting-seams to show minor overfillings, suggesting that the plaque was not treated after casting. Near the right cheek-bone of the character, there is a hole drilled from both sides. The back is plain. The bird is shown with open wings; the wings and the tail are pointed. The head and upper part of the body have anthropomorphic features. The head is ovoid, the hair is in the form of stylized plaits turning into the chest adornment. The face shows prominent cheekbones, the arched eyebrows adjoin the broad nose, the eyes are almond-shaped, and the mouth rendered with an arched depression. Only the upper part of the character's open-fronted clothing is shown, which is decorated with round depressions along the collar. Lines of similar depressions decorate the wings and tail of the bird.

16. Round open-worked plaque 5.8 cm in diameter (Fig. 7). This consists of a hoop with an inscribed cross-shaped figure. The reverse shows four semi-circular loops. The hoop is edged with pseudo-twisted cord; the space between the edges is decorated with groups of 3 to 5 convex lengths perpendicular to the edges. A head-and-shoulders anthropomorphic character is shown in the center of the cross-shaped figure. The head of the character is rounded; the hair is shown in the form of stylized plaits. The eyes are almond-shaped; the nose is straight; the mouth is rendered with an arched (with down-turned ends) depression. The neck and chest of the character are provided with a stylized neck adornment and ornamentation of clothing.

17. A belt buckle (?), 4.2 × 2.8 cm, in the form of ovoid frame with a small hook at one side and with the head of an anthropomorphic character in the center (Fig. 8). The item was apparently not treated after casting; casting-seams with metal overfillings are seen. The image is made in high relief. The head is ovoid, topped with a round

cap; curly hair is shown. The large almond-shaped eyes are outlined with a double contour; the pupils are round. The eyebrows are depicted with short oblique lines. The nose is straight and prominent; the mouth is shown with a double arch. The mustache and beard are depicted with large curls, similar to those of the hair.

The cast items described above fall into two groups: round plaques of rather good quality (see Fig. 1, 8), and castings of various shapes and poor quality. The plaque in the form of a bird with the anthropomorphic head stands apart (see Fig. 6). Nevertheless, all the images demonstrate common iconographic features: the hairstyle in the form of plaits or curls, with temple decorations hanging to the shoulders; large, almond-shaped eyes; many images show prominent noses. The majority of the characters are depicted in open-fronted clothing, ornamented along the collar and shoulders.

The question arises of where, by whom, and based on which prototypes these bronze plaques were made. Let us describe a few similar artifacts. In northwestern Siberia, two silver plaques with head-and-shoulders images of a Parthian king were found: one of these was found in Khanty-Mansi Okrug, its exact provenance is unknown (it was acquired by the Khanty-Mansiysk Museum in 1939) (Kinzhalov, 1959); another (almost identical) plaque was found in the hoard near the village of Pikovka, in the Tomsk Region (it is kept in the Kolpashevo Local Museum) (Fedorova, 2018: 112, fig. 4, *6*). The most accurate attribution of the Khanty-Mansyisk plaque was provided by E.V. Zeimal (Sokrovishcha Priobya, 1996: 46–47). Recently, another silver medallion has become known, apparently cut off a dish with an image of a man, whose face and clothing are clearly of Parthian type (Fedorova, Gusev, Podosenova, 2016: 35). Actually, these examples, which served as prototypes for the above-described bronze plaques, are enough. It does not seem reasonable to discuss the features of the Parthian iconography reflected in sculptures, coins, etc., because these prototypes were not known to the population of Siberia.

According to Zeimal, "judging by iconographic details of the outfit and haircut, the silver medallion can be dated to the 80–30s of the 1st century BC (Sokrovishcha Priobya, 1996: 46). For us, it is no matter exactly what Parthian king was depicted on the medallion; what is important is the age estimate and iconography of the character. Notably, this iconography is quite similar to that of the bronze plaques under discussion: the pseudo-twisted cord along the edges, representation of the haircut and short beard, large almond-shaped eyes, straight prominent nose, torque on the neck, and open-fronted clothing ornamented along the collar and shoulders. Evidently, real Parthian silver medallions served as prototypes for the discussed plaques.

The Kazym artifacts, unlike the Parthian medallions, were cast of bronze. Certain parallels can be provided: a head-and-shoulders anthropomorphic image from the sanctuary at Barsov Gorodok-1/9 (Shirin, Yakovlev, 2010: Ill. 59), a round "portrait" medallion supposedly from the same sanctuary (Ibid.: Ill. 72); a fragment of a plaque with a head-and-shoulders anthropomorphic image from an unknown archaeological site on the Tromyogan River (Ibid.: Ill. 98), and a round medallion from the cemetery near the village of Sogom, Khanty-Mansiysky District, KhMAO–Yugra (personal communication by A.V. Kenig).

The plaque 1 type occurs most frequently. Judging by the pictures provided at the treasure-hunting sites, four other similar items of various quality have been found beyond archaeological context: the first plaque was "from KhMAO–Yugra"; the second was found near the village of Sherkaly, Oktyabrsky District, KhMAO–Yugra; the third near Katravozh, Priuralsky District, YaNAO; and the fourth plaque was "from Trans-Urals". The only known parallel to plaque 2 is the item found in the village of Vagilskaya, Garinsky District, Sverdlovsk Region.

Conclusions

Thus, we can state, firstly, the abundance of "portrait" medallions, which became evident in the recent years; and secondly, their apparent replication, with variable casting-quality (defective items have also been recorded). There can be two hypotheses. First, the castings, including those with visible defects, were produced beyond northwestern Siberia, and were imported here through trade links. However, it is doubtful that defective goods were bought anywhere in large quantities. The second hypothesis is more reasonable: high-quality imported goods made of precious metal (silver) were copied in northwestern Siberia or in Trans-Urals.

The latter hypothesis is supported by the following observations. First, as was mentioned above, the number of defect castings is significant. Second, images with similar iconography have been noted on the clearly local products, e.g., on the bird-shaped figurine (plaque 6). Third, numerous local copies of imported artifacts were recorded: ceramic vessels imitating bronze cauldrons on underpans; stone pendants imitating the pendants cut off the imported mirrors; ceramic beads imitating imported faience beads. Fourth, among the artifacts from the ritual-manufacturing center of Ust-Polui, a model made of clay slate was found, which apparently had been used as a template for a casting mold. The model shows the face of an anthropomorphic character of the "Parthian" type, similar to the images of a Parthian king on silver plaques from the Khanty-Mansiysk and Kolpashevo museums (Fedorova, 2018: 112, fig. 4, *7*). Thus, it seems most probable that the Kazym "portrait" medallions were produced after the Parthian prototypes in northwestern

Siberia. The dispersal area of these models, like many other imported goods, is the Lower Ob basin. To sum up, we should note that the presence of replicas of the imported goods testifies to stable cultural and trade links between northwestern Siberia and ancient centers of civilization.

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A Runic Inscription at Sarykoby (Southeastern Altai)

This article introduces our reading and interpretation of a recently discovered runic inscription found at the petroglyphic site Sarykoby, in the northern spurs of the Saylyugem Range in the Chuya steppe, southeastern Altai. The inscription belongs to a large composition with unusual representations. It consists of two lines with 21 and 13 characters. After discussing several variants of translation, we have selected the most plausible ones. The translation of the inscription with two variants of the second line is as follows: "I have written on the rock, ah! Oh, please speak! Give me luck (or "Going to battle") – oh – I have written (this)". The word su/sü in the inscription meaning 'glory, imperial state, greatness, happiness', is one of the few Mongolian loans in Old Uyghur and possibly in Old Turkic. The Sarykoby inscription is located in an inconspicuous place, the characters are small, and the carving is shallow. This confirms the common view that many runic inscriptions in the Altai are intimate and were not intended for the public eye. At the same time, the Sarykoby inscription invites the readers to a dialog, and possibly carries a call to prayer or blessing. Its content is religious and philosophic in a sense. Perhaps the author believed that the inscription could confer a blessing upon the readers. This makes it very meaningful and unusual in the corpus of runic inscriptions of the Altai.

Keywords: *Runic inscription, translation, interpretation, Chuya steppe, southeastern Altai, Old Turkic.*

Introduction

The history of research into Old Turkic epigraphy of the Altai started two centuries ago. In 1818, the well-known explorer of Siberia, G.I. Spassky, first published the tracing of a runic inscription from the valley of the Charysh River. In 1865, Academician V.V. Radlov found another runic inscription carved on the bottom of a silver vessel during the excavations of kurgans near the village of Katanda. However, the inscription did not attract much attention on his part and was first read at the very beginning of the 20th century by his student, P.M. Melioransky. Individual runic inscriptions on the items from Old Turkic burials were discovered in the 1930s by S.V. Kiselev, L.A. Evtyukhova, S.M. Sergeev, and A.P. Markov. The Old Turkic epigraphy of the Altai was particularly actively studied in the second half of the 20th century. Numerous inscriptions were found on rocks and steles in Central and Southern Altai. It is enough to say that the petroglyphic site in Kalbak-Tash I is still the largest accumulation of rock runic inscriptions of the Old Turkic period in the territory of not only the Altai Republic, but all of Russia (Kubarev V.D., 2011: 9 app. IV; Tybykova, Nevskaya, Erdal, 2012: 4, 69). Scholars, such as A.I. Minorsky, A.P. Okladnikov, B.K. Kadikov, V.D. Kubarev, V.A. Kocheev and others, have made

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their contribution to the enrichment of the corpus of the Altai runic monuments. Philologists, archaeologists, and historians S.V. Kiselev, K. Seidakmatov, E.R. Tenishev, N.A. Baskakov, S.G. Klyashtorny, D.D. Vasiliev, I.L. Kyzlasov, A.T. Tybykova, M. Erdal, I.A. Nevskaya, and others undertook the translation of these texts in different years. Their research has resulted in recently published comprehensive work (Tybykova, Nevskaya, Erdal, 2012; Vasiliev, 2013; Konkobaev, Useev, Shabdanaliev, 2015). The catalog of Old Turkic runic monuments contained only 90 short texts from the territory of the Altai (Tybykova, Nevskaya, Erdal, 2012: 32–43), while there were already 101 texts in the recently published atlas (Konkobaev, Useev, Shabdanaliev, 2015: 4, 302–340). After new finds (Tugusheva, Klyashtorny, Kubarev, 2014; Kubarev G.V., 2016; Kindikov B.M., Kindikov I.B., 2018: 18–19, 35–36, 44, 57, 61), including those which have not yet been published, their number today may reach 110–120. In 2018, a new runic inscription was discovered in the Chuya steppe.

Location and description of the inscription

During the survey by the Chuya team of the IAET SB RAS, at least six new petroglyphic locations were found on the northern spurs of the Saylyugem Ridge, stretching 18–20 km from the Zhalgyz-Tobe Mountain to the Buraty River. The runic inscription was found in a small group of petroglyphs in the Sarykoby (Altai 'yellow, ginger-color ravine') site located about 3 km southwest of the village of Zhana-Aul (Fig. 1). Up to a hundred figures of animals and people occur in several compositions at this site. The vast majority of these was made using a pecking technique, and belongs to the Late Bronze Age–Early Iron Age.

The runic inscription was a part of the composition measuring 100 × 110 cm and unusual in the content of its representations. Petroglyphs were drawn on a horizontal rock surface, which had a heavy desert varnish. The composition included 22 figures of animals and people. In the center were large images of running deer with branching antlers, as well as a bear, and four birds resembling cranes in a line (Kubarev G.V., 2018: Fig. 2). This composition can be called the most conspicuous in the small petroglyphic complex of Sarykoby. The runic inscription was drawn in its upper northwestern part (Fig. 2).

The first line of the inscription was located horizontally (taking into account the general orientation of the early petroglyphs on the rock surface) and had 21 characters (Fig. 2, 3). It was inscribed by its author into a natural "canvas"—a horizontal strip formed by two cracks. The last character almost joined the edge of the rock surface. Three oblique lines closely spaced to each other were carved 2.5 cm from it. The second line of 13 characters (see Fig. 2, 4) was written 8 cm down from the beginning of the first line. The lines were parallel to each other. The height of the characters ranged from 3 to 5 cm and was 3.5 cm on average. Some of the characters, especially in the second line, were located very close to each other. They were carved with a sharp item in one step, were strongly varnished, and therefore could be clearly distinguishable only in natural sunlight from the side. Besides two amorphous spots (see Fig. 2), the lines were separated by the pecked human figure, which, judging by the image of three-fingered hands, belongs to the

Fig. 1. Location of the petroglyphic site of Sarykoby.

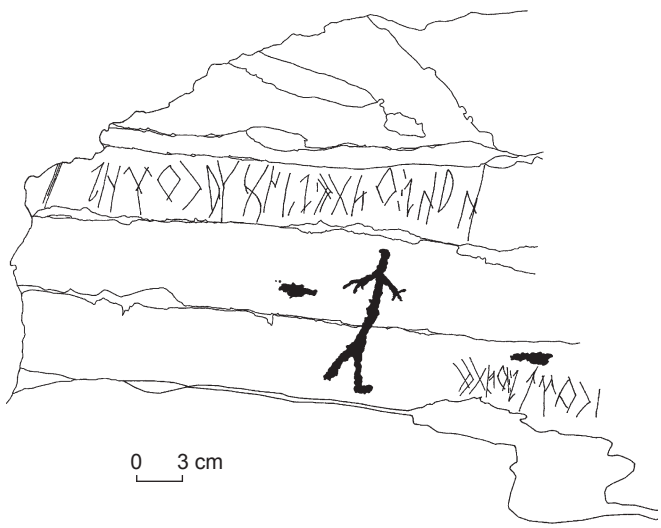

Fig. 2. Tracing of two lines of the runic inscription.

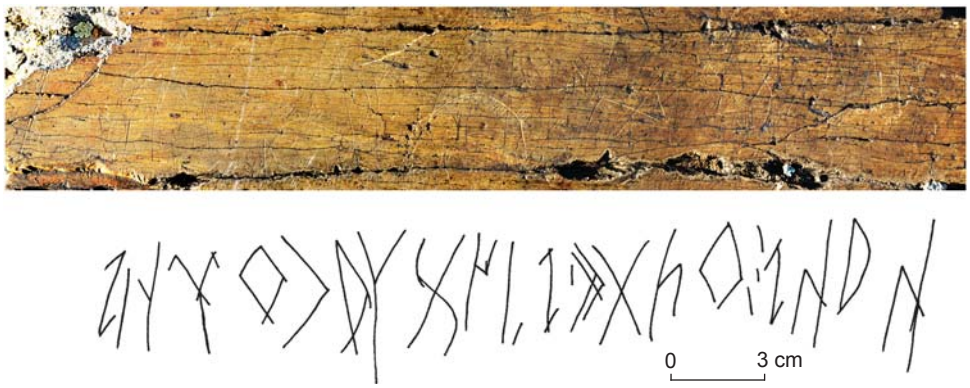

Fig. 3. Photograph and tracing of the first line of the runic inscription.

Late Bronze Age. It is difficult to explain why the author wrote the second line of the inscription so far from the first line under which there was more than enough space. Nevertheless, it was engraved separately, and was literally squeezed between the hole and the pecked spot.

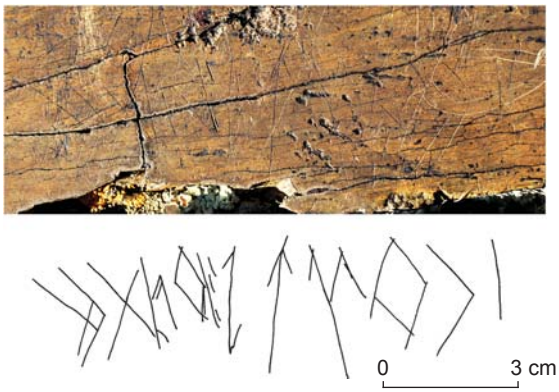

Fig. 4. Photograph and tracing of the second line of the runic inscription.

Interpretation of the inscription

The reading and interpretation of the inscription were based on numerous photographs and careful tracings made by one of the authors of this article in the field. Copying was made on transparent polymeric materials with the subsequent improvement of the drawing using photographs. Both the lines of the inscription and groups of individual characters were photographed so it would be possible to reach the maximum zoom of the digital image. Copying the inscription's characters was complicated by the fact that they were shallowly cut by a sharp item, as well as by the presence of possibly random lines, naturally appearing on the horizontal surface of the rock (from the passage of livestock, displacement of small stones, etc.). Nevertheless, the vast majority of the characters were clearly distinguishable, especially in lateral sunlight.

Despite the fact that the lines were not very close to each other, we have no reasons to speak about two separate inscriptions. The lines were interconnected by distinctive features—two graphic and one orthographic. In both lines, characters **A** were inverted as compared to the canonical form of this grapheme, and characters $\mathbf{b_2}$ had the main form of lozenge with the minimal extension (if any) of the lines below. In none of these lines were the vowels of the verbs *biti-* and *ber-* expressed explicitly.

The transliteration of the inscription using the system commonly used for the Turkic runic script is as follows:

$k_1\, y_1\, k_1\, A : b_2\, t_2\, d_2\, m : A : s_2\, \ddot{w}\, z\, l_2\, y_1\, w\, b_2\, r_2\, ŋ_2\, A$
$s_2\, w\, b_2\, r_2\, I\, p\, A : b_2\, t_2\, d_2\, m$

Comparing this transliteration with the tracing of the inscription, we need to discuss several points. In the first line, after the word $\mathbf{b_2t_2d_2m}$, a vertical dividing mark was carved in the middle level of the inscription line. Then, after the character **A**, there was another mark at the lower level. Usually the character separating the words consisted of two dashes located one below the other. According to M. Erdal, both dashes were related to the same word-separating character, which in transliteration was indicated by the colon (the generally accepted designation of a word separator consisting of two parts). They should probably be interpreted in this way, or else one of these dashes can be considered a random line. The dash after the character **A** corresponds to what we see in other places of the inscription, but the line in front of it also makes sense, since character **A** does not actually belong to the word *biti-d-im*.

The arrow-shaped character (**ᵂq**) in the second line should probably be read as **I**: the "hook" visible on its front (left) side seems to be a part of a much longer slanting line on the rock (or rather, two natural lines which were parallel in this place). The character **I**, according to Erdal, was followed by the character **p**, which had not been noticed by G.V. Kubarev. In the case that this character was not there, Erdal suggested interpreting **I**

in front of it as the inverted **p**, otherwise, the sequence of characters such as **b$_2$r$_2$I** or **s$_2$wb$_2$r$_2$I** would not have made sense. The penultimate character of the second line, transmitted by a vertical line on the tracing, should be interpreted as character **s$_2$**. Since the use of this letter in this context does not make sense, Erdal suggested that the line should be considered random.

Here is the transcription of the text, adding the implied vowels in brackets:

k(a)y(a)ka b(i)t(i)d(i)m - ä! sözl(ä)yü b(e)r(i)ŋ - ä!
su b(e)r(i)p - ä b(i)t(i)d(i)m.

The translation of the inscription with two possible options in the second line is as follows:

I have written on the rock, ah! Oh, please speak!
Give me luck (or "Going to the battle") – oh – I have written (this).

Comments to the translation

According to Erdal, the character **A**, which is not a morphological element of the previous word, should be interpreted as exclamation, and not as a simple word separator, although the problem of its meaning has not been completely resolved (see (Erdal, 2002: 56, Fuβn. 12), where it was shown that this element is synharmonic, that is, obeys the rule of the vowel harmony). The translation of the word *ber-* as 'please' needs an explanation. Erdal has already written about the use of this verb, primarily meaning 'give' and having only secondary meaning of 'graciously (kindly)' (Erdal, 2004: 260–261)*.

The spelling of the first word in the second line is irregular, since the consonant **s$_2$**, usually combined only with the front vowels, was used with the back **w**. This is not a blatant violation of the spelling rules of runic writing, since irregularities in the use of characters denoting sibilants abundantly appeared even in the Orkhon texts**. Yet the irregularity in writing the segment **s$_2$w** does not make it possible to answer the question of how to read that word: in phonetic transcription with the front or back vowel. In the former case, it could be *sü* 'army', or *sö* 'the distant past', or the borrowed Chinese word *sü* 'foreword'; in the latter case *so* 'chain, fetters'. Another, fifth reading could be the noun meaning 'glory (triumph)', which is written as *suu* or *süü* in the Old Uyghur sources that will be discussed below. Three possible options ('the distant past', 'foreword', or 'chain') make no sense in this particular context, as the Object to the Verb *ber-* 'to give' and the author of the inscription as the Subject.

If we assume that **b$_2$r$_2$** should be read as *bar-* 'go', despite the presence of front consonants and due to the abovementioned violations of synharmony, it is possible to suggest the reading of *sü* as 'army'. Then *sü bar-* should be translated as 'go to the battle', even though the first word has the form of the Nominative Case and not Dative Case. This interpretation is based on the parallel with the expression *sü yorı-* (*yorı-* 'go', is also an intransitive verb), which occurs in three places of the Orkhon inscriptions: *öŋdün kagangaru sü yorılım* – "Let us fight the war against the eastern Khagan" in line No. 5 of the inscription in honor of Tonyukuk, the repetition of *sü yorılım* with the same meaning in line No. 11 of the same text, and *kök öŋüg yoguru sü yorıp… suvsız käçdim* – "I have passed (with) the army without water… crossing the Blue Desert" on the southeastern side of the monument to Bilge Khagan. Words in the Nominative Case with Dative content combined with intransitive verbs are quite rare in Old Turkic language*. The main problem with this interpretation is the writing of *bar-* with the consonants combined with front vowels; it is possible, although in fact it is very unlikely, that the type of the runic script with which the writer was familiar, did not include characters **b$_1$** and **r$_1$****.

The word *su/sü* 'glory, imperial state, greatness, happiness' was usually written with two vowels (Ligeti, 1973: 2–6). L. Ligeti found this word in a number of Uyghur and Mongolian texts of the Yuan dynasty, where it was always used in relation to the Mongol Emperor. In the Uyghur language, derivatives of this word have suffixes with both front and back vowels; in the Mongolian language only with front vowels, although Ligeti was able to etymologically connect them with several other Mongolian lexemes which also had front vowels. Since he found the use of this noun in Uyghur texts only during the period of the Mongol rule, Ligeti considered it to be a Mongolian borrowing in the Old Uyghur language, which has been preserved in the Chagatai language. Nevertheless, in the Manichaean text published by P. Zieme, this word was present in the expression *ulug kutun suun yalanar* 'burning with enormous greatness

*Ibid., on p. 261, two examples with *sözläyü ber-* were mentioned.

**See also the suffix *-yU* in the first line, which was written with the characters used in the words with back vowels, although the stem *sözlä-* has front vowels.

*Erdal is aware only of the phrases *baçak olor-* 'hold the post' (with *olor-* 'sit'), mentioned five times in the early Manichaean text Xwastvānīft, and *dyan olor-* in the Buddhist source Wutaishanzan, B, r 10, in which the verb *olor-* is accompanied by the borrowed word *dhyāna*, usually translated as 'meditation'. Notably, all cases of such use of *yorı-* and *olor-* are stable expressions.

In the majority of runic inscriptions, **ŋ$_1$ does not differ from the much more common **ŋ$_2$**. Very few of them have a clear difference between **a** and **ä**, which looks like **l$_2$** above and **č** below, as it appears for example in the inscription E15 (see (Erdal, 2002: 56–57)).

and glory' (line 435) (1975). The words *kut* and *suu* were used here as the Binomial in the Instrumental Case. *Kut* means 'heaven's benevolence'; hence, 'luck' and 'happiness', which are quite synonymous with *suu*. Their use with the verb *yal-ın + a-*, formed from *yal-ın*, 'flame', is not unexpected: early Mongolian manuscripts contained the binomial expression *suu jali*, in which *jali* was a Turkic loanword *yalın*. In a footnote, Ligety pointed out that in later woodcut editions, *suu jali* was replaced by *čog jali*, where *čog* 'glow, heat' was also a Turkic loanword. According to E. Wilkins (oral communication), the Uyghur words *su/sü* recorded at the same time also belonged to the Yuan period and were usually used for describing the Emperor. Ligeti was correct in his etymology, and there are no doubts in his reading of the early Manichaean manuscript. Therefore, this word is one of the few early Mongolian borrowings in the Old Uygur language*. In this case, it could have been used in the Sarykoby inscription, even if it was of Mongolian origin.

The phrase *su/sü ber-* is synonymous with *kut ber-* 'bless someone'. The latter phrase has been found in the second prediction from "Ïrq bitig"—a book of omens, also written in runic script. God says there: *Kut bergäy män*: – "I will bring (you) good luck". The person who made the Sarykoby inscription could have believed in its ability to convey its blessing to those who would read it. This interpretation of the second line can be associated with the phrase *sözläyü beriŋ-ä!* in the first line. Whom was this imperative addressed to? It might have been a polite appeal to a person or being, or else the author could have meant many recipients. We do not know whether the inscription was an invitation to dialogue, or call to prayer or blessing. Its content resembles two sentences in a Yenisei runic inscription** discovered by A.V. Adrianov: *(ä)sizni sözl(ä)ti b(i)tiyür b(ä)n. uk(u)glı k(i)ši (ä)rkä sözl(ä)yü b(e)rd(i)m* – "I write, making grief (sorrow) speak. I spoke with the understanding people"*** (Erdal, 1998: 89). The author of that inscription presents himself as the initiator of the dialogue. If he makes his sorrow speak, can it be the case that the author of the analyzed text also "invites" his own words to "speak" and express *su/sü* 'blessing'?

The word which can be read as *(ä)sizni* and interpreted as 'sorrow' (in the accusative case) in the Yenisei inscription, can also be read as *sizni*—the second person plural pronoun in the accusative case, meaning plural recipients and/or polite address to one or many persons. The phrase *sizni sözl(ä)ti b(i)tiyür b(ä)n* could mean "I write making you speak". Such an interpretation of that inscription, "making its reader speak", would support our reading and interpretation of the Sarykoby inscription.

Conclusions

The Sarykoby inscription is located on a horizontal surface in a very inconspicuous place; the characters are small in size and were carved shallowly in one step—all this confirms the opinion of many scholars about the intimate nature of many Altai runic inscriptions (Kyzlasov, 2005: 435; Tybykova, Nevskaya, Erdal, 2012: 17). They were not intended for everybody's viewing and reading. The attention of the author of the Sarykoby inscription was undoubtedly attracted by large and expertly executed rock composition of the Late Bronze Age–Early Iron Age, if for no other reason than other similar petroglyphs were absent from that place (the rest of the petroglyphs were much more modest both according to their area and number of images). Other runic inscriptions, as well as petroglyphs or graffiti of the Old Turkic period, have not been detected there. The composition depicts hunters with bows, deer with branching antlers, bear, and several birds (probably cranes). And although there is no direct connection between the content of the Sarykoby runic inscription and this rock composition, the latter might have served as a kind of pointer intended for attracting attention to the inscription.

Finding each new runic inscription in the Altai is an important scholarly discovery. This is even more true for Kosh-Agachsky District of the Republic of Altai, bordering Mongolia. To this date, 13 runic monuments are known there, while 75–80 runic inscriptions are known in Ongudaisky District (Central Altai). In addition, only five of the Kosh-Agach inscriptions were written on the rocks; the rest were carved on steles or items from burials.

