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Late Pleistocene Paleoenvironments and Episodic Human Occupations in the Orkhon Valley of Central Mongolia

Here, we present initial results of a new course of research being carried out at the Moiltyn-am, Orkhon-1, and Orkhon-7 Paleolithic sites in the Orkhon River Valley, central Mongolia. Our research focuses on the Moiltyn-am site, which preserves a cultural and chronological sequence from the Final Middle to the Late Upper Paleolithic. Results from analyses of rare earth elements, Strontium (Sr) isotopes, and faunal assemblages are correlated with data on

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paleoenvironmental conditions in the region during MIS-3 and MIS-2. Our conclusions are based in part upon post-depositional changes detectable in archaeological material from cultural layers at the Moiltyn-am site revealed through convergent analyses of stratigraphy, sedimentology, planigraphy, and the comparison of Sr isotopes in sediments and osteological remains. XRF-derived geochemical data from the Moiltyn-am sedimentary sequence yields evidence of past climatic conditions. We correlated these data with human occupational episodes in the Orkhon Valley during the Middle and Upper Paleolithic, and the results are analyzed in the context of extant paleoenvironmental information from northern Mongolia. Our results indicate a relatively humid climate prevailed during MIS-3, followed by a period of aridification, and the redeposition of sediments at Moiltyn-am. Faunal analysis reveals that Bos sp. and equids were the principal prey species for humans in the Final Middle to Initial Upper Paleolithic, supplemented by members of the Caprinae during the Early Upper Paleolithic. A complex mammoth fauna inhabited forest-steppe and steppe landscapes in the Khangai Mountains during MIS-3 and MIS-2.

Keywords: *Mongolia, Pleistocene, geochemistry, paleoclimate, Paleolithic, fauna.*

Introduction

The large number of Paleolithic archaeological sites discovered thus far in Mongolia establishes it among other important regions preserving evidence of the behavior of Pleistocene people. Mongolia is situated at the nexus of the South Siberian, Central Asian, and North Chinese environmental provinces, and comprises complex biomes and transition zones among them. Despite this diversity of biotic zones, the boundaries of which repeatedly changed during the Pleistocene, thus potentially effecting human subsistence strategies, the range of variability of known Paleolithic archaeological complexes is rather limited. Mongolian sites represent either one technocomplex, most often the Upper Paleolithic (e.g., sites in the middle Selenga River Valley) (Derevianko et al., 2007, 2013; Zwyns et al., 2019; Rybin et al., 2020), or several traditions separated by long hiatuses (e.g., Tsagaan Agui Cave in the Gobi Altai region) (Derevianko et al., 2000). Paleolithic sites located on the upper reaches of the Orkhon River (Khangai Mountain Range, central Mongolia) stand apart. Here, we refer to three stratified archaeological sites (Moiltyn-am, Orkhon-1, and Orkhon-7) located along a 10 kilometer stretch of the river, which have yielded cultural materials representing an unprecedented variety of cultural traditions, technologies, and settlement systems. It is especially important to note that the continuous cultural and stratigraphic sequence recorded in these sites covers the period corresponding to Marine Isotope Stages (MIS) 2 and 3. Here, lithic industries have been attributed to the Middle and Terminal Middle Paleolithic, as well as the Initial, Early, Middle, and Late Upper Paleolithic. It is possible that multiple cultures are represented within these subdivisions.

The valley of the Orkhon, Mongolia's longest waterway and a southern tributary of the Selenga River, defines one of the most important natural pathways connecting arid southern Mongolia (the Gobi Altai region) through the Valley of the Lakes (Nuuruudyn khöndii) with China (Xinjiang and the Ordos Plateau) and, through the Selenga Basin, with southwestern Transbaikalia in Russia (Rybin, Khatsenovich, 2020). Obviously, the complex paleoclimatic conditions characteristic of the Late Pleistocene may have either stimulated or hindered the dissemination of human groups, as well as faunal communities, through these corridors.

Our research, including isotopic and geochemical analyses, chronometric dating, and paleontological investigations, has been aimed at reconstructing past climatic and environmental conditions in the eastern Khangai Mountains and the Orkhon Valley, and comparing those results with evidence for episodic human settlement in the region (Fig. 1). The studies were aimed at identifying factors relevant to the formation of patterns of Pleistocene human settlement in the region, determining the climatic and environmental parameters of the lifeways (and potential coexistence) of hominin ancestors, and correlating the timing of the peopling of this area with the chronology of human occupation in contiguous regions.

We focused on reconsidering earlier-derived stratigraphic data and determining the state of preservation of the layered sequence at Moiltyn-am, one of the most famous open-air Paleolithic sites in Central Asia, which has been regarded since the 1960s as a reference point for understanding the regional Pleistocene cultural sequence (Okladnikov, 1981). Our data provide reliable grounds for reconstructing the environmental and climatic contexts of Pleistocene human habitation and available resources in the Orkhon Valley, as well as for assessing the impact of post-depositional processes on the state of preservation of the cultural remains encountered.

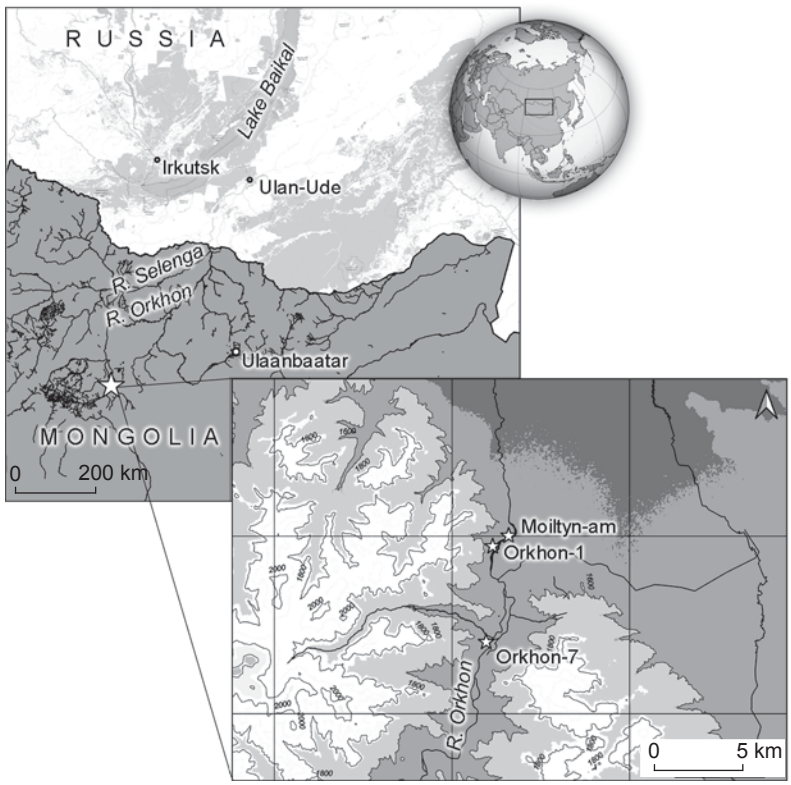

Fig. 1. Map of Paleolithic archaeological sites in the Orkhon Valley, Mongolia.

Research materials and methods

This study is based on materials recovered from three stratified open-air sites located on terrace 2 of the Orkhon River, near Kharkhorin in Övörkhangai Province, where the easternmost foothills of the Khangai Mountains meet the rolling steppe of central Mongolia, about 365 km west-southwest of Ulaanbaatar.

The Moiltyn-am site was discovered by Academician A.P. Okladnikov in 1949 and has been subsequently studied by several research teams: in 1960–1964, investigations there were directed by A.P. Okladnikov and V.E. Larichev, in 1985–1986 under the direction of Academician A.P. Derevianko and V.T. Petrin, and in 1996–1997 by a joint Mongolian-French expedition led by J. Jaubert (Ibid.; Derevianko, Kandyba, Petrin, 2010; Jaubert et al., 2004). All researchers assumed that some layers at Moiltyn-am were redeposited; however, investigations of the mechanics of redeposition and the search for the stratigraphic position of redeposited materials did not adequately clarify the situation, due in part to the lack of organic material suitable for radiocarbon dating. Okladnikov argued that the lower layer of the site contained Middle Paleolithic materials, while overlying strata yielded remains attributable to various subdivisions of the Upper Paleolithic (Okladnikov, 1981).

The Orkhon-1 and Orkhon-7 sites are located 1 and 7 km upstream, respectively, from Moiltyn-am (Fig. 1). These localities have revealed the longest stratified cultural sequences yet known in Mongolia. Two cultural complexes have been identified at Orkhon-1: a Middle Paleolithic horizon and an assemblage probably attributable to the Middle Upper Paleolithic. The Orkhon-7 site yielded a Terminal Middle Paleolithic horizon with a lithic industry documenting the Middle to Upper Paleolithic transition, and an Initial and Early Upper Paleolithic horizon. These sites, with the exception of the Orkhon-1 Middle Paleolithic horizon, yielded sufficient organic material (animal bones and carbonaceous lenses) to generate a large series of radiocarbon dates (Table 1). On the basis of the results of grain-size and palynological analyses and then-available radiocarbon dates, attempts were made in the late 1980s to partially reconstruct the climatic context of Pleistocene human occupation of the Orkhon Valley (Derevianko et al., 1989). Our new course of research initiated in 2018–2019 has clarified previous research data (Khatsenovich et al., 2018, 2019a, b).

A 4 m^2 trench was excavated at Orkhon-1, and an 8 m^2 unit was opened at Moiltyn-am in order to further investigate the stratigraphic relationships of the cultural layers at these sites (Fig. 2). The profiles at Orkhon-1 and Orkhon-7 were cleaned and samples for optically stimulated luminescence (OSL) dating and for a broad range of other analyses were collected from every layer at each these three sites, including Moiltyn-am.

The state of preservation of the deposits was determined based on the analysis of the original positions and orientations of linear artifacts (Bertran, Texier, 1995; McPherron, 2005). This study (Marchenko et al., 2020) yielded results useful for evaluating conclusions drawn by previous researchers (Lenoble, Bertran, 2004).

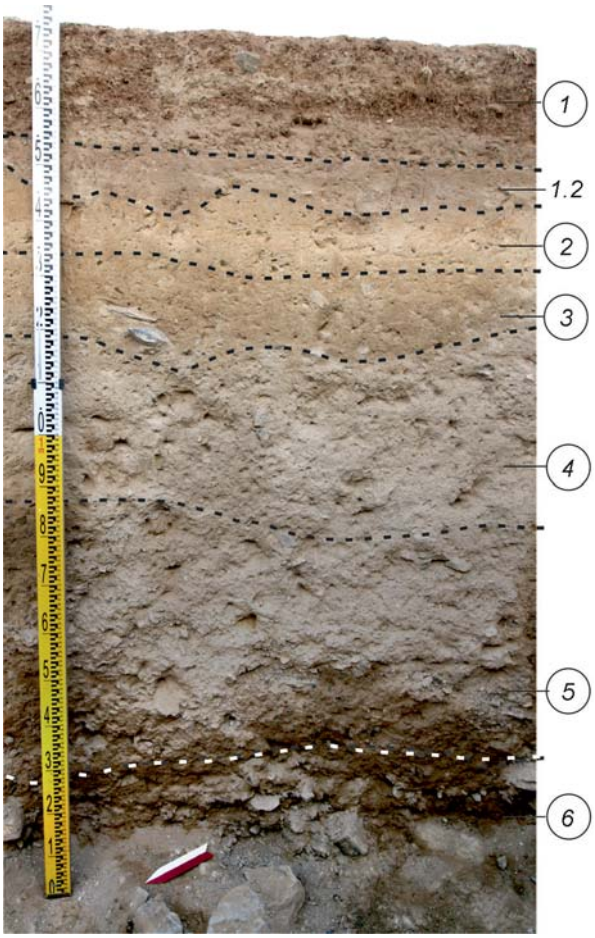

Fig. 2. Stratigraphic section of the southwestern wall of the 2018 excavation unit at Moiltyn-am.
1 – sod and sub-sod layer, bearing a mixed archaeological complex; *2* – layer of yellow-gray loess-like loam, with inclusions of fine gravel and grus, bearing a mixed archaeological complex; *3* – layer of light yellow-brown loam, with inclusions of small and large debris, enclosing an Upper Paleolithic archaeological complex; *4* – layer of convoluted laminar structure, with alternating cemented brown loamy and sandy layers permeated with fine gravel, bearing an Early Upper Paleolithic archaeological complex; *5* – dark brown loamy layer, with frequent shale inclusions, bearing an Early Upper Paleolithic complex; *6* – loose, light brown sandy loam, with significant inclusions of gravel and an Early Upper Paleolithic complex.

Standard archaeozoological analysis was conducted on the faunal collections (Gromova, 1950; Olsen, Shipman, 1988; Reitz, Wing, 2012; Baumann et al., 2020). Since the small-scale work carried out in 2018–2019 was of a preliminary nature, the amount of osteological remains recovered made it possible to identify only one individual of each species in the faunal complexes analyzed. Thus, the number of identified specimens (NISP) for each species was employed as the basis for interpretation. The derived data at least provide grounds for preliminary conclusions to be drawn concerning indicator species for reconstructing past environments.

Calibration and modeling of radiocarbon dates were carried out through OxCal v.4.4.2 software (Bronk Ramsey, 2020) using the IntCal20 calibration curve (Reimer et al., 2020). Although the number of dates was not sufficient for Bayesian analysis, date modeling allowed the identification and elimination of outliers—dates that stand out from the general sample and affect calibration accuracy and precision.

The main sediment-forming elements were determined through X-ray fluorescence (XRF) at the Center for Collective Use of Multielement and Isotope Studies (Sobolev Institute of Geology and Mineralogy, SB RAS, Novosibirsk). Paleogeographic conditions of sedimentation at Moiltyn-am were analyzed on the basis of the following principal geochemical indices:

$CIA = 100 \times Al_2O_3/(Al_2O_3 + Na_2O + CaO + K_2O)$, in which CaO – calcium oxide – a chemical index of alteration, indicates the ratio of primary and secondary minerals (Nesbitt, Young, 1982);

$CALMAG = 100 \times Al_2O_3/(Al_2O_3 + CaO + MgO)$ (Nordt, Driese, 2010) – one of the CIA index variations;

$CIW = 100 \times Al_2O_3/(Al_2O_3 + Na_2O + CaO)$ – chemical index of weathering (Harnois, 1988);

$CPA = 100 \times Al_2O_3/(Al_2O_3 + Na_2O)$ – chemical proxy of alteration (Cullers, 2000; Buggle et al., 2008);

$Al_2O_3/(CaO + Na_2O + K_2O + MgO)$ – a modification of the CIA index; a measure of the intensity of weathering (Gallet, Jahn, Torii, 1996; Retallack, 2001).

The increasing CIA, CALMAG, CIW, and CPA values indicate a warm, humid climate, while decreasing indices point to cold, arid conditions.

$ICV = (Fe_2O_3 + K_2O + Na_2O + CaO + MgO + TiO_2)/Al_2O_3$ – index of compositional variability is a reflection of sediment maturity (Cox, Lower, Cullers, 1995);

$(CaO + MgO)/Al_2O_3$ – an index assessing the accumulation of carbonates (Retallack, 2001);

TiO_2/Al_2O_3 (Schilman et al., 2001) or TM (Yudovich, Ketris, 2011) – this index tracks the degree of homogeneity of the material. It can be used as a paleoclimatic indicator provided that the source of the material remains unchanged.

The following petrochemical modules were also analyzed: Al-Si-M (aluminosilicate), HM (hydrolyzate), FM (femic), FM (ferrous), TM (titanium), NM (sodium), KM (potassium), AM (alkaline), TAM (total alkalinity), NAM (normalized alkalinity) (Ibid.).

Isotope studies were conducted in the Geoanalytic Center for Collective Use (Zavaritsky Institute of Geology and Geochemistry, Ural Branch of the Russian Academy of Sciences, Yekaterinburg). Sample preparation and measurements were executed through methods described in (Vishnevskaya et al., in press). Rare earth elements (REE) content was determined using a NexION 300S quadrupole mass spectrometer (PerkinElmer, USA). Determination of strontium isotopic ratios was carried out on a multicollector inductively coupled plasma mass spectrometer (ICP MS; Neptune Plus, Thermo Scientific, USA). The correctness of the measurement technique was assessed using the international strontium standard SRM-987 ($^{87}Sr/^{86}Sr$ isotopic ratio 0.71025). Mass fractionation was corrected by normalization according to exponential law with respect to a $^{88}Sr/^{86}Sr$ ratio of 8.3752.

Research results

Stratigraphy

Six lithological layers were identified at Moiltyn-am, each of which represents a cultural horizon (Fig. 2). The total thickness of the deposits is 170 cm. Layers 2–4 are deformed conformably; they sank down, probably under the influence of cryogenic processes. Layers 4–6 are combined into a single unit; they have the same sedimentary origin and probably the same age of deposition (distinct from the age of the enclosed archaeological complexes).

The analysis of the directions and orientations of linear artifacts indicates disturbances in all cultural horizons at Moiltyn-am. The layers comprising the middle unit (layers 2 and 3) are composed of scree deposited under dry conditions. The sediments of the lower unit (layers 4–6) exhibit traces of solifluction that occurred when the soil was saturated. Layers visible in the 1990s excavation trench at Moiltyn-am (Lenoble, Bertran, 2004) are better preserved than those of the 2018–2019 trench, located lower on the terrace slope.

The Orkhon-1 stratigraphic column in trench 1-2 comprised seven layers; archaeological horizons are associated with layers 4 and 7. The profile of Orkhon-7, trench 3 (2018–2019) includes 12 layers and generally corresponds with the descriptions by S.V. Nikolaev (Derevianko, Nikolaev, Petrin, 1992, 1994), except for our identification of an additional layer (Khatsenovich et al., 2019b).

Faunal analysis

Only 20 animal bones were recovered at Moiltyn-am. A well-preserved adult tarbagan (*Marmota sibirica*) radius from layer 6 is smaller than that of marmots as a whole (Gromova, 1950). *M. sibirica* is a common member of the Late Pleistocene fauna of the Selenga Basin (Khenzykhenova, 2010). Large ungulates are represented by the remains of a large bovid and a horse. A fragment of a *Bos* sp. indet. humerus from layer 2 exhibits a sharply protruding medial ridge, the edge of which is slightly shifted laterally in the direction of the distal trochlea of the humerus (by 31 % of the width of the entire distal trochlea), which is typical of the genus *Bos* (Bibikova, 1958; Balkwill, Cumbaa, 1992) (Fig. 3, *1*). A scapula fragment from layer 6 represents a medium-sized equid (Fig. 3, *2*). This scapula is somewhat larger than those of the kulan (*E. hemionus*) of southern Siberia; therefore, reliable identification of this specimen is difficult. Pending verification by alternative methods, this specimen is assigned to *Equus* sp. indet.

The fossil collection from the Orkhon-1 2018 excavations contains only seven specimens; insufficient to carry out a comprehensive analysis. Layer 4 yielded fragments of *Equus ferus* bones. Osseous remains from layer 5 were classified to the family Equidae (horse or wild ass). A mandible retaining a single tooth was recovered from layer 7. The adult mandible exhibits certain features of bovid morphology, but is smaller than that of the *Bison priscus* of southern Siberia. The molar (M_3) is 39.3 mm long and 16.8 mm wide; bison teeth from the Angara region are 42.0–54.7 mm long. Thus, the mandible can most likely be attributed to the Baikal yak (*Poephagus baikalensis*).

The Orkhon-7 faunal assemblage is significantly larger (92 spec.), but most of the fossils are unidentifiable fragments. Layer 8 yielded an equid vertebral body and an equid right scaphoid bone. The relative height

Fig. 3. Faunal remains from the Moiltyn-am site.
1 – fragment of *Bos* sp. indet. humerus, layer 2; *2* – fragment of *Equus* sp. indet. scapula, layer 6.

of the latter is noticeably greater than that of ancient European caballoid horses (Langlois, 2005), as well as those of Siberian Late Pleistocene horses*. A mountain sheep or argali (*Ovis ammon*) atlas vertebra recovered from layer 10 is associated with even older remains. The measurements performed according to the method of A. von den Driesh (1976) coincide with those of known *Ovis ammon* from Transbaikalia*.

Radiocarbon dating

Several radiocarbon dates were derived from bone remains recovered from deposits at Moiltyn-am and Orkhon-1. Together with previously published dates from Pleistocene sites in the Orkhon Valley (Derevianko, Kandyba, Petrin, 2010), they attest to the initial peopling of the valley beginning at least 50,000 cal BP (Orkhon-7, trench 3, layer 10b). The valley was subsequently visited sporadically until ca 34,000 BP, with occupation episodes occurring between 23,000–25,000 BP, immediately prior to the Last Glacial Maximum and immediately following the LGM, until nearly the beginning of the Holocene (Table 1).

Geochemical and isotopic characteristics of sediments at the Moiltyn-am site

The values of the chemical index of alteration (CIA) throughout the profile are low, falling within 49.6–50.4 (c/v – coefficient of variation = 0.6 %) (Fig. 4), which indicates the influx of young material from unweathered rocks (Buggle et al., 2008; Interpretatsiya…, 2001). CIA = 70 was taken as the boundary for separating sediments accumulated in cold versus warm climates (Nesbitt, Young, 1982). Thus, the accumulation of the deposits took place under cold, arid environmental conditions with underdeveloped leaching processes. The nearly constant CIA value throughout the profile indicates that no significant changes in climatic conditions occurred. The CIW and CPA indices do not change noticeably throughout the profile, the CIW values fall within the range of 56.2–57.3 (c/v = 0.7 %), CPA – 73.0–73.6 (c/v = 0.4 %), which indicates a low degree of chemical transformation of the sediments. When studying arid environments, the CALMAG index is also calculated, since this index is closely related to humidity, in particular with average annual precipitation (Yudovich, Ketris, 2011). The CALMAG values exhibit great variability, fluctuating throughout the profile within the range of 50.55–60.38 (c/v = 5.8 %). The highest values correspond with layer 6; they gradually decrease upward to layer 3, which is characterized by lowest values, attesting to a decrease in environmental humidity. Layer 2 exhibits increasing CALMAG values, which is an indicator of greater moisture content. Note that in this article, the humidity and aridity of the environment refer to the relative increase or decrease in the amount of precipitation in the course of sedimentation.

The sediment maturity index or the index of compositional variability (ICV) fluctuates from 1.53 to 1.85 (c/v = 6 %) throughout the profile; the values are higher in layers 2 and 3, indicating that aeolian processes played a greater role in the formation of these strata as compared to layers 4–6. Values of ICV >1 are typical of young deposits containing only a small amount of clayey minerals.

*Unpublished data of A.M. Klementiev.