Summarizing our research, we should say that we have a clearly legible, but still rather mysterious inscription, which apparently includes a borrowing from the Proto-Mongolian language. Its content in a certain sense is religious-philosophical. The inscription invites the readers to dialogue, or perhaps contains a call for prayer or blessing, which manifests its originality and importance in the corpus of the Altai runic monuments.

*It can be assumed, for example, that the word *nayrag* referring to the bodily characteristics of Buddha, is derived from the Mongolian verb *naira-*. The Khitan language, akin to Mongolian language, could have been one of the sources of such borrowings. Another possible source was the Middle Mongolian language of the inscriptions of the 6th century, made in the Brahmi script; they have recently been discovered in Mongolia. D. Maue identified the characters of the inscriptions (2018), and A. Vovin their language (2019).

**The expression *y(a)l(ı)m k(a)yam* – "my bare (forested) rock" was used twice in this inscription. The most amazing thing is that the form *sözläyü* was also written there as $\mathbf{s_2\ddot{w}zl_2y_1w}$ with the adverbial suffix violating synharmony. Both inscriptions were relatively poor in the explicitly expressed vowels.

***Or "for the reading people", since the text can also be read as *okıglı kiši ärkä*. Vowels after rounded vowels are not always spelled out in this inscription.

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The Ussuriysk Tortoise—A 13th Century Jurchen Monument

This article gives a detailed account of the scholarship focusing on the stone effigy of a tortoise found in 1864 near the Yuzhno-Ussuriyskoye fortified site in Primorye by the mining geologist I. Lopatin. The accompanying events are described. The main source is the unpublished diary of F.F. Busse, who unearthed the sculpture in 1885. He also excavated a kurgan on which it had been placed, and six other burial structures. His findings suggest that before the kurgans were built, the place had been occupied by a 13th-century Jurchen tribal cemetery. Stone tortoises with steles on their backs, called "steles on the spirit's path", had been placed at such cemeteries near the graves of top-ranking persons. There was no inscription on the stele nor on the top, and there was no stone vault under the adjacent kurgan. This is possibly due to the fact that the mausoleum was constructed for a person who had died far from that place. On the basis of Busse's diaries and new archaeological findings, I suggest that the cemetery with which the tortoise statue was associated might be connected with the key historical figure of the region—Puxian Wannu, who founded the Jurchen state Eastern Xia.

Keywords: *Jurchen, Puxian Wannu, cemetery, stone tortoise, Jin Dynasty, Eastern Xia State, Far East.*

Introduction

In 2019, 155 years have passed since the first publication of information about a stone tortoise, a unique object of the cultural heritage of the 13th century, discovered in the territory of the future village of Nikolskoye (now the city of Ussuriysk), in the Primorye. The monument was found by the mining engineer I.A. Lopatin in 1864 (Lopatin, 1864). In the work "Some Information on 49 Ancient Localities in the Amur Land", he published drawings of the tortoise, the slab, and the bas-relief representing two dragons, along with information on their location—"north of the earthen fortification" (1869: 5), as well as detailed drawings of the sculptures, with sizes, indicating that the tortoise with a stele on its back was made of coarse, pale red granite, and the slab and bas-relief were made of metamorphic bluish-white limestone (Ibid.: 6).

In the 19th century, in Ussuriysk, two stone tortoises (including the one described in this article)* and several stone sculptures of soldiers, officials, lions, and rams, accompanying the burials of nobles, were discovered. Since the discovery of these statues, information about them has been very confused; erroneous data continue to be reproduced in various publications (Busse, Kropotkin, 1908; Dryakhlov, Romanov, Chalenko, 2006), despite the fact that scholars have published exact descriptions of the monuments (Okladnikov, 1959; Okladnikov, Derevianko, 1973; Zabelina, 1960; Larichev, 1966; Vorobiev, 1975, 1983). This study provides information about the Ussuriysk tortoise from all known sources, attempts to connect this burial complex with the name of Puxian

*Currently, one tortoise is in Ussuriysk and the other is in Khabarovsk.

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Wannu, who ruled in Primorye in the 13th century, and presents the information from the diaries of F.F. Busse about the excavation of a mound under the figure of the tortoise in 1885, and about kurgan No. 2, near the tortoise, excavated in 1889 (1885a, b; 1889).

History of the discovery of, and research on, the Ussuriysk stone tortoise

The stone tortoise that is the subject of this study is a reptile sculpture standing on a pedestal about 15 cm high, both being made of pink granite (Fig. 1). The length of the tortoise's body is 224 cm; the maximum width is 144 cm; the height is 65 cm, and the weight is not less than 6 tons (400 poods) (Busse, 1885a) (Fig. 2–4). The tortoise is represented very realistically, with its head stretched forward and raised upward on a powerful neck. It seems that the body of the tortoise is slightly pressed down by the stele, which was inserted into a hole in its back measuring 75 × 32 cm, with a depth of 20 cm, in the central part of the shell (Fig. 5). Although the tortoise's body looks pressed, it is noticeable that the limbs are bent resting on the surface, and the paws show resistance to gravity. The back of the tortoise is protected by the shell, with pecked hexagons in the form of symmetrical horn shields imitating concentric annual rings. The tail protrudes from under the shell in the back of the sculpture. All the details of the sculpture are well elaborated. The head is round and elongated; eyes "looking" at the sky are engraved in the upper part of the head. The nostrils are marked by two recesses or holes; the mouth is rendered by well-elaborated semi-oval. There is a recess (urn)—the third eye, which symbolizes the spiritual essence, on the forehead of the tortoise.

Lopatin pointed out that no inscriptions were found on the stele, nor on its top with the dragons. According to Busse, a large stone slab lay under the foundations of the church; according to the peasants who built the church, it had constituted the vertical part of the monument with the tortoise at its base (1889: Fol. 5). This slab was later mentioned by A.Z. Fedorov: it had been located under the bell-tower of the old wooden church, but when the church was later moved to the village of Novo-Nikolskoye in 1914, Father Pavel Michurin found the slab and placed it in the porch of the newly built stone church, where it was clearly visible. Fedorov examined this slab when it was removed from under the bell-tower, and did not find any inscriptions on it. The absence of inscriptions was also confirmed by Father Pavel Michurin (Fedorov, 1916: 19).

The sculpture of the tortoise was found in the area northwest of the ancient fortification (Southern Ussuriysk fortified settlement) (Fig. 6, *a*), on a hill 10 m in diameter and 1.5 m high, which was located on the south side of a group of six kurgans (Fig. 6, *b*, *c*). The animal's head was facing south; that is, the kurgans were located behind the tortoise. The sculpture was placed, not in the center of the kurgan, but closer to its southern edge (Busse, 1885a: Fol. 76). During the inspection by Busse, the back part of the sculpture, oriented to the north, and a section of tortoise's back, were under the ground. Two holes were visible to the north of the figure. These were the remains of the underground passage, which the robbers had made to penetrate into the mound under the tortoise. This resulted in the stone statue's sinking. In his diary, Busse indicated that the tortoise was located on the southern edge of the kurgan, which was 7 sazhens* in diameter and 5 feet high, and he wrote all measurement results on the attached drawing (1885a: Fol. 76–77).

In 1885, owing to the threat of destruction of the hill where the tortoise was standing, F.F. Busse and V.F. Mikhailovsky transported the statue to the public garden in the village of Nikolskoye. Busse described the process of excavating and transporting the figure in detail (1885b: Fol. 71–74). He used the method of excavation pits and established the stratigraphy of the kurgan: a thin layer of sod, clay, and pieces of black tile at a depth of 30 cm. The thickness of the layer with such fragments in the western part of the mound reached 120 cm. The sterile soil was yellow clay, from which the mound, of regular hemispherical shape lined with halves of bricks along the edge (except for the southern side), was made. The collected material evidence included mainly fragments of tiles, as well as fragments of end-disks with images of flowers and dragons, nails, and an arrowhead. On the northern side, behind the statue, flat hewn stone measuring 60 × 50 × 23 cm was discovered.

Notably, the methods of excavation and engineering solutions to the problem of transporting the monument were well thought-out: a sled had to be moved under the statue. For this purpose, two trenches were made to a depth of 2 feet** on two sides (east and west) below the base of the sculpture. Then, supporting logs were brought under the figure, 2/3 of the soil was removed, and only after that was the sled of five logs pulled up to the sculpture. Using the labor of 40 peasants, the tortoise was placed on the sled, which was harnessed to 11 pairs of bulls. Work on the study of the kurgan under the tortoise ceased with the beginning of frost in late October. Mikhailovsky was entrusted with continuing the excavations, but he could not proceed, burdened with other affairs.

The study of the kurgan was continued under the leadership of Busse only in 1889. The works resumed owing to the construction of peasant houses in the immediate vicinity of the archaeological site, and the setting of a cross 20 meters east of it, which indicated the

*About 14.9 m.

**About 60 cm.

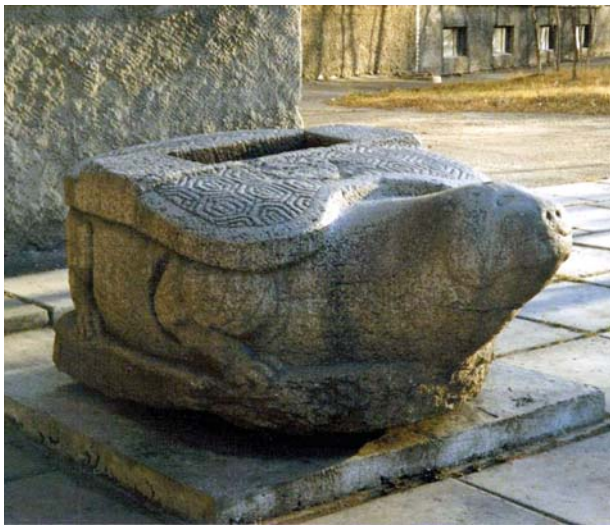

Fig. 1. Sculpture of the Ussuriysk stone tortoise. *Photograph by the author*.

Fig. 3. Drawing of the monument made by F.F. Busse (1885a).

location of the future church. The goal of the excavations was to find a burial in a crypt under the kurgan. To achieve that, a well 1.2 m deep and measuring 1.8 × 2.7 m was dug under the tortoise. According to Busse, a shrine under a tiled roof with clay decorations stood on top of the mound, and the tortoise was inside the shrine. Judging by numerous fragments of tile in its entire thickness, the kurgan was made on the site of a destroyed dwelling (Busse, 1889: Fol. 74–76). The excavation report, presented by Busse at a meeting of the Society for the Study of the Amur Region, said that there was no crypt or grave inside the kurgan. The kurgan, of regular hemispherical shape, was constructed of local yellowish clay. The tortoise was placed, without a foundation pit, a

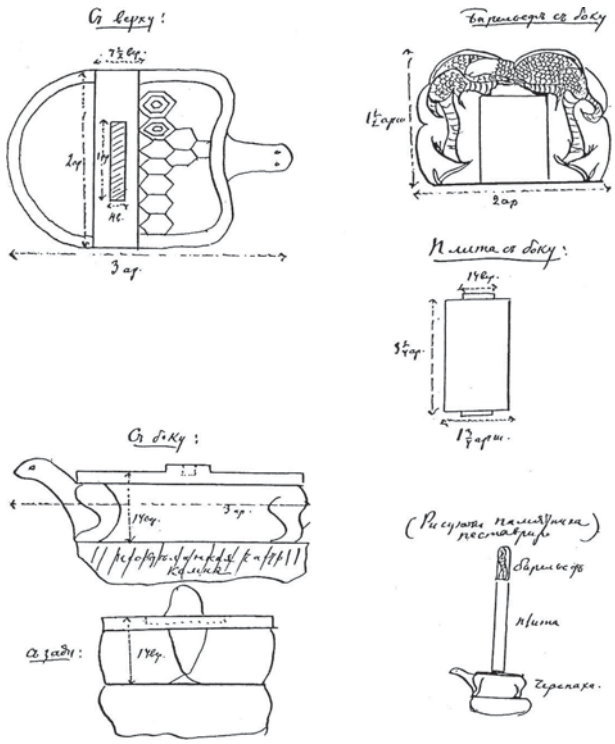

Fig. 2. Drawings of the tortoise, stele, and top made by I.A. Lopatin in 1864 (Lopatin, 1869).

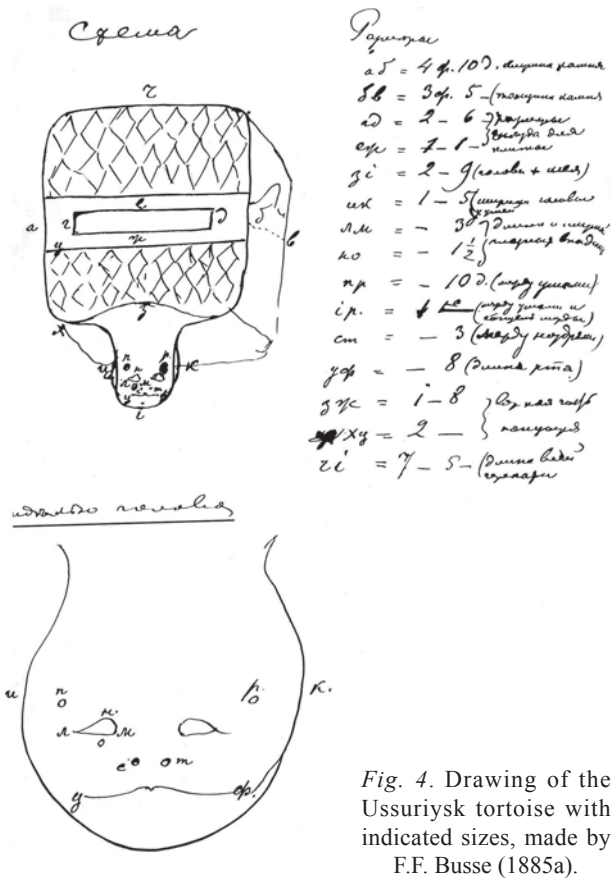

Fig. 4. Drawing of the Ussuriysk tortoise with indicated sizes, made by F.F. Busse (1885a).

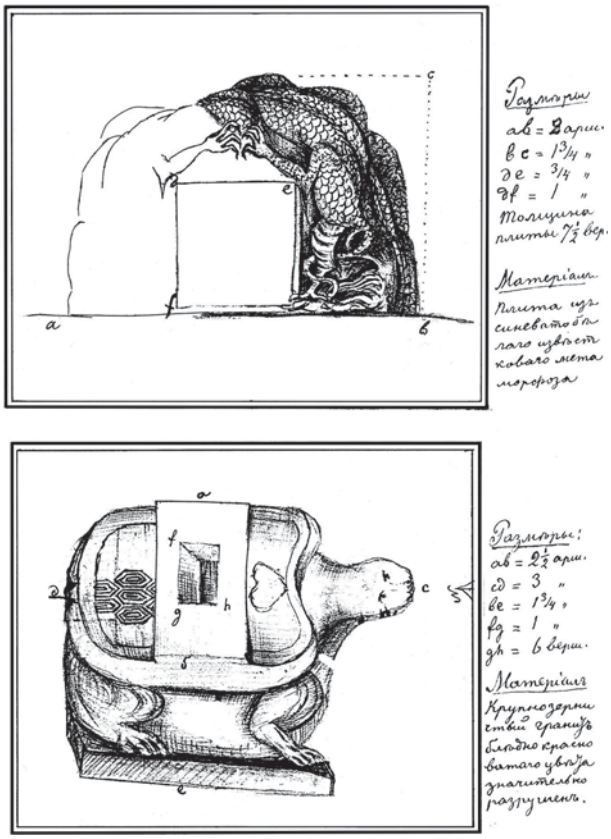

Fig. 5. Drawings of the top and tortoise made by I.A. Lopatin in 1868 (Busse, 1885a).

little south of the center, and there was a small shrine on independent posts behind it (Ibid.: Fol. 13–14).

According to the description of the excavations, the tortoise stood on a platform about 10 m in diameter and about 1 m high. On the southern side, a pathway with an area of 2.5 m^2 was made of seven bricks laid with their wide sides to each other in one row. A "belt" of halves of gray bricks was made along other sides of the platform. The tortoise was oriented with its head to the south. A tiled roof decorated with bas-reliefs of horned dragons and end-disks with floral ornamentation was built over the tortoise. The roof was supported by wooden columns, which rested on four stone bases. This structure covered an area of about 5 m^2 (2.25 × 2.25 m) and was probably 4 m high. In its architecture it could have resembled a pagoda or open pavilion.

Six kurgans were located next to the tortoise (Fig. 6, *b*, *c*). Busse drew a line from north to south across the hill with the tortoise, conventionally dividing the kurgans into two groups—western and eastern. The kurgans of the western group almost touched each other, and made up a triangle. The kurgans of the eastern group (it was called "the tortoise group") were located in a meridional direction. The northern kurgan (No. 2) of this group, with traces of cremation, was excavated by Busse in 1889. It was located 40 m from the statue. In plan view, the kurgan had the form of a round embankment with a diameter slightly exceeding 8 m and a height of about 1 m. At a depth of 60 cm from its day surface, a square-shaped grave pit measuring 2.25 × 2.0 m and 1.05 m deep was found. At its edges, it was lined with wood, the remains of which could be seen as a black strip. A layer of gray clay up to 10 cm thick covered the bottom of the pit. A wooden box-coffin measuring 62 × 34 cm (see Fig. 6, *d*) was found at a depth of 63 cm inside the pit, 30 cm from its western wall. This box did not have a lid. It was made of rough split boards (battens), which were coated with earth on both sides. The boards were not fastened at the corners. Most likely, they covered the walls of the pit, which was used as a coffin or urn. In his report, Busse wrote, "Both the bottom and walls of the box were covered with a 5 cm layer of black paste similar in composition to that which was found in the grave pit. The same layer filled the entire space of the box. It is very likely that the whole grave pit was filled with this layer after placing

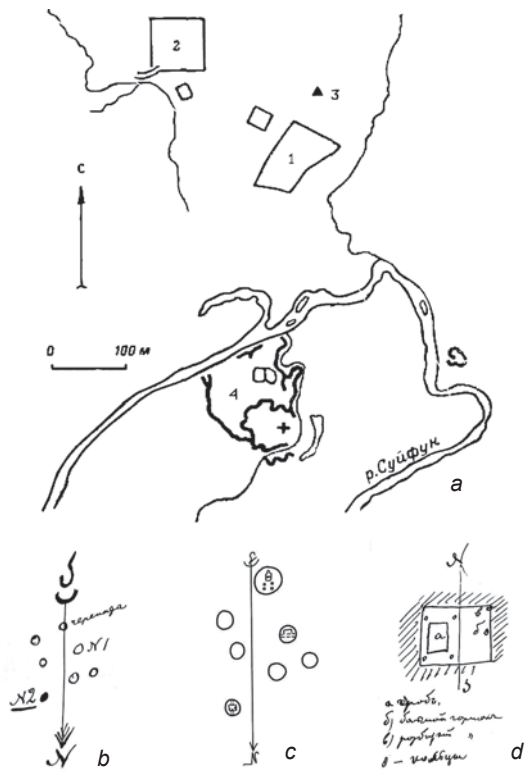

Fig. 6. Plan of the ancient fortifications and tombs in the vicinity of Ussuriysk: 1 – Southern Ussuriysk fortified settlement, 2 – Western Ussuriysk fortified settlement, 3 – location of the Ussuriysk tortoise, 4 – Krasny Yar fortified settlement (Busse, Kropotkin, 1908) (*a*); location of kurgans near the Ussuriysk tortoise (Busse, 1889, 1893) (*b*, *c*); plan of kurgan No. 2 (Busse, 1889) (*d*).

the remains of the deceased inside. A large number of golden spangles was found in that layer. There was a large amount of charcoal with clay inside the coffin, in its upper part. Possibly, these could have been the remains of the coffin lid. The fragments of human bones with traces of being in the fire, along with black oily paste (remains of cremation), were below. Iron staples with rings were found on the external surface of the box at the corners. Iron nails were discovered in the process of unearthing the grave pit. A gray pear-shaped ceramic vase about 23 cm high filled with black paste (burnt decayed bone) with small fragments of bones was at the bottom of the pit, near the middle of the eastern wall. An identical vase with similar content, but apparently broken during the burial, was found in the northeastern corner. Clods of burnt decayed bone, which might have not fit into them, were located between these vases. The bottom of the grave pit consisted of a layer of gray clay, 10–12 cm thick" (1893: Fol. 17).

The features of this burial suggest that the body of the deceased was burned elsewhere. Then, the ashes were placed in a wooden urn and lowered into the grave pit. Ceramic urns with ashes of two more deceased were placed nearby. After that, everything was covered with the remains from the cremation that did not fit into the urns, up to the level of the upper part of the grave pit. After that, the burial mound was made.

Other two kurgans of the tortoise group were excavated in 1889 by V.U. Ulyanitsky. Unfortunately, despite the written promise that Ulyanitsky gave to Busse, he did not submit to the journal the records of the excavations and the collection of antiquities which he found. Busse wrote in his memoirs about the excavations of the kurgan closest to the tortoise and territory to the west of it, done by Ulyanitsky, "He made a deep trench from W to E, at a depth of about a foot below the level of the surrounding area, and found a plank and clods of oily black paste under it, identical to the paste that I found in another kurgan. Further excavations to the south and north up to the level of the plank and deeper, as I recall, did not reveal any remnants of antiquity. As for the other kurgans, I have no information about the results of Ulyanitsky" (1893: Fol. 17). It follows from this description that there was a wooden urn in the kurgan, where the remains of the human skeleton had been placed after cremation.

Records of excavations by Busse and drawings by Lopatin make it possible to conclude that a Jurchen clan cemetery with the burial of a noble was in the place of the kurgans. The "path of the spirits", marked by stone statues of people and animals, had to depart from the grave of the noble. In China, since ancient times, clan cemeteries always began with constructing the "path of the spirits" (Lin Yun, 1992: 34). The stele on the tortoise was set on the "path of the spirits", that is, at the other end of the road.

Historical context of the find

The stylistic features of the stone tortoise and the top on its stele leave no doubt that the figures were made in the 13th century. This conclusion is confirmed by the Chinese scholar Lin Yun, who drew attention to the fact that the legs in all early sculptures of tortoises (for example, near the grave of Liu Xu of the Northern Wei Dynasty) were parallel to the ground; while in Jin tortoises, the legs seem to rest with their front part against the pedestal. Shell plates of the Early Jin tortoises were represented as elongated hexagons with their long sides across the shell, while on the Ussuriysk tortoise, they form a horizontal pattern. Differences are also observed in the shape of the top on the stele. For example, the tops dated to the 12th century have the shape of five-sided scepters—plates with rounded ends; while the top found near the Ussuriysk tortoise was rectangular (Lin Yun, 1992: 40).

All scholars have observed that there were no inscriptions on the stele nor on the top of the Ussuriysk tortoise. This can be explained by the possibility that the clan mausoleum had been prepared in advance, and the person for whom it was intended was never buried in it. According to the written sources of the 13th century, the key historical figure in this land was Puxian Wannu—the founder of the Jurchen state of Eastern Xia (1215–1233). Today, it is reliably known that the Upper capital of this state (the town of Kaiyuan) was located within the boundaries of the Krasny Yar fortified settlement (Artemieva, 2008). Puxian Wannu was first mentioned in historical chronicles in connection with the events of 1215. Being the commander of the Jin forces in Liaodong at the time, and fearing the capture of the empire by the Mongols, Puxian Wannu seceded from the Jin dynasty, declared himself the ruler of the new state Da Zhen ("Great Zhen"), and accepted the name of Tiantai ("Celestial Quietude"). These historical events played a major role both in the life of the Jurchen ethnic group, and in the political and economic life of Primorye. In the initial period of the Great Zhen State, the residence of Puxian Wannu was located in Liaoyangfu, the eastern capital of Jin. Wannu's external policy was aimed at maintaining independence from the Mongols. His campaigns in the neighboring lands did not bring victories. In 1214, taking advantage of the absence of Wannu, the ruler of the Khitan state of Eastern Liao Yelü Liuge captured the Eastern capital with the support of the Mongols, and took Wannu's wife and relatives prisoners. Caught in a hostile environment, Wannu marched with his army of 100,000 to the east to Helan County, and further to the northeast to Primorye, where he created the state of Dongxia (Eastern Xia) and declared himself its ruler. In order to keep peace on the borders of the state and gain time to prepare for war, Puxian Wannu formally expressed submission to the Mongols and sent his son

Tege to Genghis Khan. Eastern Xia established relations with Goryeo. Thanks to a delicate diplomatic game on the part of Puxian Wannu, the Eastern Xia state lasted until 1233. That year, the Mongol troops, passing through the territory of the Goryeo State, captured the southern capital of Eastern Xia, where Puxian Wannu was at that time. In 1233, Puxian Wannu was captured, and the Mongol troops retreated, leaving 100 or more horsemen in Eastern Xia (Wang Shenrong, Zhao Mingqi, 1990; Zheng Ming, 1985; Ivliev, 1990, 1993). There is no information on the place or circumstances of the burial of Puxian Wannu. There is only the information that in 1233 the ruler of the Eastern Xia State was captured by the Yuan troops in the Southern capital (the Chengzishan fortified settlement) (Zhao Mingqi, 1986). This probably explains the absence of a grave with a stone coffin in the kurgan next to the tortoise and inscriptions on the stele.

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Turkic Inscriptions in Cyrillic on 14th–15th Century Eastern European Lithic Artifacts

This study introduces two Turkic inscriptions written in Cyrillic on lithic artifacts—one on a mid-14th century casting mold recently found in Bolgar, southwestern Tatarstan, the other on a tablet with uncertain date found in Polotsk, in the Vitebsk Region of Belarus, more than half a century ago. Both are similar in that Turkic speech is rendered in Cyrillic script. We discuss the paleographic aspects, interpret the historical context, and suggest a translation of certain words and expressions. Some of them indicate tribal structure and remnants of pagan (totemic) beliefs. The inscriptions testify to the adoption of Russian culture, especially literacy and religion, not only by immigrants from the steppes to the forest zone (the Lithuanian-Russian State), but also by the steppe and forest steppe Islamized population of the Volga basin living within the boundaries of the Golden Horde. Apart from documenting the knowledge of Russian, the inscriptions testify to the assimilation of Christianity, with which the Russian language was inherently linked.

Keywords: *Bolgar, Golden Horde, Russia, Turkic languages, literacy, Cyrillic inscriptions.*

Introduction

Throughout their entire history, Slavic tribes and state associations coexisted in Eastern Europe with settled, semi-nomadic, and nomadic peoples, including the Iranian- and Turkic-speaking peoples. The Old Russian state had the closest trading and cultural ties with Volga Bulgaria—a multitribal (yet Turkic in its essence) state entity, which emerged in the Middle Volga region in the 10th century. Volga Bulgaria was not only a military rival of Russia, but also a permanent partner in craftsmanship and trade. Russians constantly lived on its territory, while Volga Bulgarian merchants and craftsmen also permanently lived in Russian towns (Poluboyarinova, 1993: 116–118). The relations of Rus with the Turkic-speaking peoples of the steppe zone of Eastern Europe (the Khazars, Pechenegs, Torks (Guzes), and Cumans) in the 9th–13th centuries were just as diverse.