Table 1. **Radiocarbon dates from Orkhon-1, Orkhon-7, and Moiltyn-am generated from 1990–2020**

Site	Layer	Method	Lab code	Date, yrs BP	Calibrated date, yrs BP (68.3; 95.4 %, IntCal 20)	Source
Moiltyn-am	2	AMS	SOAN-8156	18,830 ± 290	23,050–22,400 23,750–22,200	Rybin et al., 2016
"	4	AMS	GifA-10857	20,240 ± 300	24,700–23,900 25,200–23,750	Bertran et al., 2003
"	2	AMS	AA-112827	32,460 ± 620	37,750–36,100 39,100–35,700	Present study
Orkhon-1, trench 1-2	4	^{14}C	SOAN-2886	29,465 ± 445	34,450–33,500 35,100–32,850	Derevianko, Nikolaev, Petrin, 1992
"	4c	^{14}C	RIDDLE-717	34,400 ± 800	40,600–38,500 41,200–37,350	Derevianko, Kandyba, Petrin, 2010
"	5a	^{14}C	RIDDLE-716	38,600 ± 800	42,950–42,150 43,950–41,850	Ibid.
"	7	AMS	AA-112828	>40,400	–	Present study
"	7	AMS	AA-112829	>40,400	–	"
Orkhon-7, trench 3	3	^{14}C	SOAN-2878	9910 ± 85	11,650–11,200 11,750–11,150	Derevianko, Kandyba, Petrin, 2010
Orkhon-7, trench 1	4	^{14}C	USA	15,100 ± 900	19,550–17,250 20,850–16,150	Astashkin et al., 1993
"	4b	^{14}C	USA	15,600 ± 900	20,200–17,950 21,700–16,900	Ibid.
"	5	^{14}C	USA	23,595 ± 459	28,300–27,300 28,900–27,050	"
Orkhon-7, trench 3	2	^{14}C	SOAN-2883	23,595 ± 155	27,900–27,600 28,100–27,350	"
"	5	ESR	–	25,000	25,000	"
"	5	Pa-231	USA	25,400 ± 1100	–	"
"	5	Th-230	USA	25,500 ± 1400	–	"
"	6a	^{14}C	SOAN-2879	31,490 ± 310	36,150–35,500 36,450–35,250	Derevianko, Petrin, 1995
"	6b	^{14}C	SOAN-2880	33,295 ± 500	38,950–37,350 39,450–36,700	Astashkin et al., 1993
"	5c	^{14}C	SOAN-2885	33,785 ± 300	39,350–38,300 39,550–37,600	Derevianko, Petrin, 1995
"	6c	^{14}C	SOAN-2881	37,400 ± 580	42,350–41,650 42,550–41,250	Astashkin et al., 1993
"	7	ESR	–	38,200	38,200	Ibid.
"	7	^{14}C	SOAN-2884	39,970 ± 819	43,950–42,750 44,550–42,400	"
"	9	^{14}C	SOAN-2882	40,000 ± 700	43,900–42,800 44,450–42,500	Derevianko, Petrin, 1995
"	9	ESR	–	40,500	40,500	Astashkin et al., 1993
"	10b	^{14}C	USA	45,100 ± 1700	49,850–45,800 54,650–44,750	Ibid.
"	10b	ESR	–	59,500	–	"

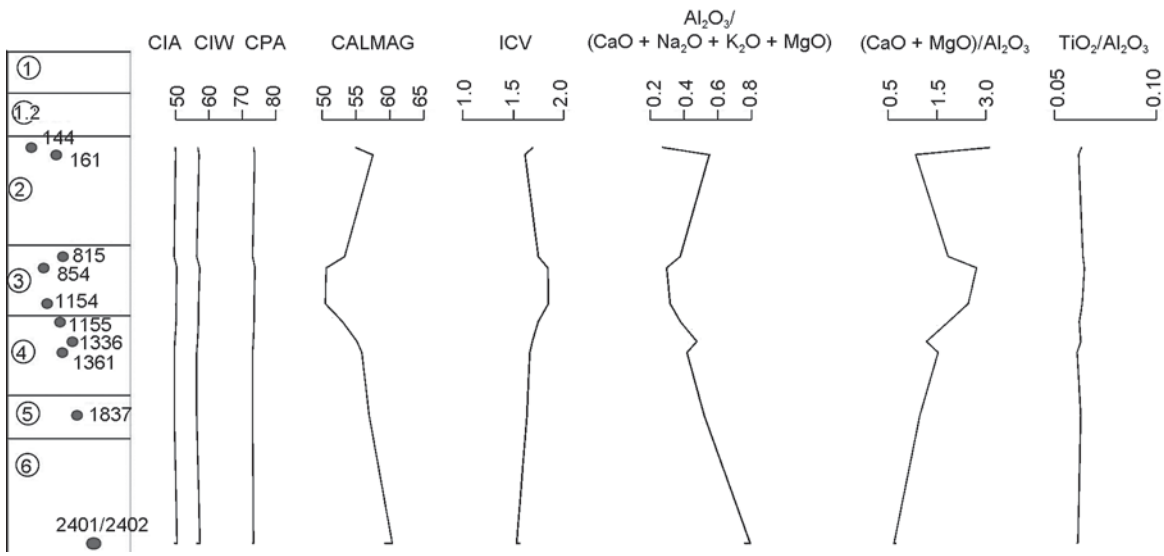

Fig. 4. Distribution of geochemical indices along the Moiltyn-am profile.

Another variation of CIA is the index Al_2O_3/(CaO + + Na_2O + K_2O + MgO); it shows a more dynamic distribution of values and generally corresponds to the distribution pattern seen in CALMAG, but exhibits greater sensitivity to changes in moisture content. Its values vary from 0.27 to 0.80 (c/v = 5.8 %); there is a clear tendency for the values to decrease upward from layer 6 to layer 3 and increase from the top of layer 3 to layer 2, with a sharp drop in the upper part of layer 2. Since the increase in this index's values is associated with active leaching processes, it can be assumed that the accumulation of deposits in layers 6–4 occurred under conditions of gradually decreasing the moisture content in the paleoenvironment and a decrease in the effect of chemical weathering. The lowest Al_2O_3/(CaO + Na_2O + K_2O + MgO) values in layer 3 suggest accumulation in a relatively arid environment with the lowest degree of humidity, with increasing humidity during the formation of layer 2.

The derived values of the carbonate index (CaO + MgO) / Al_2O_3 are in agreement with the hypothesized dynamics of changes in the environment. The curve of the index values is inversely proportional to the curve of Al_2O_3 / (CaO + Na_2O + K_2O + MgO). It varies (c/v = 44.9 %) from 0.65 at the base of layer 6 to 3.08 in layer 2; increased values were recorded in layer 3 and the upper part of layer 2, which indicates the greatest carbonate content in the deposits and sedimentation under the most arid conditions.

Geochemical modules Al-Si-M, HydrolyzateM, FerrumM (Table 2) are similarly distributed through the profile, exhibiting extremely low variability (1.7–1.8 %); a slight increase was noted in layer 3. The variability of FerrumM values is 17.6 %; maximum values are also noted in layer 3. Variations of NatriumM, PotassiumM, AlcaliM, and Normal-alkali-M fall in the range of 1.0–2.0 %. A slightly higher coefficient of variation was observed for Total-Alkalinity-M –6.1 %. The TitaniumM value practically does not change throughout the layers analyzed (c/v = 2 %). Low Al-Si-M and HydrolyzateM values are indicators of young material at the source of sediment origin. NAM values >0.40 indicate the presence of a large amount of feldspar in the sediments; this is also evidenced by ALcalinity-M values >1.5 (Ibid.). Such a distribution of geochemical modules is apparently associated with young, weakly weathered material at the source of the sediments. Despite grain-size differences in the sediments, the primary material did not differ significantly in petrographic composition and degree of maturity; this can be explained by the fact that the material originated at a single location, but was transported by different means.

Low HydrolizateM values are characteristic of sediments poorly transformed by chemical weathering processes. A low SodiumM value indicates a very low degree of chemical differentiation.

Concentrations of rare earth elements and yttrium (REE+Y) normalized to chondrite (Sun, McDonough, 1989) are shown in Fig. 5 and in Table 3. The distribution of the chondrite-normalized REE indices is similar. The samples are enriched in light REEs, depleted in heavy REEs, without an anomaly in Ce

(Ce / Ce* ~1): they are characterized by a small negative Eu anomaly (Eu / Eu* ~0.78). Note that the spectrum of Sample 1837 (layer 5) is similar to the others, but the concentrations of all elements are almost two times higher. Fig. 5 also indicates the composition of REEs in the upper continental crust (UCC) (Taylor, McLennan, McCulloch, 1983). The samples under study, except for the magnitude of the Europium anomaly, show the same distribution pattern. Comparisons have been made with the mean composition of loess on the Chinese Loess Plateau (CLP in the graph) (Yokoo et al., 2004). The distribution of elements normalized to chondrite does not show any significant differences within the data. The diagram of distribution of samples normalized to PAAS (post-Archean Australian shale, which is the standard of Phanerozoic sedimentary rocks (Taylor, McLennan, 1985)) shows differences between the sediments at Moiltyn-am and the mean composition of the loess: the former have a positive Europium anomaly, and the latter have a negative one. This index suggests a different amount of plagioclase in the rocks and the degree of alteration. Despite the fact that the distribution patterns are similar, the sources of these sediments were probably different.

It has been established that the ratio of non-normalized LREE (La + Ce + Pr + + Nd + Sm + Eu) to HREE+Y (Gd + + Tb + Dy + Ho + Er + Tm + Yb + Lu + Y) can be considered as a climate indicator (Ronov, Balashov, Migdisov, 1967): less than 2.5 = arid, 2.5–4.0 = semi-arid-semi-humid, above 4 = humid. The ratio of LREE/HREE at Moiltyn-am varies within the range of 2.9 to 3.8 (mean 3.5), which is typical of sediments formed under semi-arid to semi-humid climatic conditions (Ibid.). This is also confirmed by the Th/U ratio (Siko, Goikovi, 1966), which varies from 2.6 to 3.8 (mean 3.1)

*The magnitude of anomalies was calculated from (Bau, Alexander, 2006).

Table 2. **Petrogenic oxides content of the Moiltyn-am deposits, wt%**

Oxide	MA 19 144 ISO	MA 19 161 ISO	MA 19 815 ISO	MA 19 854 ISO	MA 19 1154 ISO	MA 19 1155 ISO	MA 19 1336 ISO	MA 19 1361 ISO	MA 19 1837 ISO	MA 19 2401 ISO	MA 19 2402 ISO
SiO_2	44.49	57.95	53.60	48.28	49.17	52.87	56.53	53.81	58.19	63.77	63.01
TiO_2	0.53	0.65	0.62	0.59	0.59	0.61	0.66	0.62	0.67	0.71	0.70
Al_2O_3	10.81	13.62	12.46	11.66	11.89	12.69	13.45	13.13	13.68	14.93	14.77
Fe_2O_3	3.57	4.44	3.90	3.84	3.91	4.03	4.32	4.17	4.39	4.91	4.80
MnO	0.06	0.09	0.07	0.06	0.07	0.07	0.08	0.07	0.10	0.12	0.10
MgO	1.78	1.85	2.29	2.67	2.72	2.43	2.17	1.97	1.88	1.62	1.63
CaO	15.87	6.47	10.69	13.92	12.80	10.78	7.94	10.06	7.24	3.14	3.49
Na_2O	2.39	2.96	2.79	2.52	2.61	2.78	2.98	2.94	3.06	3.30	3.32
K_2O	2.38	3.11	2.77	2.55	2.58	2.75	3.01	2.91	3.04	3.29	3.23
P_2O_5	0.53	0.34	0.22	0.22	0.31	0.21	0.19	0.21	0.34	0.39	0.42
BaO	0.06	0.08	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.09
SO_3	1.05	0.40	0.27	0.17	0.27	0.15	0.28	0.32	0.31	0.18	0.20
V_2O_5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cr_2O_3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
NiO	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Loss on ignition	16.71	8.10	10.02	13.29	12.57	10.47	7.80	9.54	6.84	3.32	3.66
Total	100.23	100.08	99.79	99.84	99.58	99.92	99.51	99.86	99.83	99.77	99.45

Table 3. **The content of rare earth elements and yttrium (μg/g) and the isotopic composition of strontium in the Moiltyn-am deposits**

Chemical element	MA 19 144 ISO	MA 19 161 ISO	MA 19 815 ISO	MA 19 854 ISO	MA 19 1154 ISO	MA 19 1155 ISO	MA 19 1336 ISO	MA 19 1361 ISO	MA 19 1837 ISO	MA 19 2401 ISO	MA 19 2402 ISO
La	18	20	29	22	15	23	19	19	27	17	18
Ce	40	40	60	50	33	48	43	38	60	35	39
Pr	5	5.1	7	6.1	4	5.5	5.6	5.2	8	4	5
Nd	20	20	29	24	17	21	22	20	32	17	20
Sm	3.8	4.2	6	4.4	3.5	4	4.7	3.9	6	3.4	3.9
Eu	0.9	1.1	1.1	1.1	0.9	1.1	1.1	0.9	1.6	0.7	0.8
Gd	3.5	4	5	4	3.1	4	4	3.5	6	3.1	3.3
Tb	0.5	0.6	0.6	0.6	0.5	0.5	0.6	0.5	0.9	0.4	0.5
Dy	2.8	3.4	4	3.2	2.8	3.1	3.8	3.1	5	2.8	2.9
Y	15	17	11	16	13	17	18	14	25	8	7
Ho	0.6	0.7	0.8	0.6	0.5	0.6	0.8	0.6	1	0.5	0.6
Er	1.6	2	2.2	1.8	1.6	1.8	2.3	1.8	3	1.6	1.7
Tm	0.23	0.29	0.32	0.26	0.23	0.26	0.33	0.26	0.4	0.23	0.24
Yb	1.5	1.9	2.1	1.7	1.5	1.7	2.1	1.7	2.8	1.5	1.5
Lu	0.24	0.3	0.3	0.26	0.22	0.25	0.3	0.25	0.4	0.2	0.22
Ce*	1.007	0.927	0.959	1.034	0.993	0.984	1.016	0.917	0.992	0.954	0.982
Eu*	0.741	0.808	0.597	0.787	0.818	0.832	0.756	0.730	0.806	0.647	0.664
REE+Y	376	411	542	448	327	431	433	384	604	328	367
(La-Gd)/ (Tb-Lu, Y)	3.61	3.15	4.26	3.94	3.21	3.90	3.03	3.46	3.21	3.62	3.77
La/Yb	8.61	7.55	9.91	9.28	7.17	9.70	6.49	8.02	6.92	8.13	8.61
La/Sm	3.06	3.07	3.12	3.23	2.77	3.71	2.61	3.15	2.91	3.23	2.98
LREE/HREE	3.11	2.72	3.45	3.38	2.77	3.35	2.65	2.98	2.75	2.98	3.10
$^{87}Sr/^{86}Sr$	0.709265	0.709595	–	0.709588	0.709543	0.709381	0.709255	0.709549	0.709101	–	–

Note: All the estimated values are given for the values normalized to chondrite. Measuring error for the strontium isotopic composition is 0.005 %.
*The magnitude of anomalies calculated after (Bau, Alexander, 2006).

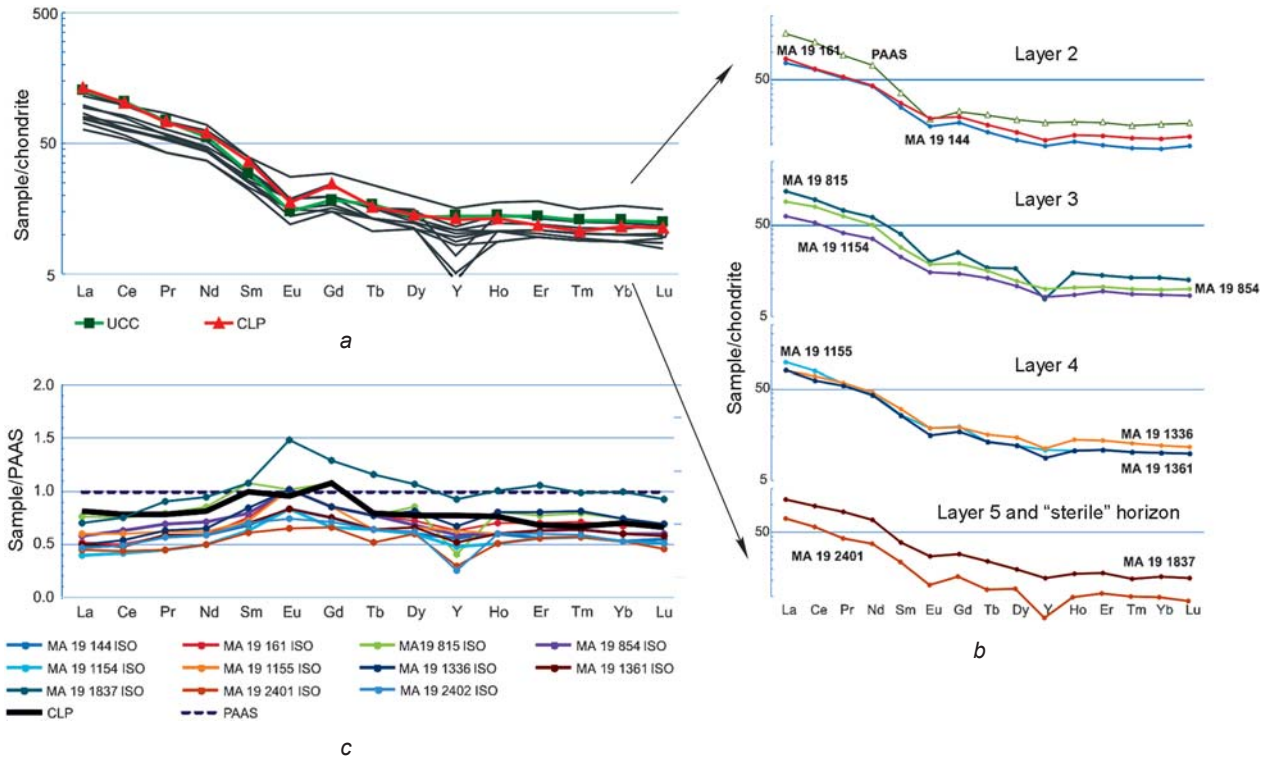

Fig. 5. Distribution of rare earth elements and yttrium.
a – normalized to chondrite (Sun, McDonough, 1989); *b* – the same, separately for each layer; *c* – normalized to PAAS (Taylor, McLennan, 1985). UCC – mean compositions of the upper continental crust (after (Taylor, McLennan, McCulloch, 1983)), CLP – mean compositions of central Chinese loess (after (Yokoo et al., 2004)).

and corresponds to the range between typically arid and typically humid environments.

The strontium isotopic composition of the study samples varies from 0.7091 to 0.7096 (Fig. 6, see Table 2). The ^{87}Sr / ^{86}Sr ratio increases up the profile, which indicates that there were no sharp climate fluctuations and changes in the locations of materials origin. In addition, two points (in layers 2 and 4) fall outside the trend line, which can be best explained by the redeposition of sediments.

Sediments in the Moiltyn-am area do not contain any anomalous trace elements, and their geochemical features are comparable with PAAS clayey rocks; the $^{87}Sr/^{86}Sr$ ratio of these rocks is typical of the upper continental crust, which implies that the sediments were subjected to vigorous mixing (Jahn et al., 2001).

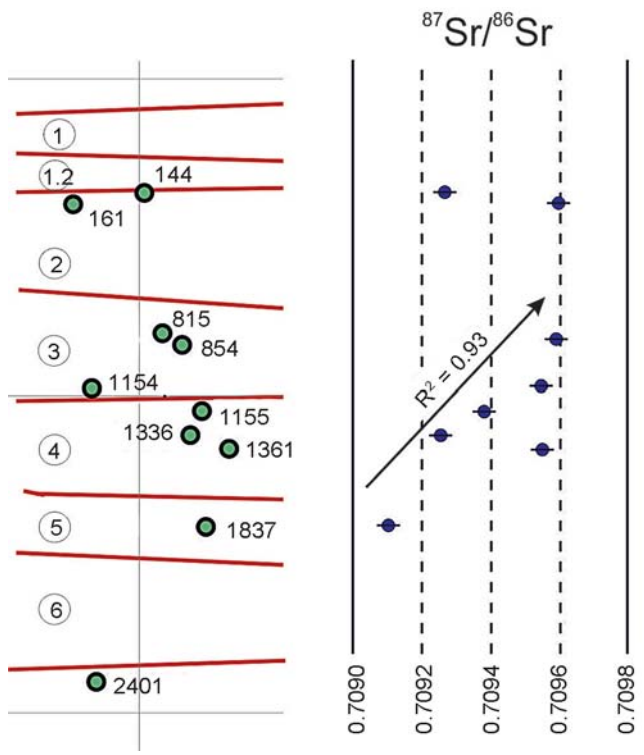

Fig. 6. Strontium isotopic composition of sediments at Moiltyn-am.
R^2 is the value of the reliability of the approximation for all values, except for samples MA 19 144 ISO and MA 19 1361 ISO.

Discussion

The data presented here provide additional information about the sedimentation features and depositional integrality of the Moiltyn-am layered sequence. On the basis of the reconstructed geomorphological situation, derived geochemical data, and the results of the analysis of the positions and orientations of linear artifacts, we conclude that all the deposits at the site were formed owing to the redeposition of nearby lithic material: the lowermost layers owing to down-slope migration processes in the valley, layers 3 and 2 evincing significant aeolian transport of dust from the valley (Fig. 7). The destruction of the uppermost deposits was so significant that some of the archaeological materials were exposed on the surface.

Distinctions between the middle and lowermost sedimentary units can also be traced in the state of preservation of the surface of uncovered remains: faunal material from layers 2 and 3 exhibits an unconsolidated structure and highly damaged surfaces, while bones recovered from layers 5 and 6 are dense and well-preserved (Klementiev et al., 2019). Patina covering both sides of stone artifacts from layer 2 testifies to the repeated transport of those objects until the moment of their interment.

Sedimentation at sites in the Orkhon Valley took place under various environmental conditions. Today, the Kharkhorin region is characterized by a semi-arid and cold steppe climate (Köppen climate classification Bsk), with an average annual temperature of –0.2 °C and an average rainfall of 254 mm per year. During MIS-3 (ca 57,000–29,000 cal BP), the climate differed

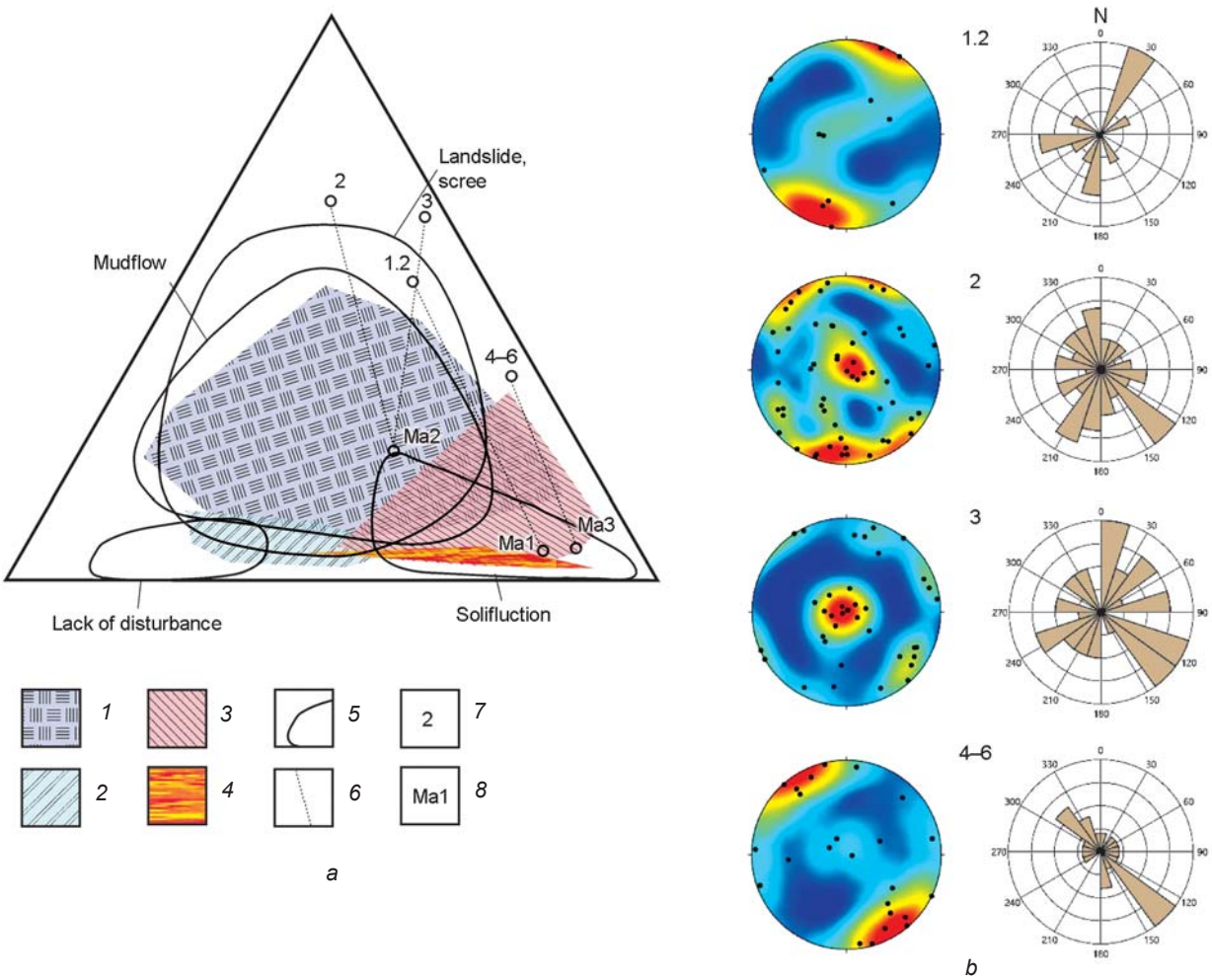

Fig. 7. Diagrams after Benn (after (McPherron, 2005)) (*a*), Schmidt and rose diagrams (*b*) for the Moiltyn-am deposits.
1 – mudflow; *2* – shallow outflow; *3* – solifluction; *4* – steep outflow; *5* – boundaries of post-depositional processes (after (Lenoble, Bertran, 2004)); *6* – correlation of units corresponding to one another; *7* – number of the layer identified in 2018–2019; *8* – number of the layer identified in 1997.

from current conditions throughout the entire Khangai Plateau and, in particular, in the Orkhon Valley (Fig. 8).