After the Mongols conquered a significant part of Eastern Europe, all Turkic-speaking peoples who had settled on this territory became a part of the Jochi Ulus (the Golden Horde). Its main spoken language was the Turkic language of the Kipchak type. The writing systems on the territory of both Volga Bulgaria and the steppe zone differed from the Old Russian system both in terms of language and alphabet (the Cyrillic script), which was adopted by the Russians from Bulgaria of the Balkans. Writing based on Arabic script spread in Volga Bulgaria with the adoption of Islam in the 10th century. Unfortunately, manuscripts of the pre-Mongol period from the territory of Volga Bulgaria have not survived. We can get some idea of the Volga Bulgarian language

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of this time from epigraphic monuments—epitaphs on stone gravestones, made either in Kufic writing in the Turkic language, or in Arabic. The surviving early epigraphic monuments of Volga Bulgaria go back to the 13th–14th centuries (Mukhametshin, Khakimzyanov, 1987; Khakimzyanov, 1987), but they do not fully reflect the living spoken language, which was used in everyday life by the population of this state. Therefore, a rare find of an inscription on a casting mold discovered at the Bolgar fortified settlement during the excavations conducted in 2016 by a joint team from the Institute of Archaeology of RAS and Institute of Archaeology of the Academy of Sciences of Tatarstan is of great interest (Medyntseva, Koval, Badeev, 2018) (Fig. 1).

Description of finds from Bolgar and Polotsk

The casting mold with an inscription was found in the very center of the Golden Horde town of Bolgar. It was a part of a large set of casting molds that belonged to a workshop for casting non-ferrous metal products, which had been completely destroyed by digging works. During archaeological studies conducted in 2016–2018 (excavation area CXCII), only a part of the household with the workshop was unearthed. A set of 86 intact and fragmented halves of casting molds was found during the excavation at the site (Badeev, Koval, 2018: 280–283, fig. 6). The workshop probably functioned in the mid 14th century (1350–1360s); however, subsequently the molds became redeposited and ended up in pits, which were filled in the 1360–1380s. The paleographic features of the inscription correspond to the time indicated by the stratigraphic date (Medyntseva, Koval, Badeev, 2018: 144).

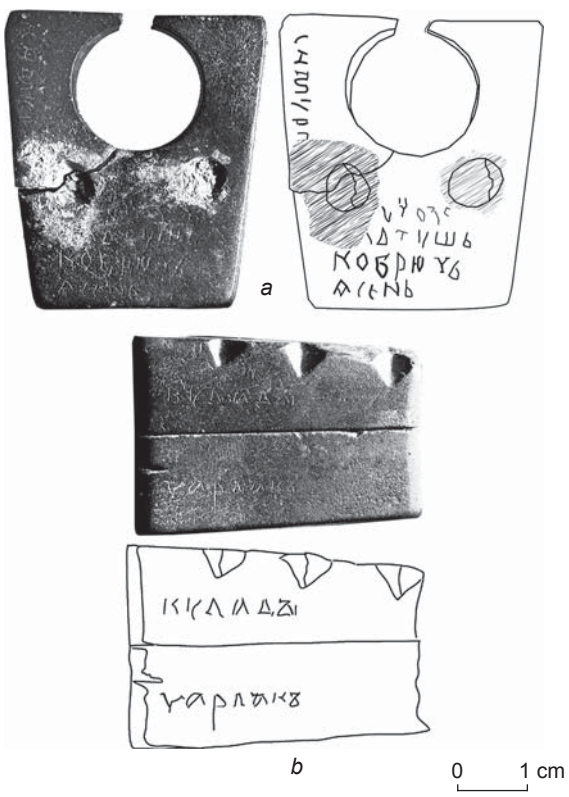

Fig. 1. Photos and tracings of the casting mold from Bolgar with inscriptions. Stored in the Bolgar State Historical and Architectural Museum-Reserve. *Photo by A.A. Medyntseva.*
a – flat, segmented surface of one of the halves; *b* – trapezoidal end.

The casting molds were made of various materials, including local white stone (limestone, marl), schist rocks from the Urals, and fragments of Central Asian talchlorite pots*. Shield rings, bead temple rings, plate bracelets, a needle case, various pendants and medallions, mushroom-shaped weights, buttons, beads, belt plaques, and tops of headdresses were cast in them (Badeev, Koval, 2018: Fig. 6). As a rule, personal adornments did not have a specific ethnic association; however, all of them were typical primarily of the territory of the Golden Horde, although they also appeared at the sites of Medieval Rus as imported products. Many casting mold halves have graffiti in the form of circles, images of birds, lines, zigzags, grids, or geometric figures (Fig. 2). Some halves constitute sets and precisely fit each other, including two halves for casting a shield ring, on which barely visible inscriptions have survived. Both halves were carved from dense black schist with fine scintillating inclusions. The inscriptions were drawn very shallowly, and consisted of small letters, making it difficult to read and photograph them. They were made on the trapezoidal ends of both halves and on the flat side of one of them. Unfortunately, two through holes for connecting pins made of lead were made next to the inscriptions. As a result of lead corrosion, two lines of the inscription were hidden by adhering lead oxides. The inscriptions were made in the Cyrillic script, as evidenced by specific Cyrillic letters **Ш, Ь, Ъ, Ѧ, Ы**, but the language of the inscription was not Old Russian. Most likely, the Cyrillic letters rendered the inscription written in one of the Turkic dialects. Before the conquest by the Mongols and at a later time, the main population of Bolgar consisted of Turkic-speaking Bulgars, and was constantly enriched by an influx of Turkic-speaking peoples from the vast

*The rock types were identified by R.I. Kadyrov from the Institute of Geology and Petroleum Technologies of the Kazan (Volga Region) Federal University, to whom the authors express their gratitude.

territories of the Golden Horde, Central Asia, and the Caucasus. The Turkic language of the Kipchak type, as scholars believe, became the main language of the Golden Horde by the 14th century (Khalikov, 1989: 124, 129–131).

The letters on the side surfaces of the mold are best preserved. We can clearly read two words there (one on each half), which constitute one inscription: **КѴЛА(Б)Ы ЧАРЛАКЪ** (*kula(b)y/charlak*). The first word has survived in the modern Tatar language in the form of *kalyp* and means "mold, form for casting molten metal" (Tatarsko-russkiy slovar, 1966: 218). It is also known from the modern Bulgarian language in the form of *kalp* with the meaning "form, sample, block" (Bernstein, 1975: 247).

Thus, if we take into account that the inscriptions were drawn on one half of the stone casting mold, they can be considered to be the signature of the stone cutting artisan who made this mold (Medyntseva, Koval, Badeev, 2018: 142). Such signatures of artisans appear very rarely on Old Russian products. These are the well-known signatures on Maxim's molds from his jewelry workshop, which was destroyed during the conquest of Kiev by the Mongols in 1240, and two signatures with the same name from the layers at the site of the scorched ruins of Serensk destroyed by the Mongols two years earlier (Medyntseva, 1978; 2000: 71–73). Judging by the possessive form of the name "Maxim" in the inscription, it was most likely inscribed not by a carver-artisan, but by a jeweler-caster who was marking his property. A graffito on a mold of the 13th century from Novgorod with the image of a warrior and the name *Danila* has been interpreted as a signature of the caster (Rybina, 1998: 37–38). The inscription on the molds from Bolgar was definitely left by the stone-cutting artisan and can be understood as "cut the mold" or "the mold of a cutter." This reading gives us the key to deciphering a more extensive, but unfortunately damaged inscription on the front side of one of the halves of the mold (the word *charlak* was inscribed on its side).

Fig. 2. Graffiti on the casting molds from Bolgar. *Photo by V.Y. Koval.*

Only indistinct characters have been preserved from the first two lines, which were damaged by oxides. The first line is completely illegible; four letters **ТУШЬ** (*tush'*) are visible in the second line; the last three letters can be read quite clearly. These may be the remains of the word preserved in the modern Tatar language as *tash-* 'lithic, made of stone' (Tatarsko-russkiy slovar, 1966: 523), written in Cyrillic, with the character **Ь** at the end of the word. Notably, the Cyrillic letter "izhitsa" was used in the inscription to transmit a sound close to **А** (see the word *kulaby* above). The last two lines have been preserved much better, and the words **КО(В)РЮЧЬ ѦСЄНЬ** (*ko(v)ryuch' yasen'*) can be read. The last word is quite clear: this is a Cuman (Kipchak) name, which has appeared many times in the written sources. The Cuman Khan Yasen-Osen-Asen is known from the Old Russian chronicles (Polnoye sobraniye…, 1962: 76, 97v). In Bulgaria on the Danube River, two brothers (Asen and Peter) led an uprising of the Cumans in the late 12th century and then founded the dynasty of the Asenovites (Zlatarsky, 1972: 430–480). Therefore, such a name has been historically attested to and its reading is beyond doubt. The word *kovryuch* (possible reading *kobryuch*, which does not change its meaning) most likely means belonging to an ail (patriarchal family, clan, kurin), named after the founder of the clan. Such collectives were parts of larger ethnic entities, for example, the unions of the Chorni Klobuky, Berendei, Torkiis, Kovui, as well as the "tribes" of Moguts, Tatrans, Shelbirs, Revugs, and Olbers. The name of the large tribal association of the Koui (Kovui) has the greatest consonance with the word *kovryuch*. According to the Old Russian type of word formation, *kovryuch* should be the possessive form derived from the root of the personal name Kovryut or Kovryui with the possessive suffix *-ich*, which was

used to designate both paternal names and ethnic (tribal) affiliation. Such a name is absent from Old Russian and Cumanian dictionaries of personal names, although it is quite possible that it existed in other Turkic languages. Thus, we can assume that the inscription speaks about the casting mold carved by a man named Yasen from the Kovryui clan.

Now we should turn to the beginning of the inscription—the line located perpendicular to the four other lines (first two of which were damaged by oxides, and the final two, which have been read above). At its beginning, the word **СИМѴР(Г)** (*simur(g)*) can be read*. This is the name of a mythical character widely known in the Iranian-speaking world. In Iranian mythology, Senmurv (Simurg) is a winged dog with two paws and claws, an intermediary between the celestial and terrestrial worlds, patron of crops and vegetation, which has two essences—benevolent and demonic (Trever, 1937). It is known that each Cumanian (and Torkic) tribal entity had its clan patron (totem) as an animal or bird. It can be assumed that the artisan indicated the name of the tribal totem at the beginning of the inscription, which was followed by his own tribal origin, occupation, and property—the casting mold that he made. The spread of Islam in Bolgar since the 10th century did not exclude the persistence of pagan views among the diverse tribes of the Golden Horde and probably tribal totems (even in the 14th century), especially the clan name, which was passed down from generation to generation.

A different interpretation of this inscription is also possible. Along with the word *semirgÜk* (Semurg, the mythical bird), the Cumanian vocabulary included the word *semÜrgÜk*—the name of an ordinary singing bird (Drevnetyurkskiy slovar, 1969: 495). Keeping this in mind, we can assume that the word SIMUR(G) designated a simple singing bird. Such an interpretation seems more preferable, since there are two graffiti with images of birds on another half of a casting mold from the complex under consideration (Fig. 2, *1*, *2*). If one assumes that several carvers belonging to the same family clan worked in the same workshop, a competent artisan, while marking his product, left a rather lengthy benevolent (?) inscription; a second illiterate artisan marked the mold with images of the bird-totem, and other artisans made ornamental decoration or drawings. Signs resembling Turkic runes were made at the end of one of the molds in a row resembling an inscription (Fig. 2, *4*). Some epigraphic and numismatic finds make it possible to conclude that the runic script of the Kuban type was preserved among the artisans of Volga Bulgaria living under Islam, until the 12th or even 13th centuries (Kyzlasov, 2012: 232). In our case, the runic-like characters only vaguely resemble the runic script*. A graffito in the form of a cross with flower-like ends on one of the molds (Fig. 2, *3*) may be evidence that the casters of Bolgar were familiar with Christianity**.

In general, the inscription carries concentrated and at the same time multifaceted information about the occupation and origin of the mold cutter. In the context of the entire unique complex of casting molds, it can testify to close contacts between the Turkic-speaking population of Bolgar and literate Russian people, whose written culture was adopted by some of the local dwellers. At the same time, one cannot exclude the possibility that, along with writing, some basic concepts of Orthodox Christianity were also adopted.

Another Cyrillic inscription in the Tatar language made on a flat stone tablet is known. It was found during the excavations in Polotsk over half a century ago. The inscription was published by G.V. Shtykhov (1963); it was deciphered and briefly commented on by B.A. Rybakov (1963). The item with the inscription was found in the layers of the 13th–16th centuries. A list of Tatar numerals from one to ten was drawn on the tablet in Cyrillic letters (Fig. 3, *a*, *b*, *d*). According to paleographic features but without corresponding commentary, Rybakov dated the inscription to the 14th–15th centuries and correlated it with the Tatars of the Grand Duchy of Lithuania, who were settled there by Vytautas in 1397–1398. The language of the inscription was called Tatar, but taking into account the date of Rybakov, it is more likely that it was a dialect of the Tatar language called Tyurki. That dialect was spoken by the Turkic tribes resettled from the Urals-Volga region, who were invited by Vytautas in the late 14th–early 15th century for protecting the land against the German knights, and were later called the Lithuanian Tatars. However, it should be noted that according to some documents and legends, the Cumans from the Tugorkan clan who came to the Duchy of Lithuania, were already serving in Lithuania as early as the 13th century (Fedorov-Davydov, 1966: 228). Unfortunately, at the time of discovery, the tablet with inscriptions was in an unclear stratigraphic situation, mixed with the finds of the 13th–16th centuries, so it is impossible to clarify its date.

*Only the vertical line is visible in the last character.

*The authors are grateful to I.L. Kyzlasov for his advice on this issue.

**Of course, it is also possible that one of the casters in this workshop was a Christian (or even Russian), but he lived and worked in a Muslim town in a foreign cultural environment.

It is difficult to date the inscription discovered in Polotsk on paleographic grounds owing to its poor preservation. However, its closest parallel in terms of time and type is our inscription on the mold from Bolgar. Indeed, the letter **И** with a horizontal bar, equal sized loops in the letter **В**, triangular loops in the letters **Ь** and **Ъ** measuring half of the height of the letter, represent archaic features for the 13th–14th centuries in both inscriptions. Moreover, the letter **Ѧ** has "rounded" loops, which in manuscripts serves as a sign of the second half to late 13th century. The letter **Ꙗ** in two cases resembles the shape of the number 4 with its long curved tail. Experts in birch-bark letters call this form "Ч-shaped", and letters of this form are known from the group of birch-bark manuscripts dated to the second half of the 14th to early 15th centuries (Zaliznyak, 2000: 189, pl. 21). In the third case, the letter **Ꙗ** has a shape like in the inscription from Bolgar (see the commentary above). Both inscriptions (from Bolgar and Polotsk) must have been chronologically close; therefore, Rybakov had some grounds for dating the inscription from Polotsk to the late 14th–15th centuries. Other features of the inscription from Polotsk, which were not mentioned by the publishers, include **Ц** (*tsi*) instead of **Ч** (*cherv*) in the word *uch* (*three*) and the opposite designation of the diphthong **ѪѺ** (*uoan-un – ten*). The first feature may reflect the dialect ts–ch merger typical of the Old Russian northwestern dialects (Zaliznyak, 2008: 34); the second feature may reflect the transmission of sounds of the Early Tatar language with the help of Cyrillic letters. Turkologists will probably find an explanation for these dialectic features, which will make it possible to more accurately describe the specific nature of the Turkic dialect in both inscriptions, especially since Rybakov pointed to some regional parallels to the Tatar numerals.

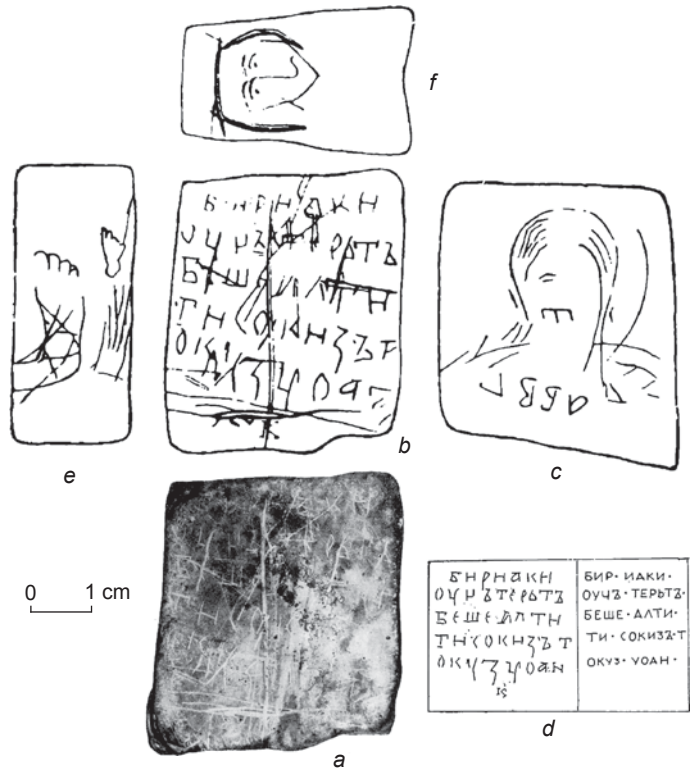

Fig. 3. Inscription on the front longitudinal side of the item (*a*, *b*) and its reconstruction (*d*), tracing of images on the back longitudinal side (*c*) and ends (*e*,*f*). Photo of the item: (Shtykhov, 1963: 247), inscriptions on the front side: (Rybakov, 1963: 248).

The inscription from Polotsk is an important testimony to the regional Early Tatar language of a population that was in an isolated foreign language environment. Unfortunately, this inscription did not become the object of close attention for its first publishers. Neither the drawings on the back longitudinal side and end surfaces of the tablet, nor even Cyrillic letters representing the beginning of the Cyrillic alphabet caused much interest on the part of researchers. Only in 2011, in a comprehensive study of Belarusian epigraphy, I.L. Kalechits cited the Cyrillic transliteration of the inscription on the front (?) longitudinal surface, gave a description of drawings on the back longitudinal side, as well as the transverse sides, as well as her reading of the beginning of the Cyrillic alphabet on the back longitudinal side (2011: 58, 59, fig. 35). The transliteration of the inscription on the front longitudinal surface (in the works of Rybakov and Kalechits, **ѪЦЬ** was mistakenly transliterated as **ѪЧЬ**) is the following: **БИРИѦКИ/ ѺѪЦЬТЄРЬТ/ БЄШЄѦЛТИ/ ТИЄѺКИЗЪТ/ ѺКѪЗѪѺѦТ/ К**. On the back side, Kalechits read the inverted four first letters of the alphabetical sequence **ѦБВГ** drawn under a chest-high image of a person with the remains of a halo around his head, reasonably considered by Kalechits as an attempt to reproduce an icon. For determining the date, Kalechits accepted the view of Rybakov, but expressed some doubts about his suggestion of considering the author of the inscription to be a native Tatar speaker. She admitted that the inscription, including the alphabet and numeration, could have been written down by a student who was practicing writing the alphabet and Tatar numerals by ear, not knowing the Tatar language. Kalechits agreed with G.V. Shtykhov, who rightly called the stone tablet "a notebook of a student". Probably, doubts about the use of the Cyrillic alphabet by the Tatar population were caused by the lack of "everyday" monuments of that type. Now, with the

discovery of synchronous inscriptions in the Turkic (the Volga Turks?) language in the Cyrillic script in Bolgar, both of these finds have lost their exclusivity.

The presence of the Tatar population in the Grand Duchy of Lithuania is not something new, and the use of the Cyrillic script in writing is not surprising, since the Old Russian language in its Western version, as well as the Cyrillic script, were used there not only in everyday life, but also in official documents and chronicles.

Discussion

Notably, both Cyrillic-Turkic inscriptions, which were found in areas separated by great distance from each other, are associated with Christianity: an image of the cross appears on one mold from Bolgar (see Fig. 2, *3*) and a sketch of the figure of a saint and the initial four letters of the Cyrillic alphabet appear on the stone tablet from Polotsk. As Kalechits rightly observed, the initial letters of the alphabet, drawn on a stone tablet, are evidence of learning how to write. It is important to note that the process of writing letters of the alphabet in the understanding of a person of the Middle Ages contained a sacred meaning. This becomes understandable if we take into account the process of teaching how to read and write, which differed from the present-day learning process. The order of letters and their names, which survived until the 20th century and became the basis of the very word "azbuka" (alphabet): "Az, buki, vedi, glagol, dobro…", etc, are known from the preserved "Alphabetic Prayers"—the acrostics in which the initial letters of lines constituted the phrases of the prayer text. Their authorship is attributed to Cyril (Constantine) and his disciples. It should be kept in mind that teaching how to read and write began precisely with the alphabet prayers, which were memorized by heart. Later, an unknown scholar proposed memorizing not the whole verses, but only the initial words which made up the names of the letters arranged in a certain order—*azbukas* (*abecedaria*, *alphabets*) to facilitate the learning process of writing. While studying the alphabet, the students memorized the full names of the letters and at the same time the first sounds of the words, which started the prayer phrases. Thus, the learning process was inextricably linked with the prayer text; learning how to read and write occurred simultaneously with memorizing the prayer. Therefore, the writing of abecedaria (alphabets) had not only educational and practical meaning, but also a sacred meaning: the writer pronounced not the sounds as is done in the present-day teaching process, but the first words of the alphabet prayer or the entire prayer. Consequently, the unknown owner of the tablet was supposed to pronounce the words of the alphabet prayer while writing the letters of the alphabet. The presence of Cyrillic letters in the Polotsk inscription is a proof that its Turkic-speaking author was a Christian and Orthodox.

Conclusions

The inscriptions published in this article belong to the period of turbulent ethnic changes and emergence of a new "Tatar" language based on the Cuman-Kipchak language. At the same period, the Russian population moved to the Golden Horde in large numbers. The spiritual culture of the Russians included the Cyrillic script and Christian religious beliefs. The Cyrillic Turkic inscriptions, which illustrate the vernacular language Tyurki from the time when new ethnic identities were emerging, is important evidence for linguistic Turkic Studies and for the studies of contacts between Russians and steppe dwellers in the area of spiritual culture. These inscriptions testify not only to the familiarity of the Turkic-speaking population of the Golden Horde with the Russian language and writing, and their use of this writing for their own professional needs, but also to the adoption of the spiritual foundation of the Cyrillic writing (Russian Christianity) by some representatives of that population.

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The Topography of Ritual Buildings in Villages of the Tobolsk Governorate (Late 19th to Early 20th Century)

This is the first case study of important places of public worship in three villages of the Tobolsk Governorate in the late 1800s and early 1900s, with reference to architectural planning, hagiography, and religious attitudes. The churches in Obdorskoye and Romanovskoye are located either on an elevated, unoccupied territory in a natural environment or in the center of residential quarters, according to the Russian architectural traditions. The choice of saints was motivated by the ethnic, religious, and cultural situation. Dedications of altars to Archangel Michael, Sts. Peter and Paul, St. Basil the Great, and St. Nicholas were meant to protect while affirming religious values, canons, and dogmas of Russian Orthodoxy. At the Kobyatskie yurts, a mosque was built. Its architecture stood out from the residential quarters, following the Islamic tradition. Its construction, evidencing the religious identity of the residents of the yurts, testified to the recognition of their rights. The topography of religious buildings in villages differing in the ethnicity and religious beliefs of residents evidenced the strategy of ecclesiastical guidance, religious symbolism, and the villagers' attitudes.

Keywords: *Symbols, signs, Orthodox churches, Islamic architecture, villages of Tobolsk Governorate, hagiography, ethno-religious identity.*

Introduction

Ritual buildings are symbolic in any culture, embodying people's religious beliefs and worldview. The study of the way religious structures are placed helps us to understand the symbolic and topographic role of religious buildings in the collective consciousness of society. The attention of scholars should thus be directed toward the topography of churches, chapels, mosques, etc., understood in this case as semantic features of the location of buildings and structures. One of the methods for exploring these features is the analysis of the urban situation, as it was done, for example, by A.A. Prokudina and M.S. Tomskaya (2009). When studying the symbolic aspects of ritual buildings' placement, it is advisable to supplement research using the case-study method, applied to the analysis of reference data and site plans. In addition, when we speak about the symbolism of Orthodox ecclesiastical architecture, it is impossible to ignore hagiographic writings and religious attitudes. This fosters the need to address theological literature, doctrine, and canons. The important role of this approach is preconditioned by the specific nature of symbols in Orthodoxy, which are understood not simply as conventional images or signs. According to the Church doctrine, ecclesiastical symbols embody the heavenly or divine prototype and thereby they fulfill their purpose.

This study is the first attempt to identify the specific features of ritual buildings' placement in the settlements of the late 19th to early 20th century using evidence from the "Reference Book of the Tobolsk Diocese by September 1, 1913" (hereafter, RBTD) (Spravochnaya kniga…, 1913) and site plans of the villages of the

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Tobolsk Governorate drawn in the 1840–1880s on the order of the Tobolsk Treasury Chamber in connection with measures to regulate settlement development and allocate land plots for the settlers, from the State Archives of Tobolsk (GBUTO "City archive in Tobolsk", F. 154, Inv. 2). The scholarly value of these sources has been analyzed; their reliability and rich information content have been established (Kurilov, Mainicheva, 2008). Notably, these reference materials contain data only on Christian churches and chapels. This study will not consider popular understanding of images and symbols of Orthodoxy, since the sources employed do not make it possible to take into account its specific features. Decisions on the placement of buildings and other architectural structures, and consecration of altars were made at the official level by civil and religious authorities in accordance with rules and doctrines. Our hypothesis is that the features of topography of the semantically important religious buildings could be manifested in the clearest manner in the settlements with complex ethnic composition and non-Russian population. Therefore, from more than 15 site plans, which stipulated the placement of a church or chapel, we focused on those that were drawn for the settlements located in the districts with mixed population (Russians and native non-Russian minorities, according to the terminology that existed in the documents of the Russian Empire in the late 19th to early 20th centuries; the names of ethnic groups will be given in accordance with this terminology), where ritual buildings were available. There were three such settlements: the village of Obdorskoye in Berezov Okrug, as well as the village of Romanovskoye with the Romanovskie yurts and the Kobyatskie yurts in the Tobolsk Okrug of the Tobolsk Governorate. In the list of settlements for 1868–1869, compiled at a time close to the period when the site plans were created, there were 11 Russian villages, 144 non-Russian uluses, and no non-Russian yurts in Berezov Okrug; and 36 Russian villages, 194 non-Russian yurts, and no non-Russian uluses in Tobolsk Okrug (Spiski naselennykh mest… (the List of Settlements, hereafter, SNM), 1871). Unfortunately, there was no information on the ratio of the ethnic groups in the population of each of the settlements, but the site plans clearly indicated the areas where both Russians and native non-Russian minorities resided. The SNM mentioned the districts where native non-Russian minorities lived (Ibid.: CLIII): the Samoyedic people and Ostyaks roamed near the village of Obdorskoye in Berezov Okrug and wintered on a part of the village territory; the Tatars lived in the yurts of Tobolsk Okrug (Ibid.: CLIV, CLVIII); and the Kobyatskie yurts were mentioned as a Tatar settlement (Ibid.: CLIV). The compilers of that reference book noted that the non-Russian population prevailed over the Russian population in Berezov Okrug: 100 people of both sexes included 21 Samoyedic people and 63 Ostyaks (Ibid.: CLIX), while Tobolsk Okrug could be considered "the center of the Tatar population" (Ibid.: CLIV), since there were 25 Tatars per 100 Russians.