Data generated by lithological, sedimentological, and paleocryological analyses suggest that the early stage of the formation of terrace 2, containing Orkhon-7, dates back to ca 40,000 BP (Derevianko, Nikolaev, Petrin, 1992), during a cold climatic interval evidenced by powerful cryogenic deformations. Hence, cold snaps were sharp but short-lived under arid conditions between 40,000–37,000 BP. Significant climate fluctuations lasting for several centuries are also recorded. In general, noticeable cryo-deformations

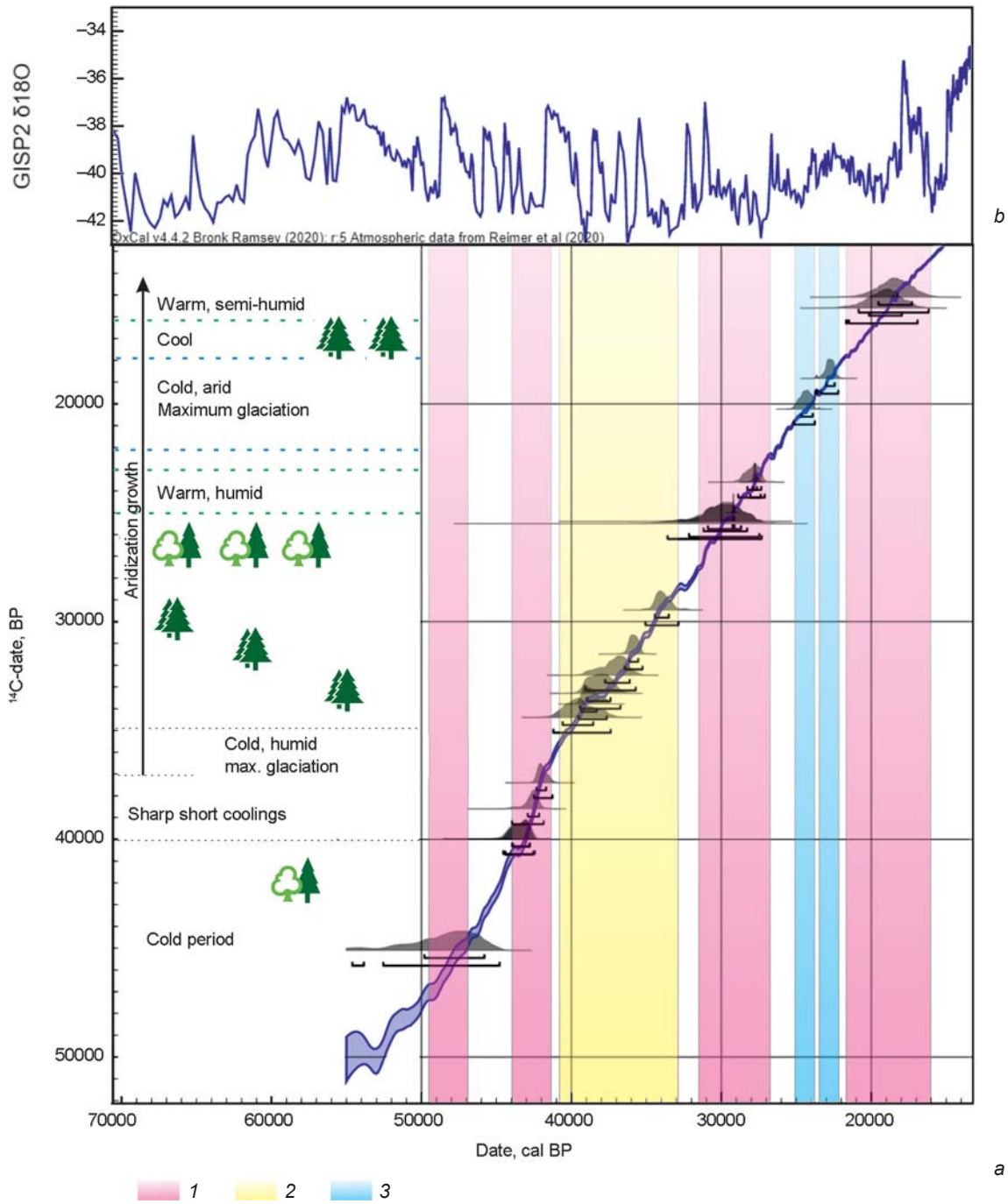

Fig. 8. Paleoclimatic changes and distribution of calibrated radiocarbon dates from sites in the Orkhon Valley (*a*), reconstruction of temperature fluctuations based on data from annual core layers of the Greenland Ice Sheet Project 2 (*b*).
1 – human occupation episodes; *2* – a series of occupation episodes; *3* – probable occupation episodes during the Last Glacial Maximum.

decreased up the profile owing to increasing climate aridification. The results of palynological studies at Orkhon-1 and -7, supported by radiocarbon assays, indicate that afforestation processes were vigorous during the first half of MIS-3, and areas lightly vegetated by coniferous species and mixed forests expanded (Ibid.).

According to the new chrono-climatic scale based on analytical data on sedimentation processes in the Gobi Altai and Khangai Plateau regions and on OSL dates from deposits in Orkhon excavation units (Lehmkuhl, Nottebaum, Hülle, 2018), MIS-3 represented a period of relatively high humidity in the Khangai. Studies of moraine sequences in this highland area have shown that glaciated tracts were most extensive ca 40,000–35,000 cal BP; the climatic conditions of MIS-3 were cold and humid, with more precipitation than today in winter. In the drier Gobi Altai district (Batbaatar, 2018), maximum glaciation during MIS-3 occurred between ca 40,000–30,000 BP.

Lithological, sedimentological, and paleocryological data from the Orkhon Valley indicate favorable humid conditions at the end of MIS-3 (ca 25,000–28,000 cal BP). According to the results of palynological analysis, this was a period of forest expansion in the region; but while moisture conditions remained unchanged, it was cooler than during the previous phase (Derevianko, Nikolaev, Petrin, 1992).

The boundary of Orkhon terrace 1 was formed at lower temperatures during a cold phase; the accumulation process began with the humidification of the climate and the development of dense vegetation cover, which promoted the accumulation of loess. This coincides with data on dated eolian deposits of the LGM (23,000–18,000 BP) (Grunert, Lehmkuhl, 2004; Schwanghart, Schütt, Walther, 2008). In the Late Pleistocene (14,400 ± 1400 BP for the lithological section at an altitude of 2439 m asl and 13,300 ± ± 1300 BP at an altitude of 2047 m asl), periglacial processes prevailed in the highest montane areas (i.e., those exceeding 2800–3000 m asl) of the Khangai. In the alpine zone (1800–2800 m asl), aeolian deposits accumulated. Limited accumulation of sediments was noted at lower elevations on alluvial fans and, based upon the study of paleolakes and the results of OSL dating (Lehmkuhl, Nottebaum, Hülle, 2018), lacustrine water levels were low and the climate was very dry.

In the Orkhon Valley, cold and dry conditions have been reconstructed for the period of MIS-2 (ca 29,000–14,000 cal BP); average annual temperatures could have dropped to –6 °C (Derevianko, Nikolaev, Petrin, 1992). The area was characterized by an arid, extreme continental climate for a long period, contributing to the formation of specific stable landscapes during the Pleistocene. At the same time, minor fluctuations in temperature and humidity contributed to sharp local differentiation. Palynological data for MIS-2 in the Orkhon Valley are characterized by a low content of arboreal pollen (7 %), dominated by birch (*Betula* sp. indet.) and pine (*Pinus* sp. indet.) (Ibid.). Xerophytic taxa (e.g., *Artemisia*, *Cichorium*, members of the Amaranthaceae) dominated the herbaceous composition.

Analyses of periglacial zones reconstructed on the basis of dated moraines in the Khangai and Gobi Altai mountain ranges (Batbaatar, 2018) suggest three models of glacier development depending upon the local climate: 1) glaciers were larger in moderately humid regions during MIS-3 than during MIS-2; 2) in semi-arid regions, maximum glacier extensions were recorded during MIS-2; 3) in arid regions, Early Holocene glaciers were comparable in size to those of the LGM. In the Khangai, where the climate was more humid than in the Gobi Altai region, maximum glaciation is dated to ca 22,000 BP. ^{10}Be isotope studies of moraines in the Khangai region (Rother et al., 2014) and in the Gobi Altai (Vassallo et al., 2005) have shown that in the Khangai Mountains during MIS-2 (ca 23,000 to 17,000–16,000 BP), large-scale glaciation took place, reaching the maximum extent of MIS-3 glaciers.

Results of the analysis of geochemical models and rare earth elements also indicate that the climate of the Orkhon Valley remained semi-arid and, periodically, semi-arid to semi-humid during the Late Pleistocene. According to geochemical indicators of weathering at Moiltyn-am, the source of raw materials did not change significantly during the formation of all the layers at the site. Sedimentation occurred in an arid environment; layers 6–4 were accumulated under relatively humid conditions as compared to overlying strata. The driest conditions were observed during the formation of layer 3 (ca 25,000–30,000 cal BP). Our conclusions are at variance with earlier data that regarded this period as representing the wettest phase at the site (Derevianko, Nikolaev, Petrin, 1992). Moiltyn-am layer 2 was formed under conditions of increasing relative humidity and intensification of weathering processes.

During MIS-3, environmental conditions in the Khangai Mountains in general and in the Orkhon Valley in particular, were favorable for human habitation and the presence of faunal communities adapted to fluctuations in relative aridity and humidity, despite

periods of climatic instability. Currently, the Khangai region is a key area for the development of ungulate breeding: cattle, ovicaprids, and horses graze here. In the arid regions of the Gobi Altai district, south of the Khangai Plateau, camels have replaced cattle in the livestock repertoire. Currently available radiocarbon data suggest attribution of isolated finds and remains of groups of species from archaeological deposits in Mongolia to the Late Upper Pleistocene and Holocene. The most numerous remains of bones and associations of species have been recorded during MIS-3 and early MIS-2 (Table 4).

Table 4. **Fauna of Mongolian regions during MIS-3 and -2***

Period, ka BP	Selenga Valley	Orkhon Valley	Eastern Mongolia, Gobi Desert	Western Mongolia, Gobi Altai
12–14	Kharganyn-Gol-5: *Ovis ammon*, *Struthio asiaticus*	–	–	–
15–17	Tolbor-4, -15: *Struthio asiaticus*	–	–	–
18–20	–	–	–	Sudjiin Khunduk Agui Cave: *Capra sibirica*
21–23	Dörölj-1: *Struthio asiaticus*	–	–	Tsagaan Agui Cave: Equidae
24–26	Tolbor-4: *Struthio asiaticus*	–	–	Tsagaan Agui Cave: Equidae Yarool Dzykhtyn Agui Cave: *Capra sibirica*
27–29	Dörölj-1: horse Tolbor-15: *Struthio asiaticus*	Moiltyn-am: *Bos* sp.	–	Sudjiin Khunduk Agui Cave: *Capra sibirica*
30–32	Tolbor-21: *Marmota sibirica* Kharganyn-Gol-5: *Ovis ammon* Dörölj-1, Tolbor-4: *Struthio asiaticus* Tolbor-15: Equidae	–	Salkhit: *Coelodonta antiquitatis*	Yarool Dzykhtyn Agui Cave: *Capra sibirica*
33–35	Kharganyn-Gol-5: *Ovis ammon, Cervid/Saiga* Tolbor-16: *Bos* sp., Felinae, Caprinae, Equidae Tolbor-4: Equidae, *Struthio asiaticus* Tolbor-15: Equidae	–	Rashaan Khad: *Bos* sp., *Equus*	Tsagaan Agui Cave: *Allactaga*, *Lepus tolai*, *Pantholops hodgsoni*, *Equus ferus, Equus hemionus* Yarool Dzykhtyn Agui Cave: *Capra sibirica*
36–39	Tolbor-21: *Coelodonta antiquitatis*, *Equus ferus*, *Equus hemionus*, *Poephagus baikalensis* Tolbor-16: *Bos* sp., *Mammuthus* sp.	Orkhon-7: Equidae Moiltyn-am: *Equus ferus*, *Bos* sp., *Marmota sibirica*, *Struthio asiaticus*	–	Tsagaan Agui Cave: Equidae Yarool Dzykhtyn Agui Cave: *Capra sibirica*
40–42	Tolbor-16: *Bos* sp.	Orkhon-1: *Poephagus baikalensis* Orkhon-7: *Equus ferus*	–	–
43–45	Kharganyn-Gol-5: *Ovis ammon*	–	–	Chusutuin-Gol: *Equus ferus, Camelus* sp., *Panthera* sp., *Crocuta* sp., *Mammuthus primigenius*
46–49	Kharganyn-Gol-5: *Equus hemionus, Poephagus baikalensis,* Equidae	Orkhon-7: *Ovis ammon,* Rhinoceratidae	–	Tsagaan Agui Cave: Equidae
50–52	Tolbor-21: *Cervid/Saiga*	–	–	Tsagaan Agui Cave: *Allactaga*, *Lepus tolai*, *Citellus*, *Canis lupus*, *Equus hemionus*, *Procapra gutturosa*, *Pantholops hodgsoni*, *Ovis ammon*, *Capra sibirica*

*Based on data published in (Dinesman, Kiseleva, Knyazev, 1989; Derevianko, Nikolaev, Petrin, 1992; Ovodov, 2001; Derevianko et al., 2013; Zwyns et al., 2019) and drawn from the present study.

Various assemblages of Karginian interstadial (MIS-3) mammals have been identified through paleontological analysis and confirmed by ZooMS. Fossils of proboscideans, bovids (*Bos* or *Bison* and yaks), equids (horse and kulan), ovicaprids, rhinoceros, deer/saiga, and felids have been recorded from archaeological sites in northern and central Mongolia and the Khangai region. The predominance of bones of *Bos* sp. indet. in these sites indicates a specialization of the local populations on hunting large bovids. In Mongolia, the genus *Bos* may be represented by both the aurochs (*B. primigenius*) and Baikal yak (*Poephagus baikalensis*), but the bones recovered as part of this study have been defined as yak. ZooMS analysis of these remains identified two complementary genera: *Bos* sp. indet./*Bison* sp. indet. (Zwyns et al., 2019). It cannot be excluded that the zoogeographic distribution of the Pleistocene wild horse, kulan, and, probably, Przhevalsky's and Ovodov's horses (*Equus ferus*, *E. hemionus*, *E. przewalski*, and *E. ovodovi)* in the Khangai were the same. The latter species have been recorded northwest (Plasteeva et al., 2019; Plasteeva, Vasiliev, Kosintsev, 2015) and east (Yuan et al., 2019) of Mongolia. In the ungulate group, equids and large members of the Bovidae were the principal landscape-forming species in the arid ecosystems of Mongolia, and the predominance of bovids has been noted in Middle and Upper Paleolithic complexes; representatives of the Caprinae (mountain sheep, ibex, probably gazelle) were noted in addition to the usual bovid-horse pair in Early Upper Paleolithic collections.

The faunal complex of western and southern (Gobi) Mongolia differs from that of Khangai. The latter correlates with the mammoth faunal complex, which reflects environmental conditions yielding steppe landscapes typical of the Lake Baikal region and Yenisei regions of Siberia and the Altai Mountains. The composition of the Mongolian Altai and Gobi Altai faunal complexes correlates with montane arid habitats close to semi-deserts.

The diversity of large Pleistocene mammals in Mongolia during MIS-3 suggests a lack of large predators (Rautian, Sennikov, 2001) in this area. Humans partially compensated for this deficit through their occupation of the large predator ecological niche. The development of human hunting (predatory) strategies during the Initial and Early Upper Paleolithic in Mongolia was ensured by changes in technology. This is consistent with the conclusion that a distinct expansion of specialization and an increase in the ecological valence of a predator are possible under conditions of complex and, therefore, relatively energetically expensive adaptation (Ibid.). Thus, during the second half of the Mongolian Late Pleistocene, the trophic pyramid of the northern latitudes of Eurasia (Vereshchagin, Baryshnikov, 1992) was supplemented by the genus *Homo*. *Homo* must be regarded as an active predator in this trophic pyramid.

Available radiocarbon dates for Paleolithic sites in the Orkhon Valley suggest the coexistence of hominin groups who used various stone working technologies. Probably, by ca 45,000 cal BP, the Orkhon Valley was populated by humans employing a simple pebble industry (e.g., Orkhon-7, section 3, horizon 7; section 2, horizon 5) and a somewhat younger, but still ≥40,000 years old, lithic complex including Levallois technology (e.g., Orkhon-1, section 1-2, horizon 3). This period was characterized by a cold, humid climate, the spread of mixed forest cover, and repeated waterlogging.

Of the radiocarbon dates modeled for this period (Bronk Ramsey 2020 OxCal v.4.4.2, IntCal20), only three can be taken into account; all of them fall within the range of 42,000–44,000 cal BP, the onset and end of the period bracketed by 42,000–47,000 and 43,000–39,000 cal BP respectively, defining a duration of 1000–3000 years. First, the number of available radiocarbon dates is insufficient for Bayesian analysis, since some of the assays are accompanied by large error intervals, while others are infinite. Second, we envision short-term, single-episode occupations of the Orkhon Valley (Orkhon-7 and Orkhon-1) by groups of people exhibiting varying sets of cultural characteristics. The archaeological materials correlate with the bones of large ungulates—bovids and horses, as well as argali. Most of the Early Upper Paleolithic dates were derived from archaeologically sterile layers in trench 3 at Orkhon-7 and correlated with cultural layers of neighboring excavations. Modeling of only three dates directly associated with archaeological material indicates the probable onset of the Early Upper Paleolithic between 39,000–33,500 cal BP, terminating 34,000–31,000 cal BP. The main period of Early Upper Paleolithic complexes falls within the warming period in MIS-3, when sudden cold snaps ended, aridification was well underway, and coniferous forests (probably dominated by larch, *Larix* spp.) prevailed. In the Khangai area, remains of bovids, horses, and sheep are associated with archaeological material of that period. The middle stage of the Upper Paleolithic lasted between 1500 to 5000 years; its probable onset and termination occurred 36,000–24,000 and 28,000–21,000 cal BP. During this period, the central Mongolian climate changed from increasingly arid to warm and excessively humid, then to the cold and dry

Last Glacial Maximum, which is possibly associated with a hiatus in the cultural sequence and continuity of human habitation in the region; archaeologically-associated LGM faunal remains in Mongolia are scarce, including only Asian ostrich (*Struthio anderssoni* and/or *S. asiaticus*) eggshells.

Conclusions

Collectively, our data indicate gradual aridification of a semi-arid to semi-humid climate in the Orkhon Valley during MIS-3 and -2. This conclusion is supported by the faunal complex reconstructed for the Khangai Mountains, representing the complex mammoth fauna of the steppe and forest-steppe ecozones. The available chronometric determinations do not allow modeling calibrated dates to identify likely episodes of human occupation and reliably correlate them with specific climatic changes. Nevertheless, taking into account radiometric dates of archaeological culture-bearing layers, features of identified lithic industries and their deposition, it can be concluded that human occupation of the Orkhon Valley was episodic, sporadic, and of variable duration. Two discrete occurrences of human occupation have been established thus far at Moiltyn-am; one for the lithological unit including layers 4–6, in which layer 4 is redeposited, and one for layer 3. Layer 2 is rich in archaeological artifacts and includes a complex of materials from layers 4–6 and the later ones, probably younger than the Last Glacial Maximum or contemporaneous with it. Remains of the large bovid – horse – sheep triad are most often found at these sites; the occurrence of bovids, most likely represented by the Baikal yak, decreases with the period of aridification lasting from the Middle Paleolithic to the Early Upper Paleolithic. The diversity of human material culture documented in the study area is obviously associated with paleoecological and paleoclimatic parameters, the fluctuating availability of water resources supporting predictable presence of prey animals, and lithic raw materials suitable for stone tool production, as well as with a favorable geographical location on the pathways of migratory game. The available chronostratigraphic characteristics of sites in the Orkhon Valley are still insufficient for conclusions to be confidently drawn about the coexistence of different hominin groups exhibiting varying cultural characteristics. It is possible that ancestral human populations migrating through the valley did not often encounter one another owing to what we perceive as short-term habitation of the currently known archaeological sites.

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References

Astashkin A.V., Derevianko A.P., Milov A.D., Nikolaev S.V., Petrin V.G., Tsvetkov Y.D. 1993
EPR-datirovaniye: Sravneniye dannykh po datirovaniyu kostnykh ostatkov na arkheologicheskom pamyatnike Orkhon-7 (Mongoliya) metodami EPR i ^{14}C. *Altaika*, No. 3: 9–16.

Balkwill D.M.S., Cumbaa L.A. 1992
Guide to the Identification of Postcranial Bones of *Bos taurus* and *Bison bison*. Ottawa: Canadian Museum of Nature.

Batbaatar J. 2018
Quaternary Glaciation in Central Asia. Washington: Univ. of Wash.

Bau M., Alexander B. 2006
Preservation of primary REE patterns without Ce anomaly during dolomitization of Mid-Paleoproterozoic limestone and the potential re-establishment of marine anoxia immediately after the "Great Oxidation Event". *South African Journal of Geology*, vol. 109: 81–86.

Baumann M., Plisson H., Rendu W., Maury S., Kolobova K.A., Krivoshapkin A.I. 2020
The Neandertal bone industry at Chagyrskaya Cave. *Quaternary International*, vol. 559: 68–88.

Bertran P., Fontugne M., Jaubert J. 2003
Permafrost aggradation followed by brutal degradation during the upper Pleniglacial in Mongolia: The probable response to the H2 Heinrich event at 21 kyr BP. *Permafrost and Periglacial Processes*, iss. 14: 1–9.

Bertran P., Texier J.-P. 1995
Fabric analysis: Application to Paleolithic sites. *Journal of Archaeological Science*, vol. 22: 521–535.

Bibikova V.I. 1958
O nekotorykh otlichitelnykh chertakh v kostyakh konechnostey zubra i tura. *Bulleten Moskovskogo obshchestva ispytateley prirody. Otdel biologichesky*, vol. 63 (6): 23–35.

Buggle B., Glaser B., Zoller L., Hambach U., Markovic S., Glaser I., Gerasimenko N. 2008
Geochemical characterization and origin of Southern and Eastern European loesses (Serbia, Romania, Ukraine). *Quaternary Science Review*, vol. 27 (9/10): 1058–1075.

Cox R., Lower D.R., Cullers R.L. 1995
Influence of sediment recycling and basement evolution of mudrock chemistry in the Southeastern United States. *Geochimica et Cosmochimica Acta*, vol. 59: 2919–2940.

Cullers R.L. 2000
The geochemistry of shales, silt-stones and sandstones of Pensilvanian – Permian age, Colorado, USA: Implications for provenance and metamorphic studies. *Lithos*, vol. 51: 181–203.

Derevianko A.P., Dorj D., Larichev V.E., Petrin V.T. 1989
Arkheologicheskiye issledovaniya v Mongolii v 1988 g. *Izvestiya Sibirskogo otdeleniya AN SSSR*, No. 17, Ser.: Istoriya, filologiya i filosofiya, iss. 2: 26–34.

Derevianko A.P., Kandyba A.G., Petrin V.T. 2010
Paleolit Orkhona. Novosibirsk: Izd. IAET SO RAN.

Derevianko A.P., Nikolaev S.V., Petrin V.T. 1992
Geologiya, stratigrafiya, paleogeografiya paleolita Yuzhnogo Khangaya. Novosibirsk. (Prepr./RAN Sib. otdeleniye. IAET SO RAN).

Derevianko A.P., Nikolaev S.V., Petrin V.T. 1994
Stratigrafiya i paleogeografiya paleoliticheskikh pamyatnikov Khangaya. *Altaika*, No. 4: 69–71.

Derevianko A.P., Olsen D., Tseveendorj D., Petrin V.T., Krivoshapkin A.I., Brantingham P.D. 2000
The stratified cave site of Tsagan Agui in the Gobi Altai (Mongolia). *Archaeology, Ethnology and Anthropology of Eurasia*, No. 1: 23–36.

Derevianko A.P., Petrin V.T. 1995
The Levallois of Mongolia. In *The Definition and Interpretation of Levallois Technology*, vol. 23. Madison, Wisconsin: Prehistory Press, pp. 455–471.

Derevianko A.P., Rybin E.P., Gladyshev S.A., Gunchinsuren B., Tsybankov A.A., Olsen D. 2013
Early Upper Paleolithic stone tool technologies of Northern Mongolia: The case of Tolbor-4 and Tolbor-15. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 41 (4): 21–37.

Derevianko A.P., Zenin A.N., Rybin E.P., Gladyshev S.A., Tsybankov A.A., Olsen D., Tseveendorj D., Gunchinsuren B. 2007
The technology of Early Upper Paleolithic lithic reduction in Northern Mongolia: The Tolbor-4 site. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 29 (1): 16–38.

Dinesman L.G., Kiseleva N.K., Knyazev A.V. 1989
Istoriya stepnykh ekosystem Mongolskoy narodnoy respubliki. Moscow: Nauka.

Driesh A.A. 1976
Guide to the measurement of animal bones from archaeological sites. *Peabodi Museum*, bull. 1.

Gallet S., Jahn B., Torii M. 1996
Geochemical characterization of the Luochuan loess-paleosol sequence, China, and paleoclimatic implications. *Chemical Geology*, vol. 133: 67–88.

Gromova V.I. 1950
Opredelitel mlekopitayushchikh SSSR po kostyam skeletal. Iss. 1: Opredelitel po krupnym trubchatym kostyam. Moscow, Leningrad: Izd. AN SSSR. (Tr. Komis. po izhuch. chetvertich. perioda AN SSSR; iss. IX).

Grunert J., Lehmkuhl F. 2004
Aeolian sedimentation in arid and semi-arid environments of Western Mongolia. In *Palaeoecology of quaternary drylands*, W. Smykatz-Kloss, P. Felix-Henningsen (eds.), vol. 102. Berlin: Springer, pp. 195–218.

Grunert J., Lehmkuhl F., Walther M. 2000
Paleoclimatic evolution of the Uvs Nuur basin and adjacent areas (Western Mongolia). *Quaternary International*, No. 65/66: 171–192.

Harnois L. 1988
The CIW index: A new chemical index of weathering. *Sedimentary Geology*, vol. 55: 319–322.

Interpretatsiya geokhimicheskikh dannykh. 2001
E.V. Sklyarov, D.P. Gladkochub, T.V. Donskaya, and others. E.V. Sklyarov (ed.). Moscow: Intermet Inzhiniring.

Jahn B.M., Gallet S., Han J. 2001
Geochemistry of the Xining, Xifeng and Jixian sections, Loess Plateau of China eolian dust provenance and paleosol evolution during the last 140 ka. *Chemical Geology*, vol. 178 (1–4): 71–94.

Jaubert J., Bertran P., Fontugne M., Jarry M., Lacombe S., Leroyer C., Marmet E., Taborin Y., Tsogtbaatar B., Brugal J.P., Desclaux M., Poplin F., Rodière J., Servelle C. 2004
Le Paléolithique supérieur ancien de Mongolie: Dörölj 1 (Egiïn Gol). Analogies avec les données de l'Altaï et de Sibérie. In *Acts of the XIVth UISPP Congress, University of Liège, Belgium, 2–8 September 2001*. Section 6: Le Paléolithique Supérieur. Oxford: Archaeopress, pp. 225–241.

Khatsenovich A.M., Rybin E.P., Bazargur D., Marchenko D.V., Ge J., Dolgushin I.D., Shevchenko T.A., Kogai S.A., Gunchinsuren B., Olsen J.W. 2019a
Novaya khronologiya i kulturnaya atributsiya arkheologicheskikh kompleksov pamyatnika Moiltyn am (Tsentralnaya Mongoliya). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXV. Novosibirsk: Izd. IAET SO RAN, pp. 269–275.

Khatsenovich A.M., Rybin E.P., Bazargur D., Marchenko D.V., Ge J., Klementiev A.M., Kogai S.A., Dolgushin I.D., Shevchenko T.A., Gunchinsuren B., Olsen J.W. 2019b
Geokhronologicheskaya i arkheologicheskaya letopisi pamyatnika Orkhon-7: K postanovke voprosa. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXV. Novosibirsk: Izd. IAET SO RAN, pp. 276–281.

Khatsenovich A.M., Rybin E.P., Olsen D.V., Guchinsuren B., Bazargur D., Marchenko D.V., Klementiev A.M., Kogai S.A., Shelepaev R.A., Popov A.Y., Kravtsova N.A., Shevchenko T.A. 2018
Khronostratigraficheskiye issledovaniya srednego paleolita na pamyatnike Orkhon-1, Tsentralnaya Mongoliya. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIV. Novosibirsk: Izd. IAET SO RAN, pp. 174–178.

Khenzykhenova F.I. 2010
Surok iz mestonakhozhdeniy pozdnego pleistotsena – golotsena Baikalskogo regiona. In *Proshloye, nastoyashcheye i budushcheye surkov Yevrazii i ekologicheskiye aspekty rasseleniya surkov v Baikalskom regione: Tezisy dokl. X mezhdunar. soveshch. po surkam stran SNG*. Ulan-Ude: BNC SO RAN, p. 61.

Klementiev A.M., Khatsenovich A.M., Rybin E.P., Bazargur D., Marchenko D.V., Kogai S.A., Gunchinsuren B., Olsen J.W. 2019
Noviye danniye po paleofaune pozdnego pleistotsena Mongolii (po materialam pamyatnika Moiltyn am). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXV. Novosibirsk: Izd. IAET SO RAN, pp. 129–134.

Langlois A. 2005
Le Cheval du gisement Pléistocène moyen de La Micoque (Les Eyzies-de-Tayac, Dordogne): *Equus mosbachensis micoquii* nov. ssp. *Paleo*, vol. 17: 73–110.

Lehmkuhl F., Nottebaum V., Hülle D. 2018
Aspects of Late Quaternary geomorphological development in the Khangai Mountains and the Gobi Altai Mountains (Mongolia). *Geomorphology*, vol. 312: 24–39.

Lenoble A., Bertran P. 2004
Fabric of Palaeolithic levels: Methods and implications for site formation processes. *Journal of Archaeological Science*, vol. 31: 457–469.

Marchenko D.V., Khatsenovich A.M., Rybin E.P., Bazargur D., Gunchinsuren B., Olsen D. 2020
Sravnitelnoye issledovaniye sokhrannosti kulturo-vmeshchayushchikh otlozheniy na pamyatnike Moiltyn am (Tsentralnaya Mongoliya). *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. Iss. 5: Arkheologiya i etnografiya: 70–85.

McPherron S.J.P. 2005
Artifact orientations and site formation processes from total station proveniences. *Journal of Archaeological Science*, vol. 32: 1003–1014.

Nesbitt H.W., Young J.M. 1982
Early Proterozoic climates and plate motions inferred from major element chemistry of lutites. *Nature*, vol. 299: 715–717.

Nordt L.C., Driese S.D. 2010
New weathering index improves paleorainfall estimates from Vertisols. *Geology*, vol. 38 (5): 407–410.

Okladnikov A.P. 1981
Paleolit Tsentralnoy Azii. Moiltyn am. Novosibirsk: Nauka.

Olsen S.L., Shipman P. 1988
Surface modification on bone: Trampling versus butchery. *Journal of Archaeological Science*, vol. 15 (5): 535–553.

Ovodov N.D. 2001
Pleistotsenovaya fauna peshchery Tsagan-Agui (MNR). In *Prirodniye usloviya, istoriya i kultura Zapadnoy Mongolii i sopredelnykh regionov*. Tomsk: Izd. Tom. Gos. Univ., pp. 146–147.

Plasteeva N.A., Vasiliev S.K., Klementiev A.M., Kosintsev P.A. 2019
Morfologicheskaya differentsiatsiya loshadey (Equus ovodovi, Equus hemionus) i granitsy ikh obitaniya v Zapadnoy Sibiri v pozdnem pleistotsene. *Zoologicheskiy zhurnal*, vol. 98 (10): 1156–1167.

Plasteeva N.A., Vasiliev S.K., Kosintsev P.A. 2015
Equus (*Sussemionus*) *ovodovi* Eisenmann et Vasiliev, 2011 from the Late Pleistocene of Western Siberia. *Russian Journal of Theriology*, vol. 14: 187–200.

Rautian A.S., Sennikov A.G. 2001
Otnosheniya khishchnik-zhertva v filogeneticheskom masshtabe vremeni. *Ekosystemniye perestroyki i evolyutsiya biosfery*, iss. 4: 29–46.

Reimer P.J., Austin W.E., Bard E., Bayliss A., Blackwell P.G., Bronk Ramsey C., Butzin M., Cheng H., Edwards R.L., Friedrich M., Grootes P.M., Guilderson T.P., Hajdas I., Heaton T.J., Hogg A.G., Hughen K.A., Kromer B., Manning S.W., Muscheler R., Palmer J.G., Pearson C., Plicht J., van der, Reimer R.W., Richards D.A., Scott E.M., Southon J.R., Turney C.S.M., Wacker L., Adolphi F., Büntgen U., Capano M., Fahrni S.M., Fogtmann-Schulz A., Friedrich R., Köhler P., Kudsk S., Miyake F., Olsen J., Reinig F., Sakamoto M., Sookdeo A., Talamo S. 2020
The IntCal20 Northern Hemisphere radiocarbon age calibration Curve (0–55 cal kBP). *Radiocarbon*, vol. 62 (4): 725–757.

Reitz E.J., Wing E.S. 2012
Zooarchaeology. 2nd edition. Cambridge: Cambridge Univ. Press.

Retallack J.J. 2001
Soil of the Past, an Introduction to Paleopedology. Oxford: Blackwell.

Ronov A.B., Balashov Y.A., Migdisov A.A. 1967
Geokhimiya redkozemelnykh elementov v osadochnom tsikle. *Geokhimiya*, No. 1: 3–19.

Rother H., Lehmkuhl F., Fink D., Nottebaum V. 2014
Surface exposure dating reveals MIS-3 glacial maximum in the Khangai Mountains of Mongolia. *Quaternary Research*, vol. 82: 297–308.

Rybin E.P., Khatsenovich A.M. 2020
Middle and Upper Paleolithic Levallois technology in eastern Central Asia. *Quaternary International*, vol. 535: 117–138.

Rybin E.P., Khatsenovich A.M., Gunchinsuren B., Olsen J.W., Zwyns N. 2016
The impact of the LGM on the development of the Upper Paleolithic in Mongolia. *Quaternary International*, vol. 425: 69–87.

Rybin E.P., Paine C.H., Khatsenovich A.M., Bolorbat Ts., Talamo S., Marchenko D.V., Rendu W., Klementiev A.M., Odsuren D., Gillam Ch., Gunchinsuren B., Zwyns N. 2020
A new Upper Paleolithic occupation at the site of Tolbor-21 (Mongolia): Site formation, human behavior and implications for the regional sequence. *Quaternary International*, vol. 559: 133–149.

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

Schwanghart W., Schütt B., Walther M. 2008
Holocene climate evolution of the Ugii Nuur basin, Mongolia. *Advances in Atmospheric Science*, vol. 25: 986–998.

Siko ek B., Goikovi S. 1966
An experimental determination of geochemical facies of sedimentary rocks in the Dinarides based on Th/U ratio. *Freiberger Forschungshefte*, vol. C210: 197–211.

Sun S.S., McDonough W.F. 1989
Chemical and isotopic systematics of oceanic basalts: Implications for mantle composition and processes. *Magmatism in the Oceanic Basins*, A.D. Saunders, M.J. Norry (eds.), vol. 42: 313–345.

Taylor S.R., McLennan S.M. 1985
The Continental Crust: Its Composition and Evolution. Oxford: Blackwells Scientific.

Taylor S.R., McLennan S.M., McCulloch M.T. 1983
Geochemistry of loess, continental crustal composition and crust model ages. *Geochimica et Cosmochimica Acta*, vol. 47: 1897–1905.

Vassallo R., Ritz J.-F., Braucher R., Carretier S. 2005
Dating faulted alluvial fans with cosmogenic 10Be in the Gurvan Bogd mountain (Gobi-Altay, Mongolia): Climatic and tectonic implications. *Terra Nova*, vol. 17: 278–285.

Vereshchagin N.K., Baryshnikov G.F. 1992
The ecological structure of the "Mammoth Fauna" in Eurasia. *Annales Zoologici Fennici*, vol. 28: 253–259.

Vishnevskaya I.A., Okuneva T.G., Bazargur D., Urazova K.K., Klementiev A.M., Marchenko D.V., Rybin E.P., Olsen J.W., Khatsenovich A.M. (In press)
Preliminary results of REE distribution and 87Sr/86Sr ratio in organic and mineral sources from the Paleolithic sites of Mongolia. *Geoarchaeology and Archaeological Mineralogy.* Proceedings of 7th Geoarchaeological Conference, Miass, Russia, 19–23 October 2020.

Yokoo Y., Nakano T., Nishikawa M., Quan H. 2004
Mineralogical variation of Sr–Nd isotopic and elemental compositions in loess and desert sand from the central Loess Plateau in China as a provenance tracer of wet and dry deposition in the northwestern Pacific. *Chemical Geology*, vol. 204: 45–62.

Yuan J.-X., Hou X.-D., Barlow A., Preick M., Taron U.H., Alberti F., Basler N., Deng T., Lai X.-L., Hofreiter M., Sheng G.-L. 2019
Molecular identification of late and terminal Pleistocene Equus ovodovi from northeastern China. *PLoS ONE*, vol. 14 (5): e0216883.

Yudovich Y.E., Ketris M.P. 2011
Geokhimicheskiye indikatory litogeneza (litologicheskaya geokhimiya). Syktyvkar: Geoprint.

Zwyns N., Paine C.H., Tsedendorj B., Talamo S., Fitzsimmons K.E., Gantumur A., Guunii L., Davakhuu O., Flas D., Dogandžić T., Doerschner N., Welker F., Gillam J.C., Noyer J.B., Bakhtiary R.S., Allshouse A.F., Smith K.N., Khatsenovich A.M., Rybin E.P., Byambaa G., Hublin J.J. 2019
The northern route for human dispersal in Central and Northeast Asia: New evidence from the site of Tolbor-16, Mongolia. *Scientific Reports*, vol. 9 (1): 1–10.

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Percussive-Abrasive Stone Tools from Chagyrskaya Cave: Results of Functional Analysis

This article presents a comprehensive study of percussive-abrasive active stone tools from Chagyrskaya Cave, using experimental use-wear and statistical methods, supplemented by 3D-modeling. Experiments combined with use-wear analysis allowed us to determine the functions of these tools by comparing the working surfaces and use-wear traces in the Chagyrskaya samples with those in the reference samples. As a result, we identified 19 retouchers, four hammerstones for processing mineral raw materials, and one hammer for splitting bone, which indicates the dominance of secondary processing over primary knapping in the Chagyrskaya lithic assemblage. Using statistical analysis, we traced the differences in the dimensions of the manuports and lithics under study. These artifacts are a promising and underestimated source of information for identifying working operations associated with stone- and bone-processing; moreover, they can provide new data on the functional attribution of sites and the mobility of early hominins.

Keywords: *Chagyrskaya Cave, Middle Paleolithic, percussive-abrasive stone tools, experimental use-wear analysis, statistical analysis, 3D-modeling.*

Introduction

The category of percussive-abrasive stone tools includes artifacts of diverse appearance. Such tools were used in various working operations, including splitting, polishing, fragmenting, crushing, and grinding mineral and organic raw materials (Semenov, 1953; Beaune, 1989, 1993; Kuchugura, 2003; Grichan, 2006). According to the classification by S. de Beaune, active and passive stone tools have been identified (1989). The group of active tools includes hammerstones, retouchers, abraders, grinders, pestles, and pestle-grinders, while that of passive tools includes anvils, grinding plates, fat lamps, mortars, and pallets.

The percussive-abrasive stone tools have been reported from many Middle Paleolithic sites in the Altai (Okladnikov, 1983; Prirodnaya sreda…, 2003: 126; Shunkov, Kozlikin, Mikhienko, 2019). Specialized studies of such artifacts from the Paleolithic assemblages of the Altai and adjacent regions are currently rare (Belousova et al., 2017; Shalagina et al., 2019; Kharevich et al., 2020; Shalagina et al., 2020). The present study is aimed at the identification and functional analysis of the percussive-abrasive active tools among the artifacts from Chagyrskaya Cave.

Chagyrskaya Cave is listed among the main Middle Paleolithic sites in the Altai Mountains. The cave is situated at the steep left bank of the Charysh River, in

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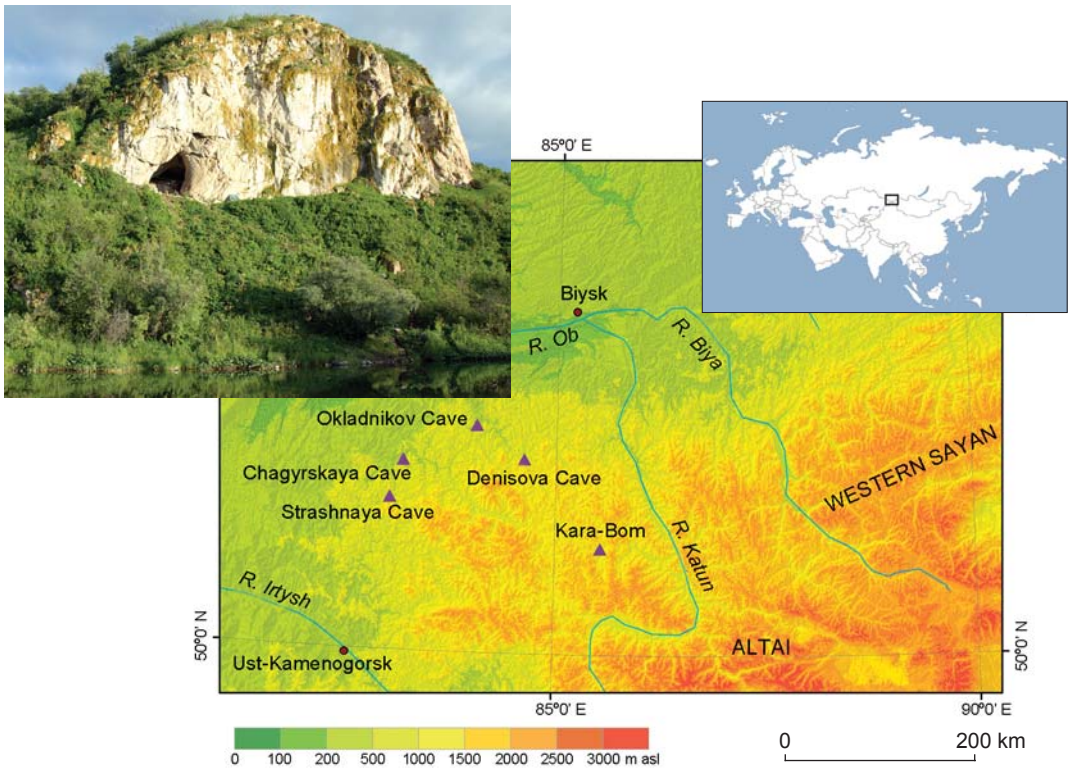

Fig. 1. Location of Chagyrskaya Cave (inset: southern view on the cave).

the southern part of the Altai Territory (Fig. 1). Remains of the Neanderthal material culture were recovered from layers 5–6c/2. According to the available stratigraphic and micromorphological data, layer 6c/2 was the source of artifacts that were accumulated in all culture-bearing stratigraphic units; therefore, we consider them as a single complex formed about 60–50 ka BP. In functional terms, the site is assessed as a Neanderthal base camp with an extensive complete cycle of stone tool processing, including all stages—from decortication of cores to modification of finished products (Kolobova, Shalagina, Chabai et al., 2019; Kolobova, Chabai, Shalagina et al., 2020).

The Chagyrskaya collection of hammerstones and retouchers is one of the most numerous among all the Middle Paleolithic assemblages in the region. The functional analysis of these artifacts makes it possible to reveal the unexplored aspects of ancient technologies associated with the economic and production activities of the late Neanderthals in the Altai.

Materials and methods

The study addressed the collection of percussive-abrasive tools and manuports (untreated pebbles brought by man) recovered from Chagyrskaya Cave. The study sample includes 58 items (see *Table*; Fig. 2) of granite, pegmatite, fine- and coarse-grained sandstone pebbles (determinations by M. Krajcarz, Institute of Geological Sciences, Polish Academy of Sciences).

In this study, we focused on determining the morphometric characteristics of artifacts, recording and interpreting use-wear marks through experimental use-wear analysis (Beaune, 1993; Zampetti, Lemorini, Massussi, 2007; Hamon, Plisson, 2008; Adams et al., 2009; Stepanova, 2015) and 3D-modeling (Grosman, Smikt, Smilansky, 2008; Porter et al., 2016; Benito-Calvo et al., 2018). All pebbles were examined at low magnification for the availability of use-wear traces, after cleaning in an ultrasonic bath. For identification of working areas and detailed analysis of macro- and microtraces we used an Altami CM0745-T microscope with a magnification of ×7–45; the photographic recording was performed by Canon EOS 5D Mark IV camera with an EF 100mm f/2.8 Macro IS USM lens, with further processing in the Helicon Focus software. In parallel with the functional analysis, experiments in stone- and bone-knapping were carried out. Pebbles of fine- and coarse-grained sandstone and granite collected in the alluvium of the Charysh River were used as hammerstones (40 spec.) and retouchers (10 spec.) (Kolobova, Chabai, Shalagina et al., 2020).

All the percussive-abrasive tools were subjected to 3D-modeling using a RangeVision Pro 5m structured illumination scanner (Kolobova, Fedorchenko, Basova

Percussive-abrasive stone tools and manuports from the Middle Paleolithic assemblages of Chagyrskaya Cave

Parameter	Tools		Manuports		Natural negative scars
	Intact	Fragmented	Intact	Fragmented	
Quantity	17	7	19	13	2
Length (mm)	31–89	50–99	25–94	31–45	34; 29
Width (mm)	30–82	37–76	16–77	23–31	29; 23
Thickness (mm)	10–44	20–34	10-48	8–21	7; 9
Mass (g)	17–421	53–312	9–530	3–46	9; 6
Volume (cm^3)	6.4–161	20.4–120.3	3.2–202.7	0.9–18.7	3.2; 2
Shape (number of spec.):					
oval elongated	5	3	5	1	–
oval slightly elongated	6	1	6	1	1
subtriangular	3	1	3	4	–
subrectangular	1	1	2	2	1
polygonal	1	–	2	3	–
ovoid	1	–	1	2	–
segmental	–	1	–	–	–

et al., 2019). The objects under study were installed on the platform and automatically scanned from several angles in the ScanCentre program. The resulting models were combined into one, which was exported to the RangeVision ScanMerge program. We used the ScanCentre, Geomagic Wrap, RangeVision ScanMerge software to determine the metric characteristics and cross-sections, build a mesh curvature map, and record the utilization macro-traces.

The differences in metric parameters and volume of percussive-abrasive tools and manuports have been determined through statistical analysis. The nonparametric Kruskal-Wallis test and the pairwise Mann-Whitney test were used to compare three samples for one variable (metric parameter or volume), because of the abnormal distribution of data in these samples, as determined through the Shapiro-Wilk test. In case of a statistically significant difference, the Bonferroni correction was applied to exclude type 1 error (Grzhibovsky, 2008). Statistical calculations were performed using the PAST program (Hammer, Harper, Ryan, 2001).

Nonparametric three-dimensional scaling was used to ordinate samples of percussive-abrasive tools and manuports by several variables simultaneously (metric parameters and volume). To unify the available data, we used the procedure of *z*-standardization of samples beforehand. Based on of ordination data, a graph was created, in which the coordinate scaling system shows the relative position of artifacts and manuports. At the same time, the distance between individual objects in the samples reflects their similarity or difference in the analyzed variables. To verify the obtained data, we applied the PERMANOVA nonparametric multivariate test to the scores of the main scaling coordinates. As a result, we obtained the detailed data, indicating similarity and difference of the analyzed samples for all four variables (Ibid.).