One of the problems of the site plans under consideration is the lack of contour lines, which complicates the analysis of the landscape and does not make it possible to establish the height of the area where a ritual building was located in relation to other buildings. However, it is still possible to imagine the general altitudinal position of the settlement area, since the direction of the river flow was indicated, and it is known that the right bank of rivers in Western Siberia is steeper than the left bank. For example, an elevated sand-clay mountain (or hill) stretched along the right bank of the Ob River, which rose five sazhens above the waterline in the area of the village of Obdorskoye (Ibid.: X).

Specific features of ritual buildings' placement in the settlements

A drawing of the site plan completed in 1846 for the settlement of Obdorskoye (present-day Salekhard) in Berezov Okrug (Fig. 1) was found in the archive of the Tobolsk Governorate. The plan was made by the Turinsky junior land surveyor Devyatov dated December 9–12, 1846, on the order of the Tobolsk State Chamber from December 2, 1846. The village of Obdorskoye was located on the Pilui River (present-day Polui River), a tributary of the Ob River. The site plan was drawn schematically, and only individual zones are visible. The network of streets is not shown. The building system was located along the SW-NE line; from south to north it was cut by a ravine and stream valley. The southwestern part was occupied by residential buildings; the northeastern part was occupied by trading shops which were located on an area of 40 × 170 sazhens adjacent to the territory of the new (as noted on the site plan) Orthodox cemetery with an area of 20 × 70 sazhens. The outskirts of the southwestern part of the village were occupied by the church with an area within the fence measuring 10 × 20 sazhens. A stone church with stone bell tower was built in 1886–1894 at the expense of the parishioners and the merchant A.M. Sibiryakov. There were three altars in the church: in the name of Apostles Peter and Paul, St. Nicholas the Wonderworker, and St. Basil the Great (Spravochnaya kniga…, 1913: 36). The altars were oriented to the east. This irregularly shaped area free of development measured 40 × 50 sazhens (40 oriented toward the north-south and 50 toward the east-west) and was located on the high bank of the stream. The church was built on the place of the ancient pagan shrine (Ieromonakh Irinarkh, 1906: 17). The old Orthodox cemetery, which was closed according to the plan for settlement arrangement from October 27, 1830, was located near the church. The house

of the clerk Karpov with barns, non-Russian log house for collecting tribute, as well as non-Russian log cabins for wintering, were on the other side of the stream.

The site plan for the village of Romanovskoye with the Romanovskie yurts, that is, the places where the Tatars of the Demyanskaya Volost of the Tobolsk Governorate lived, was compiled by the Junior District Land Surveyor Mokrinsky of Tara in 1878 on the order of the Tobolsk Treasury Chamber from September 3–5, 1877, and approved on June 23, 1879 (Fig. 2). The village consisted of one curved street of a single row of buildings, and was located along the left bank of the Chanbyshevaya River, which flowed almost parallel to the Irtysh River and fell into it along the SW-NE line. An area of 33 households was drawn on the site plan. The housing area was limited by the rivers to the southeast and by the Bezymyannoye swamp to the northwest, and had a wooden one-story church built in 1831 in the center. The church had two altars: in the name of the Apostles Peter and Paul, and Archangel Michael. The altars were oriented to the northeast. The reference book mentions a chapel (Spravochnaya kniga…, 1913: 22), but it was not marked on the plan; it might have been built after the site plan was completed. The priest's house and rural school with their land plots were located not far from the church, closer to the river bank; these structures were divided by a lane, which led to the river. In order to secure the access of the church's territory to the river, it was planned to demolish dilapidated non-residential buildings. Yurts were located to the northeast of the rest of the building area, on the border with the irregularly shaped church plot measuring 20 × 60 sazhens. A cemetery directly adjoined the yurts in the northeastern part of the settlement.

The Kobyatskie yurts in Begishevskaya Volost of Tobolsk Okrug, Tobolsk Governorate, was a settlement where the Tatars lived. Its site plan (Fig. 3) was made for native non-Russian minorities of the Vagaiskaya non-Russian Volost by the land surveyor Mokrinsky on October 3, 1877, upon an order of 1877, and was approved on November 2, 1877. The yurts with 34 land plots were located on the right bank of the Irtysh River. A residential system of the

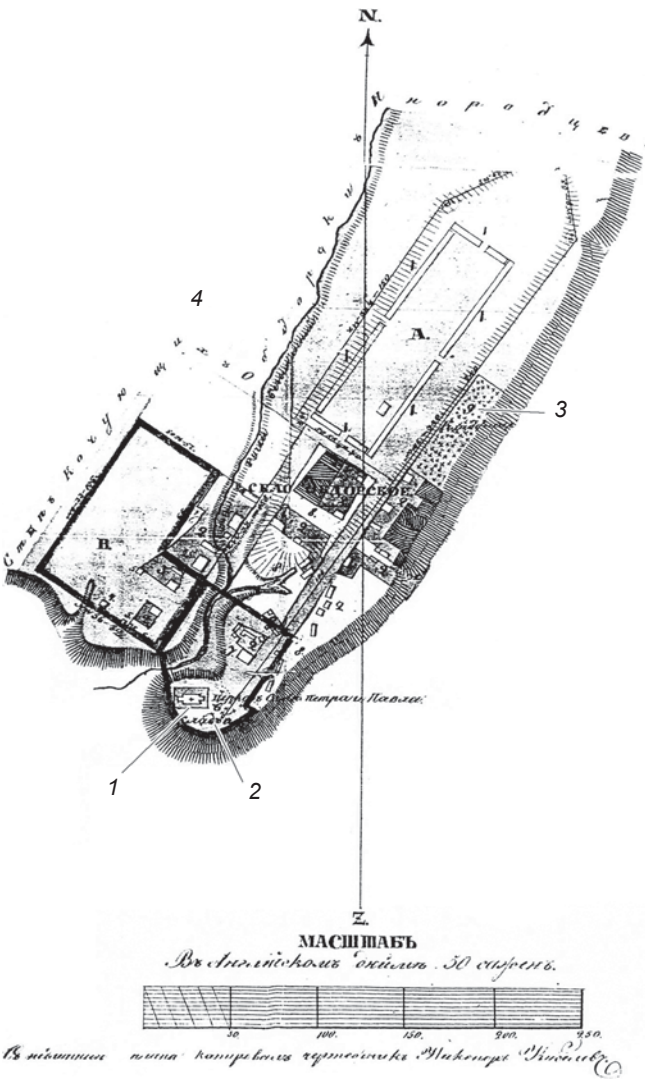

Fig. 1. Fragment of the site plan showing the village of Obdorskoye, 1846 (GBUTO "City archive in Tobolsk". F. 154, Inv. 21, D. 98, fol. 1).
1 – church of Apostles Peter and Paul; *2* – old Orthodox cemetery; *3* – new Orthodox cemetery; *4* – steppe of the nomadic Obdorskoye native non-Russian minorities.

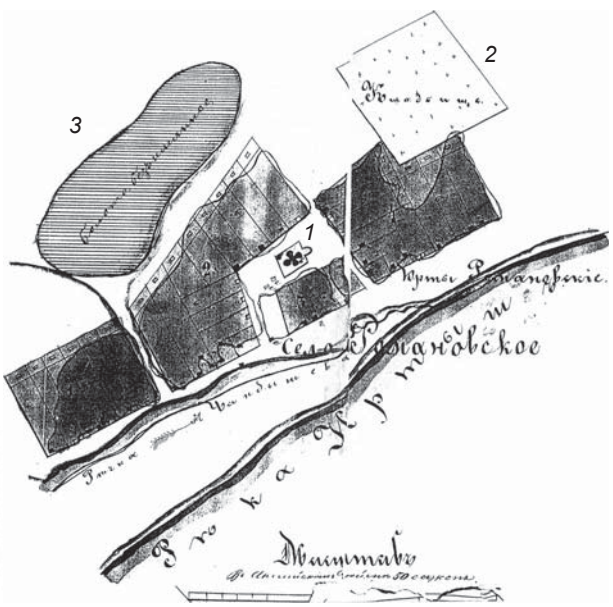

Fig. 2. Fragment of the site plan showing the village of Romanovskoye with the Romanovskie yurts, 1878 (GBUTO "City archive in Tobolsk". F. 154, Inv. 21, D. 963, fol. 1).
1 – church; *2* – cemetery; *3* – Bezymyannoye swamp.

"nested" type was converted into a street system with two-sided placement of land plots. One long main street going towards the northeast from the bank of the river was planned; it was crossed by two small streets: one in the center of residential quarters, and the second at the northern end of the yurts, which had access to the Kobyak River. One old street was located along the bank and was a part of the road from the city of Tobolsk to the village of Golyshevskoye. According to the site plan, all structures on both sides of the road were to be demolished in order to free the collapsing bank of the Irtysh River. A mosque with a fence on a plot measuring 10 × 15 sazhens was to be placed at the center of the new main street, a small distance from the intersection. Its entire land plot was equal in area to an ordinary household plot. It is difficult to establish exactly how the mosque was supposed to be built, but according to the tradition, it had to have been strictly oriented toward the Kaaba in Mecca.

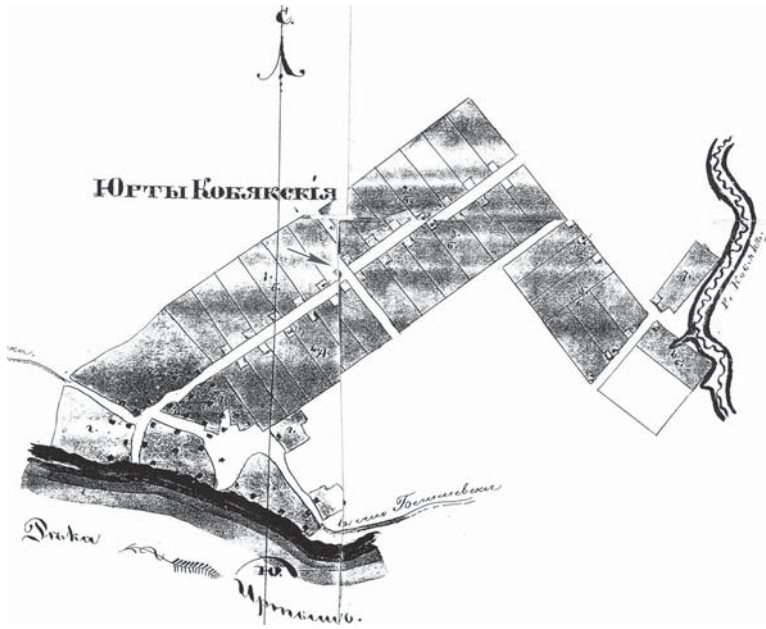

Fig. 3. Fragment of the site plan showing the Kobyatskie yurts, 1877 (GBUTO "City archive in Tobolsk". F. 154, Inv. 21, D. 3768, fol. 1). An arrow indicates the place where the mosque was built.

In the villages of Obdorskoye and Romanovskoye with yurts there were Orthodox churches, and in the Kobyatskie yurts a mosque, which reflected the religious and cultural situation in the region. In SNM, the Samoyedic people were called idol-worshippers. Christianization met their active resistance. The Samoyedic people even murdered the baptized Ostyaks (Spiski naselennykh mest…, 1871: CLXII). There were churches intended not only for spiritual guidance of the Russian population living there, but also for fostering the conversion of pagans to Orthodoxy in the settlements, near which the Samoyedic people roamed. The Tatars followed Sunni Islam, and their conversion to Orthodoxy was an exception (Ibid.: CLVI). They were subordinate to the Orenburg Spiritual Mohammedan Assembly; for their worship in the yurts a mosque was built.

Dedication of church altars

Dedication of altars in churches is important for our discussion. In the villages of Obdorskoye and Romanovskoye, the main altars were dedicated to the Apostles Peter and Paul (feast day July 12, or June 29 according to the Julian Calendar)—zealous propagators of Christianity among the Gentiles and Jews, as follows from the Lives of these saints. According to the Church doctrine, the Holy Spirit descended upon the Apostles on the day of Pentecost; they received the gift of testifying about the Lord before the nations in order to spread the message of divine miracles in various languages. The Acts of the Apostles mention that the Apostles Peter and Paul preached repentance and converted many Jews and Gentiles to Christianity (Acts 13: 46). It is thus sung in their Magnification hymn: "We magnify you, Apostles of Christ Peter and Paul, who have enlightened the whole world by your teachings and have brought all the ends to Christ". Already the early Christians venerated the Holy Apostles. Their veneration began after their martyrdom, and their burial place became a Christian holy place. In the Russian Orthodox Church, the feast day of these saints has acquired the status of one of the 18 great feasts, including Easter, the twelve Great Feasts, the Protection of the Holy Mother of God, Circumcision of the Lord, Nativity of John the Baptist, and Beheading of John the Baptist. Images of the Apostles Peter and Paul in the iconostases of the Orthodox churches have become a canonic part of the Deesis.

According to the Church tradition, people pray to the Holy Apostles Peter and Paul for their help in God-pleasing undertakings, bringing non-Christians to the Christian faith, and strengthening in faith those who have lost it. The Orthodox Church glorifies the Apostles who worked hard to spread Christianity, praises the firmness of Peter and reason of Paul, and regards them as an image of the conversion of sinners and those who are being corrected. The dualism of the images of Apostles Peter and Paul as a symbol of a difficult path to the faith was reflected in their lives: Apostle Peter was with Christ from the very beginning, denied him, but repented, while Apostle Paul was a staunch opponent of the Savior, but converted and became his firm follower (see (Protoierey

Aleksandr Men, (s.a.))). It is clear that in the complex ethnic and religious situation in Siberia in the 19th to early 20th centuries, the images of the Apostles played an important symbolic role, which was intended to invigorate the spirit of believers and bring the doctrines of Orthodoxy into a non-Russian environment.

The altar of the Obdorskoye church is dedicated to another symbolic image of Orthodoxy—St. Nicholas the Wonderworker (feast days December 19, or December 6 according to the Julian Calendar; May 22, or May 9 according to the Julian Calendar; and August 11, or July 29 according to the Julian Calendar), as well as weekly commemoration on every Thursday. Cultural, philological, and ethnographic studies (see, e.g., (Vinogradov, 1900; Mainicheva, 2005a, 2006; Ryndina, 2002, 2005; Sarbash, (s.a.); Sidorenko, 1993; Uspensky, 1982; Fursova, 2001; Shaizhin, 1909; and others)) have established the great importance of St. Nicholas in Russian culture as a patron saint of travelers and seafarers, as well as a defender, helper, and protector of people. In the iconography, the sword in the hands of St. Nicholas (a holy warrior who defended an Orthodox city from foreigners) was interpreted as the armament of a warrior and as "the sword of the Spirit, which is the Word of God" (Eph. 6:17), by which sins are destroyed (Fig. 4). The image of St. Nicholas was associated with protection from sin, as well as bodily and spiritual sorrows. In the "Menaion Reader", it is succinctly said that St. Nicholas "performed many great and glorious miracles on the earth and on the sea, helping those in harm, and saving them from drowning, and bringing them to dry land from the depths of the sea, delivering them from corruption and bringing them home, delivering people from bonds and dungeons, protecting them from death by the sword, and freeing them from death, and granting many cures to many people… He has enrichened many of those who suffer from the utmost poverty and misery, has given food to the hungry, and is a ready helper, warm protector, and fast defender and intercessor to everyone in every need, and he helps those who call on him and delivers them from troubles" (Tserkovno-narodniy mesyatseslov…, 1990: 64). Obviously, the dedication of one of the altars of the church on the northern edge of the Russian Orthodox world to St. Nicholas the Wonderworker was more than appropriate.

The third altar of the Obdorskoye church was dedicated to Basil the Great—another revered saint of Orthodoxy (feast day January 13, or January 1 according to the Julian Calendar; the general commemoration of the Three Holy Hierarchs—St. Basil the Great, St. Gregory of Nazianzus, and St. John Chrysostom is on February 12, or January 30 according to the Julian Calendar) (Fig. 5). It follows from the Life of the saint that he possessed profound knowledge, was famous due to his endeavors for the benefit of the Orthodox world and unity, and supported the Christians, strengthening their faith and calling for courage and patience. St. Basil spent all his personal wealth on the poor: he created almshouses, homes for travelers, and hospitals, as well as male and female monasteries. His contemporary Bishop Amphilochius thus praised his merits: "He… has been able to help not only his fellow countrymen, but also all countries and towns of the world and all people, and he has always been and will be a most saving teacher for all Christians"

Fig. 4. Hinged icon of St. Nicholas with a sword and model of a church. Metal. Vagaisky District, Tyumen Region, FMA, 2010.

Fig. 5. Icon of the Three Hierarchs: St. Gregory of Nazianzus, St. Basil the Great, and St. John Chrysostom. Metal. From the collection of the Tobolsk Historical and Architectural Museum-Reserve.

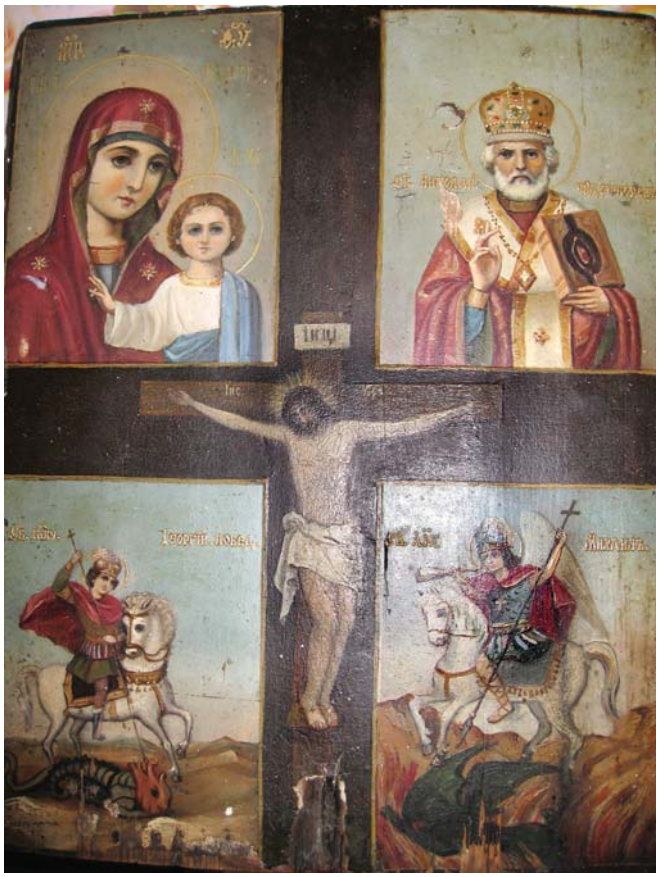

Fig. 6. Icon with St. Nicholas and Archangel Michael on the right side. Vagaisky District, Tyumen Region, FMA, 2015.

(Svyatitel Vasiliy Velikiy, (s.a.)). In his "Homily on the Commemoration Day of His Brother, Basil the Great", St. Gregory of Nyssa wrote: "…he again ignited… the teaching of faith… by the power of grace which dwelt in him. He appeared to the Church as a beacon for those wandering at night on the sea, he directed everyone to the true path…", likening St. Basil the Great to other champions of Christianity, such as Apostle Paul, Elijah, and John the Baptist (Svyatitel Grigoriy Nisskiy, (s.a.)).

The second altar in the church of Apostles Peter and Paul in the village of Romanovskoye was dedicated to Archangel Michael (feast days September 19, or September 6 according to the Julian Calendar; and November 21, or November 8 according to the Julian Calendar). According to the Scriptures, Archangel Michael is one of the highest angels, leading an army of heavenly incorporeal powers inhabiting the spiritual world, through whom God can communicate his will to people. In the Scriptures, Archangel Michael acts as a fighter against the devil and against lawlessness among people. In the Book of Revelation, the Archangel Michael appears as the main leader in the war against the dragon-devil and other rebellious angels: "…And there was war in heaven: Michael and his angels fought against the dragon; and the dragon fought and his angels, and prevailed not; neither was their place found any more in heaven. And the great dragon was cast out, that old serpent, called the Devil, and Satan." (Rev. 12, 7–9). Apostle Jude mentions Archangel Michael as the adversary of the devil (Jude, 9, cf. Joshua 5, 13–14; Dan. 10; 12, 1). Archangel Michael is credited with the defeat of the Assyrian army, besieging Jerusalem in the times of the Prophet Isaiah (2 Kings 19, 35). The Church reveres Archangel Michael as a defender of faith and fighter against heresies and any evil. In one of the popular iconographies, he is depicted with a fiery sword in his hand or a spear that overthrows the devil (Fig. 6).

Taking into account the above church symbols, which according to Orthodox doctrine possessed a special power and effectiveness, the name of the altars of churches in honor of Archangel Michael, the Apostles Peter and Paul, St. Basil the Great, whose images were associated with the idea of physical and spiritual protection of people, as well as the spread and affirmation of Christianity, and

were believed to have belonged to the highest ranks of the "heavenly hierarchy" cannot be considered random. For instance, St. Theophan the Recluse wrote: "…Our Lady the Mother of God is… above everyone… She is followed by incorporeal ranks, nine, in their order; then follow the saints of God: the Prophets and the greatest Prophet John the Forerunner; Apostles with the preeminent Apostles Peter and Paul; Holy Bishops including those considered to be Great: Basil the Great, Gregory of Nazianzus, and John Chrysostom, St. Nicholas, as well as the Russian Holy Bishops Peter, Alexis, Jonah, and Philip; Martyrs, Confessors, Holy Monks, Holy Unmercenaries, and Fools for Christ" (Svyatitel Feofan Zatvornik, (s.a.)). Reference materials indicate the distribution of altar dedications for the churches under consideration in the Tobolsk Governorate by the early 20th century, mentioning 625 altars with 97 names, with the largest number of altars in honor of St. Nicholas the Wonderworker (79). There were fewer altars of other dedications, including Archangel Michael (31), the Apostles Peter and Paul (25), and St. Basil the Great (4) (for more details see (Mainicheva, 2005b: 122; Kurilov, Lyutsidarskaya, Mainicheva, 2005: 75–90)). The dedications of the four altars in the churches in the two settlements with mixed population analyzed above were among the top ten in terms of prevalence in the Governorate.

Conclusions

Villages with mixed population in the Tobolsk Governorate had Orthodox churches and chapels, and villages with Tatar population had mosques. The stone church in the village of Obdorskoye and wooden church in the village of Romanovskoye with the Romanovskie yurts were located in an elevated place or in the center of residential development, and had free access to natural landscapes, following the traditions of Russian church-building. Information on specific reasons for dedicating altars in churches, for example, in memory of some historical event or specific person, which was often the case, has not been found; however, the common symbolic importance of altar dedication for the spiritual appropriation of the territory by the population with Orthodox identity is obvious. Revered cults, which were important for protection in a material and spiritual sense, affirmation of the values, canons, and doctrines of Orthodoxy, and strengthening the spirit, were chosen taking into consideration the ethnic, religious, and cultural situation. Dedication of altars to Archangel Michael, the Apostles Peter and Paul, St. Basil the Great, and St. Nicholas was intended to play an important role in the spiritual life of the population. According to the site plan, the mosque in the Kobyatskie yurts was supposed to be located along the street as a part of the row of buildings, standing out among the residential housing with its architecture, which corresponded to the Islamic tradition. The plans for the building of a Muslim architectural structure for prayer, which was of symbolic importance, testifies to the recognition of religious sentiments and needs of the followers of Islam in the society, and symbolically manifests the religious identity on the part of the inhabitants of the yurts. In the late 19th to early 20th century, the topography of symbolically important ritual buildings in the settlements of the Tobolsk Governorate with a population of different ethnic composition and religious beliefs, was associated with the existing strategy of religious guidance, religious symbolism, and ethno-religious identity of the dwellers.

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Mesolithic Human Teeth from Zamostye-2, Moscow Region

We describe the morphology of deciduous and permanent human teeth from Zamostye-2—a Mesolithic site in the Moscow Region, Russia. Pathological changes indicate a variable diet, including both animal and vegetable food. Non-metric analysis reveals several Upper Paleolithic retentions, but the overall combination is insufficient for tracing population affinities. Metrically, permanent teeth from Zamostye are similar to those from the Mesolithic burial ground on Yuzhny Oleny (Southern Reindeer) Island, Karelia, while differing from the teeth of Mesolithic Western and Southern Europeans. Our findings agree with those of recent genetic studies that revealed close affinities between the Mesolithic populations of European Russia, contrasting them with the Mesolithic groups of Western and Northern Europe.

Keywords: *Mesolithic, Zamostye-2, Yuzhny Oleny Island, dental anthropology, dental metric traits, paleodiet, paleogenetics.*

Introduction

The Zamostye-2 site is located in the north of the Sergievo-Posadsky District of the Moscow Region, on the left bank and in the bed of the Dubna River. The site was first discovered in 1987; and since 1989, full-scale excavations have been carried out there by V.M. Lozovsky and O.V. Lozovskaya. With some short breaks, the excavations lasted until 2001, when they were temporarily stopped in order to study the excavated material, and were then resumed in 2009–2013 (Lozovsky, Lozovskaya, 2013: 6–8).

The cultural layers of the site lie in lake-bog deposits at a depth of 2–4 m from the ground's surface, and can be described as a consequence of organogenic sapropelic deposits saturated by peat and macroremains. Several cultural layers belonging to the Late Mesolithic, Early and Middle Neolithic were detected at the site. The lower Late Mesolithic layer is dated to between 7000 and 6600 BC, the upper layer ca 6400–6000 BC, and the final Mesolithic layer ca 6000–5800 BC. The Early Neolithic horizon consists of the remains of a dwelling area, dated to 5800–5200 BC on the basis of the site's materials, and belonging to the Upper Volga culture. The Middle Neolithic layer belongs to the Lyalovo culture and is dated to 4900–4300 BC (Lozovsky et al., 2013: 18).

A small sample of human bone remains was collected at the site. The sample can be divided into two categories: deciduous teeth that were lost in a natural way and persisted in the layer of the dwelling area; and isolated reburied fragments of skulls and postcranial bones from adult. As no intentional burials were found at the site, it can be suggested that somewhere nearby there was a burial ground blurred by the river, and the bone fragments were brought by water during seasonal flooding of the camp.

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While the Mesolithic remains do not constitute a representative sample, they are of great interest, since no Mesolithic skeletal remains have previously been found in this area. The main purposes of this study are a comprehensive morphological description of the sample, a preliminary reconstruction of their possible population affinities, and a reconstruction of the general diet of the Mesolithic population that inhabited the Zamostye-2 site.

Material and methods

The Mesolithic dental sample from Zamostye-2 includes a fragment of the mandible of an adult individual, a fragment of a maxilla of an adult individual (both with teeth preserved), a fragment of a subadult mandible with teeth *in situ*, and four isolated deciduous teeth. The number of individuals to whom the remains might have belonged is from 4 to 7. The bone specimens probably belonged to three individuals: a young female, an adult individual of unidentified sex, and a subadult 1.5–2 years old. The isolated deciduous teeth were lost naturally and at different ages; thus they could have belonged to one or several children.

All the teeth were studied using several protocols for describing crown non-metric traits (Zubov, 2006; Zubov, Khaldeeva, 1993; Edgar, 2017). Main diameters of the crowns and roots of the teeth were measured as well. The second deciduous molar of the subadult's mandible was microCT scanned using Skyscan-1172. The scanning protocol was set as follows: tube voltage 100 kV, current strength 100 μA (no filter), rotation step 0.25°, averaging over three frames, at the resolution of 3.45 μm/pixel. Reconstruction of the raw images was carried out in the NRecon software (Bruker-microCT); a 3D model of the tooth and separation of the dentine from enamel were done using the CTAn software (Bruker-microCT). For visualization of the digital model we used the CTVox software (Bruker-microCT). Morphology of the dentine-enamel junction was described using the 3D model, maximum thickness of the lateral enamel level of the metaconid was measured, as well as the volume of lateral dentine and the pulp chamber (LDPV). Enamel thickness was measured perpendicularly to the vertical axis of the lingual surface of the metaconid. For this, a buccolingual section was done along the line connecting apexes of the protoconid and the metaconid. The LDPV was measured following a standard protocol (Benazzi et al., 2011, Toussaint et al., 2010) in CTAn.

Mesiodistal and buccolingual diameters of the upper first and lower second molars of the adult individuals were further compared to measurements of Mesolithic and Upper Paleolithic dental specimens (from an open-source repository) from Germany, France, Sweden, Denmark, Italy, Portugal, and Serbia (Voisin et al., 2012). The specimens were also compared to the sample from the Mesolithic burial ground of the Onega culture at Yuzhny Oleny Island, and to some Upper Paleolithic finds from European Russia (unpublished data of A.V. Zubova). As it was not possible to identify sex from a mandible, comparative analyses were carried out on sex-combined samples.

Besides the morphological study, a paleopathological description of the teeth was performed, in order to reconstruct the diet of the population under study. This included scoring caries lesions, enamel hypoplasia (LEH), periodontal disease, ante-mortem tooth loss, dental calculus, and ante-mortem enamel chipping.

The frequency of carious lesions is traditionally considered the main indicator of diet composition. The lesions emerge as a result of enamel demineralization triggered by bacterial fermentation of carbohydrates from food, which is accelerated by consumption of soft and viscous food items (Lillie, 1996; Keenleyside, 2008; Larsen, Shavit, Griffin, 1991). Another important marker, dental calculus, is a result of mineralization of the bacterial plaques attached to enamel's surface. There is no strict correlation found between diet composition and the development of dental calculus, but a number of studies have shown that a higher prevalence of calculus in combination with a low frequencies of caries is observed in populations consuming more protein and less carbohydrates. However, in agriculturalists, a high prevalence of both pathologies is found.

The markers of disturbance of periodontal tissue supply were employed as a secondary marker, which can be related to the severity of dental calculus or a vitamin deficiency (Nazir, 2017; Strohm, Alt, 1998; Putten et al., 2009). Enamel hypoplasia was used as yet another secondary variable, which is viewed in the majority of bioarchaeological studies as a marker of biological stresses in childhood, or a lack of food recourses (Mednikova, 2017: 80).

Morphological description of the finds

In the sample from Zamostye-2, specimens No. 8, 9, 14, 17, 18, 20, and 21* can be assigned to Mesolithic times.

Specimen No. 8 (layer 7, square B3; date according to the layer 6500–6000 BC, date of the bone 7663 ± 44 BP (KIA-51435)). This is the left half of the mandible of a young female (18–20 years). Alveoli of the first and second premolars, and third molar are preserved; the first and second molars were *in situ* (Fig. 1). The crown of the first molar is destroyed. The second tooth is four-

*Hereinafter, numbers of specimens and archaeological information are provided according to the list submitted by O.V. Lozovskaya to the Museum of Anthropology and Ethnography (MAE) of the Russian Academy of Sciences (RAS).

cusped, crown pattern is "Y", cervical enamel extension is grade 6, protostylid is grade 1. Tami, t6, distal and middle trigonid crests, deflecting wrinkle of the metaconid, posterior fovea, and central cusp are all absent. The odontoglyphic pattern displays intertubercular fissures I–VI and grooves 1 and 2med, 1 and 2prd, 1 and 2end. The hypoconid is heavily abraded, and its odontoglyphic pattern is not visible. An anterior fovea is observed, odontoglyphic variant is 2med(II).

The roots of the surviving teeth protrude from the alveoli for 3.5–4.0 mm on average, which is in general not typical for such a young age. But no traces of inflammation were observed on the fragments of the alveolar margin, excluding a small porotic area in the interdental space. Deposits of dental calculus were detected on the preserved part of the crown of the first molar. This preserved part is adjacent to the mesial plane of the second molar. Calculus is observed in all planes of the lower third of the crown. There is also a carious lesion in fissure III of this tooth.

Specimen No. 9 (ditch; date according to the layer 7000–6000 BC). This is a fragment of the right half of the maxilla of an individual 20–30 years old. The alveolus of the first incisor is preserved; the second incisor, canine tooth, premolars, and first molar are *in situ* (Fig. 2). The lateral incisor displays an absence of both lingual and labial shoveling, a weak development of the lingual cusp, and the presence of finger-like projections. The canine exhibits very weakly pronounced marginal ridges on the lingual surface (shoveling, grade 0–1), as well as tuberculum dentale and distal accessory ridge. The labial cusp of the first molar is only slightly larger than the lingual one, while the two cusps of the second molar are of equal size. The hypocone of the first molar is not reduced, while its metacone shows an initial stage of reduction. The crista oblique is interrupted. A weakly pronounced Carabelli cusp (grade 2), distal and mesial accessory cusps are present. The odontoglyphic pattern of the crown is not traceable, owing to dental wear; the anterior and posterior fovea and cingular derivatives are absent. Cervical enamel extension is grade 5.

The roots of the present teeth protrude from the alveoli for 3–4 mm, on average. Some porosity of the alveolar margin is observed, which suggests a disturbed supply of the periodontal tissues. Enamel hypoplasia is present on the labial surface of the canine and incisor. This is also observed in the lower third of the crown of first molar, where it surrounds the whole crown. Dental calculus is present on labial surface of all the teeth and in the interdental space. A caries lesion was detected near the central fovea of the first molar. Ante-mortem vertically oriented enamel defects (chipping) are present on the incisor, the canine, and the first premolar.

Specimen No. 14 (layer 1, square B1). This is the mandible of a subadult of 1.5–2 years of age (Fig. 3).

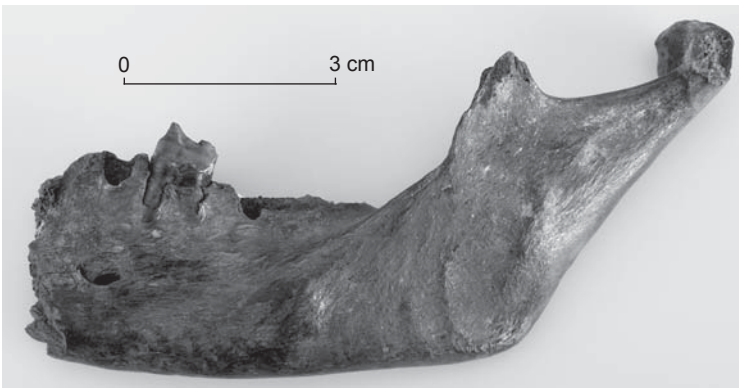

Fig. 1. Mandible, specimen No. 8.

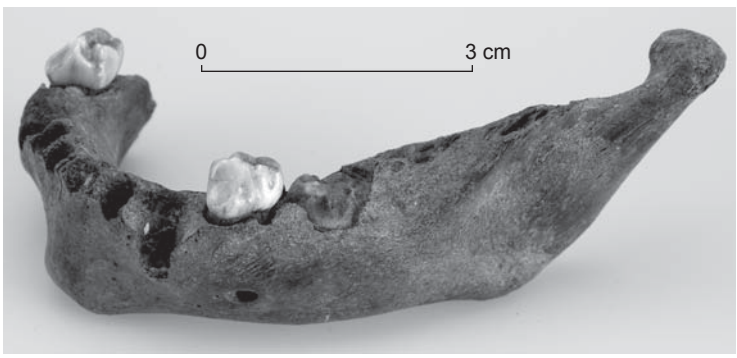

Fig. 2. Maxilla, specimen No. 9.

Fig. 3. Subadult mandible, specimen No. 14.

Erupting deciduous teeth (both first molars and the left second molar) were found *in situ*. The crowns of the first molars are five-cusped, with a "Y" pattern. The epicristid connecting the cusps of the trigonid is interrupted by intertubercular fissure II. The odontoglyphic pattern includes deep intertubercular fissures I–V and the grooves delimiting axial ridges of all cusps except hypoconulid. Fissures I and V reach the labial surface.

The second left molar is five-cusped, but the odontoglyphic differentiation of its occlusal surface is significant. The crown exhibits an X5 type of contact. The odontoglyphic pattern includes intertubercular fissures I–V and grooves 1 and 2 of all the five cusps. Duplicate grooves 2'med and 2'prd are observed in the metaconid and protoconid, while 3end is present on the entoconid. The distal trigonid crest, epicristid, deflecting wrinkle of the metaconid, protostylid, cebtarl cusp, and posterior fovea are absent. A very weakly developed fovea of the protostylid, an anterior fovea, a 2med (fc) variant, and type 2 of superposition of contact points of the first grooves of the metaconid and protoconid with fissure II are present.

The morphology of the enamel dentine junction completely corresponds to the appearance of external enamel of the crown. The maximum thickness of lateral enamel of the metaconid is 1.037 mm, while the volume of lateral dentine and pulp chamber is 151 mm^3.

Specimen No. 17 (layer 7, square A12; date according to the layer 6500–6000 BC). This is the crown of an upper right second deciduous molar of a subadult 8–10 years old. The strong enamel abrasion suggests that an age of 10 years is most plausible. The preserved fragment has three roots: two labial and one lingual. The hypocone of the tooth is markedly reduced, and the metacone does not display any sign of reduction. The odontoglyphic pattern is abraded. Dental calculus is observed on the interproximal surfaces, the hypocone displays ante-mortem enamel chipping.

Specimen No. 18 (layer 7, square B12; date according to the layer 6500–6000 BC). This is the crown of an upper right lateral deciduous incisor of a subadult individual of 6–7 years of age. The preserved part of the tooth is an adjacent fragment of the cervical portion of the root system, about 2.5 mm in length. The tooth is moderately worn; some dental calculus is observed on the interdental surfaces and on the labial side. Lingual or labial shoveling, lingual inclination of the crown, and accessory ridges are all absent.

Specimen No. 20 (layer 7, square A11; date according to the layer 6500–6000 BC). This is the upper left first deciduous incisor of a subadult ca 5–6 years of age. A marked lingual cusp is present, while finger-like projections, as well as lingual or labial shoveling, are absent. Several very small enamel defects are observed on the cutting edge of the tooth. Focal hypoplasia in the form of a vertical strip of malformed enamel is present (3.1 mm long and 1.6 mm wide).

Specimen No. 21 (layer 7, square A11; date according to the layer 6500–6000 BC). This is the lower right second deciduous incisor of a subadult ca 5–6 years of age. Dental calculus is found on the mesial and distal interproximal surfaces. Several small enamel chippings are observed on the labial surface of the cutting edge.

Discussion and conclusions

Reconstruction of diet. Both individuals represented by permanent teeth display carious lesions in the fissures. A high prevalence of this pathology is typically considered a marker of an agricultural subsistence strategy. It is believed that caries is very rare or absent in populations of hunters and gatherers (Murphy et al., 2013: 2554; Turner, 1979: 623, tabl. 2). This view is largely supported by world-wide data, but there are a number of exceptions. For instance, increased prevalence of caries was described for the Early Bronze Age hunter-gatherers of Western Siberia. According to isotopic data, these people consistently consumed local wild plants with the C3 type of photosynthesis (Marchenko et al., 2015: Tabl. 4; Marchenko et al., 2016: 173; Zubova, Marchenko, Grishin, 2016: Tabl. 1). To date, there has been no archaeological evidence of any type of agricultural activities for the Mesolithic population of the Upper Volga lowlands. This suggests that the high prevalence of caries in the ancient population from Zamostye-2, like in Western Siberia, is related to a general diversity of diet, which included not only fish or meat, but also local plants. This is confirmed by the results of archaeobotanical studies showing the long-standing tradition of consumption of local fruit and berries by the inhabitants of the camp (Beriuete, 2018: 47), as well as by the results of the isotopic analysis (Meadows, Lozovskaya, Moiseev, 2018). The vertical enamel chippings found in the incisors, canines, and premolars might be due to gnawing of small bones or nuts (Lee et al., 2011: 971).

Population history of the group. The set of non-metric dental traits observed in the permanent dentition is generally not diagnostic. The only conclusion that can be drawn is the absence of "Eastern" markers in the upper lateral incisor and lower second molar. The finger-like projections detected in the upper incisor and canine, and the distal accessory ridge observed in the canine, suggest somehow "archaic" (on the modern human scale) morphology of the teeth.

The lower second deciduous molar is the key tooth for both deciduous and permanent molar row (Farmer, Townsend, 1993; Bockmann, Hughes, Townsend, 2010). In our case (specimen No. 14), it shows a combination of taxonomically neutral (five cusps, absence of the

"Eastern" markers) and "archaic" (complexity of the odontoglyphic pattern, presence of the anterior fovea) features. On the other hand, according to the micro-CT results, the proportions of the internal tissues of the crown are fairly progressive, and match up completely to the features of modern European populations (Benazzi et al., 2011: Tabl. 3). The tooth displays the maximum possible value of the ratio between the largest thickness of lateral enamel of the metaconid and the volume of lateral dentine and the pulp chamber. This ratio tends to increase in the course of human evolution, as enamel thickness increases while dentine volume decreases in more progressive taxa as compared to more archaic ones (Ibid.: 325). These features sharply distinguish this molar from the Upper Paleolithic specimens studied previously. The tooth displays, rather, similarity to the Mesolithic specimen from the Onega culture burial ground of Yuzhny Oleny Island (Table 1).

Table 1. **Proportions of inner tissues of the crowns of the deciduous second molars of the mandible from Zamostye-2 and reference samples**

Site	LDPV	MaxETH/ LDPV
Kostenki-14 (Paleolithic)	192	0.47
Yudinovo (Paleolithic)	171.05	0.60
Yuzhny Oleny Island (Mesolithic)	147.5	0.63
Zamostye-2 (Mesolithic)	151	0.68

Note. LDPV – lateral dentine plus pulp volume; MaxETH – maximum thickness of metaconid enamel.

The metric variables of the permanent teeth (Table 2) appeared to be more informative in terms of exploring the population history of the studied Zamostye group. The bivariant plots for mesiodistal and buccolingual diameters of the first upper molar and second lower molar clearly demonstrate that the closest analogs to the teeth from Zamostye-2 are found in the sample from the Yuzhny Oleny Island burial ground. This latter sample shows much smaller sizes of molars than the majority of other European finds (Fig. 4, 5).

The summary difference between the Yuzhny Oleny Island sample and the Mesolithic and Paleolithic European population is statistically significant for three out of four tooth dimensions used in our intergroup analysis (Table 3). This observation is in perfect agreement with genetic studies suggesting different origins of Eastern vs. Western European hunter-gatherers, where the former include the group from Yuzhny Oleny Island and the Mesolithic and Neolithic population from Samara region of the Volga (Mathieson et al., 2015).

In order to obtain an integral picture of the differences between the Mesolithic and Upper Paleolithic European samples, a canonical discriminate analysis employing mesiodistal and buccolingual diameters of the upper first and the lower second molars was carried out. Since both permanent molars from Zamostye-2 show a similar range of analogs, their characteristics were summarized. As is seen in Fig. 6, three clusters are clearly differentiated in the space of first two canonical vectors (CV). The first

Table 2. **Dimensions of the dental specimens from the Mesolithic layers of the Zamostye-2 site**

Number of the specimen	Tooth	Mesiodistal diameter	Buccolingual diameter	Height of the crown (min)	Length of the root system (min)
			Maxilla		
9	I^2	7	6.7	9.3	…
	C	7.9	8.9	…	21
	P^1	6.6	8.7	7.9	…
	P^2	6.6	9.3	7.5	…
	M^1	11	11.3	7.2	18.8
17	m^2	…	9.6	…	…
18	i^2	5.4	4.7	6	…
			Mandible		
8	M_2	11.2	10	6.7	…
14	m_1 right	9.2	8	7.2	…
	m_1 left	9.4	8.1	7.2	…
	m_2 right	10.2	8.6	…	...
21	i_2 right	5.4	5.04	…	…

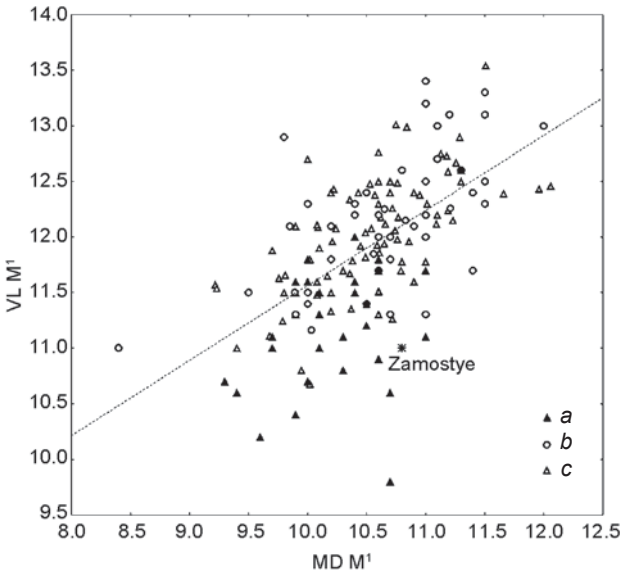

Fig. 4. Results of the comparison of metrics of the upper first molar from Zamostye-2 with European Upper Paleolithic and Mesolithic dental samples.
a – sample from Yuzhny Oleny Island; *b* – Upper Paleolithic specimens; *c* – Mesolithic specimens.

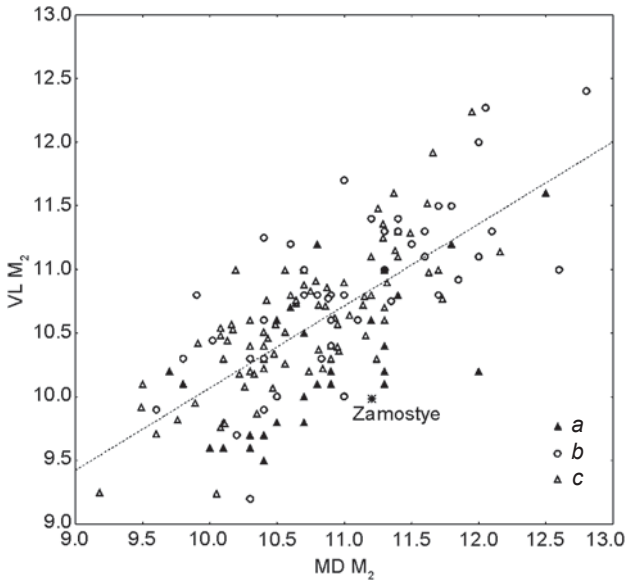

Fig. 5. Results of the comparison of metrics of the lower second molar from Zamostye-2 with European Upper Paleolithic and Mesolithic dental samples.
Legend same as on Fig. 4.

Table 3. **Values of the t-test for comparison of dimensions of the upper first and lower second molars from Yuzhny Oleny Island (YOI) and the Paleolithic (PE) and Mesolithic (ME) European population**

Parameter	t-test results	
	YOI and ME	YOI and PE
MD M^1	2.48*	3.12*
VL M^1	7.15*	6.95*
MD M_2	–1.18	1.42
VL M_2	2.81*	4.39*

Note. YOI – Yuzhny Oleny Island sample (N = 29); ME – Mesolithic population of Northern, Western, and Southern Europe (N = 84); PE – Paleolithic population of Western and Southern Europe (N = 47).
*$p < 0.05$.

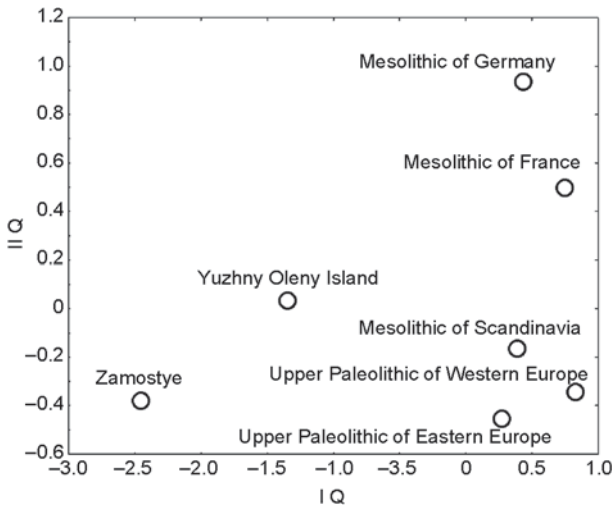

Fig. 6. Plot of the first two canonical vectors of the analysis of the Paleolithic and Mesolithic dental samples.

cluster includes the teeth from Zamostye-2 and Yuzhny Oleny Island. These specimens display negative values of CV I, which clearly differentiate them from other samples that all occupy the other pole of the vector axis. CV II separates these latter into two subgroups. The first includes both Upper Paleolithic samples and a combined Mesolithic sample from Denmark and Sweden, the second Mesolithic samples from France and Germany. Thus, the results of the multivariate analysis confirm the observation regarding a possible affinity between the populations from Zamostye-2 and Yuzhny Oleny Island made when considering the single dimensions of the teeth.

In our opinion, the similarity between the specimens from these two sites is of interest from the point of view of detailing the picture of affinities of the population of forest zone of Eastern Europe, drawn by the results of paleogenetic studies. As mentioned above, a considerable genetic similarity is observed between ancient populations of such remote areas as Karelia and the Samara region of the Volga. Our results based on the study of dental

remains from Zamostye-2 make it possible to hypothesize tentatively that this group might also be related to the Eastern hunter-gatherers.

Conclusions

While the Mesolithic dental remains from Zamostye-2 cannot be treated as a proper population sample, their study revealed results important for reconstruction of the subsistence strategy and affinities of the population of the forest zone of Eastern Europe. The pathological changes of the dentition observed in the studied specimens suggest that these people had a diverse diet that included both animal and vegetable food. Non-metric variables of the deciduous and permanent teeth from Zamostye-2 display a number of "archaic" features, but their pattern in general is insufficient to trace population affinities. The results of the analysis of the metric characteristics of the permanent molars from Zamostye-2 suggest that the inhabitants of the site might have had common origins with the Onega culture population from Yuzhny Oleny Island. More generally, the studied dental sample shows similarities to a wide range of Eastern European populations collectively referred to in paleogenetics as Eastern hunter-gatherers.

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The Physical Anthropology of the Odino People, Western Siberia

The physical features of individuals buried at Odino cemeteries Tartas-1 and Preobrazhenka-6 are compared to those of people belonging to other Neolithic and Early Bronze Age cultures of the Barabinskaya forest-steppe. This study tests the hypothesis about the morphological diversity of the autochthonous substrate, which correlates with various chronological stages and cultures of the region. Measurements of the Odino group were supplemented by published data on the Sopka-2/4A population. We examine individual measurements and average characteristics, processed by principal component analysis. Local populations belonging to the Odino culture were craniometrically diverse. The hypothesis about the ties between Odino and the contemporaneous population of Central Asia is not supported. The analysis of individual data revealed several crania sharply differing from others, and similar to those of the Botai sample of the late fourth and third millennia BC.

Keywords: *Early Bronze Age, Barabinskaya forest-steppe, Odino culture, funerary-ritual complex, craniology.*

Introduction

The Odino archaeological culture was first distinguished by V.I. Molodin on the basis of materials from several cemeteries in the Barabinskaya forest-steppe: Sopka-2/4A, Preobrazhenka-6, and Tartas-1 (2008; 2012: 7–9). Before the separation of this culture, some sites of the forest-steppe zone of the Eastern Trans-Urals and Western Siberia were referred to as the "Odino type of settlement complex" (Molodin, 1985: 33). But the absence of identified cemeteries, and very limited associated goods from the settlements, hampered full-scale reconstruction of characteristics of the culture (Molodin, 2010). The area occupied by this culture ranges from the left-bank Tobol region in the west to the Central Barabinskaya in the east, from the boundary between forest-steppe and steppe in the south to taiga zone in the north (Molodin, 2012: 183).

The cemeteries of the Odino culture from the Barabinskaya forest-steppe occur inside necropolises consisting of burial complexes of varying chronology and different cultures. In Sopka-2, a small group of Odino burials (Sopka-2/4A) displays a spatial continuity with neighboring burials of the Krotovo culture (Sopka-2/4B). At the adjacent Tartas-1 necropolis, a stratigraphic palimpsest of burials of various archaeological cultures of the Bronze Age was discovered, where the Odino burials are placed stratigraphically between graves of the Ust-Tartas and Krotovo cultures. For the Odino complex of Sopka-2/4A, there is a radiocarbon date placing it in the first half of the 3rd millennium BC (29th to 27th centuries BC) (Ibid.: 190–193). The Odino burials from Tartas-1 are dated by the ^{14}C method to the middle and second half of the same millennium, i.e. to the time of the Krotovo culture. Thus, both stratigraphic observations and absolute dates point to the temporary coexistence of

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the Odino and Krotovo cultures (Ibid.: 194). Moreover, the parallel evolution of the two cultures is also reflected in their burial rites (Molodin, Grishin, 2016: 342) and pottery-making traditions (Ibid.: 374).

Human skeletal remains from the Odino culture have been studied previously. A study of a large cranial sample from Sopka-2/4A has demonstrated a similarity to the samples of preceding archaeological stages from Sopka-2, i.e. the Neolithic and Early Iron Age materials. An important feature of the cranial morphology of the sample from Sopka-2/4A is a concentration of traits highly specific for the Neolithic skulls from the same region, which suggests "conservation" of this indigenous Neolithic substrate in the Odino population. The presence of those "morphologically Neolithic" skulls was interpreted as a result of incorporation of individuals related to the Ust-Tartas culture into Odino populations (Chikisheva, 2012: 97). Such an interpretation was based mainly on the concept of the culturogenesis of the population of the Barabinskaya forest-steppe, which assumes a single autochthonous line of evolution from the Neolithic to the Ust-Tartas culture, then to the Odino and Krotovo cultures (not excluding some effect from contemporaneous cultures of the neighboring regions of Eurasia). But the features of the burial rites of the two last-named cultures, as well as their mitochondrial DNA affinities, do not match up to the described scheme.