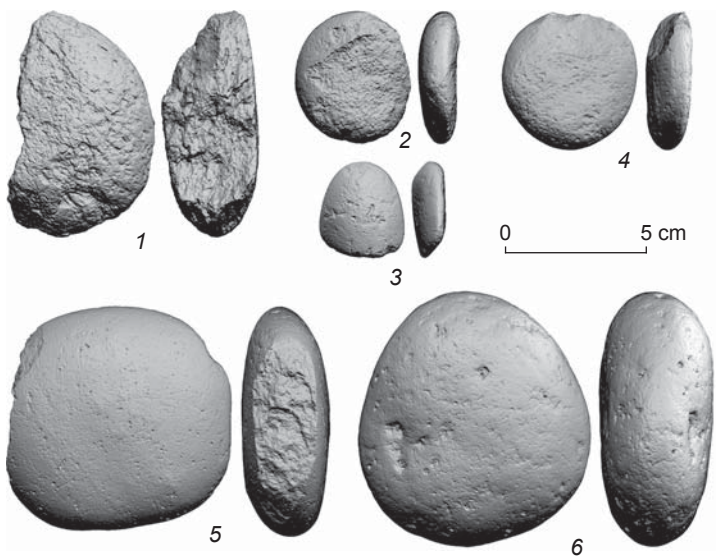

Fig. 2. Percussive-abrasive stone tools from Chagyrskaya Cave.
1, *5* – hammers for stone-knapping; *2–4* – retouchers; *6* – hammer for bone-splitting.

Study results

Experimental simulation. The experiment has shown several stages of formation of use-wear marks on simulated tools (Fig. 3). Pebbles of oval, ovoid, and subrectangular shape, 72 to 153 × 57 to 113 × 17 to 96 mm in size and weighing from 121 to 2107 g, were used as hard mineral hammerstones for processing stone raw materials (35 spec.). Working areas were located at the tops and edges of the pebbles; when exhaustion became heavy, the tool was reoriented. After half an hour of work, there appeared signs of microflaking, edge damage, and solitary rounded dimples on the contact surfaces of the hammerstones. At this stage, some pebbles subjected to primary reduction showed small cracks and solitary negative scars. One hour of work with a hammerstone led to extensive formation of dents and edge damage, which resulted in some smoothing of the rounded surface of the pebble's top. The areas involved in reduction of the simulated core showed small linear traces and smoothing of the surface. The hammerstones' efficiency dropped dramatically after an hour of operation. Use for an hour and a half or more led to the formation of heavy edge damage and dents, large negative scars or longitudinal fragmentation (Fig. 3, *1*; 4, *2*).

During the experimental bone-knapping, oval and ovoid pebbles, 124 to 142 × 81 to 115 × 52 to 81 mm in size and 946–1924 g in weight, were used as hard mineral hammerstones (5 spec.). Working zones of the tools were on the pebbles' tops. As a result of half an hour of

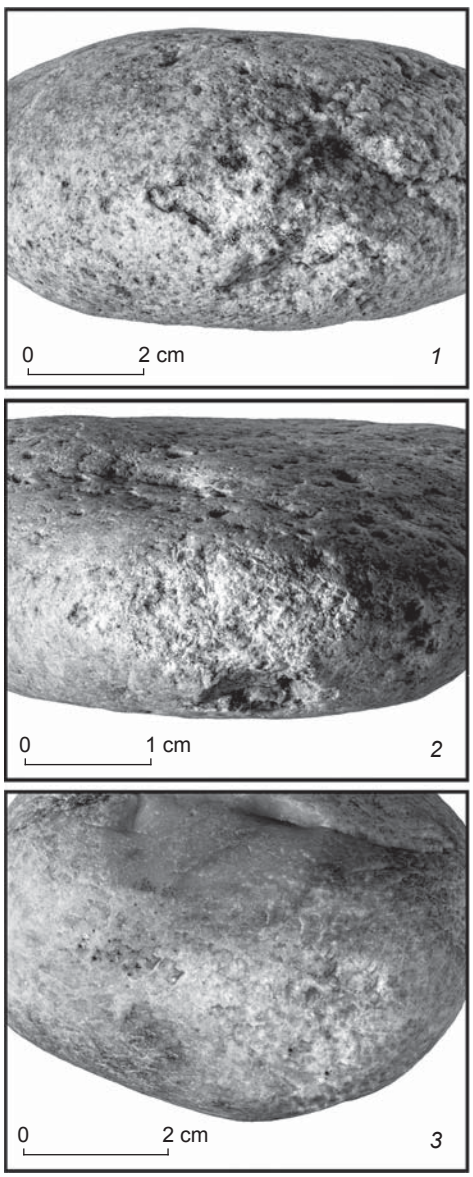

Fig. 3. Standard simulations.
1 – hammer for stone-knapping (2 hours of operation); *2* – retoucher (2 hours of operation); *3* – hammer for bone-splitting (1.5 hours of operation).

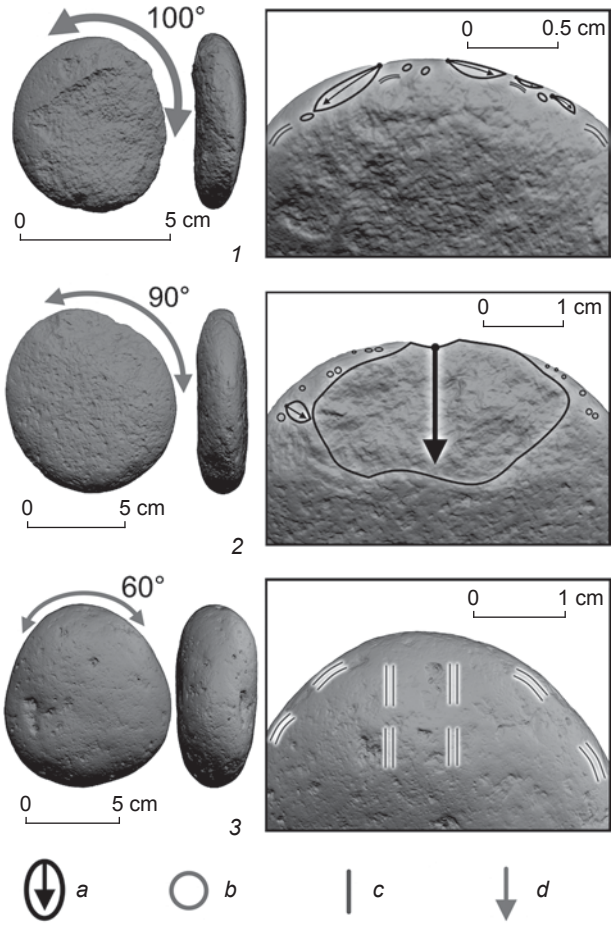

Fig. 4. Distribution of working zones and typical use-wear signs on percussive-abrasive tools from Chagyrskaya Cave.
1 – retoucher; *2* – hammer for stone-knapping; *3* – hammer for bone-splitting.
a – negative scar and its direction; *b* – dimples; *c* – linear traces; *d* – working edge width.

knapping of long bones, the experimental hammerstones showed weak microflaking and smoothing reminiscent of attrition; linear tracks were spread from the points of percussion to the edges of pebbles. The use of tools for over an hour led to a heavy leveling of the working surfaces and the formation of small dimples and dents; the associated linear traces became more pronounced (see Fig. 3, *3*; 4, *3*). The effectiveness of the mineral hammerstones in bone-splitting did not decrease after two hours of intense work.

Pebbles of oval, ovoid, and subtriangular shapes, 62 to 96 × 45 to 64 × 21 to 43 mm in size and weighing 117–355 g, served as retouchers for processing stone implements (10 spec.). Working zones were located in the same way as on hammers; only the long edges were used more often. After half an hour of retouching stone blanks, there appeared small rounded dents, weak microflaking, linear traces, and smoothing on the contact surfaces of the tools. After an hour of work, the retouchers showed weak microflaking, a greater number of dents subtriangular in shape, and denser linear traces; the working surfaces were heavily smoothed, and small negative scars were recorded. Further use of a tool led to more prominent and larger scars (see Fig. 3, *2*; 4, *1*). The effectiveness of stone retouchers decreased after 45 minutes of intensive work, when all the edges became worn out.

As a result of the experimental program, a representative collection of 50 standard models was formed. The traceological analysis of the standard samples identified a set of use-wear marks characteristic of each type of percussive-abrasive tool. Hard mineral hammers for stone-knapping had one, rarely three or more, worked-out areas of various shapes, with large oval dimples and dents, heavy microflaking and edge damage, and negatives scars (over 60 % of all specimens; see Fig. 3, *1*; 4, *2*). Working areas of the hammerstones, which were used for bone-splitting, were characterized by weak microflaking, dents, dimples, linear traces, and general smoothing of the surface (see Fig. 3, *3*; 4, *3*). Experimental retouchers had one wide (more than 60° archwise) or several narrower working zones with small elongated dimples and dents, weak microflaking, and linear traces. A total of 30 % of retouchers showed small negatives scars formed due to a counterblow during the processing of stone blanks (see Fig. 3, *2*; 4, *1*).

Study of working zones and use-wear traces on the experimental percussive-abrasive tools allowed us to establish the main distinctive features of the identified types of tools. Retouchers differed from hammers for stone-knapping by the following criteria: smoothing of working surface; oblong shape of dents; presence of clear linear traces, not overlapped by heavy microflaking, dimples and dents; rarity of large negative scars, which resulted only from cracks and other deformations in the used pebble. These distinctions were observed at all stages of utilization and can be explained by the functional purpose of these tools, and not by the intensity of their use.

Functional analysis. The traceological analysis of the collection of pebbles recovered from Chagyrskaya Cave revealed the following types of tool: retouchers (19 spec.), hammerstones for knapping of stone (4 spec.) and bone (1 spec.). Stone retouchers for processing mineral raw materials (19 spec.) are represented by intact (79 %) and fragmented (21 %) pebbles of granite and fine-grained sandstone (see *Table*; Fig. 5, *1*, *2*). These tools have one elongated subrectangular (53 %; Fig. 5, *1*), more rarely one (21.1 %; Fig. 5, *2*) or three (25.9 %) narrow oval working zones with rounded, elongated dents and dimples. The majority of retouchers (68 %) showed large dimples and small negative scars, and the percussion point located in the zone of weak microflaking and edge damage (see Fig. 4, *1*). Artifacts without significant mechanical damage (32 %) showed weak microflaking, edge damage, and dents on the convex surfaces. Macro use-wear traces in the form of dimples, dents, and negative scars were noted on all stone retouchers from Chagyrskaya Cave; these traces were directed mainly towards the center of the tool or parallel to its lateral sides (see Fig. 4, *1*).

Hard mineral hammers for stone-knapping (4 spec.) are represented by intact (50 %) and fragmented (50 %) pebbles (see *Table*; Fig. 5, *3*). These bear one wide elongated sub-rectangular (75 %) or narrow oval (25 %) working area heavy microflaking, edge damage, deep rounded dimples, one or several negative scars of large utilization removals. Macro use-wear traces are directed mainly towards the center of the tool and parallel to its lateral sides (see Fig. 4, *2*).

A hard mineral hammerstone for bone-knapping is an intact ovoid pegmatite pebble (see Fig. 5, *4*). A wide working area is located at the top of the artifact. Multidirectional linear traces, signs of microflaking, and small oval dents at the top and subtriangular dents at the edges have been recorded (see Fig. 4, *3*). The working area of the artifact is heavily smoothed.

Statistical data. To identify the main differences in the metric characteristics of the percussive-abrasive tools and manuports from Chagyrskaya Cave, a comparative analysis of the volume and massiveness index (width-thickness ratio) was carried out. The volume parameter was chosen as a variable that reflects all metric characteristics of the artifact as a whole. The massiveness index determines the main parameters of the working zones of pebbles: its increase means narrowing the utilized areas due to a decrease in the thickness of the product and vice versa. According to the presented graph (Fig. 6, *1*), the values of this parameter for all the tools and manuports fall into a wide range from 1.0 to 3.5. Comparison of the massiveness index of three groups of artifacts according to the Kruskal-Wallis test did not show any statistical difference ($H = 0.92$, $p = 0.62$).

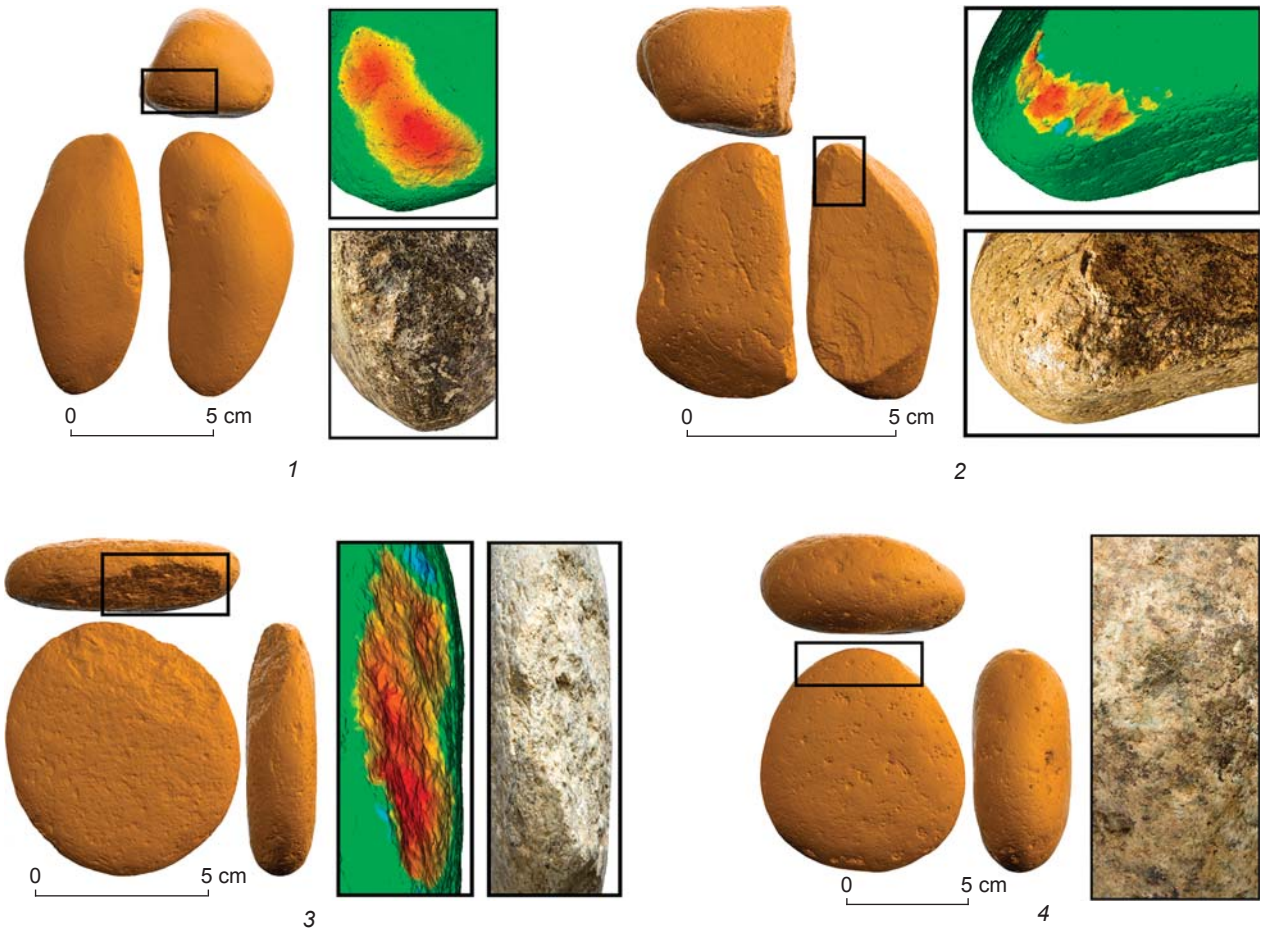

Fig. *5*. 3D-models, mesh curvature maps, and macro-photos of the use-wear signs on percussive-abrasive stone tools from Chagyrskaya Cave.
1, *2* – retouchers (No. 1229 and 1897); *3* – hammer for stone-knapping (No. 446); *4* – hammer for bone-splitting (No. 1510).

When comparing the samples by volume, the bone-knapping hammer was not included into the sample, because it was the only one. The Kruskal-Wallis test showed a significant difference in volume between the three analyzed samples ($H = 17.08$, $p = 0.00019$). At the same time, the pairwise Mann-Whitney test, used with the Bonferroni correction, showed that statistically the manuports differed significantly from the retouchers and hammerstones, which demonstrated the same values. It means that larger pebbles were selected to be used as such tools.

To verify the obtained data, we apply the nonparametric three-dimensional scaling to ordinate the samples by metric variables (length, width, thickness) and volume. A statistically stable result was obtained (stress level 0.0009). On the graph (Fig. 6, *2*), the relative distance between objects reflects the cumulative similarity or difference in the analyzed variables. Manuports are concentrated in the right part of the graph, and hammers and retouchers in the central. At the same time, manuports and hammers with extreme values of all variables are noted.

To assess the similarity/difference between the samples, we applied the PERMANOVA nonparametric multivariate test to the scores of the main scaling coordinates. The test has shown a statistically significant difference ($F = 10.74$; $p = 0.0001$). Pairwise comparison indicated that manuports differed from retouchers and hammerstones by the aggregate of the variables. Thus, the percussive-abrasive tools and manuports from Chagyrskaya Cave are distinct in both the volume and metric parameters.

Discussion

Any comparisons of the Middle Paleolithic percussive-abrasive active tools from the Altai and adjacent regions is complicated because of the incompleteness of the available data: not all such finds have been identified as artifacts, analyzed, and described in publications. However, the typical microflaking, dimples, and negatives scars of removals noted on their surfaces make it possible to identify artifacts at the stage of field-studies.

A specific problem in the analysis of such tools is identifying of bone-splitting hammerstones, owing to the absence of evident macro-signs of utilization. Microscopic use-wear traces on such tools are visible with magnifying devices.

The primary method for studying percussive-abrasive tools is the experimental use-wear analysis based on the morphometric characteristics, macro and micro use-wear traces. The obtained analytical data made it possible to develop classifications based on these tools' functional determinations and dimensions (Semenov, 1953; Beaune, 1989, 1993; Zampetti, Lemorini, Massussi, 2007; Stepanova, 2015). At present, functional analysis is complemented by morphometric, petrographic, and statistical studies, as well as 3D-modeling (Benito-Calvo et al., 2018; Grosman, Smikt, Smilansky, 2008; Pop et al., 2018; Porter et al., 2016).

The executed comprehensive study provides information on the functional specificity of the Middle Paleolithic percussive-abrasive tools from Chagyrskaya Cave. The study method with the use of mesh curvature maps has been tested, which facilitates the identification and visualization of working surfaces with use-wear signs. All the identified artifacts were active tools (hammerstones and retouchers). However, the site collection contains one passive instrument—the anvil. This suggests a complex organization of the site-space. It was established that hard mineral hammers were used for the primary reduction of stone raw materials; retouchers were used in the preparation of bifacial tools, secondary working, and modification of the uni- and bifacial tools. This is consistent with the results of a preliminary attributive analysis of the Chagyrskaya collections, according to which about 60 % of the spalls were removed with hard hammers. About 30 % of the spalls indicate soft hammers, which is consistent with a large number of bone retouchers at the site (Kolobova, Rendu, Shalagina et al., 2020). Judging by the composition of the collection of percussive-abrasive tools, in which retouchers (19 spec.) prevail over hammerstones (5 spec.), we can assume that secondary working processes were far more active than the primary reduction in Chagyrskaya Cave. The Neanderthals probably split stones beyond the site, at the outcrops of raw material.

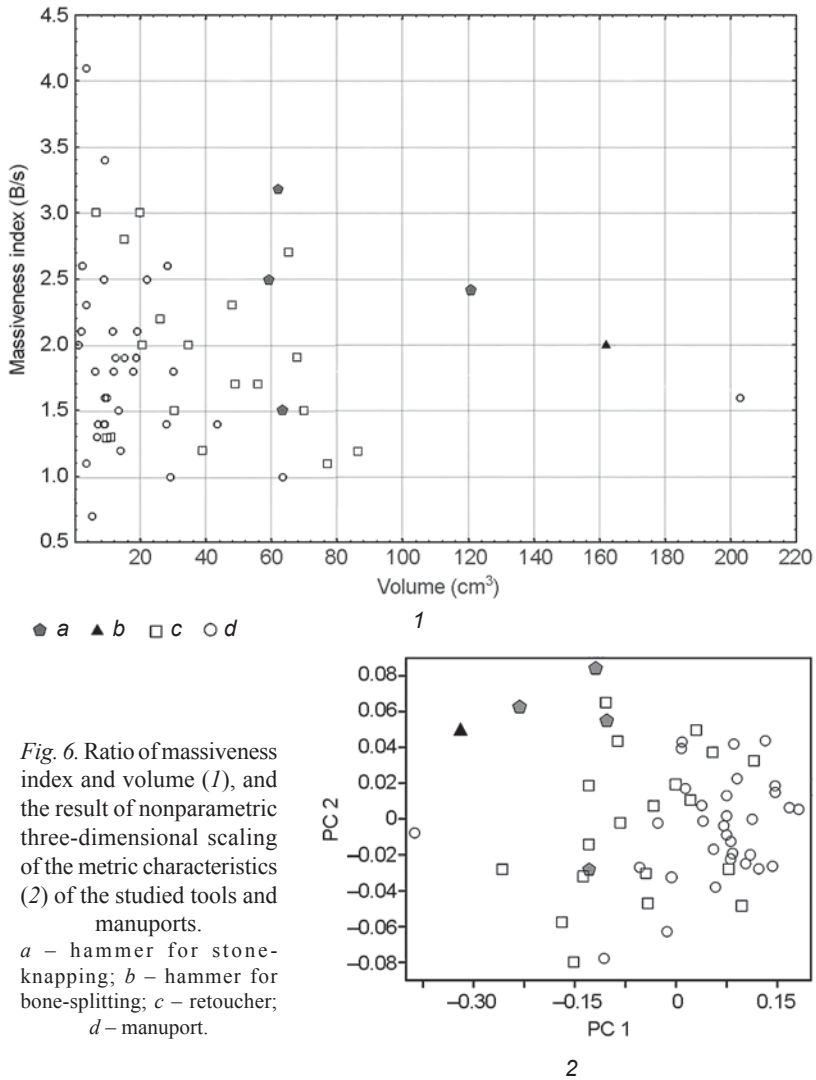

Fig. 6. Ratio of massiveness index and volume (*1*), and the result of nonparametric three-dimensional scaling of the metric characteristics (*2*) of the studied tools and manuports.
a – hammer for stone-knapping; *b* – hammer for bone-splitting; *c* – retoucher; *d* – manuport.

Conclusions

Until recently, it was believed that hammerstones and retouchers did not possess any specific set of features suitable for intra- and inter-regional correlation (Stepanova, 2015). The present study confirms this thesis, but the composition of the percussive-abrasive tools is indicative of the production processes that took place directly at the site. The abundance of rejected retouchers and hammers at the site results from the availability of raw materials for their production. Therefore, these tools might not have been regarded as valuable; they were not taken away from the site. Regarding other types of implement, a different attitude to these is recorded: bifacial tools made of high-quality material were used for a long time; these were transported from site to site intended for various economic activities (Uthmeier, 2012).

The experimental use-wear analysis of simulated tools made it possible to establish the functional distinctions

between the main types of percussive-abrasive active stone tools, differentiating hammers for stone-knapping and retouchers by the characteristics of working zones with use-wear signs. Statistical comparison of metric parameters and volumes of the artifacts and manuports showed a significant difference. Pebbles larger than the manuports but of the same shape were chosen as tools. The revealed metric preferences of the Neanderthals from Chagyrskaya Cave for hammerstones and retouchers are exclusively functional.

This study has shown that percussive-abrasive tools, which have been greatly underestimated until now, are an important part of the archaeological assemblages of Chagyrskaya Cave. Analytical study of these tools from the Altai sites seems to be relevant and promising. The presence or absence of artifacts in this category, the degree of their utilization, and their position in the cultural layer may indicate the labor processes at the site, the reduction techniques used, and the functional attribution of the studied assemblages.

Acknowledgements

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References

Adams J., Delgado S., Dubreuil L., Hamon C., Plisson H., Risch R. 2009

Functional analysis of macro-lithic artefacts: A focus on working surfaces. In *Non-Flint Raw Material Use in Prehistory: Old Prejudices and New Directions*, F. Sternke, L. Eigeland, L.-J. Costa (eds.). London: Archaeopress, pp. 43–66.

Beaune S.A., de. 1989

Essai d'une classification typologique des galets et plaquettes utilisés au Paléolithique. *Gallia Préhistoire*, vol. 31: 27–64.