A supine position of the deceased, with the head to the north-northeast, dominates in both Odino and Krotovo burials (Sopka-2/4A and Sopka-2/4B, respectively) and goes back to the indigenous burial traditions of the Ust-Tartas culture (Molodin, 2012: 176; Molodin, Grishin, 2016: 349). A specific feature of the Odino burials is shallowing of the pit in its northeastern part as compared to the southwestern part, intended to raise the head or the upper part of the body of the deceased. The same aim was pursued by making a ground pillow (Molodin, 2012: 175–176). This trait of the burial rite distinguishes the Odino culture "among cultures of the Early to Middle Bronze Age of Eurasia and general and Western Siberia in particular" (Ibid.: 180). A study of mtDNA has demonstrated the existence of a common genetic background for populations of the Ust-Tartas, Krotovo, and Odino cultures, with the most prominent continuity observed between the first two cultures (Molodin et al., 2013: 177–178).

Integrating the data from archaeological, anthropological, and paleogenetic studies of the ancient population of the Barabinskaya forest-steppe, Molodin arrived at the conclusion that carriers of the two pottery traditions formed by the Final Neolithic time (Linear-Pricked and Comb-Pit) acquired their specifics in terms of both material and spiritual culture, as well as anthropological and genetic features, during the Early Metal Ages. As a result, two groups of populations of different cultural (and, probably, ethnic) traditions (Ust-Tartas and Comb-Pit) had been formed in the region by the 4th millennium BC. Later, these two evolved into the autochthonous Krotovo and Odino cultures, respectively (Molodin, 2016). This conclusion of Molodin's is crucially important for studying anthropological materials belonging to the two cultures, since the autochthonous "substrate" common to both appears to be morphologically polymorphic.

The cranial type of the Neolithic and Early Bronze Age population of the Barabinskaya forest-steppe can be assigned to the Northern Eurasian anthropological formation (Polosmak, Chikisheva, Balueva, 1989: 78–81; Chikisheva, 2012: 68). But assuming such an affinity is not inconsistent with the presence of morphological differences between single populations belonging to different cultural and chronological units. So far, there has been no detailed analysis of the cranial morphology of the Barabinskaya cluster of this, undoubtedly very complex, racial structure. In a monograph from T.A. Chikisheva (2012), it has been demonstrated that the Neolithic to Early Bronze Age population of the Barabinskaya forest-steppe displays a substantial morphological distinctness when compared to all available contemporaneous cranial samples from Northern Eurasia. Since the publication of this monograph, the number of cranial samples representing the population of this cultural/chronological continuity has substantially increased, as a result of excavations in the Barabinskaya forest-steppe, led by Molodin. Importantly, new Neolithic specimens have been studied and described (Chikisheva, Pozdnyakov, Zubova, 2015; Chikisheva, Pozdnyakov, 2016).

In this study, craniometrical data obtained for two samples of the Odino culture are presented and explored. The position of the Odino samples against a background of craniometrical variation of groups representing the archaeological cultures of Barabinskaya forest-steppe of the 6th to 3rd millennia BC is analyzed.

Material and methods

Two cranial samples from the Odino culture were employed in this study. One of the samples represents the Tartas-1 complex located in the Vengerovsky District of the Novosibirsk Region. This site was first detected in 2003 at the floodplain of the right bank of the Tartas River, 2.5 km north of the Stary Tartas village (Molodin et al., 2003), and has been studied since then. The cemetery of the Odino culture was found at the site in 2008 (Molodin et al., 2008), and the skeletal sample was collected during the 2008–2012 field seasons. The second sample was obtained from the Preobrazhenka-6 cemetery in the Chanovsky District of the Novosibirsk

Region, at the margin of the floodplain of the right bank of the Om River, 5 km west of the Staraya Preobrazhenka village (Molodin et al., 2005). The skeletal sample of the Odino culture was collected in the 2005–2010 field seasons. The cranial part of the sample, excavated in 2005, has been studied and described previously (Pozdnyakov, Chikisheva, 2005).

A statistical analysis was carried via cranial measurements (Tables 1–3). Samples of the Neolithic to Early Bronze Age archaeological cultures of the Barabinskaya forest-steppe were used as reference data. These include the following sites: Neolithic (6th to 5th millennia BC) – Sopka-2/1, Protoka, Korchugan (Chikisheva, 2012: 200–208), Vengerovo-2A (Chikisheva, Pozdnyakov, Zubova, 2015); Ust-Tartas culture (4th to first half of the 3rd millennia BC) – Sopka-2/3, Sopka-2/3A (Chikisheva, 2012: 222–237); Odino culture (first half of the 3rd millennium BC) – Sopka-2/4A (Ibid.: 238–263); Krotovo culture (late 3rd to early 2nd millennia BC) – Sopka-2/4B (Ibid.: 268–291)*. For interpopulation comparisons, we employed principal component analysis, which was carried out in Statistica for Windows 10.

Results and discussion

The morphological pattern of the new cranial samples of the Odino culture can be best described through a comparative study, including the published data for the Sopka-2/4A complex. The level of sexual dimorphism of cranial metrics is not increased in any of the three samples, but the degree of cranial robusticity varies substantially between them: both males and females from Sopka-2/4A are the most robust, while the skulls from Preobrazhenka-6 are the least robust (Table 4). The mean of maximum cranial length is the largest in males of Sopka-2/4A, but it is also large in the other two samples. Maximum cranial breadth is medium or small; thus the ratio of these two dimensions varies between meso- and dolichocranial forms. The latter form is found in female skulls from Preobrazhenka-6 and the male sample from Tartas-1. Basion-bregma height is medium in all the Odino samples. The ratio of the occipital and parietal components of the sagittal arc (occipito-parietal index, OPI) is almost equal across the groups: it ranges from 93.2 to 93.9. The only exception is the female sample from Preobrazhenka-6, where it is 97.4. The frontal bone is narrow (in females from Preobrazhenka-6 it is much narrower than in the other samples) and moderately protruding; its squama is strongly inclined.

The dimensions of the facial skeleton are more variable across the Odino samples. The face of both males and females from Sopka-2/4A is wide and moderately tall, while in Tartas-1 and Preobrazhenka-6 it is of medium width and height. The female sample from Preobrazhenka-6 displays a notably narrow and low face; though, according to the conventional account (Alekseev, Debets, 1964: 118), facial dimensions in this group are rather medium, but close to small values. According to the combination of the horizontal profile angles, both males and females from Sopka-2/4A, males from Preobrazhenka-6, and females from Tartas-1 are homomesoprosopic, while males from Tartas-1 and females from Preobrazhenka-6 are heteroprosopic-mesopic and clinognathic. In all the samples, individuals with flattened (platyopic and platygnathic) heteroprosopic faces are present.

In the samples of the Odino culture, decreased values of the angles of the vertical facial profile are observed. The crania from Sopka-2/4A are mesognathic according to the values of general and alveolar facial angles, though prognathic skulls occur in the sample as well. These latter are predominant in the samples from Tartas-1 and Preobrazhenka-6; thus, the mean values of the angles are low in those two groups.

The orbits are absolutely large in all the samples, but relatively low (hameconchia) or medium (mesoconchia) and closer to low variants. The lowest orbit is observed in females from Preobrazhenka-6 and Tartas-1.

The nasal aperture is of medium width in all the samples and relatively mesorrhine. The protrusion of the nasal bridge (simotic and dacryal heights, simotic and dacryal indexes) is medium in all the Odino samples, with the highest values observed in males from Tartas-1. The nasal protrusion angle is low across all the samples, excluding females from Preobrazhenka-6 (where the angle was only measured on two skulls, but was high in both cases). A skull with a strongly protruding nose was also observed in a female from Sopka-2/4A and a male from Preobrazhenka-6. We described the general morphological pattern of the individuals showing strongly protruding noses. This includes a large maximum cranial length, a dolichocranial head-shape, a high OPI, an inclined forehead, a wide, mesoprosopic, and mesognathic face, and a high (protruding) nasal bridge. Females from Preobrazhenka-6 also display an alveolar prognathism.

Summing up, the samples of the Odino culture from three cemeteries (which we assume to belong to three local populations) exhibit a common complex of cranial features: for the cranial vault: large horizontal dimensions, dolicho- or mesocrania, medium height, equal length of the frontal and parietal parts of the sagittal arc, accompanied by a shortening of its occipital part; for the facial skeleton: medium height, mesoprosopia,

*In the monograph cited, the complexes of the Odino and Krotovo cultures are not labeled 4A and 4B, since these labels were introduced after its publication.

Table 1. **Individual data and means of cranial metrics of males of the sample form Tartas-1 (Odino culture)**

Variable*	152	253/2**	247/3	362	364	365	369/2	491	496	497	498	*X* (*n*)	*S*
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Age	30–35	30–35	45–50	50–55	30–35	20–25	30–35	45–50	35–40	45–50	35–40	–	–
1	183.0	178.0	…	…	193.0	189.0	187.0	178.0	178.0	…	180.0	183.3 (8)	5.8
8	144.0	132.0	…	…	141.0	133.0	138.0	134.0	139.0	140.0 ?	127.0	136.0 (8)	5.5
17	131.0	129.0	…	…	133.0	136.0	…	129.0	143.0	…	…	133.5 (6)	5.36
20	111.0	106.0	…	…	110.0	116.0	111.5	106.0	118.0	…	112.0	111.3 (8)	4.23
5	103.0	103.0	…	…	104.0	100.0	…	97.0 ?	107.0	…	…	103.4 (5)	2.51
9	90.5	85.8	99.8	…	95.7	94.3	97.0	96.0	92.5	…	93.0	93.8 (9)	4.06
10	115.0	110.0	123.0	…	117.0	116.0	117.0	112.0	120.0	…	106.0	115.1 (9)	5.16
11	129.0	118.0	…	131.0	127.0	127.0	127.0	120.0	125.0	…	118.0	124.7 (9)	4.82
12	117.0	108.0	…	116.0	107.0	113.0	105.0	109.0	106.0	…	111.0 ?	110.1 (8)	4.61
29	112.2	107.7	115.0	…	111.4	114.5	115.0	108.0 ?	107.5	…	109.5	111.6 (8)	3.13
30	97.2	108.5	…	…	116.0	117.5	115.3	109.5	103.5	…	112.0	109.9 (8)	6.9
31	104.0	90.5	…	93.0	102.0	102.3	93.0	91.2	101.0	…	…	97.1 (8)	5.68
26	128.0	124.0	133.0	…	128.0	132.0	132.0	125.0	121.0	…	121.0	127.1 (9)	4.65
27	107.0	121.0	135.0	…	128.0	129.0	129.0	120.0	127.0	…	128.0	124.9 (9)	8.05
28	128.0	106.0	108.0	115.0	124.0	123.0	115.0	110.0	115.0	…	…	116.0 (9)	7.58
Angle of transverse curvature of the forehead	141.0	141.4	126.7	…	134.6	134.0	134.4	134.8	136.4	…	131.4	135 (9)	4.5
Sub.NB	21.2	22.0	26.5	…	23.5	26.5	23.1	25.5	22.0	…	22.0	23.6 (9)	2.07
Occipital subtense	28.6	24.0	…	28.5	28.0	28.6	21.0	25.0	21.0	…	…	25.6 (8)	3.33
45	138.0	130.0	…	…	…	141.0	…	133.0	139.0	…	131.0	135.3 (6)	4.59
40	96.0	106.0	…	…	107.0	103.0	…	97.0	101.0	…	…	101.7 (6)	4.55
48	71.0	67.0	77.0 ?	…	74.5	78.0	75.0	62.0 ?	67.0	…	68.0	71.5 (7)	4.41
47	117.0	106.0	133.0 ?	…	119.0	126.0	123.0	…	118.0	…	…	118.2 (6)	6.85
43	107.0	105.0	…	…	110.0	115.0	109.0	109.0	109.0	108.0 ?	106.0	108.8 (8)	3.06
46	101.0	95.5	…	…	105.0	100.0	101.0	97.5	99.0	94.0	91.0	98.2 (9)	4.23
60	54.0	56.5	…	…	…	58.0	57.0	…	55.0	…	57.0	56.3 (6)	1.47
61	64.0	62.0	…	…	67.0	62.5	61.0	…	58.0	63.0	58.0	61.9 (8)	3.01
62	42.6	…	50.0	…	…	49.0	47.0	…	47.0	…	50.0	47.6 (6)	2.8
63	33.5	38.5	…	…	40.5	34.0	32.0	…	32.0	38.0	33.0	35.2 (8)	3.31
54	23.5	23.5	…	…	23.5	24.0	26.0	24.0	25.0	25.0 ?	25.0	24.3 (8)	0.92
55	50.0	48.3	53.5	…	53.5	52.0	54.5	44.0 ?	47.5	…	51.0	51.3 (8)	2.55
51	44.0	44.5	…	…	43.0	48.0	42.0	44.0 (dexter)	45.0	…	46.0	44.6 (7)	1.97
51a	41.0	40.3	…	…	40.0	44.5	38.0	…	40.0	…	42.0	40.8 (7)	2.02
52	34.5	32.6	37.3	…	37.5	33.5	33.0	36.5	33.0	…	35.5	34.8 (9)	1.94
Nasomalar angle	140.8	145.6	142.4	…	142.2	136.4	140.0	148.5?	142.4	…	136.4	140.8 (8)	3.15
Zygomaxillary angle	128.9	129.5	…	…	130.4	126.9	124.5	140.4?	129.1	129.5	129.8	128.6 (8)	1.94
SS	2.0	4.0	…	…	5.0	…	…	…	…	…	5.0	4.0 (4)	1.41
SC	5.0	7.0	…	…	9.0	8.0	6.0	…	…	…	7.8	7.1 (6)	1.45

Table 1 (end)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
DS	10.5	14.0	…	…	13.5	…	…	…	…	…	13.0	12.8 (4)	1.55
DC	20.2	21.2	…	…	27.5	…	22.0	…	…	…	20.5	22.3 (5)	3
32	70.0	79.0	…	…	76.0	83.0	75.0	74.0 ?	77.0	…	71.0	75.9 (7)	4.49
GM/FH	59.0	70.0	…	…	62.0	76.0	65.0	66.0 ?	69.0	…	60.0	65.9 (7)	6.15
72	83.0	76.0	…	…	78.0	81.0	85.0	76.0 ?	80.0	…	75.0	79.7 (7)	3.64
73	86.0	79.0	…	…	82.0	87.0	90.0	82.0 ?	85.0	…	79.0	84.0 (7)	4.16
74	78.0	60.0	…	…	70.0	68.0	71.0	63.0 ?	66.0	…	63.0	68.0 (7)	5.86
75	60.0	51.0	…	…	54.0	…	…	…	…	…	49.0	53.5 (4)	4.80
75 (1)	23.0	25.0	…	…	24.0	…	…	…	…	…	26.0	24.5 (4)	1.29

*According to R. Martin (after (Alekseev, Debets,1964)).
**Number of burial/number of skeleton.

Table 2. **Individual data and means of cranial metrics of females of the sample form Tartas-1 (Odino culture)***

Variable	193	253/1	253/3	270/1	286	330/2**	484	487	492	495	*X* (*n*)	*S*
1	2	3	4	5	6	7	8	9	10	11	12	13
Age	30–35	40–45	40–50	35–40	20–25	13–15	60+	19–24	35–40	18–20	–	–
1	186.0	179.0	…	181.0	183.0	178.0	…	…	…	164.0	178.6 (5)	7.66
8	137.0	131.0	…	138.0	…	135.0	…	…	…	134.0	135.0 (4)	3.16
17	127.5	131.0	…	130.0	122.0	125.0	…	…	…	126.0	127.3 (5)	3.56
20	113.0	110.0	…	110.0	…	109.0	…	…	…	105.0	109.5 (4)	3.32
5	102.0	102.0	…	100.0	96.0	93.0	…	…	…	93.0	98.6 (5)	3.97
9	92.2	91.0	…	85.4	87.3	92.0	…	…	98.5 ?	88.5	90.5 (6)	4.63
10	113.0	112.0	…	115.0	107.0	115.0	…	…	…	114.0	112.2 (5)	3.11
11	117.0	118.0	…	123.0	115.0	121.0	…	137.0 ?	…	120.0	121.7 (6)	7.99
12	105.0	102.0	117.0	111.0	…	110.0	…	121.0 ?	…	99.0	109.2 (6)	8.68
29	115.8	112.2	…	109.5	106.8	107.5	107.5	…	116.0 ?	103.6	110.2 (7)	4.69
30	106.0	109.0	118.0	109.5	108.0	108.5	126.0	…	…	103.0	111.4 (7)	7.93
31	104.5	93.4	98.0	103.7	…	89.2	…	94.6	…	88.0	97.0 (6)	6.35
26	130.0	130.0	…	127.0	121.0	127.0	124.0	…	132.0	114.0	125.4 (7)	6.32
27	114.0	122.0	128.0	115.0	120.0	123.0	147.0 ?	…	…	117.0	119.3 (6)	5.20
28	123.0	106.0	118.0	118.0	…	104.0	…	118.0	…	102.0	114.2 (6)	8.21
Angle of transverse curvature of the forehead	133.1	136.4	…	140.8	127.6	128.9	…	…	…	136.8	134.9 (5)	4.93
Sub.NB	25.3	26.7	…	27.0	22.5	28.0	25.2	…	…	21.3	24.7 (6)	2.29
Occipital subtense	26.2	19.6	24.5	24.2	…	21.5	…	22.6	25.0	18.3	22.9 (7)	2.94
45	130.0	128.0	…	…	…	120.0	…	139.0 ?	…	128.0	131.3 (4)	5.25
40	106.0	102.0	…	…	88.0	93.0	…	…	…	93.0	97.3 (4)	8.22
48	66.0	65.0	…	…	65.0	57.0	…	…	87.0	64.0	69.4 (5)	9.86
47	106.0	97.0	…	117.0	116.0	98.0	…	…	…	102.0	107.6 (5)	8.73
43	104.5	102.5	…	104.0	98.0	99.0	…	106.5	117.0	100.0	104.6 (7)	6.15
46	98.0	95.0	…	87.0	…	89.0	…	94.0	101.0	98.0	95.5 (6)	4.85

Table 2 (end)

1	2	3	4	5	6	7	8	9	10	11	12	13
60	53.5	55.0	…	…	51.0	50.0	…	…	54.0	50.0	52.7 (5)	2.11
61	64.5	61.0	…	…	59.0	57.0	…	64.0	69.0	64.0	63.6 (6)	3.41
62	45.0	…	…	…	…	41.4	…	…	…	41.0	42.5 (3)	2.20
63	38.5	37.0	…	37.0	33.0	31.0	…	40.5	40.0	37.0	37.6 (7)	2.49
54	27.0	24.2	…	…	23.0	23.0	…	24.0	24.0	21.5	24.0 (6)	1.80
55	47.3	51.0	…	55.0	49.0	42.3	…	…	63.0	45.0	51.7 (6)	6.49
51	46.5	42.6	…	47.0	…	41.0	…	…	47 (dexter)	…	45.8 (4)	2.13
51a	…	38.8	…	39.0	…	39.0	…	…	…	…	38.9 (2)	…
52	32.3	33.2	…	34	33.0	35.5	…	…	38.5	…	34.2 (5)	2.48
Nasomalar angle	141.0	145.1	…	152.8	135.2	140.0	…	…	144.7	143.1	143.7 (6)	5.76
Zygomaxillary angle	125.6	127.1	…	…	…	132.9	…	131.4	136.4	130.8	130.3 (5)	4.21
SS	4.0	3.0	…	2.5	2.2	2.5	…	…	…	…	2.90 (4)	0.79
SC	9.0	7.0	…	5.5	6.5	6.0	…	…	…	…	7.0 (4)	1.47
DS	…	11.0	…	9.2	…	9.5	…	…	…	…	10.1 (2)	…
DC	…	20.0	…	24.0	…	20.0	…	…	…	…	22.0 (2)	…
32	79.0	86.0	…	85.0	…	85.0	…	…	…	71.0	80.3 (4)	6.90
GM/FH	72.0	76.0	…	75.0	…	82.0	…	…	…	66.0	72.3 (4)	4.50
72	81.0	79.0	…	…	…	78.0	…	…	…	76.0	78.7 (3)	2.52
73	86.0	82.0	…	…	…	83.0	…	…	…	77.0	81.7 (3)	4.51
74	59.0	64.0	…	…	…	63.0	…	…	…	68.0	63.7 (3)	4.51
75	63.0	68.0	…	…	…	65.0	…	…	…	…	65.5 (2)	…
75 (1)	18.0	11.0	…	…	…	13.0	…	…	…	…	14.5 (2)	…

*See note to Table 1.

**Measurements of this individual were not used for calculating the sample mean.

mesognathia, mesorhinia, and absolutely large and mesohameconchal orbits. The width of the face varies from wide to medium.

The female sample from Preobrazhenka-6 is the most specific. Its cranial morphology exhibits features either absent (Tartas-1, males from Sopka-2/4A) or represented by single skulls (a female from burial 191A of Sopka-2/4A, and a male from burial 3 of Preobrazhenka-6) in other samples. The main feature distinguishing this pattern is strong nasal protrusion. The individuals displaying this trait also exhibit large (as compared to the group mean) horizontal dimensions and height of the cranial vault, the highest OPI, a wide, mesoprosopic or mesopno-clinognathic face, and a strongly protruding nasal bridge. The presence of this morphologically specific cranial pattern at Preobrazhenka-6 could probably be interpreted as evidence for close kin relationships between the females buried at this site. Yet another interesting feature of this "type" is the shape of the lower margin of the piriform aperture, which displays the *fossae praenasales* pattern in all females, and in the single male with the strongly protruding nose.

We found an analog to the cranial complex described above in a small sample from the Botai settlement site, dated to the late 4th to 3rd millennia BC (Rykushina, Seibert, 1984), of the Botai archaeological culture (Seibert, 1983). The main subsistence strategy of this culture was horse-breeding, probably accompanied by the hunting of wild horses. The perfectly humidified steppes of Northern Kazakhstan of the 3rd millennium BC provided great conditions for the stable persistence of huge herds of wild horses (Khabdulina, Zdanovich, 1984). At the Odino culture settlements in the Barabinskaya forest-steppe, bones of both wild and domesticated animals, including horses, were found. This makes researchers hypothesize that the Odino population was in transition to a manufacturing economy, i.e. husbandry (Molodin, Nesterova, Mylnikova, 2014). It is likely that this population had some trade contacts with the Botai groups of the Northern Kazakhstan steppe, which led to the introduction of horses into the Odino culture's

Table 3. **Individual data and means of cranial metrics**

Variable	Male												
	1	3	6	9	10	24	37/1	38	41	46	50/1	53	55
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Age	30–35	16–19	15–18	30–35	20–25	30–35	20–25	25–30	45–50	25–30	30–35	25–30	40–45
1	…	187	174	…	…	…	…	193	…	…	…	186	195
8	…	142	153	…	…	…	…	…	…	…	…	…	139
17	…	137	…	…	…	…	…	132	…	…	…	…	137
20	…	121.5	114	…	…	…	…	118	…	…	…	…	111
5	…	104	…	…	…	…	…	98	…	…	…	…	105
9	…	97.2	97.6	…	86	93	…	89.4	97.4	…	…	…	94
10	…	123	116	…	…	123.0 ?	…	111	110.0 ?	…	…	..	117
11	…	128.5?	138	…	…	135.0 ?	…	121	…	…	131	…	128
12	…	112.0?	109	…	…	…	…	110	…	…	113	…	118
29	…	108.3	110.4	…	122.3	112	…	116.6	107.5	…	…	107	120
30	…	112.3	105.8	…	…	…	…	117.3	102.3	…	…	104.5	117.8
31	…	100.5	…	…	…	…	…	95	94.2	…	90	…	102.8
26	…	122	122	…	134	133	…	145	122	…	…	118	139
27	…	123	120	…	…	137	…	137	124	…	…	127	128
28	…	125	…	…	…	…	…	130	116	…	106	…	127
Angle of transverse curvature of the forehead	…	136.4	132.7	…	136.8	134.2	…	133.9	138.8	…	…	…	132.9
Sub.NB	…	21.8	21	…	23.2	25	…	26	24.5	…	…	20.5	27.8
Occipital subtense	…	31.3	…	…	…	…	…	27	25.5	…	20.5	…	29.5
45	…	137	…	…	…	…	…	…	…	…	…	…	137
40	…	102	…	…	…	…	…	99	…	…	…	…	104
48	…	74	70	77.0 ?	…	76	…	70	71	…	…	68	75
47	…	124	117	127.0 ?	…	117	…	…	116.0 ?	…	…	111	124
43	…	109	108	…	98.0 ?	105	…	103	103	111	…	109	108
46	…	101.5	102	…	…	92	…	92	96	106.5	…	97	99
60	…	56	…	…	…	56	…	…	…	60	…	56	62
61	…	62.5	70	61.5	…	60	…	…	59	62	61	57	64
62	…	50	…	46	…	…	…	…	…	49	…	49	52
63	…	33.5	37.5	39	…	39	…	35	32	36.5	40	32	41.5
54	…	24	25.5	22.5	…	…	…	23	26	…	…	25	24
55	…	53	54	55.0 ?	…	53	…	48.5	54	…	…	46	53
51	…	45.5	42.5	47	…	…	…	43	43	…	…	42	42.5
51a	…	42	…	43	…	…	…	38.8	…	…	…	38	39.5
52	…	37	38.7	…	…	…	…	35	33.5 (dexter)	…	…	28	37
Nasomalar angle	…	136.6	137.6	…	150.4 ?	142.6	…	141.4	142	…	…	141.8	148.9

in the sample form Preobrazhenka-6 (Odino culture)*

							Female						
58	61	64/1	66	70	*X* (*n*)	*S*	19/2	47	54/1	62	64/2	*X* (*n*)	*S*
15	16	17	18	19	20	21	22	23	24	25	26	27	28
40–45	40–45	40–45	30–35	20–25	–	–	35–40	45–50	25–30	30–40	20–25	–	–
182	…	…	177	173	183.4 (8)	8.33	…	191.0 ?	178	168	179	179.0 (4)	9.42
137	140	…	140	140	141.6 (7)	5.26	…	131.0 ?	133	131	136	132.8 (4)	2.36
139	127	…	131	126	132.7 (7)	5.12	…	…	127	122	126	125.0 (3)	2.65
111	111	…	123	104	114.2 (8)	6.32	…	…	102.5	99	104	101.8 (3)	2.57
107	…	…	95	96	100.8 (6)	5.11	…	…	92	89	94	91.7 (3)	2.52
95	…	…	93.5	82	92.5 (10)	5.21	93	87.7	83	79.8	95	87.7 (5)	6.44
123	…	…	120	110	117.0 (9)	5.61	118	107	106	106	112	109.8 (5)	5.22
124	121	…	125	120	127.2 (10)	6.13	…	123.0 ?	117	117	121	119.4 (4)	3
100	108	…	111	113	110.4 (9)	4.88	…	107.0 ?	107	100	111	106.3 (4)	4.57
112	…	…	109	102.5	111.6 (11)	5.92	94.8	109.4	104	103	105	103.2 (5)	5.31
116	123	…	108.5	110	111.8 (10)	6.69	…	116	112	107	106.5	110.4 (4)	4.5
93	92	…	93	97	95.3 (9)	4.14	…	…	107	93	96	98.7 (3)	7.37
…	…	…	126	114	127.5 (10)	9.87	123	122	115	120	119	119.8 (5)	3.11
130	137	…	118	125	127.8 (11)	6.79	…	130	124	119	120	123.3 (4)	4.99
110	118	…	115	111	117.6 (9)	8.23	…	…	130	107	117	118.0 (3)	11.53
…	…	…	134.2	142.2	135.8 (9)	3.12	131.4	133.9	137.8	141.2	136.4	136.1 (5)	3.74
…	…	…	25	19	23.4 (10)	2.76	27	20.3	21.5	27	23	23.8 (5)	3.11
24.5	32.5	…	28	22	26.8 (9)	4.05	…	…	30	23	28	27.0 (3)	3.61
139	…	…	132	130	135.0 (5)	3.81	…	…	125	122	130	125.7 (3)	4.04
104	…	…	94	92	99.2 (6)	5.15	…	…	99	97	94	96.7 (3)	2.52
69	…	…	67	64	71.0 (11)	4.07	64.5 ?	70	66	66	66.5	66.6 (5)	2.04
115	…	…	112	111	117.4 (10)	5.76	…	108	110	104	106	107.0 (4)	2.58
110	…	…	105	99	105.7 (12)	4.3	106	101	100	96	104	101.4 (5)	3.85
96	…	…	90	92	96.7 (11)	5.14	…	97	95	92	89	93.3 (4)	3.5
58	…	…	50	54	56.5 (8)	3.66	…	…	56	56	54	55.3 (3)	1.15
65	…	…	59	60	61.8 (12)	3.42	…	62	61	62	61	61.5 (4)	0.58
47	…	…	-	46.4	48.5 (7)	2.16	…	…	46.5	47	47	4.8 (3)	0.29
37	…	…	38.5	34.5	36.6 (13)	3.04	…	34.7	37	34	31.5	34.3 (4)	2.26
24.4	24	…	25	22.2	24.1 (11)	1.21	…	26.5	26	22.5	23	24.5 (4)	2.04
55	…	…	48	46.3	51.4 (11)	3.5	45.5	50.5	46.5	45	46.4	46.8 (5)	2.17
45.7	…	…	41	42.2	43.4 (10)	1.94	41.7	44.5	42	41	44	42.6 (5)	1.52
44.3	…	…	39.3	37	40.2 (8)	2.57	…	42.1 (dexter)	39	37	40.5	39.7 (4)	2.17
35	…	…	33.5	32	34.4 (9)	3.18	33.2	32.5	29.5	30.5	34	31.9 (5)	1.88
135.8	…	…	142.9	142.6	142.1 (11)	4.55	146	136.8	145.8	152.6	143.7	145.0 (5)	5.66

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Zygomaxillary angle	…	128.9	132.7	…	…	144.3	…	122.9	128.3	138.2	…	137.2	140.6
SS	…	3.7	3.6	…	…	…	…	2	…	…	…	…	5.2
SC	…	10.4	7.8	…	…	…	…	7	…	…	…	…	11.7
DS	…	12.8	…	…	…	…	…	11	…	…	…	…	11.2
DC	…	25.4	…	…	…	…	…	20	…	…	…	…	19.3
32	…	78	73	…	…	…	…	81	…	…	…	…	75
GM/FH	…	74	63	…	…	…	…	71	…	…	…	…	65
72	…	82	76	…	…	…	…	84	…	…	…	…	81
73	…	89	77	…	…	…	…	89	…	…	…	…	92
74	…	72	72	…	…	…	…	67	…	…	…	…	55
75	…	52	57	…	…	…	…	…	…	…	…	…	67
75 (1)	…	30	19	…	…	…	…	…	…	…	…	…	14

*See note to Table 1.

Table 4. **Mean scores of robustness traits in the cranial samples of the Odino culture**

Variable	Tartas-1		Preobrazhenka-6		Sopka-2/4A	
	Male	Female	Male	Female	Male	Female
Superglabellar region (1–6)	3.7 (9)	1.4 (8)	2.7 (11)	1.4 (5)	4.1 (34)	2.3 (40)
Browridge (1–3)	2.0 (9)	1.4 (8)	1.9 (12)	1.0 (5)	2.1 (35)	1.5 (41)
External occipital prominence (0–5)	2.5 (11)	0.5 (8)	1.2 (10)	0.5 (4)	2.6 (27)	0.6 (35)
Mastoid process (1–3)	1.8 (9)	1.0 (10)	1.3 (13)	1.0 (5)	2.4 (31)	1.5 (40)

Note. In parentheses, number of observations is given.

subsistence economy. But any interpopulation contacts may result in incorporation of people of another culture into a group. Among the burials of the Odino culture, such "incorporates" do not differ from the locals in terms of funerary rite; they are only particular in their physical features. The strongly prognathic facial shape of one of the skulls from Botai was explained by G.V. Rykushina by a possible ancient admixture of equatorial elements into the population of the Botai culture (Rykushina, Seibert, 1984). But in the samples from the Odino culture, the vertical facial profile in general is mesognathic, and there is only a tendency towards an alveolar prognathism. This makes Rykushina's hypothesis less plausible.

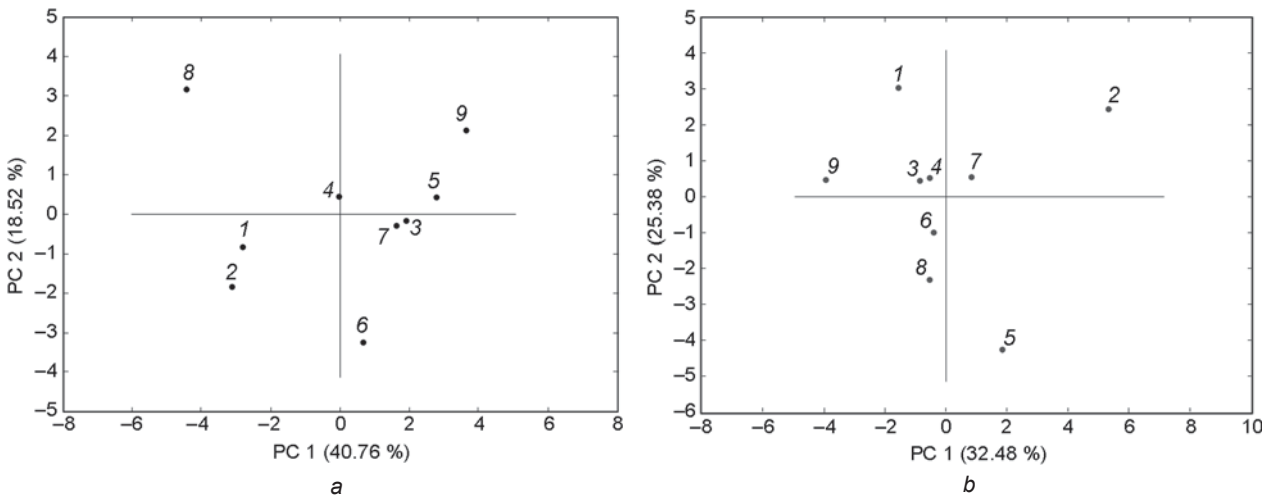
Vast cranial samples from the funerary-ritual complexes of the Barabinskaya forest-steppe appeared not as representative for a comparative statistical analysis of single skulls, owing to the poor preservation of most skulls from those complexes. When variables of both facial and neurocranial compartments were combined in the same analyses in Statistica, this led to a substantial decrease of sample sizes and to the exclusion of unique single Neolithic specimens from the analysis. Thus, a principal component analysis of single individuals was not possible, and only an intergroup analysis based on means was carried out.

Nineteen cranial metric variables were employed. For the neurocranium: maximum length and breadth, *basion-bregma* and *porion-bregma* heights, and minimum frontal breadth. For the mid-facial skeleton: upper facial height, breadth between *frontomalare temporale* and zygomaxillary chord, and nasal and orbital heights and breadths. Indexes of nasal protrusion, simotic and dacryal; and angles: nasomalar, zygomaxillary, forehead inclination, and nasal protrusion.

The first two factors of the principal component analysis account for app. 60 % of the total variance (see *Figure*). Notably, both males and females of the Odino culture from Sopka-2/4A, of the Krotovo culture from Sopka-2/4B, and of the flat burials of the Ust-Tartas culture at Sopka-2/3A cluster compactly close to each other on the plot. A small sample of the Neolithic specimens from Barabinskaya locates in the same sector of the plot. But males and females from the sample of the Late Krotovo culture from Sopka-2/4B display different

Table 3 (end)

15	16	17	18	19	20	21	22	23	24	25	26	27	28
129.3	…	…	137.2	131	133.7 (11)	6.33	…	124.5	133.9	130.4	128	129.2 (4)	3.96
4.2	…	…	3.5	2	3.5 (7)	1.15	…	…	2.5	1	3.5	2.3 (3)	1.26
13.3	…	…	8.5	6	9.2 (7)	2.64	10	…	7.8	6	6.2	7.5 (4)	1.85
10.5	…	…	11	12.7	11.5 (6)	0.97	…	…	9.2	9.2	11	9.8 (3)	1.04
22	…	…	22.5	19.7	21.5 (6)	2.31	…	…	21.8	20.3	20.2	20.8 (3)	0.9
…	…	…	84	72	77.2 (6)	4.71	…	…	82	88	77	82.3 (3)	5.51
…	…	…	75	62	68.3 (6)	5.72	…	…	78	82	67	75.7 (3)	7.77
79	…	…	82	80	80.6 (7)	2.57	…	…	76	75	81	77.3 (3)	3.21
85	…	…	89	86	86.7 (7)	4.86	…	…	80	80	86	82.0 (3)	3.46
62	…	…	61	67	65.1 (7)	6.2	…	…	60	64	65	3.0 (3)	2.65
56	…	…	65	55	58.7 (6)	5.96	…	…	47	…	57	52.0 (2)	…
23	…	…	17	25	21.3 (6)	5.82	…	…	29	…	24	26.5 (2)	…



Scatterplots of the PC1 and PC2 of male (*a*) and female (*b*) samples of the Neolithic and Bronze Age from the Barabinskaya forest-steppe.

1–3 – Odino culture: *1* – Tartas-1, *2* – Preobrazhenka-6, *3* – Sopka-2; *4* – classic period of the Krotovo culture (Sopka-2); *5* – late period of the Krotovo culture (Sopka-2); *6*, *7* – Ust-Tartas culture: *6* – Сопка-2/3, *7* – Sopka-2/3A; *8* – Neolithic (Vengerovo-2); *9* – summary sample of the Neolithic (Sopka-2, Protoka, Korchugan).

affiliations: while the former cluster together with the other samples from Sopka-2, the latter are separated from these. Summing up, the analysis of the Neolithic to Early Bronze Age cranial samples has demonstrated a cultural and chronological continuity in morphology between populations of various periods at Sopka-2.

The male Odino culture samples from Tartas-1 and Preobrazhenka-6 display a morphological similarity, while females from the same samples are quite distinct. The peculiarity of the cranial morphology of the Odino female sample from Preobrazhenka-6 was mentioned above and putatively explained by kin relationships between the females. But the distinct position of the Late Krotovo female sample can be explained by the persistence of a larger proportion of Andronovo-related ancestry in females of this group as compared to its males. Thus, the former retained cranial features more typical of the autochthonous population of the Barabinskaya forest-steppe.

Conclusions

This study was aimed at testing the hypothesis about the degree of morphological polymorphism of the autochthonous substrate, basal for the population of the Barabinskaya forest-steppe. But the expected result was not achieved, as the study failed to demonstrate differentiation of cranial complexes of the samples representing main cultural and chronological formations known from archaeological data. The same unified anthropological variant has persisted without substantial change over several millennia—from the Neolithic to the Middle Bronze Age. However, some variation in features of this general "type" among local populations of the Odino culture was nevertheless detected. It was not described previously, as skeletal material from only one site, Sopka-2, was studied. The addition of new samples from other burial sites of the Odino culture led to the detection of this variation. In our principal component analysis, we have intentionally narrowed the scale of variation of reference data to only one anthropological type represented in the indigenous population of Barabinskaya.

The hypothesis about the ties between the Odino people and the contemporary population of Central Asia was not supported. Such ties were also not confirmed by the mtDNA data (Pilipenko, 2010: 10). On the other hand, in the dental samples from Tartas-1 and Preobrazhenka-6, markers of the "Southern" complex were detected (Zubova, Molodin, Chikisheva, 2016). Not less important, among the grave goods from Sopka-2/4A there are artifacts that have direct analogs from Central Asian sites of the Namazga IV, V period (Molodin, 2012: 190). At the moment, we cannot explain such a discrepancy between the results of different disciplines, and leave this question open until future research.

Our analysis of morphology of individual skulls of the Odino culture detected the presence of single individuals demonstrating a consolidated complex of cranial features dissimilar to the main Barabinskaya "type". Parallels for this complex can be found in some skulls from the late 4th to 3rd millennia BC Botai settlement (Rykushina, Seibert, 1984). Probably, the Odino population of the Barabinskaya forest-steppe had contacts with Botai groups of Northern Kazakhstan.

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A Study of Human Bones from a Dwelling at Ust-Voikar, in the Subarctic Zone of Western Siberia

This article discusses bones of two males from a medieval or recent double burial at Ust-Voikar, on the Yamal Peninsula. The camp was constructed by northwestern Siberian natives. Both individuals had been buried in a hearth inside a dwelling, which was still used after that. The results of tree-ring analysis suggest that the burial dates to the last third of the 17th century, or the first decade of the 18th century. Both males were adult (adultus–maturus). Their physical features point to the northern East European Plain. The unusual nature of the burial, then, evidently stems from the fact that they were intruders. No lethal injuries suggestive of violence were found on the bones. Both individuals show signs of malnutrition during childhood (deficiency of vitamin C and phosphorus). Their diet consisted mostly of carbohydrates (apparently coarse cereals). The entheses and articular surfaces likely indicate physical activity, such as sailing and fishing with nets.

Keywords: *Northwestern Siberia, Ust-Voikar, burial, dwelling, physical anthropology, dental anthropology, paleopathology, paleodiet.*

Introduction

The Ust-Voikar settlement is located in the Shuryshkarsky District of the Yamal-Nenets Autonomous Okrug, on the left bank of the Gornaya Ob branch (one of the channels of the Malaya Ob River), northeast of the mouth of the Voikarsky Sor. The first researchers of the site identified it with Fort Voikar, a settlement known from written sources and folklore (Fedorova, 2006: 11). This was one of the aboriginal medieval "forts" that served as local centers of different functions for the natives of the northwestern Siberia (Perevalova, 2004: 214). According to the dendrochronological data for the wooden buildings found during the first excavation at the site in early 2000s, the early dwellings are dated to the late 13th to early 14th centuries AD. A later period of building activity at the site likely falls into the second half of the 17th century, and single dwellings were built during the 19th century (Gurskaya, 2008: 218, 223; Fedorova, 2006: 16).

The ethnic composition of the population of the settlement is still a question open for debate. But taking into account the known facts of the ethnic history of the northern part of the Lower Ob region, this population can be preliminary classified as Ugro-Samoyedic, while the presence of a Komi-Zyryan component can be reasonably

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suggested as well. The zone of northern taiga where the site is located was historically, during medieval and modern times, an area of intense contacts between the ethnic groups mentioned above. Those contacts led to the formation of the northern (Lower Ob) group of the Khanty, in particular the ethnic group of the Voikar Khanty, which emerged as a result of the ethnogenetic processes taking place in the Voikar River basin (Martynova, 1998, 2005; Perevalova, 2004; and others).

In 2016, an extraordinary archaeological object—a double burial intentionally placed into the hearth of dwelling No. 11 (according to the numeration for the objects excavated since 2012)—was found at the site (Novikov et al., 2016). The building was of the frame-and-pillar type of construction, with a separate internal space, the walls of which were made using the plow technique. The external walls were made of vertically placed planks. The hearth, of rectangular shape, occupied the central part of the internal space. Dwellings of similar construction have previously been described for another aboriginal settlement in the same region, Fort Nadym (Kardash, 2009: 56–58).

The deceased were placed inside a wooden frame delineating the hearth (Fig. 1). The width of the construction was not large enough to bury the bodies of two adult people. Thus, one of the individuals was in a supine position on his back, while the second was on his left side with the legs bent at the knees. The heads of both were oriented westwards, and their legs towards the entrance of the dwelling. No trace of cremation was observed in the remains. The burial was filled with wood chips and coal-ash fractions that were probably taken from the cooled filling of the hearth.

It is of note that later, above the ruin of this dwelling, two new log houses were built one after the other, inside the area delimited by the ruin and preserving the original plan of the preceding building. Despite these reconstructions, the position of the hearth has been intact during the whole period, and the burials have been for a long time under an active fireplace. As a result, the total thickness of the layer of coal and ash covering the burials was 50–55 cm.

Dwelling No. 11 and the adjacent dwelling were dated using tree-ring analysis: they were most likely built in the middle of the last third of the 17th century, and the early 18th century, respectively*. It was not possible to determine precisely the time of inhumation; thus, it may be broadly dated to the whole period of construction, i.e. from the last third of the 17th century to the early 18th century.

The main purpose of this work was to study the human remains from Ust-Voikar as comprehensively as possible,

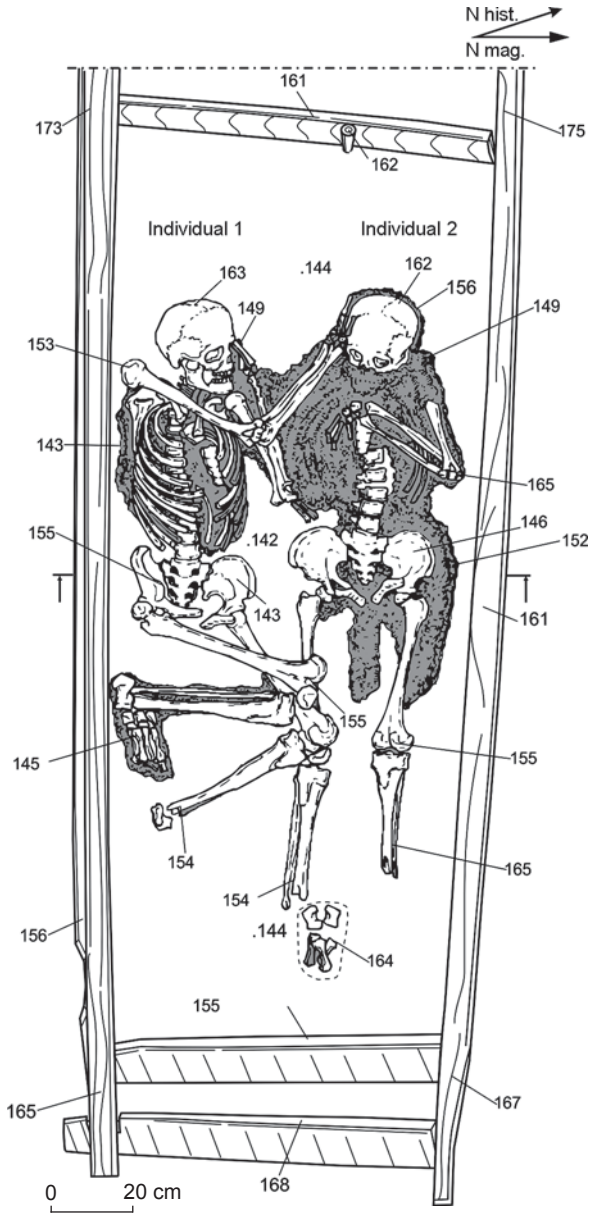

Fig. 1. Burial 1 in the hearth of dwelling No. 11 (the area of dispersion of textile remains is depicted in gray).

using a variety of methods available to the physical anthropologist, in order to reconstruct the way of life, and the diet, of these people.

Methods

A complex protocol involving cranial metrics and dental traits was used to infer the possible origins and population affinities of the buried individuals (Alekseev, Debets, 1964; Zubov, 2006; Zubova, 2013). A description of their dental pathologies was carried in order to reconstruct the health conditions and diets of

*Tree-ring analysis was carried out by Y.N. Garkusha, IAET SB RAS.

the individuals, with a distant aim of reconstructing their social status (Angel, 1984; Goodman, Martin, Armelagos, 1984; Buzhilova, 1998: 128).

Postcranial metrics were collected following a conventional protocol; stature and skeletal proportions were reconstructed based on the raw measurements (Alekseev, 1966). The individual values of the postcranial metrics were assigned to the categories developed by D.V. Pezhemsky (2011).

The postcranial non-metric protocol included two parts. The first was devoted to describing the morphology of entheseal sites, using the grade system of V. Mariotti for assessing muscular activity, enthesophyte development, and erosion of bone tissue (Mariotti, Facchini, Belcastro, 2004). Only muscles with a similar type of attachment to bone were employed, in order to avoid a bias in scoring the grades (Razhev, 2009: 253–254). The second part dealt with porous changes in articular surfaces and deformations of the contours of the joints. All large joints, as well as surfaces of the cervical, thoracic, and lumbar vertebrae, were studied.

Results

Ages at death of the deceased

A detailed examination of the two skulls and postcranial skeletons led us to the conclusion that the previously determined ages at death of the individuals (35–40 years for one, and 45–50 for another) (Novikov et al., 2016) need revision. Different skeletal markers of age (degree of suture closure, epiphyseal fusion, dental and articular surface status) contradict each other. Incomplete fusion of the vertebral arches (well-defined fusion lines are observed), heads of the ribs, iliac crests, clavicular proximal diaphyses, and acromions (only individual 2) suggest that the age at death of both individuals should be placed between 22 and 25 years (Schaefer, Black, Scheuer, 2009). But the status of cranial suture closure points towards an older age at death: 35–40 years for individual 1, and not less than 45–55 years for individual 2. The dental age of the two is determined as 40–45 and 45–50 years, respectively. The established discrepancy between the velocity of epiphyseal fusion, suture closure, and the degree of teeth wear is probably explained by a pathological process of endogenous character. If all the skeletal age markers are considered together, the age at death of both deceased may be broadly determined as *adultus–maturus*.

Cranial and dental morphology

Skeleton 1. The neurocranium is of small length and medium width. The cranial index lies at the border between meso- and brachycranic values. The cranial height measured from *porion* displays a very small value, while the height measured from *basion* is medium. The frontal arch is the longest component of the sagittal arch. The frontal bone is moderately wide at the level of the temporal lines, but is substantially wider at the coronal suture. The squama of the frontal bone is convex, only slightly inclined, but fairly protruding in the transverse plane. The robustness of the supraorbital region is weakly pronounced. The face is mesognathic according to the angles of vertical profile, but orthognathic according to the index of facial protrusion. The face is low, medium in width, and strongly horizontally protruding at both levels. The orbits are of medium width and height, of mesoconchal shape. The piriform aperture is mesorrhine; low and medium in width. The dimensions of the nasal bones are large at the level of dacryon, while simotic width and subtense are medium. The nasal bones are strongly protruding. All main dimensions of the mandible are medium, excluding the height of the ramus and the condylar width: these variables display large values (Table 1).

A spacing is observed between the central teeth; the cutting edge of the incisors is straight; lingual or vestibular shoveling is absent, as is the case for cingular derivatives. The degree of reduction of the hypocone of the upper second molars is moderate (4–), the Carabelli cusp is absent. In the distal part of all three molars in the raw, elements of the posterior fovea are observed. Both first and second lower premolars are strongly differentiated. The first molars display at least five cusps (a sixth cusp might have been also present), the second molars four cusps, and the third molars five cusps. A distal accessory tubercule is present in the second and third molars, while its presence or absence cannot be scored for the first molars owing to their strong attrition. The vestibular cingulum is enlarged. Protostylids are present in the third molars, while C7 is found in the second molars. The distal trigonid crest and epicristid are absent, the degree of convexity of the axial crest of the metaconid cannot be scored owing to its strong attrition. All three lower molars exhibit an "X"-pattern of grooves.

Skeleton 2. The skull displays mesocrany, and is more elongated than that of skeleton 1. The height of the vault is small, both from *porion* and *basion*. As in Skeleton 1, the frontal arch is the longest element of the sagittal contour. This bone is fairly convex, weakly inclined, medium in width, and displays a weak robustness of the supraorbital region. The face is low and moderately wide, clinoprosopic. The widths of the orbits and piriform aperture are larger than in skeleton 1. The nasal bridge is more protruding at dacryon, the angle of protrusion of the nasal bones is smaller, the simotic width is larger, and the simotic index smaller. The mandible is slightly taller and wider than that of skeleton 1 (Table 1).