Beaune S.A., de. 1993

Nonflint stone tools of the Early Upper Paleolithic. In *Before Lascaux: The Complex Record of the Early Upper Paleolithic*, H. Knecht, A. Pike-Tay, R. White (eds.). Boca Raton: CRC Press, pp. 163–191.

Belousova N.E., Fedorchenko A.Y., Rybin E.P., Kozlikin M.B. 2017

Osobennosti tekhnologii proizvodstva krupnykh plastin v industriyakh nachala verkhnego paleolita Gornogo Altaya. In *Trudy V (XXI) Vserossiyskogo arkheologicheskogo syezda v Barnaule – Belokurikhe*, vol. I. Barnaul: Izd. Alt. Gos. Univ., pp. 16–21.

Benito-Calvo A., Crittenden A.N., Livengood S.V., Sánchez-Romero L., Martínez-Fernández A., Torre I., de la, Pante M. 2018

3D 360° surface morphometric analysis of pounding stone tools used by Hadza foragers of Tanzania: A new methodological approach for studying percussive stone artefacts. *Journal of Archaeological Science: Reports*, vol. 20: 611–621.

Grichan Y.V. 2006

Noviye aspekty paleoekonomiki v pozdnepaleoliticheskikh pamyatnikakh Zabaikalya (po materialam poseleniya Varvarina Gora). In *Chelovek i prostranstvo v kulturakh kamennogo veka Yevrazii*, A.P. Derevianko, T.I. Nokhrina (eds.). Novosibirsk: Izd. IAET SO RAN, pp. 9–16.

Grosman L., Smikt O., Smilansky U. 2008

On the application of 3-D scanning technology for the documentation and typology of lithic artifacts. *Journal of Archaeological Science*, vol. 35 (12): 3101–3110.

Grzhibovsky A.M. 2008

Analiz trekh i boleye nezavisimykh grupp kolichestvennykh dannykh. *Ekologiya cheloveka*, No. 3: 50–58.

Hammer Ø., Harper D.A.T., Ryan P.D. 2001

PAST: Paleontological statistics software package for education and data analysis. *Palaeontologia Electronica*, vol. 1 (4): 1–9.

Hamon C., Plisson H. 2008

Functional analysis of grinding stones: The blinding-test contribution. In *Prehistoric Technology "40 years later": Functional Studies and the Russian Legacy*, L. Longo, N. Skakun (eds.). Leningrad: Archaeopress, pp. 29–38.

Kharevich V.M., Zotkina L.V., Anoikin A.A., Taimagambetov Z.K. 2020

Vspomogatelniye instrumenty rasshchepleniya v kamennykh industriyakh nachalnoy pory verkhnego paleolita (po materialam stoyanki Ushbulak). *Stratum plus*, No. 1: 239–256.

Kolobova K.A., Chabai V.P., Shalagina A.V., Krajcarz M.T., Krajcarz M., Rendu W., Vasiliev S.K., Markin S.V., Krivoshapkin A.I. 2020

Exploitation of the natural environment by Neanderthals from Chagyrskaya Cave (Altai). *Quartär*, vol. 66: 7–31.

Kolobova K.A., Fedorchenko A.Y., Basova N.V., Postnov A.V., Kovalev V.S., Chistyakov P.V., Molodin V.I. 2019

The use of 3D modeling for reconstructing the appearance and function of non-utilitarian items (the case of anthropomorphic figurines from Tourist-2). *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 47 (4): 66–76.

Kolobova K., Rendu W., Shalagina A., Chistyakov P., Kovalev V., Baumann M., Koliasnikova A., Krivoshapkin A. 2020

The application of geometric-morphometric shape analysis to Middle Paleolithic bone retouchers from the Altai Mountains, Russia. *Quaternary International*, vol. 559: 89–96.

Kolobova K.A., Shalagina A.V., Chabai V.P., Markin S.V., Krivoshapkin A.I. 2019

Signification des technologies bifaciales au Paléolithique moyen des montagnes de l'Altaï. *L'Anthropologie*, vol. 123 (2): 276–288.

Kuchugura L.I. 2003

K voprosu o tipologii izdeliy iz neizomorfnykh porod v verkhnem paleolite. *Arkheologicheskiy almanakh*, No. 13: 308–314.

Okladnikov A.P. 1983
Paleoliticheskaya stoyanka Kara-Bom v Gornom Altaye (po materialam raskopok 1980 goda). In *Paleolit Sibiri*. Novosibirsk: Nauka, pp. 5–20.

Pop E., Charalampopoulos D., Arps C.S., Verbaas A., Roebroeks W., Gaudzindski-Windheuser S., Langejans G. 2018
Middle Palaeolithic percussive tools from the Last Interglacial site Neumark-Nord 2/2 (Germany) and the visibility of such tools in the archaeological record. *Journal of Paleolithic Archaeology*, vol. 1: 81–106.

Porter S.T., Huber N., Hoyer C., Floss H. 2016
Portable and low-cost solutions to the imaging of Paleolithic art objects: A comparison of photogrammetry and reflectance transformation imaging. *Journal of Archaeological Science: Reports*, vol. 10: 859–863.

Prirodnaya sreda i chelovek v paleolite Gornogo Altaya. 2003
A.P. Derevianko, M.V. Shunkov, A.K. Agadzhanyan, G.F. Baryshnikov, E.M. Malaeva, V.A. Ulyanov, N.A. Kulik, A.V. Postnov, A.A. Anoikin (eds.). Novosibirsk: Izd. IAET SO RAN.

Semenov S.A. 1953
Kamenniye retushery pozdnego paleolita. In *Paleolit i neolit SSSR*, vol. 2. Moscow, Leningrad: Izd. AN SSSR, pp. 446–454. (MIA; iss. 39).

Shalagina A.V., Kharevich V.M., Krivoshapkin A.I., Kolobova K.A. 2019
Eksperimentalnoye modelirovaniye bifasialnogo rasshchepleniya v sibiryachikhinskom variante srednego paleolita Altaya. *Teoriya i praktika arkheologicheskikh issledovaniy*, No. 4 (28): 97–108.

Shalagina A.V., Kharevich V.M., Mori S., Bomann M., Krivoshapkin A.I., Kolobova K.A. 2020
Rekonstruktsiya tekhnologicheskikh tsepochek proizvodstva bifasialnykh orudiy v industrii Chagyrskoy peshchery. *Sibirskiye istoricheskiye issledovaniya*, No. 3: 130–151.

Shunkov M.V., Kozlikin M.B., Mikhienko V.A. 2019
Kamenniye industrii srednego paleolita iz yuzhnoy galerei Denisovoy peshchery: Materialy raskopok 2003 goda. *Teoriya i praktika arkheol. issledovaniy*, No. 1 (25): 51–59.

Stepanova K.N. 2015
Klassifikatsii udarno-abrazivnykh orudiy verkhnego paleolita. *Zapiski IIMK*, No. 11: 7–21.

Uthmeier T. 2012
The transition from Middle- to Upper Paleolithic at Buran Kaya III, Crimea (Ukraine): A case of conceptual continuity of lithic artefact manufacture? In *Flakes not Blades: The Role of Flake Production at the Onset of the Upper Paleolithic*. Mettmann: Neanderthal Museum, pp. 239–260. (Wissenschaftliche Schriften des Neanderthal Museums; Bd. 5).

Zampetti D., Lemorini C., Massussi M. 2007
Art et vie quotidienne dans l'Épigravettien final: Les galets utilisés de la Grotta della Ferrovia. In *Chasseurs-cueilleurs: Comment vivaient nos ancetres du Paléolitoque supérieur: Méthodes d'analyse et d'interprétation en Prehistoire*, S.A. de Beaune (ed.). Paris: CNRS, pp. 171–185.

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On the Date of the Great Shigir Idol

The Great Shigir Idol is the largest anthropomorphic wooden sculpture in the world, a unique work of Stone Age art, and a valuable source for reconstructing the material culture and worldview of the ancient population of Northern Eurasia. Although study of it began more than 100 years ago, a number of issues, such as the place of discovery, context, date, methods of exhibition, etc., remain controversial. This article analyses archival documents relevant to the location and time of discovery of the Great Shigir Idol, and on the accompanying finds. The results of a recent comprehensive study conducted by Russian and German archaeologists and scientists in 2014 are outlined. The focus is on the analysis of AMS radiocarbon dates, spanning a period from the Late Pleistocene (~10,500 cal BC) to the Late Mesolithic/Early Neolithic (~6000 cal BC). These dates show a considerable range of variation, and they disagree with those derived from the conventional radiocarbon dating in 1997. Paleogeographic and archaeological data from the Trans-Urals do not support the early (9600–9000 cal BC) estimates of the time of the idol's creation, but rather correspond to later ones, derived from the AMS ^{14}C analysis conducted in 2014. Therefore, it is necessary to continue the study of Mesolithic sites and paleoclimate of the Urals, determine the nature of primary peat formation at the Ural peatlands, and assess their age and that of the microremains of peat in early cracks in the idol, etc.

Keywords: *Trans-Urals, Mesolithic, paleogeography, Great Shigir Idol.*

Introduction

The Middle Trans-Urals is located within two geographical areas—the Ural Range and the West Siberian Plain. Cultural layers of almost all peat-bog sites in this region have been found in lakes and peaty paleolakes, in the coastal strips of the onshore sites and settlements. The banks and bottoms of the peat massifs of the Trans-Urals are composed of loams and sandy loams. The mineral bottom is overlain by multi-colored sapropels, indicating the lacustrine stage of development of the reservoir (the cultural layer was formed in water sediments). The artifacts found here are most often redeposited. The sapropels are overlain by peat of various colors and thickness. The recorded cultural layers form the habitation horizons. This is a stage of reservoir waterlogging and the formation of peat massifs. The simultaneity of the artifacts and the peat and sapropel enclosing them should be verified with ^{14}C-dates.

More than 150 Mesolithic sites have been reported from the Middle Trans-Urals; most of these non-stratified sites are located on mineral grounds, and provided quite a few ^{14}C-dates. A significant contribution to the study of the Trans-Urals Mesolithic was made by Y.B. Serikov (2000), who identified the Middle Trans-Urals Mesolithic culture, determined its origin and chronology, and outlined the specific

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features of the stone and bone tools. In recent decades, the search for and study of Mesolithic peat-bog sites in this area have been carried out by M.G. Zhilin and S.N. Savchenko. At present, seven, perhaps ten, peat-bog sites with Mesolithic cultural layers are known in the Trans-Urals. Only four of these have been excavated.

The Koksharovo-Yuryinsk I and II sites are located on the Koksharovo peat bog (Fig. 1, A); the sites were discovered and explored by Y.B. Serikov (Ibid.: 87–89). In 2007, M.G. Zhilin, S.N. Savchenko, and Y.B. Serikov studied the peaty part of the Koksharovo-Yuryinsk II site (Zhilin et al., 2012: 62–97). Both sites are multilayered; the cultural layers of the Mesolithic are embedded in the mineral ground, overlain by peat, and are not clearly separated from the Neolithic strata. These layers contain quite numerous artifacts made of stone, bone, and horn. At Koksharovo-Yuryinsk I, several fragments of arrow-shafts, two pegs, and a pine-bark float were found.

The Beregovaya I and II (peat-bog) sites are located at the Gorbunovo peat bog (Fig. 1, *A*), and were investigated by M.G. Zhilin and S.N. Savchenko (Zhilin et al., 2020: 16–87). In the peaty part of Beregovaya I, layers from the Early, Middle (two), and Late Mesolithic, and Chalcolithic were recorded (Ibid.: 16–20). The mineral bottom and the overlying peaty sapropel were covered by the Early Mesolithic layer, ca 9224–8288 cal BC (Table 1). The finds included animal- and fish-bones, a few lithic artifacts, a fragment of a wooden dart, and a bone arrowhead. In the middle part of the sapropel layer, there was a layer dated to the Early Middle Mesolithic, 8417–7741 cal BC (Table 1). Here, bones of animals, birds, and fish, four flakes, a blade, a hammerstone, and a haft element from a bone harpoon-head were discovered. In the top part of the

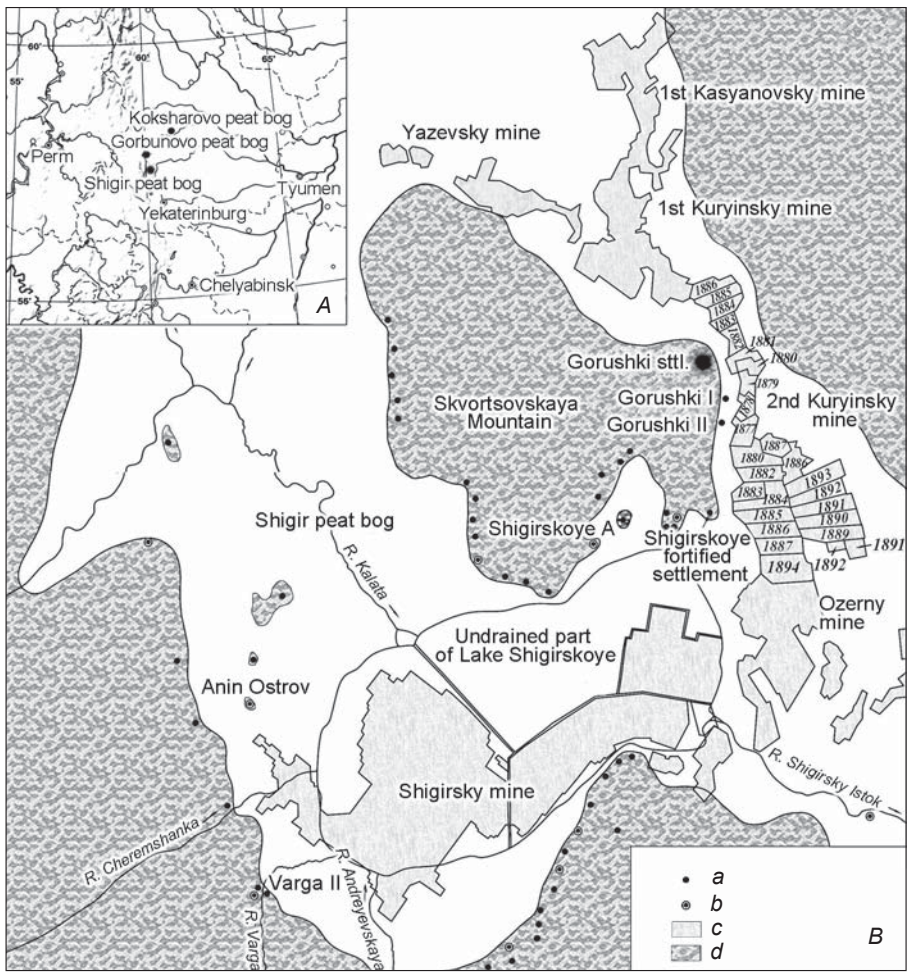

Fig. 1. Location of the Shigir peat bog (*A*), archaeological sites, and gold mining section (*B*) (after (Tolmachev, 1914) as supplemented).

a – archaeological objects; *b* – sites with the Mesolithic cultural layer; *c* – mines (the years of development are indicated); *d* – indigenous coast, islands.

Table 1. **Results of the dating of the Gorbunovo and Shigir peat bog sites**

Site	Material	Lab code	^{14}C-date, yrs BP	Calibrated date, cal yrs BC
1	2	3	4	5
Beregovaya I, Late Mesolithic	Peat	GIN-15104	8660 ± 40	7748–7590
Ditto, Middle Mesolithic	Charcoal	GIN-14775	8780 ± 40	8167–7659
	Peaty sapropel	SPb-1793	8587 ± 60	7738–7530
Ditto, Early Middle Mesolithic	Larch trunk	GIN-14773	8940 ± 30	8251–7970
	Burnt picket	GIN-15034	8400 ± 50*	7571–7352
	Sapropel	SPb-1792	8850 ± 70	8234–7741
	"	SPb-1791	8995 ± 80	8417–7841
Ditto, Early Mesolithic	Charcoal	GIN-14776	9590 ± 70	9224–8774
	Larch branch or trunk	GIN-14774	9320 ± 60	8743–8349
	Thin picket	SPb-1794	9200 ± 60	8567–8288
	Peaty sapropel	Spb-1790	9340 ± 70	8777–8409
Beregovaya II, Late Mesolithic	Plank No. 3 from flooring	GIN-14134	7960 ± 30	7028–6930, 6921–6877
	Plank No. 5 from flooring	GIN-14133	7990 ± 30	6971–6912, 6884–6830
	Plank No. 6 from flooring	GIN-14087	7990 ± 40	7042–6983, 6973–6911, 6885–6829
	Knife of elk scapula	AAR-14549	7989 ± 36	6972–6911, 6884–6829
	Burnt trunk	GIN-14085	8120 ± 50	7144–7057
	Burnt picket	GIN-14086	8350 ± 40	7490–7446, 7414–7356
	Elk antler (animal head image)	AAR-24230	8399 ± 40	7524–7416
	Sedge peat (embedding layer)	GIN-14126	7990 ± 40	7042–6983, 6973–6911, 6885–6829
	"	GIN-14080	8360 ± 40	7511–7449, 7410–7362
Ditto, Middle Mesolithic	Sinker wrap	AAR-14834	8405 ± 40	7540–7460
	Willow bark (sinker wrap)	KIA-42075	8445 ± 50	7569–7494
	Dog's coprolite	POZ-46389	8480 ± 40	7575–7530
	Wooden picket	GIN-14137	8490 ± 40	7578–7535
	Small board	GIN-14089	8670 ± 40	7683–7601
	Elk antler	GIN-14207	8840 ± 70	8198–8110, 8002–7821
	Larch branch with traces of felling	GIN-14090	8970 ± 60	8278–8183, 8042–7994
	Larch picket	GIN-14136	9010 ± 40	8278–8234
	Red deer scapula**	GIN-14208	10,200 ± 100	10,140–9754
	Sapropel (embedding layer)	GIN-14130	8520 ± 100	7651–7474
	"	GIN-14082	8970 ± 40	8275–8202
	"	GIN-14131	9170 ± 90	8475–8289

Table 1 (end)

1	2	3	4	5
Ditto, Early Mesolithic, early series	Hewn larch picket	GIN-14088	9800 ± 40	9289–9253
	Elk bones	GIN-14210	9830 ± 70	9356–9241
	Knife of a scapula	KIA-42076	9835 ± 50	9316–9255
	Charred chipped pine log	GIN-14135	9850 ± 40	9317–9266
	Knife blank of red deer scapula**	GIN-14209	10,060 ± 80	9815–9446
Beregovaya II, Early Mesolithic, late series	Picket 1, larch (pickets 1–3 from a single construction)	GIN-14251	8980 ± 90*	8285–8170, 8116–8053, 8047–7981
	Picket, larch	GIN-14248	9200 ± 40	8542–8300
	Bone tool blank	KIA-42077	9215 ± 40	8474–8337
	Picket 2, larch	GIN-14249	9230 ± 50	8489–8419, 8410–8346
	Picket 3, larch	GIN-14250	9230 ± 60	8491–8417, 8414–8344
	Peat-like sapropel (overlying or embedding layer)	GIN-14132	9210 ± 40	8469–8328
	"	GIN-14140	9390 ± 40	8724–8624
	"	GIN-14084	9610 ± 40	9011–8912, 8904–8845
Ditto, sterile interlayers	Sphagnum peat	GIN-14124	6390 ± 110	5478–5295
	"	GIN-14125	6990 ± 40	5975–5950, 5918–5837
	Charred board	SPb-2677	6929 ± 70	5933–5706
	Sedge peat	GIN-14127	8190 ± 40	7261–7225, 7193–7128
	Reed peat	GIN-14128	8200 ± 40	7301–7219, 7199–7139
	Sapropel	GIN-14129	8480 ± 40	7575–7530
	"	GIN-14081	8620 ± 40	7654–7585
	"	GIN-14083	9140 ± 40	8349–8285
Anin Ostrov	Peat-like sapropel	GIN-13869	4280 ± 60	3011–2977, 2943–2870
	Sapropel, Mesolithic layer	GIN-13872	8620 ± 130	7830–7527
Varga-2	Peaty sapropel	GIN-13863	7790 ± 40	6658–6589
	"	GIN-13860	7010 ± 50	5980–5944, 5925–5844

Note. The sites of Beregovaya I and II after (Zhilin et al., 2020: Tab. 1, 3), Anin Ostrov and Varga-2 after (Zaretskaya et al., 2014: Tab. 1).

*Invalid dates (Zhilin et al., 2020: 19, 69).

**Older fossils (Zhilin et al., 2020: 49, 69).

sapropel, there was a Middle Mesolithic layer, 8167–7530 cal BC (Table 1). The layer contained a few animal bones, lithic artifacts, and a branch with signs of processing. Late Mesolithic materials, 7748–7590 cal BC (Table 1), were found in the lower part of the peat. These include elk bones and 15 lithic artifacts.

In the peaty part of Beregovaya II, cultural layers attributable to the Early, Middle, and Late Mesolithic, Early Neolithic, and Chalcolithic were recorded (Ibid.: 21–87). The Early Mesolithic cultural layer was embedded inside the interlayer of peaty sapropel (9011–8328 cal BC) or under it, on the lake

bottom. Available radiocarbon dates form two groups (Table 1)—an early one (9356–9241 cal BC) and a late one (8542–8300 cal BC), which suggests double occupation of the site in the Early and Late pre-Boreal period. The lithic inventory included 107 items, the bone and horn collection 25 items (arrowheads; fragments of harpoons, daggers, and knives; a fishing hook; an awl, etc.); the wooden collection included fragments of a spear and a dart, five pickets, a small stick, a sliver, and a split log.

The Middle Mesolithic layer from the first half of the Boreal period, 8475–7460 cal BC (Table 1), was recorded in the upper part of the sapropel layer, which contained animal- and fish-bones and a "hoard" of bone arrowheads. The lithic inventory included 965 items, the bone and horn collection 86 items (knives, a wedge, awls, arrowheads and harpoon-heads, daggers, etc.); wooden items included a spear, four fragments of darts, an arrow-shaft fragment, a rod with a groove, a trunk with a pointed end, 14 fragments of pickets, a board, two planed sticks, 14 fragments of wooden products, two fragments with chopping marks, and chips.

A late Mesolithic layer, dated to the range of 7524–6829 cal BC (Table 1), with a footway of massive split planks, was embedded in the lower portion of the peat. The lithic inventory included 604 items, the bone and horn collection 35 items (a sculpture, an arrowhead, fragments of a dagger and a chisel, a plow, awls, a drill, a pendant blank of a wolf's or dog's fang); wooden items included a dart (?), a shaft fragment, an accumulation of thin trunks, a fragment or a blank of arrowhead, a segment-shaped product, a picket head, two sharpened sticks, fragments of two products, a paddle blade, and a rod for making fire (Ibid.: 27, tab. 3, p. 35–48).

In sum, the cultural layers of the Mesolithic peat-bog sites found in the Trans-Urals are located in the coastal strip of the onshore settlements. The Early Mesolithic layers were deposited in the lowermost portions of the sapropel, in a thin interlayer of peaty sapropel, and/or on the mineral bottom during the pre-Boreal period, ca 9400–8300 cal BC; the Middle Mesolithic layers were formed in sapropel during the Boreal period, ca 8500–7500 cal BC; the Late Mesolithic layers, in the lower portions of the peat at the turn of the Boreal and Atlantic periods, ca 7700–6800 cal BC.

The Shigir peat bog is located in the Sverdlovsk Region, 70 km northwest of Yekaterinburg (Fig. 1, *A*). In the mid- 19th century, gravel deposits of gold were discovered here. Gold lay at a depth of 7–8 m and was mined by hand in more than 20 prospector sections, with the pit's upper layers yielding ancient artifacts. The artifacts that were found during the uncovering of a large area of the peat bog were kept in various museums in Russia, in the National Museum of Natural History in Paris, and in private collections. The Shigir collection of the Sverdlovsk Regional Museum of Local Lore (SRML) includes more than two thousand items made of bone and horn, stone and metal, wood (including the Great Shigir Idol), and ceramics. The data on the age and exact location of these items are scarce and not always reliable. Judging by the ceramics dating to a wide range from the Neolithic to the Iron Age, and taking into account the rather large area where the artifacts were collected, it can be assumed that they came from non-contemporaneous sites, which probably had different functions.

In ancient times, on the territory of the Shigir peat massif, there was a water reservoir, whose initial boundaries are traceable by the outlines of the distribution of peat and sapropel deposits on the maps of 1939 compiled by the Seltorfstroy trust. However, their identification in certain areas of the peat bog is hampered by anthropogenic destructions, namely sections for peat- and gold-mining (at present, these are quarries flooded with water or stratigraphically redeposited areas).

In the Mesolithic, the Shigir peat massif was a vast lake basin cut by the Shurala, Kalata, and Shigirsky Istok rivers. Almost in the center of it, there is the so-called Skvortsovskaya Mountain (Fig. 1, *B*), known by this name in the works of V.Y. Tolmachev (1914). In fact, it is a large island, which during the Mesolithic, (judging by the sapropel deposits) was surrounded by a lake on the western, northern, and southern sides, and by separate coves on the northeastern and southeastern sides. The Kurya River flowed along the eastern coast of the Skvortsovskaya Mountain. Its floodplain was completely destroyed by the 1st and 2nd Kuryinsky mines, where in the late 19th century the Great Shigir Idol was discovered. No archaeological sites have yet been found on the eastern shore of Shigirskoye paleolake. The shallow Kurya River was probably less popular among the people than the northeastern and southeastern coves of Skvortsovskaya Mountain.

Today, 67 archaeological sites have been established at the Shigir peat bog, with nine sites containing Mesolithic cultural layers (Chairkina et al., 2001: 135–138). A large number of bone artifacts, a significant proportion of which are attributed to the Mesolithic, were found in the mines of Novy Shigirsky, Ozerny or Old Shigirsky, and 1st and 2nd Kuryinsky; this suggests the extensive development of the paleolake

water area and human habitation at its southern and southwestern coast and Skvortsovskaya Mountain during that period (Fig. 1, *B*).

Time, place, and context of the Great Shigir Idol's discovery

The first mention of a wooden idol found at the Shigir peat bog was probably made at the meeting of the Ural Society of Natural Science Lovers (UOLE) in 1890 (Tolmachev, 1914: 179). In the list of the newest acquisitions of the UOLE Museum, dated January 8, 1893, D.I. Lobanov gave information about the finds from the 2nd Kuryinsky mine, which were delivered to the museum on October 30, 1890:

"– a stone tool *in the sand under black peat**, at a depth of 5 arshins**; three wooden spoons *found on the sand* during the 4.5–5.0 arshins [3.20–3.55 m – *N.C.*]; a uncovering of the peat at a depth of wooden paddle, broken, found together with the spoons;

– a wooden idol, consisting of several pieces. When it was assembled, there were several extra pieces left, which probably belonged to another similar item, since on one of the pieces, some facial features were still visible. The idol, made up of parts, was up to 4.5 arshins [3.2 m – *N.C.*] high. *Found in the same place as the paddle and spoons*" (1893: 201–202).

Tolmachev, referring to the Lobanov's information, wrote that at the 2nd Kuryinsky mine, in the section of the "*late 1880s* at a depth of 3.5 m 'on a gold-bearing layer', three bone arrowheads with flint inserts in the blade were found. *In sections from approximately same time, at a depth of 4 m*, one wooden paddle, one large wooden idol, fragments of another idol, two stone tools, and three wooden spoons were found" (Tolmachev, 1914: 178–179). "No information was available concerning the position in which the idol was found; it is only known that it was not possible to take it intact *out of the peat*, because the wood was poorly preserved by the time of discovery, it was cracked and heavily deformed… Ten fragments of this idol have survived" (Tolmachev, 1916: 94).

Later references to the place and time of the Shigir Idol's discovery are provided in the catalog of archaeological collections of SRML, compiled by E.M. Bers: "No. 53. Wooden idol and fragments of another idol (No. 1–802). Found at the 2nd Kuryinsky mine, to the northeast of Lake Shigirskoye, *in one of the 1880 sections at a depth of 4 m*. The find is listed under No. 93 in Lobanov's catalog" (1959: 33). In the collective monograph dedicated to the archaeological sites of the Shigir peat bog, with reference to Tolmachev, it is noted that the Shigir Idol was *discovered in 1880* in the eastern part of the Shigir peat bog, in one of the sections of the 2nd Kuryinsky mine, in the peat layer *at a depth of 4 m* (Chairkina et al., 2001: 108).

The above discrepancies in the determination of the year and, consequently, the location of the section in which the sculpture was found, the depth of its deposition, and its original dimensions are understandable. The most complete information about the mines, thickness and features of the lithological layers of the 19th to early 20th centuries prospector sections, as well as information about the history of the study of the Shigir peat bog and the description of the items found there, are available in Tolmachev's publication (1914). The information he cites is taken from the works of his predecessors, including Lobanov, which is supported by the relevant links. However, it is obvious that during the first publication of the initial information about the place and context of the idol's discovery, Tolmachev made minor errors. Subsequent researchers, referring to his text as the most complete and relatively accessible source on the history of the Shigir peat bog, repeated these inaccuracies. According to the primary information sources, data from the UOLE and D.I. Lobanov, the Great Shigir Idol was discovered in the 1890 section at the 2nd Kuryinsky mine, at a depth of 3.20–3.55 m (Fig. 1, *B*). All researchers are unanimous in classifying the collection of artifacts found together with the idol. However, given the unreliability of the information about the context of discovery of artifacts in the Shigir peat bog, as well as the recent dating of the Trans-Urals wooden spoons and paddles to the Chalcolithic to Early Bronze Age (Kashina, Chairkina, 2011, 2017), the contemporaneity of this set of finds is doubtful.

The second Kuryinsky mine, with an area of ca 1 km^2, is located in the peaty-boggy valley of the Kurya River (Fig. 1, *B*). The works here were carried out through sections from the late 1870s till the early 1890s. Information on the stratigraphy, thickness of peat and mineral deposits of these sections is fragmentary. For example, according to the data from test pits, the thickness of the archaeologically sterile layers overlying the gold-bearing layer in the northern sections of 1880–1882 is 7.5–9.0 m; in the sections of 1878 and 1879, 6.0–7.5 m; and to the west of the 1877 section, 4.5–6.0 m. On both sides of the valley and

*Hereinafter, italics mine.

**1 arshin – 71.12 cm.

further south, the thickness decreases to 3.5–4.5 m; in the eastern sections of 1889–1893, to 2.5–3.5 m; in the southern sections of 1891 and 1892, to 1.5–2.5 m. In the sections of 1883–1885, located to the west of the 1890 section, the following stratigraphic layers were recorded: peat (thickness up to 1.2 m), dark gray clay (1.2 m), yellowish-gray layered clay (0.22 m), dark gray clay with quartz pebbles and shells (thickness unknown), greenish-gray gold-bearing clay (1.7 m), chlorite-mica schist (Tolmachev, 1914: 177–178). In general, the stratigraphy of the 2nd Kuryinsky mine and the section of 1890, where the idol was found, is somewhat different from that of other mines and the studied sites of the Shigir peat bog. There are neither thick layers of peat, nor sapropel, which suggests its location in the floodplain of the Kurya.

At the 1st and 2nd Kuryinsky mines, in addition to the above-mentioned finds, in one of the sections of 1883–1885 at a depth of 3.9 m, under the peat layer, in the "silt", a wooden vessel was found; in 1887, at a depth of 3.5 m, and 0.17 m above the gold-bearing layer, a human skull, fragments of a wooden paddle and a clay vessel, and bone tools (?) were found (Ibid). The sections of 1883–1887 were located on the bank of the lake bay enveloping the southeastern edge of Skvortsovskaya Mountain. Some artifacts found in the southern part of the 2nd Kuryinsky mine possibly came from local sites. The finds from the southern part of the 1st and northern part of the 2nd Kuryinsky mine, could have originated from camps and settlements located on several islands (Gorushki I and II sites) or from the now partially destroyed eastern edge of Skvortsovskaya Mountain.

Idol study results

The Great Shigir Idol, with a height of approximately 530 cm, consists of an anthropomorphic head 21 × × 34 cm in size, a board 23.0–25.5 cm wide with carved schematic anthropomorphic images, and a separate wooden piece 66 cm long, which is the base of the sculpture; the middle part, ca 200 cm, is missing (Fig. 2). In 2014, archaeologists and experts in the field of natural sciences from Russia and Germany carried out a comprehensive study of the sculpture, including an analysis of the anatomy of the wood, traces of woodworking, and tree rings, and generated a series of AMS-dates.

The ancient surface of the sculpture is covered with a dark peat patina. The patina is also present on the surface of the ancient cracks, which were filled with peat. No traces of sapropel, silt, or mineral bottom deposits were recorded on the surface or in the cracks of the figure. Researchers believe that peat formation processes took place in the Middle Trans-Urals in the Early Holocene. The burial of the Great Shigir Idol dates back to that period, when the peat layer was already partially deposited and continued to accumulate at the place of discovery, in the eastern part of the Shigir peat bog (Savchenko et al., 2018: 13, 15).

At first glance, the authors' conclusions seem logical. However, the question inevitably arises of the thickness of the already accumulated peat on which the monumental sculpture was buried, and which it couldn't have "pushed down" to the sapropel or muddy deposits at the bottom. At the bottom of some lakes and peat bogs in the Trans-Urals, there is an interlayer of peat or peaty sapropel (containing peat with a large amount of plant remains); this interlayer indicates the period of drying up of water reservoirs in the early post-glacial period.

At the Gorbunovo peat bog, at a depth of 4.4–4.5 m, the sapropel deposits overlay a peat layer 10 cm thick, which in turn covered another sapropel layer at a depth of 4.50–4.75 m, lying on clay (Khotinsky, 1977: 77). This interlayer corresponds to the period of drying-up of the reservoir in the Early pre-Boreal. The thickness of the peaty sapropel dating from 8777 to 8409 cal BC (Table 1) and overlying the sandy loam on the lake bottom at Beregovaya I is 2–5 cm (Zhilin et al., 2020: 17), and that of the peaty sapropel dating from of 9011 to 8328 cal BC (Table 1) and overlying the mineral ground at Beregovaya II is 1–6 cm (Ibid.: 25–26).

The borehole near the Anin Ostrov site, at the Shigir peat bog, showed a layer of peaty sapropel 26 cm thick, interlying the peat and sapropel strata, and dated to 3011–2870 cal BC; and also the Mesolithic layer, which was noted in the sapropel below, dated to 7830–7527 cal BC (Table 1) (Zaretskaya et al., 2014: 88, tab. 1; p. 91). At the Varga-2 site, at the same peat bog, peaty sapropel up to 30 cm thick was recorded, dated to 6658–6589 cal BC. The peaty sapropel at the eastern end of excavation 2 at the same site was dated to 5980–5844 cal BC (Table 1) (Ibid.).

The above data have shown that thickness of the interlayers of peaty sapropel, attributable to the Mesolithic, at the peat bogs under discussion does not exceed 10 cm, and the earliest date of the sapropel's formation is ca 9010–8330 cal BC. A thin layer of peat underlying the sapropel deposit obviously could not have been a layer "containing" a monumental sculpture; moreover, peaty sapropel would inevitably have been accumulated in its old cracks. The peat

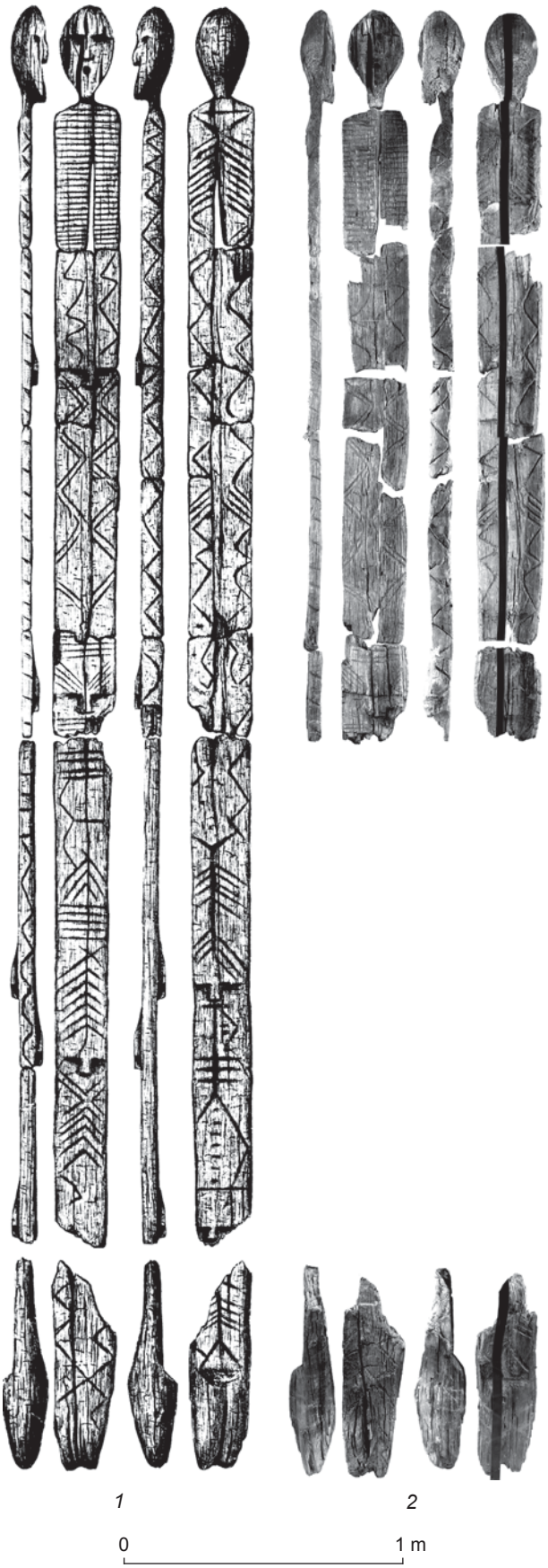

Fig. 2. Great Shigir Idol.
1 – Idol drawing after (Tolmachev, 1914); *2* – preserved part of the figure.

thickness sufficient for the immersion of the Shigir Idol ("…the idol sank in the coastal zone at a depth of less than one meter, where peat is deposited" (Savchenko et al., 2018: 13)) could not have been formed in open, and even shallow, water reservoirs: the sapropel deposit located in the lake near the shores turns into peaty sapropel, and not peat.

The idol could have been buried in the relatively thick peat layer. The rate of its accumulation in various periods of the Holocene varied: in Varga-2 section at the Shigir peat bog, in the range from 7500 ± 40 (GIN-13861) to 4870 ± 40 BP (GIN-13858), it was not more than 0.2 mm/year; and in the period from 8750 ± 70 (GIN-13865) to 7500 ± 40 BP (GIN-13861) ca 0.8 mm/year (Zaretskaya et al., 2014: 95).

The start of the waterlogging process and the formation of the earliest deposits of monolithic (not interlayers) peat on the studied peat-bog sites, including Mesolithic ones, were recorded at Beregovaya II of the Gorbunovo peat bog: in section 1 – 7511–7362 cal BC; in section 2 – 7261–7128 and 7301–7139 cal BC, i.e., ca 7500–7130 cal BC. These deposits contain the Late Mesolithic cultural layer (Ibid.: 89, 95). Waterlogging and peat formation in various parts of Lake Shigirskoye was not simultaneous: in the southwestern part at the Varga-2 site ca 7500 years ago, in the Varga section ca 6300 years ago, and in the northeastern part (Shigirskoye A settlement and Shigirskoye fortified settlement) ca 4500 years ago (Ibid.: 106).

Judging by the stratigraphy and chronology of the Mesolithic sites, as well as by the data from the palynological analysis, the accumulation of organogenic sediments (sapropels) in the paleolakes of the Trans-Urals began in the pre-Boreal period. At some of the lakes, in the Early pre-Boreal, a drier and warmer phase is recorded, which was associated with a relatively short-term drying-out of water reservoirs, leading to the formation of thin layers of peat or peaty sapropel traced on or over the mineral bottom. Peat formation in some Trans-Urals water reservoirs began in the Late Boreal or at the turn of the Boreal to Atlantic period, in the Late Mesolithic; and widespread waterlogging and peat formation as a result of a sharp dry cooling in most of the lakes occurred at the turn of the Atlantic to sub-Boreal period.

The information that there is only peat on the surface and in the cracks of the Shigir Idol, given this is correct, suggests that its "burial" took place at least

in the Late Mesolithic, when some parts of the Trans-Urals water reservoirs and paleolake Shigirskoye began to dry out and peat was formed.

Exhibition options

The researchers believe that the Shigir Idol was made with stone tools from a freshly cut and split larch trunk. The protrusions at its base are flattened, owing to contact with a hard surface. Probably, for some time, the idol stood upright on a stone, and was neither dug into nor touched the ground (Savchenko et al., 2018: 12). Other traces indicating the options for fixing the sculpture were not recorded.

The ways of exhibiting the Shigir Idol are not obvious, and can hardly be limited to the option proposed by the authors of this study. The protrusions at its base could have also been smoothed down during installing the idol into a shallow pit in the solid bedrock, which underlies the thin soft sediments almost everywhere in the Trans-Urals. The sheer absence of traces of decay, which could have disappeared on the surface, is also not a strong argument in favor of the fact that the idol was neither dug into nor touched the ground.

The lowermost part of the idol, 20–30 cm long, is slightly pointed and was probably intended for digging into the ground and/or embedding, possibly with stones. Its upper part, which is now only 25 cm wide, and initially was at least 530 cm high, should have experienced tremendous loads from atmospheric effects. The stability of the sculpture could have been ensured in different ways: it could have stood on a stone pedestal with a foundation laid by stones, leaning against a tree; inserted in a special pole construction fixed between trees; strengthened with counterweights, etc.

It cannot be excluded that the idol was not intended for vertical exhibition, and possibly nor for viewing in general, but was specially made to be immersed in water or placed on a marshy surface. These assumptions are partly consonant with the scholars' opinion that the sculpture was installed on the shore and fell into water soon after that: slight traces of rounding were noted on its surface, indicating that the item was afloat for a short period (Ibid.: 12–13).

Time of creation

In 1997, the age of the Shigir Idol was assessed by the conventional method. The available dates are well correlated with one other in the intervals of 7950–7580 (1σ) and 8210–7530 (2σ) cal BC. The AMS-data generated in 2014 differ from the above and from one another (Table 2). Samples 1 and 4 produced the youngest dates (~7000–6700 cal BC), corresponding to the Early Atlantic period. The results of dating samples 5, 3, and 7 (8700–8100 cal BC) attribute the sculpture to the pre-Boreal and Early Boreal period. Dates obtained for samples 2 and 6 (10,500–

Table 2. **Results of the dating of the Great Shigir Idol (Savchenko et al., 2018; Zhilin et al., 2018)**

Sample	Lab code	^{14}C-date, yrs BP	Calibrated date, cal yrs BC	^{13}C, ‰
		1997		
1	GIN-9467/1	8680 ± 140	7950–7590, 8210–7530	…
2	GIN-9467/2	8750 ± 60	7940–7680, 8170–7600	…
3	LE-5303	8620 ± 70	7710–7580, 7910–7530	…
		2014		
1, annual rings 1–4	MAN-21895	7930 ± 36	6854 ± 120	–26.1
5, annual rings 28–22	MAN-22436	8957 ± 28	8137 ± 104	–21.9
2, annual rings 48–52	MAN-21896	10,238 ± 43	10,020 ± 138	–29.6
6, annual rings 58–62	MAN-22437	10,518 ± 32	10,523 ± 156	–22.1
7, annual rings 88–92	MAN-22438	9262 ± 29	8503 ± 47	–21.8
3, annual rings 98–102	MAN-21897	9450 ± 40	8727 ± 56	–31.6
4, annual rings 148–152	MAN-21898	7864 ± 36	6713 ± 48	–25.7

10,000 cal BC) indicate the Late Pleistocene. Such a wide range is explicable by the repeated conservation of the idol; such traces were probably not completely removed during the preparation of the samples, which fact is confirmed by the correlation between their distances from the surface of the sculpture and the results of AMS-dating. Samples 1 and 4, the closest to the surface, were exposed to preservatives to the greatest extent; the earliest dates were obtained for the samples from the interior of the sculpture. The researchers argued that the most reliable AMS-dates from samples 2 and 6 indicated that the idol was created ca 11,000 cal BP, which is close to the boundary between the Late Dryas and pre-Boreal. However, the strong fluctuation of the calibration curve at the transition to the Holocene makes it impossible to date this time interval more accurately. The series of AMS-dates, with the greatest probability, attributes the Shigir Idol to 9600–9000 cal BC, i.e., the Pleistocene-to-Holocene transition (Ibid.: 13–15).

Conclusions

The comprehensive study has shown that the Great Shigir Idol is dated to the end of the pre-Boreal period. The choice of such early dates (9600–9000 cal BC) is not obvious; it does not correspond to the calibrated values of any of the dates obtained by the AMS-method. The issues of methods of sampling and dating of the idol are the responsibility of the experts. However, the reasons for the significant discrepancy between the dates of samples 2 and 5, 6 and 7 are unclear; moreover, judging by the figure given by the authors (Savchenko et al., 2018: 13, fig. 4), the samples are almost at the same distance from the outer surface of the trunk. It is reasonable to assume that they should have experienced approximately the same effect from preservatives.

The assumptions about the possible discrepancy between the dates of the samples that have been and have not been subjected to conservation seem justified. Our few studies of this topic did not reveal a significant difference in dates for some samples (Chairkina, Kuzmin, Burr, 2013). However, there are also anomalous (by more than five millennia!) discrepancies between the dates obtained for the samples from the objects subjected to conservation and for their archaeological context*.

*This concerns two ornithomorphic sculptures from section VI of the Gorbunovo peat bog. The data are not published.

Another indirect counterargument to the supposed early date of the Great Shigir Idol is the almost complete absence of wooden items in the Early Mesolithic layers of the Trans-Urals peat-bog sites, along with the significant number of artifacts made of stone, bone, and horn. Such an ancient age of the Shigir Idol is also disconfirmed by the previously mentioned context of its discovery. A thin interlayer of peat or peaty sapropel recorded in the sapropel or on the mineral bottom of some peat massifs in the Trans-Urals of the Early pre-Boreal period could not have been a layer "containing" the monumental sculpture. The amount of peat sufficient for its "burial" could have been deposited in the eastern part of paleolake Shigirskoye in the Boreal or at the turn of the Boreal and Atlantic, in the Middle (?) to Late Mesolithic, 7700–7100 cal BC, which conforms to the conventional dates obtained in 1997, prior to the conservation of the sculpture with butyl acrylate, dissolved in acetone and white spirit.

Thus, the paleogeographic and archaeological data suggest the need to continue research on the Great Shigir Idol in order to obtain new information about the paleoclimate, age, and nature of the primary processes of peat formation in the Ural water reservoirs; it also seems reasonable to date the micro-remains of the peat that filled deep ancient cracks in the sculpture, which were possibly not affected by the preservatives, as well as to develop clearer criteria for determining the influence of the preservatives on the results of dating the items.

References

Bers E.M. 1959
Katalog arkheologicheskikh kollektsiy Sverdlovskogo krayevedcheskogo muzeya. Sverdlovsk: Sverdl. obl. krayeved. muzey.

Chairkina N., Kuzmin Y., Burr G. 2013
Chronology of the perishables: First AMS ^{14}C dates of wooden artefacts from Aeneolithic—Bronze Age waterlogged sites in the Trans-Urals, Russia. *Antiquity*, vol. 87: 418–429.

Chairkina N.M., Savchenko S.N., Litvyak A.S., Serikov Y.B. 2001
Arkheologicheskiye pamyatniki Shigirskogo torfyanika. Yekaterinburg: Bank kulturnoy informatsii.

Kashina E.A., Chairkina N.M. 2011
Derevyannaya posuda s navershiyami v vide golov vodoplavayushchikh ptits na territorii Zauralya, lesnoy zony Vostochnoy i Severnoy Yevropy. *Vestnik Novosibirskogo gosudarstvennogo universiteta.* Ser.: Istoriya, filologiya, vol. 10. Iss. 7: Arkheologiya i etnografiya: 157–169.

Kashina E.A., Chairkina N.M. 2017
Wooden paddles from Trans-Urals and from Western and Eastern European peat-bog sites. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 45 (2): 97–106.

Khotinsky N.A. 1977
Golotsen Severnoy Yevrazii. Moscow: Nauka.

Lobanov D.I. 1893
Noveishiye priobreteniya Muzeya Uralskogo obshchestva lyubiteley yestestvoznaniya. *Izvestiya Obshchestva arkheologii, istorii i etnografii pri Imperatorskom Kazanskom universitete*, vol. XI (2): 201–203.

Savchenko S.N., Zhilin M.G., Terberger T., Heussner K.-U. 2018
Bolshoy Shigirskiy idol v kontekste rannego mezolita Zauralya. *Uralskiy istoricheskiy vestnik*, No. 1 (58): 8–19.