Table 1. **Cranial metrics of individuals 1 and 2**

Variable	1	2
1	2	3
1. Cranial length	175	182
8. Maximum cranial breadth	140	142
8 : 1. Cranial index	80.0	78.0
17. Cranial height (basion-bregma)	134	130
17 : 1. Height-length index (from basion)	76.6	71.4
17 : 8. Height-transversal index (from basion)	95.7	91.5
20. Cranial height (porion-bregma)	105	103
20 : 1. Height-length index (from porion)	60.0	56.6
20 : 8. Height-transversal index (from porion)	75.0	72.5
5. Cranial base length	100	103
9. Minimum frontal breadth	94	94
10. Maximum frontal breadth	123	117
9 : 10. Frontal index	76.4	80.3
9 : 8. Fronto-transversal index	67.1	66.2
11. Cranial base breadth	121	115
12. Occipital breadth	…	115
29. Nasion-bregma chord	111	113.6
30. Bregma-lambda chord	108.5	112
31. Lambda-opisthion chord	93.5	97.5
26. Sagittal frontal arch	128	135
27. Sagittal parietal arch	121	125
28. Sagittal occipital arch	112	119
25. Total sagittal arch	361	379
26 : 25. Fronto-sagittal index	35.5	35.6
27 : 25. Parieto-sagittal index	33.5	33.0
28 : 25. Occipito-sagittal index	31.0	31.4
28 : 27. Occipito-parietal index	92.6	95.2
29 : 26. Frontal curvature index	86.7	84.1
h. Transverse frontal curvature subtense	20	20
h : 9. Transverse frontal curvature index	21.3	21.3
Transverse frontal curvature angle	133.9	133.9
Sub.NB. Longitudinal frontal curvature subtense	26	31
Sub.NB. : 29. Longitudinal frontal curvature index	23.4	27.3
Occipital curvature height	25	23
45. Bizygomatic breadth	134	133
9 : 45. Fronto-bizygomatic index	70.1	70.7
45 : 8. Transversal facio-cerebral index	95.7	93.7
40. Basion-prosthion length	95	99
40 : 5. Facial protrusion index	95.0	96.1
48. Nasion-alveolare height	68	68
48 : 17. Vertical facio-cerebral index	50.7	52.3
47. Nasion-gnathion height	116.5	113

Table 1 (continued)

1	2	3
43. Upper facial height	102	107
46. Midfacial breadth	95	101
60. Alveolar length	53	56
61. Alveolar breadth	62.5	65
61 : 60. Alveolar index	117.9	116.1
62. Palate length	45.5	46
63. Palate breadth	38.5	42.5
63 : 62. Palate index	84.6	92.4
55. Nasal height	50	50
54. Nasal breadth	24.5	26.4
54 : 55. Nasal index	49.0	52.8
51. Orbital breadth from mf.	41	44.5
51a. Orbital breadth from d.	38	42
52. Orbital height	31.5	33.2
52 : 51. Orbital index from mf.	76.8	74.6
52 : 51a. Orbital index from d.	82.9	79.0
Frontomalareorbitale (bimalar) breadth	95	99.5
Subtense from nasion to bimalar breadth	18	20.5
Zygomaxillary breadth	100	101
Subtense from subspinale to zygomaxillary breadth	28.5	26
Nasomalar angle	138.6	135.2
Zygomaxillary angle	120.6	125.6
SC. Simotic chord	8	12.2
SS. Simotic subtense	4	5
SS : SC. Simotic index	50.0	41.0
MC. Maxillofrontal chord	20	18
MS. Maxillofrontal subtense	6.5	7
MS : MC. Maxillofrontal index	32.5	38.9
DC. Dacrial (interorbital) chord	23	20.5
DS. Dacrial subtense	12	12.5
DS : DS. Dacrial index	52.2	61.0
FC. Canine fossa depth (mm)	5	4.5
Zygomatic curvature height (following Woo)	7.5	11.5
Zygomatic breadth (following Woo)	53.5	50.2
Zygomatic curvature index	14	22.9
32. Frontal profile angle from nasion	80	87
GM/FH. Frontal profile angle from glabella	76	85
72. General facial angle	83	82
73. Mid-facial angle	86	86
74. Alveolar angle	72	67
75. Nasal bones inclination index	52	53
75 (1). Nasal protrusion angle	31	29
68 (1). Mandibular length from condyles	104	114

Table 1 (end)

1	2	3
79. Mandibular ramus angle	118	127
68. Mandibular length from angles	77	82
70. Ramus height	65	61
71a. Minimum ramus breadth	31	33.5
65. Mandibular condylar width	123	113
66. Mandibular angular width	96.5	101.5
67. Mandibular anterior width	44	48
69. Symphiseal height	30.5	31.5
69 (1). Mandibular corpus height	29	31
69 (3). Mandibular corpus breadth	9	11
C*. Mental protrusion angle	72	63
Cranial shape in the horizontal plane	Ovoid	Ellipsoid
Cranial shape in the lateral plane	Ellipsoid	″
Cranial shape in the occipital plane	Roof-like	Roof-like
Intercilium (following Martin. 1–6)	3	1
Browridges (1–3)	2	1
External occipital tuber (following Broca. 0–5)	3	1
Mastoid process (1–3)	1	2
Lower margin of the piriform aperture	Anthr.	Anthr.
Anterior nasal spine (following Broca. 1–5)	3	4

A spacing is observed between the upper central incisors. These teeth are asymmetrical: the crown of the left central incisor is bent in its basal part and shifted labially with respect to the root, while its cutting edge is inclined lingually. The marginal ridges of the lingual surface are very weakly pronounced in both central and lateral incisors (shoveling grade 1). The latter display a moderate reduction (grade 1). The upper canines display distal accessory ridges. The Carabelli cusp is present in the first upper molars, while the distal accessory cusps are absent. Reduction of the hypocone of the second molars is more strongly pronounced than in skeleton 1: 3+ in the right molar, and 4 in the left molar.

Shoveling is absent in the lower front teeth. The lower first premolars are not differentiated, the second display two cusps, with some rudimentary elements of the grooves separating the lingual cusp. The morphology of the first lower molars cannot be described, while the second molars are four-cusped and display an "X"-pattern. In the third molars, protostylids are present. The right third molar is four-cusped and displays an "X"-pattern.

Possible origin of the deceased

Main anthropological features of the studied individuals can be described on the basis of the morphological traits of the skeletons. First, both of them belong to the same anthropological type, while slight differences between them are explained by individual variation. This type displays a relatively small, low and meso-brachicranial vault, with smooth contours and moderate cranial robustness. The face is low, medium in width, and strongly protruding at both horizontal levels. The dimensions of the orbits and piriform aperture are medium. The nasal bridge and nasal bones are strongly protruding. Summing up, the morphological features of both individuals undoubtedly place them in the range of variation of the Causcasoid race. In our opinion, the closest analogs to this type are found in the samples of the Eastern Slavic population of the 17th to 19th centuries (Alekseev, 1969) (Fig. 2).

The dental pattern observed in the individuals is close to the maturized European dental complexes. It should be pointed out, however, that the possibility of individual diagnosis of dental taxonomic status in recent groups is limited. To determine this status, the following traits are important: presence of protostylid, enlarged cingulum of the lower molars, lingual inclination of the crowns of the upper incisors, and elements of the posterior fovea in the upper molars. But the protocol employed for the study and publication of the recent Ugrian, Russian, and Slavic population did not include these traits (see, e.g., (Vostochnye Slavyane…, 1999:

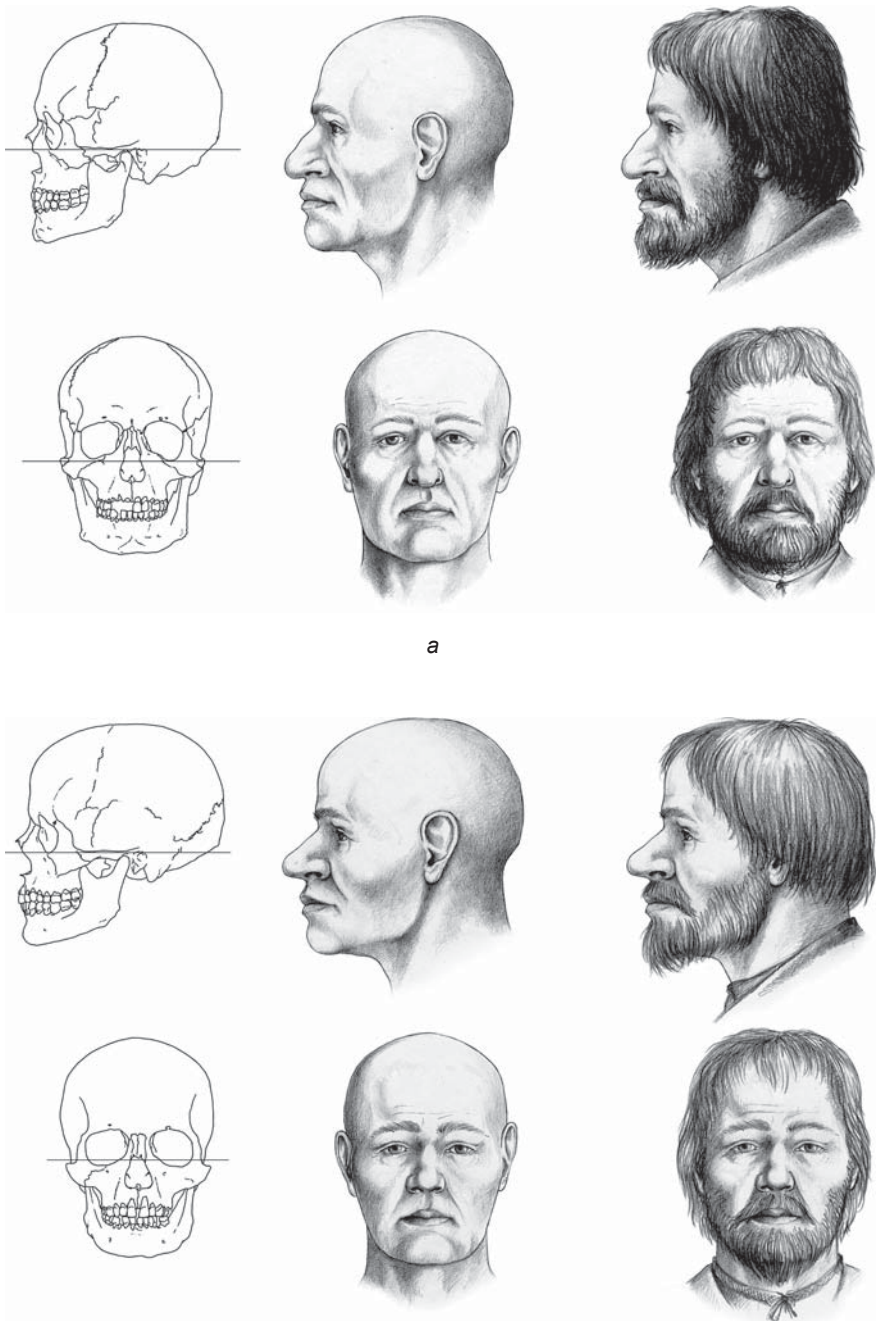

Fig. 2. Graphic facial reconstruction of the deceased (author D.V. Pozdnyakov).
a – skeleton 1; *b* – skeleton 2.

Tabl. XII-1–XII-3); thus, the area of origin of the studied individuals can be hypothesized only very tentatively. The morphological variants close to "steppe" types, with an increased frequency of four-cusped lower molars and a moderate reduction of the premolars, can be excluded from the list of potential ancestors of the Voikar individuals. The same applies to the Baltic dental type. The closest parallels to the studied specimens were observed in the medieval (11th to 13th centuries) dental samples from the Vologda Region: Chaigino-2, Volodino, Novinki (unpublished data of A.V. Zubova). The ethnic composition of those samples is complex. The cemetery of Chaygino is thought to belong to the Veps (Sankina, 2008: Tabl. 7); Volodino and Novinki as admixed, Slavic-Finnish and Slovensko-Krivich, respectively (Goncharova, 1995). An influence of similar

complexes was also present, though much more weakly pronounced, in the 11th to 12th centuries sample from Staraya Ladoga (unpublished data of A.V. Zubova). Thus, to the best of our knowledge, all analogs to the specimens from Voikar are found in the Russian North, where both Slavic and Finno-Ugric elements are present.

Paleopathological characteristics and reconstruction of diet

The first important observation can be made is that there were no signs of peri-mortem, potentially lethal, trauma observed in the skeletons. The articular surfaces of the elbow, wrist, and knee joints of both individuals demonstrate changes due to pathological bone formation. These are "islands" of amorphous tissue that resemble, to some extent, markers of osteoarthritis (Fig. 3). A visual and X-ray examination of the long bones, as well as an assessment of their cross-section shape, revealed a thickening of the compact bone layer. In addition, well-pronounced lines of epiphyseal fusion and incomplete fusion of the acromion may point towards a delay in skeletal growth.

In the dentition of the deceased, numerous pathological manifestations are observed. Carious lesions were detected in the upper left third molar of skeleton 1, and the upper and lower third molars of skeleton 2. Lineal enamel hypoplasia (LEH) was observed in the upper and lower incisors, first premolars, lower canines, and second premolars of skeleton 1, and in the upper right canine of skeleton 2. Both individuals exhibit manifestations of periodontal disease: the roots of the teeth are naked for about one third of their length, and signs of a vascular reaction are observed in the alveoli and palate. Strong deposits of dental calculus are found, predominantly on the lingual surface of the premolars and molars and on the vestibular surface of the incisors, both upper and lower. The upper right first incisor and lower left molars of skeleton 2 display enamel defects. The lower left first and third molars were lost ante-mortem. The lower right first molar exhibits manifestation of a probable defect of dentinogenesis: its occlusal surface demonstrates a bowl-shaped deepening without any external relief. The deepening reaches the level of the tooth's neck, but is covered with a smooth layer of enamel. The non-carious nature of this pathology was confirmed by a sounding, which demonstrated that the root canals were closed. As the left first molar was lost ante-mortem, it was not possible to determine if the pathology was symmetrical.

The suite of traits observed in the skeleton and dentition of both individuals suggests that they might have experienced deficiencies of vitamin C and phosphorus during their childhood and adolescence (Ortner, Ericksen, 1997). The pattern of dental pathologies points towards a diet rich in carbohydrates, and generally towards a high level of biological stress in the population to which the deceased belonged. The latter suggestion is based on the presence of LEH—the marker of episodic stress of various etiologies: famine, parasitic invasions, hereditary diseases, etc.

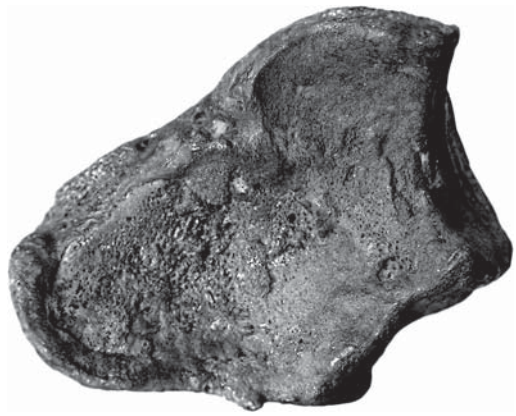

Fig. 3. Manifestations of pathological bone formation in the right radius (skeleton 1).

Postcranial metrics and reconstruction of physical activity

The full and articular (functional) lengths of the long bones of both individuals are medium or below medium, while the lengths of the tibia display small values (Table 2). The robustness index is high. The diaphyses of the humerus and ulna are rounded in a transverse section, and the radius displays a flattened section. The section through the femur of skeleton 1 at the level of diaphysis is round, while in skeleton 2 it is flattened.

The radio-humeral index in skeleton 1 points towards an equal ratio between the lengths of the two bones, while the femur is long relative to the tibia. Indices show that the humerus is slightly shortened in respect to the humer, while the forearm demonstrates a substantial elongation relative to the tibia. According to the intermembral index, the body proportions of skeleton 1 can be described as brachymorphic. The radio-humeral index in skeleton 2 suggests a relative elongation of the forearm, while the humero-femoral index shows a substantial elongation of the humerus relative to the femur.

The stature of the individuals was estimated using various formulae. For skeleton 1, these estimates are 168.5 cm (according to M. Trotter and G. Gleser), 167.7 cm (According to E. Breitinger), and 166.4 cm (according to M. Cherny and S. Komenda); and for skeleton 2 these values are 159.7; 162.4, and 158.8 cm (Pezhemsky, 2011: 299–307).

Table 2. **Postcranial metrics of individuals 1 and 2**

Variable	1	2
1	2	3
Humerus		
1. Maximum length	322/320*	313/…
2. Total length	319/317	305/303
3. Proximal epiphyseal breadth	54/56	55/55
4. Distal epiphyseal breadth	68/67	63/…
5. Maximum midshaft diameter	23/22.7	21.5/21.5
6. Minimum midshaft diameter	19/19	18/19
7. Minimum circumference	65/67	65/66
7a. Midshaft circumference	73/71.5	67/67
8. Head circumference	…/153	…
9. Maximum head diameter	…/46	…
10. Vertical head diameter	48/…	…
Radius		
1. Maximum length	246/247	231/…
2. Physiological length	229/…	220/…
4. Transverse midshaft diameter	17/18	16.5/17
5. Sagittal midshaft diameter	11/12	11.5/12
3. Minimum midshaft circumference	45/45	43/43
Ulna		
1. Maximum length	267/272	259/…
2. Physiological length	230/234	223/220
11. Antero-posterior midshaft diameter	13/14	13.5/14
12. Transverse diameter	19/19	16/17.5
13. Upper transverse diameter	22/21	15.5/…
14. Upper sagittal diaphyseal diameter	25.3/24.5	22.5/…
3. Minimum diaphyseal circumference	38/41	37/37
Clavicle		
1. Maximum length	144/141	139/142
6. Midshaft circumference	40/40	38/37
Scapula		
1. Morphological breadth	153/156	167/167
2. Morphological length	102/104	93/95
Femur		
1. Maximum length	…/446	416/414
2. Natural length	…/444	410/404
21. Condylar breadth	…/86	85/81
6. Midshaft sagittal diameter	…/26	24.5/25
7. Midshaft transverse diameter	…/25	26.5/26.5
9. Upper transverse diaphyseal diameter	…/29	29/28.5
10. Upper sagittal diaphyseal diameter	…/23.5	24/24
8. Midshaft circumference	…/81	82/82

Table 2 (end)

1	2	3
Tibia		
1. Total length	343/342	…
2. Condylo-talar length	…/322	296/…
1a. Maximum length	350/351	…
3. Proximal epiphyseal breadth	75/79	78/…
6. Distal epiphyseal breadth	56/…	…
8. Midshaft sagittal diameter	24/26	25/…
8a. Sagittal diameter at for. nutr.	29.5/27	30/…
9. Midshaft transverse diameter	19.5/20.4	23/…
9a. Transverse diameter at for. nutr.	22/22	26/…
10. Midshaft circumference	71/75	79/…
10b. Minimum diaphyseal circumference	66/…	…
Indices		
Intermembral	…/72.14	…
Tibiofemoral	…/77.03	…
Radiohumeral	76.40/77.19	73.80/…
Humerofemoral	…/72.07	76.34/…
Radiotibial	71.72/72.22	…

*Right side/left side.

Markers of physical activity are similar between the two individuals: the forelimb and its girdle experienced much higher loadings than the hindlimb. Entheseal changes in the form of enthesopathy and diaphyseal shape deformations are particularly evident in the sites of attachment of *M. deltoideus, teres major*, and *m. latissimus*. Entheseal markers are also developed at the sites of the forearm bones: *m. biceps*, pronators and supinators, flexors of the hand and fingers. An analysis of most stereotypic movements of the forelimbs points towards a frequent forceful flexing of the forearm and hand, and extensions and adductions of the humerus, which can be interpreted as an activity aimed at drawing an object to the trunk. The most typical movement for both individuals was a retraction of the prone shoulder backwards followed by an adduction of the shoulder. Such a suggestion is supported by a relocation of the articular surfaces of the shoulder joint in dorso-lateral direction, and by the presence of an additional angle of the scapula (Fig. 4, 5). The latter might be explained by permanent loadings to *m. teres major*, which is mainly involved in the types of physical activity described above.

On the basis of the analysis of entheseal and articular surface changes, the stereotypic motions can be integrated into activity complexes. The pathological manifestations in the shoulder joint described above are interpreted in some studies as a result of elevating and moving heavy objects. On the other hand, movements of the legs were mostly aimed at keeping a static position of the body, its bending and extension, as well as to flexion and extension of the foot. Importantly, the femoral muscles of the anterior, posterior, and lateral groups were moderately or weakly developed. This means that regularly carrying heavy weights is not a likely type of activity for the studied individuals, as such an activity implies a substantial loading on the hindlimb muscles.

Besides the activity patterns discussed above, there are traces of dynamic loadings requiring simultaneous work from the pectoral and dorsal muscles, particularly those involved in contraction and extension of the scapula. Thus, the shoulder joint was performing a rotation accompanied by bending and unbending in the elbow joint. As a similar complex of activity markers is observed in modern academic rowers (Smirnov, Dubrovsky, 2002: 529–532), we hypothesize that the two studied individuals rowed regularly. Judging from the observations made in the Sadlermiut (an isolated group of the Paleoeskimo) and the Thule Paleoeskimo samples, Hawkey and Merbs described the following set of features associated with rowing: arthritis of the acromioclavicular, humeroulnar, and humeroradial joints, and left-sided injuries of the joint between the ulna and metacarpal bones (Merbs, 1983: 68–72;

Fig. 4. Accessory articular surface of the right humerus (skeleton 2).

Fig. 5. Accessory scapular angle at the *m. teres major* attachment site (skeleton 2).

Fig. 6. Entheseal changes at the *m. gluteus maximus* and *m. iliopsoas* attachment sites (skeleton 1).

Hawkey, Merbs, 1995: 329–334). These are in only a partial agreement with the features observed in the present studies. This can be explained by the fact that the populations studied by Hawkey and Merbs were using kayaks with only one light paddle for their aquatic travels.

This is not what was typical for the Voikar individuals, for whom another type of rowing can be suggested: namely the use of vessels with heavy rowing-equipment, where the main loadings fell on the pectoral and dorsal muscles, while the shoulder and forearm muscles were only indirectly involved. Elaborating the hypothesis on the occupational activity of the individuals from Voikar as shipmen, it is worth noting that not only were heavy paddles used by the Russians in the Ob basin during the 17th to 18th centuries for navigating river vessels of various types, but also the rig and string draft were employed. Usual carrying of the vessels across the ground should not be overlooked either (Vershinin, 2001: 90, 92, 97, 99, 103, 104). These probable occupational factors may indirectly explain the presence of markers of extreme physical loadings observed in the skeletons: relocation of the articular surface of the humerus, and substantial development of the iliopsoas muscles and *m. glutei maximi* that bend and unbend the body (Fig. 6). Another very feasible type of physical activity might be dragging motions associated with the extraction of fishing nets. Archaeological data suggest a substantial role for fishing, including trawling, in the lifestyle of the Russian population of the northwestern Siberia (Vizgalov, Parkhimovich, 2008: 110–111).

Discussion

All the results obtained in the present study suggest that the intramural burial found at the North Siberian aboriginal settlement contained the remains of newcomers, probably of Eastern Slavic origin. The Eastern Slavs have been following Christian burial traditions, notably unified across Siberia in the 16th to 18th centuries, according to archaeological data (Tataurova, 2010: 28, 42). But the people who made the inhumation at Voikar were not familiar with the Christian burial tradition, or did not find necessary to follow it.

Were examples of such unusual inhumations are known in the burial practice of native peoples of the region? The very scarce archaeological data on the burial rites of the medieval population of the Lower Ob region are dated mostly to the 6th to 13th centuries, and afterwards there is a chronological gap until the 19th century. The burial complexes are represented by flat-grave burial grounds, where individual inhumations with grave constructions of various types were predominant. The deceased were typically in an extended supine

position, with the head oriented to southwest, south, or southeast (see, e.g., (Zeleniy Yar, 2005: 69–70, 143–149; Gusev, 2016). Such a position of the deceased was as typical in the late 19th century as well (Murashko, Krenke, 2001: 29–30). Medieval burials with a flexed position of the body are found very rarely and mostly in the tundra zone of the Yamal Peninsula (cemeteries of Kheto-Se-1, Bukhta Nakhodka-2, Yur-Yakha III) (Brusnitsyna, 2000: 37; Kardash, Gaydakova, 2017; Plekhanov, 2016). The single burial studied by V.N. Chernetsov at Khaen-Sale settlement, on the northeast coast of the peninsula, probably belongs to a later period: according to the grave goods it was attributed to the 16th century AD (1957: 236). Researchers point to some similarity between medieval cemeteries in the north of the Lower Ob region and the chronologically close burial complexes to the south of them, in the taiga zone of the Ob region (Zeleniy Yar, 2005: 288). Besides these common features, it is of note that double or collective burials were exceptional finds in this region (for the Surgut region of the Ob see, e.g., (Zykov, 2012: 84, 96, 104)).

Turning to the tradition of intramural burials, it should be noted that in Western Siberia such burials are found mostly in the forest-steppe zone during the Bronze Age and transition to the Iron Age; and even in that period, these were extraordinary (Novikova, 2011). Some cases have been observed in the taiga region in medieval times as well (Adamov, Turova, 2003; Kazymskiy… kompleks, 2018: 137–138).

Only single finds of human remains in dwellings are known for the northern part of Western Siberia in medieval and recent times. These can be divided into three groups. The first groups includes individuals who died under ruins of dwellings (Fort Nadym (Kardash, 2009: 30)). The second group includes intentional burials in dwellings demolished before making a burial (Fort Monkys Uriy (Kardash, Vizgalov, 2015: 316–329)). In both groups, the deceased were victims of armed attacks on settlements. The last group includes intentional burials in dwellings that were, according to the researchers, inhabited at the moment of creating a burial. The burials are found in different parts of the dwellings. This group includes inhumations at Khaen-sale (Chernetsov, 1957: 236) and Barsova Gora IV/26 (Surgut region of the Ob) settlements (Beltikova, 2002).

To the best of our knowledge, the only case (except the one described in the present study) in the Lower Ob region where the space of the hearth was used for ritual manipulations with human remains was also described for the Ust-Voikar settlement. In the hearth of one of the dwellings built, according to dendrochronological data (Gurskaya, 2008: 221–222) in the early 14th century, a human scalp with remains of hair was found (Etnicheskaya arkhitektura…, 2008: 48).

Thus, the burial at Voikar is completely atypical for both Christian burial rites and the traditions of the native population of the Lower Ob region. The interpretation of its semantic status in the system of beliefs of the native population of the northwestern Siberia requires further investigation.

Conclusions

The results of a complex anthropological study of the human remains found in a hearth of a dwelling at Ust-Voikar lead to several conclusions. First, the remains belonged to two adult males (*adultus* – early *maturus*), likely belonging to the same population. This population was probably related to the population of the north of the East European plain. Life conditions of this ancestral population were not advantageous, as suggested by the manifestations of childhood biological stresses, including vitamin C and phosphorous deficiencies, observed in both individuals.

The habitual diet of the deceased was rich in carbohydrates. Our reconstruction of the stereotypical motions of the individuals points towards a regular use of river vessels equipped with heavy paddles, and fishing as a part of common occupational activity. The cause of their death cannot be determined by bioarchaeological methods, though the absence of peri-mortem trauma in the skeletons might suggest that they were not victims of a military encounter.

The Lower Ob region has been, for a while, a route of dispersion of the East European population into Siberia, while northern routes across the Urals ("over the Stone") were widely used during the 17th century as well (Bakhrushin, 1928: 68; Perevalova, 2004: 33; Vershinin, 2018: 65–66). However, it does not seem possible to determine exactly what historical events of the last third of the 17th to early 18th centuries led to the inhumation of representatives of the East European population in the territory of an inhabited aboriginal settlement. We can only suggest that this unusual event was somehow related to the process of incorporation of Western Siberia into the Russian state.

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BAR – British Archaeological Reports

DVO RAN – Far Eastern Branch of the Russian Academy of Sciences

GBUTO – State Budgetary Institution of the Tyumen Region

IA RAN – Institute of Archaeology, Russian Academy of Sciences (Moscow)

IAET SO RAN – Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences (Novosibirsk)

IEA RAN – Institute of Ethnography and Anthropology, Russian Academy of Sciences (Moscow)

IIFF SO AN SSSR – Institute of History, Philology and Philosophy, Siberian Branch, USSR Academy of Sciences (Novosibirsk)

IIMK RAN – Institute for the History of Material Culture, Russian Academy of Sciences (St. Petersburg)

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)

MGU – Lomonosov Moscow State University

MIA – Materials and Investigations on Archaeology in the USSR

SAIPI – Siberian Association of Prehistoric Art Researchers

UrO RAN – Ural Branch of the Russian Academy of Sciences

YaNAO – Yamal-Nenets Autonomous Okrug

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