Serikov Y.B. 2000
Paleolit i mezolit Srednego Zauralya. Nizhniy Tagil: Nizhnetagil. Gos. Ped. Inst.

Tolmachev V.Y. 1914
Drevnosti Vostochnogo Urala, pt. II. *Zapiski Uralskogo obshchestva lyubiteley yestestvoznaniya*, vol. XXXIV (8): 151–266.

Tolmachev V.Y. 1916
Derevyanniy idol iz Shigirskogo torfyanika. *Izvestiya Imperatorskoy Arkheologicheskoy komissii*, iss. 60: 94–99.

Zaretskaya N.E., Panova N.K., Zhilin M.G., Antipina T.G., Uspenskaya O.N., Savchenko S.N. 2014
Geokhronologiya, stratigrafiya i istoriya razvitiya torfyanykh bolot Srednego Urala v golotsene (na primere Shigirskogo i Gorbunovskogo torfyanikov). *Stratigrafiya. Geologicheskaya korrelyatsiya*, vol. 22 (6): 84–108.

Zhilin M., Savchenko S., Hansen S., Heussner K.-U., Terberger T. 2018
Early art in the Transurals – New research on the wooden sculpture from Shigir, Sverdlovsk region. *Antiquity*, vol. 92: 334–350.

Zhilin M.G., Savchenko S.N., Kosinskaya L.L., Serikov Y.B., Kosintsev P.A., Aleksandrovsky A.L., Lapteva E.G., Korona O.M. 2020
Mezoliticheskiye pamyatniki Gorbunovskogo torfyanika. Moscow, St. Petersburg: Nestor-Istoriya.

Zhilin M.G., Savchenko S.N., Serikov Y.B., Kosinskaya L.L., Kosintsev P.A. 2012
Mezoliticheskiye pamyatniki Koksharovskogo torfyanika. Moscow: IA RAN.

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An Early Bronze Age Hoard of Bronze Tools from Dvin, Central Armenia

We describe a hoard found in 2018 on a hilltop near the village of Dvin, Armenia, and comprising seven daggers and six adzes. Similar pickaxes and adzes were found in caches at Dzhrashen, Yerevan, and at Nahal-Mishmar, Israel. A peculiar feature of the Dvin adzes is that their blades are sharply rounded, resembling those of the Bronze Age battle axes. All the Dvin daggers belong to a single type, similar to tangless daggers of the Maikop culture, but more robust. Results of an X-ray diffraction analysis show that the Yerevan, as well as the Dvin, specimens are made of arsenic bronze, whose source is hard to determine. Judging by the typology and the presence of blanks, the Dvin hoard indicates local metalworking, a production of artisans working in the southern part of the Alaverdy mining area. According to GPS, the direct distance between the Dvin and Yerevan hoards is just 13 km. Both locations apparently belonged to one and the same metalworking region in Armenia, and both hoards date to the late 5th to early 4th millennia BC.

Keywords: *Armenia, hoard, dagger, adze, axe, dating.*

Introduction

Hoards of weapons from the Early Bronze Age are very rare in the Caucasus and the Middle East. On the territory of modern Armenia, one such complex is known, the Yerevan hoard (Martirosyan, Mnatsakanyan, 1973). It included bronze axes, one socketed axe, and flat adzes. The Yerevan hoard was repeatedly highlighted in literature and was considered as belonging to the Kura-Araxes culture, although there were no accompanying ceramics.

The field of study of the Early Bronze Age on the territory of modern Armenia acquired a completely new perspective after the discovery of another hoard of bronze items. It was found in the vicinity of the village of Dvin, therefore it was named the Dvin hoard. Information about this discovery was received in April 2018.

Materials and research results

In May 2018, we examined the place where the hoard was found. It was in private ownership, on a high (5.6 m) hill. The surrounding area was a flat plain at an altitude of 948 m above sea level. According to amateur antiquarians, from whom archaeologists received the

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hoard, the owner of the site decided to plant rosehip bushes on a hilltop, but at a depth of one shovel he came across compactly lying bronze items. Hill coordinates: 40° 00′ 45.5″ N, 44° 35′ 45.0″ E (Fig. 1, 2). Particular interest in the location of the hoard was added by the coordinates of the area where the famous Yerevan hoard was discovered, near the village of Dzrashen, located 16 km north-west of the city of Artashat (Martirosyan, Mnatsakanyan, 1973): 40° 07′ 30.4″ N, 44° 34′ 24.7″ E. It is located 12–13 km in a straight line to the south of the place of the Dvin hoard discovery. So, they are located at a relatively short distance from each other.

The surface of the hill where the Dvin hoard was found is covered with sod, overlying gravel. The cultural layer was not identified. On the hill and the surrounding arable land, no fragments of ancient ceramics were found. The location of the hoard clearly coincides with the center of the hilltop. A piece of a bronze adze was found at a distance.

The Dvin hoard includes six flat adzes and seven daggers (Fig. 3, 4). The total mass of finds without a fragment of an adze is 2474.7 g, adzes 1940, daggers 534.7 g; the average mass of adzes is 323 g, daggers 76 g. Adzes have a significant length for tools of this category—from 234 to 264 mm (Table 1). The sharpening is double-edged. One adze is blunt (see Fig. 3, *5*). The thickness of the chopping edge is 2 mm. This product is a blank (a semi-finished product), like one pickaxe from the Yerevan hoard, with an unfinished wedge design. A unique feature of the Dvin adzes is a strong expansion of the flanged edge and its rounding. To calculate the coefficients of roundness, we will make several simple measurements (see Fig. 3, *8*). Take the bend of the blade as the arc of a circle and connect its ends with a chord A–A′, from the middle of which we lower the perpendicular to the apex of the arc (A1–B). The ratio of the segment A1–B to the length of the chord A–A′ will be the desired coefficient. In the adzes of the Dvin hoard, it is very large (Table 1). Some adzes have a narrowing towards the heel with a bend, like adzes from the Yerevan hoard. Considering the originality of the form of the weapons and their large size, it makes sense to put them in the category of their own as "adzes of Dvin type".

Analogs to these adzes in the Southern Caucasus are limited. Apart from the Yerevan hoard, which contains, in addition to adzes, axes (Fig. 5, 6), it is difficult to give other examples. Adzes from this hoard are just as large; and some of them, as well as the pickaxes, have sharply rounded blades (Fig. 5, 6; Table 2). Adzes of the Dvin type were also found in one of the Late Chalcolithic complexes of the Ilpinar burial ground in Central Anatolia (Fig. 7, *4*, *5*) (Begemann, Pernicka, Schmitt-Strecker, 1994), and in the military graves of the Ikiztepe necropolis in northwestern Anatolia (Bilgi, 2005: 46, pl. 24), dating back to the time of Arslantepe VIA, i.e. to the late 4th millennium BC. Three adzes from the Nahal-Mishmar hoard (Israel) have an additional narrowing towards the

Fig. 1. Location of the Dvin (*1*) and Yerevan (*2*) hoards.

Fig. 2. View of the area of discovery of the Dvin hoard.

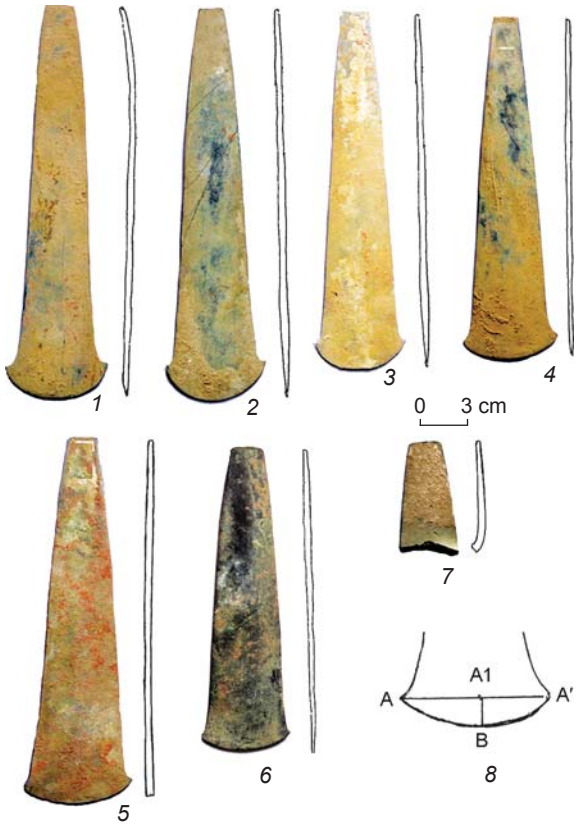

Fig. 3. Adzes from the Dvin hoard and the measurement scheme for calculating the coefficient of roundness of the blades (the numbers of the images of the adzes correspond to the serial numbers in Tables 1, 4).

heel and a strongly rounded blade (Bar-Adon, 1980: 113, 167–169) (Fig. 7, *2*, *3*). We are not aware of any other analogs. Adzes from the Maikop-Novosvobodnaya cultural cimmunity differ sharply from the Dvin in size and proportions, as well as the adzes from Suz I, the tomb of Si Girdan, Sialk III, and monuments of the Kura-Araxes culture (Korenevskiy, 2011: 60–66).

Seven daggers from the Dvin hoard are of the same type (see Fig. 4). The length of the items ranges from 181 to 250 mm, and their piercing-chopping part reaches 160 mm (see Table 1). In configuration, the Dvin daggers resemble the tangless daggers of the Maikop culture, which, however, have significant differences. The handles of the Maikop daggers are somewhat angular with a hint of highlighting shoulders. In addition, they often exhibit notches (Ibid.: 100, fig. 90, *1*), which is absent on the daggers of the Dvin hoard. Therefore, the artifacts in question were unlikely to be Maikop. However, it is obvious that the weapon makers of the Maikop-Novosvobodnaya cultural community and the Leyla-Tepe culture, and the craftsmen who made the Dvin daggers, were inclined toward the same shape with a wide trapezoidal handle, like the flint daggers of previous eras.

In the Southern Caucasus, analogs to daggers of the tangless type, as a general shape feature, are quite well-known. Such a dagger, a rare find, is present in the complex of the Kura-Araxes culture of the Kvatskhelebi S period (Tvlepias Tsqharo, burial 3) (Dzhavakhishvili, Glonti, 1962: Pl. XXXVI), but its proportions are somewhat different. Small daggers without a tang or with a semi-present tang were found at the settlements of Kyul-Tepe I and Teghut, in the early horizon (4000–3700 BC) of Areni Cave (Bobokhyan et al., 2014: 310, fig. 7, *3–5*). But all these finds are small daggers, while the daggers from the Dvin hoard are much larger in size, suitable for combat.

Outside the Caucasus, in Iran, daggers of a tangless or semi-tangless shape were found in layer 9 of Tepe Ghabristan II (Korenevskiy, 2011: Fig. 13, *1–3*; Majidzadeh, 1979: 87), contemporaneous with layers 3–5 of the Uruk time of Sialk III. Daggers with a semi-present tang are known from Tepe Hissar I (Korenevskiy, 2011: Fig. 13, *7*, *8*; Schmidt, 1933: Pl. XC, No. 930; 1937:

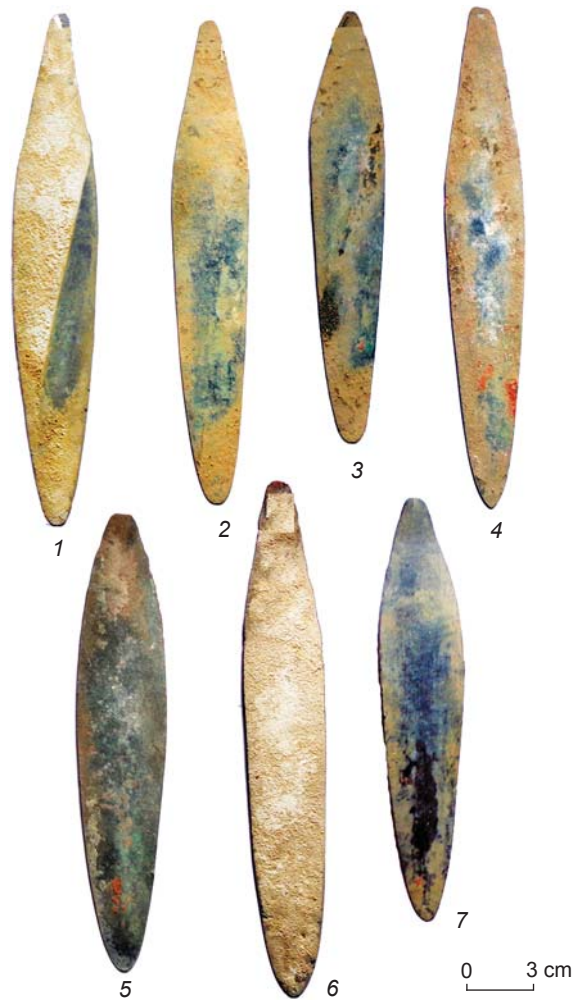

Fig. 4. Daggers from the Dvin hoard (*1–7* – No. 8–14 in Tables 1, 4, respectively).

Table 1. **Measurements of tools from the Dvin hoard and battle axe from Areni Cave**

Item	Tool	Length, mm	A, mm	B, mm	B/A	Mass, g	Adze heel, mm
1	Adze	264	76	25	0.32	370	22
2	"	247	67	26	0.38	290	15
3	"	253	60	19	0.31	340	18
4	"	239	61	18	0.29	305	17
5	"	238	62	14	0.22	340	15
6	"	234	58	13	0.22	295	15
7	Piece of adze	70	–	–	–	–	25
8	Dagger	250	–	–	–	74.4	–
9	"	225	–	–	–	73.4	–
10	"	215	–	–	–	72.18	–
11	"	207	–	–	–	58.84	–
12	"	195	–	–	–	54.88	–
13	"	181	–	–	–	68	–
14	"	185	–	–	–	133	–
15	Battle axe (Areni)	140	77	24	0.31	133	23

Note. A – length of the blade (A–A′ in Fig. 3, *8*) , B – height of the arc (A1–B in Fig. 3, *8*), B/A – coefficient of roundness of the blade.

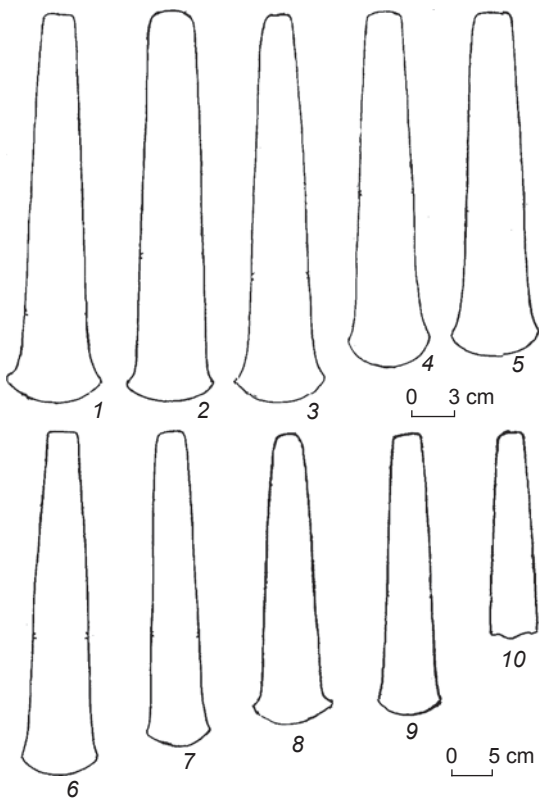

Fig. 5. Adzes from the Yerevan hoard (after (Gevorkyan, 1980)).

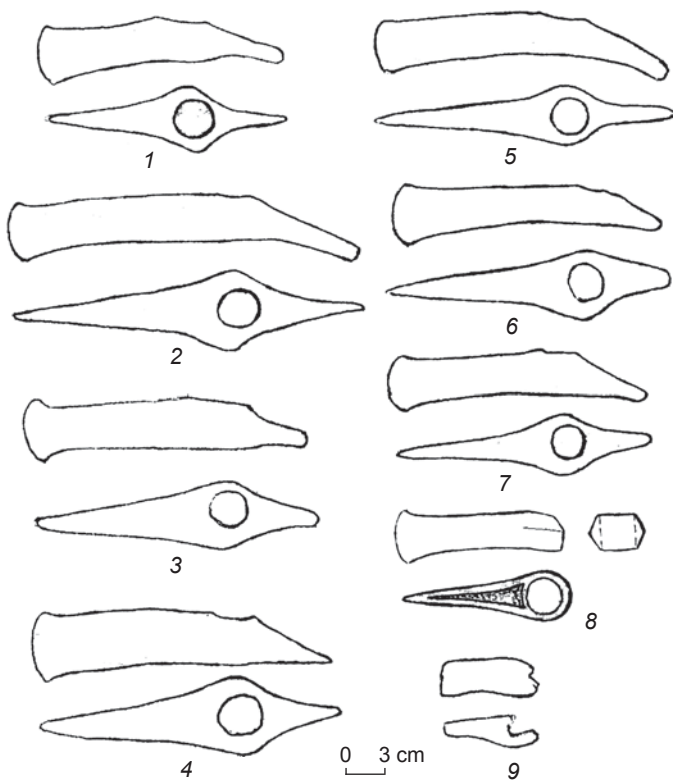

Fig. 6. Axes from the Yerevan hoard (after (Gevorkyan, 1980)).

Table 2. **Measurements of tools from the Yerevan hoard**

Lab code	Tool	Length, mm	A*, mm	B*, mm	B/A	Heel, mm	Hole diameter, mm
9751	Piece of adze	138	27	3	0.11	18	–
9750	Adze	220	47	12	0.25	20	–
9749	"	257	63	18	0.30	20	–
9748	"	257	67	8	0.11	28	–
9747	"	242	55	8	0.14	20	–
9746	"	255	64	18	0.30	18	–
9745	"	239	55	14	0.25	21	–
9744	"	224	45	12	0.26	20	–
9743	"	252	63	17	0.26	25	–
9742	"	252	60	20	0.33	24	–
9760	Pickaxe	220	48	14	0.29	–	30
9759	"	234	60	11	0.18	–	30
9758	"	206	44	13	0.29	–	27
9757	"	225	50	11	0.22	–	30
9756	"	230	42	9	0.21	–	29
9755	"	275	45	10	0.22	–	35
9754	"	190	45	10	0.22	–	32
9753	Axe	128	40	9	0.22	–	28

*See note to Table 1.

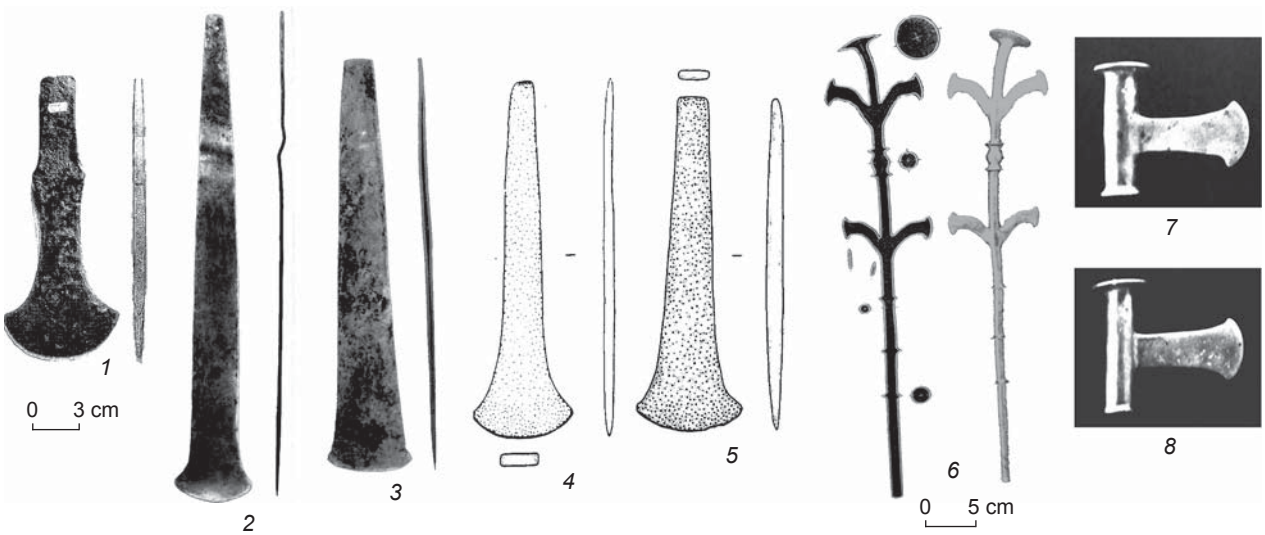

Fig. 7. Impact weapons and wedge-shaped pommels with rounded blades.
1 – Areni Cave, excavations by B. Gasparyan; *2, 3, 6–8* – Nahal-Mishmar hoard (after (Bar-Adon, 1980)); *4, 5* – Ilpinar (after (Begemann, Pernicka, Schmitt-Strecker, 1994)).

Pl. XVI, H. 3408, 3483, 4388) and II (Korenevskiy, 2011: Fig. 13, *4–6*, *9*; Schmidt, 1933: Pl. 1041, 1331, *21*, *31*). Tepe Hissar I (layers Tepe Hissar IA–C by E. Schmidt) is dated to the XL–XXXVII centuries BC (Schmidt, 1933: 323–483). Layer 9 of Tepe Ghabristan II belongs to the early 4th millennium BC (Majidzadeh, 1979: 87; Fazeli, 2004). In the Danube region, tangless bronze daggers were spread mainly in the cultures of the Tripoli BII period. For example, they are present in the Horodnica hoard of the XL–XXXVIII centuries BC (Videyko, 2004), which corresponds to the Early Maikop-Novosvobodnaya culture and the Early Uruk period of Mesopotamia (Korenevskiy, 2011: 21–40). In general, the daggers from the Dvin hoard reflect the incipient "blade revolution", which developed rapidly and had a tremendous impact on the militarization of many peoples of Western Asia, the Caucasus, and Europe in the 4th millennium BC (Korenevskiy, 2017: 59–60).

The specifics of the chemical composition of metal of the tools from the Yerevan hoard were studied by A.T. Gevorkyan and published long before the discovery of the Dvin hoard (Table 3). Emission spectral analysis was performed using the Kler method on a spectrograph with a 10-step attenuator. Data decoding was carried out using standards (Gevorkyan, 1980: 106). It was found that all items from the Yerevan hoard were made of arsenic bronze. The arsenic content ranges from 2.5 to 6.0 %. The rest of the impurities are present in fractions of a percent. Nickel, silver, and lead are noteworthy, present in the amount of tenths and hundredths of a percent. The impurities of tin, bismuth, antimony, and iron are extremely small.

Gevorkyan quite rightly noted that, using the results of the analysis, it is very difficult to associate the finished product with the geography of the ore origins. In practice, ore from various sources could be enriched and mixed. The alloying minerals introduced into the cast could also add their accompanying impurities. Also, there was a possibility of salvaging older items to produce new ones (Ibid.: 53).

The tools from the Dvin hoard were examined in 2019 using the modern method of X-ray fluorescence analysis on a Tornado Bruker spectrometer. It differs significantly from the Kler method used to determine

Table 3. **Elemental composition of metal of the tools from the Yerevan hoard, %***

Lab code	Tool	Sn	Pb	Ag	Bi	Sb	Fe	Ni	As	Cu
9742	Adze	0.001	0.3	0.15	–	–	0.03	0.09	1.3	Base
9743	"	0.05	0.3	0.012	–	0.02	0.003	0.10	5.0	"
9744	"	0.02	0.15	0.14	–	–	–	0.30	2.5	"
9745	"	0.005	0.2	0.14	–	0.01	0.03	0.25	2.5	"
9746	"	0.04	0.16	0.2	–	0.02	–	0.22	2.5	"
9747	"	0.003	0.005	0.25	–	0.017	–	0.04	2.5	"
9748	"	0.003	0.6	0.5	0.002	–	0.07	0.35	5.0	"
9749	"	0.001	0.8	0.14	–	0.26	0.001	0.20	5.0	"
9750	"	0.009	0.15	0.05	–	–	0.03	0.20	2.5	"
9751	"	0.001	0.05	0.06	–	–	0.003	0.09	3.5	"
9752	Pickaxe, scrap	0.015	0.003	0.03	–	0.004	0.001	0.30	2.7	"
9753	Axe	0.04	0.05	0.15	–	–	0.008	0.09	4.0	"
9754	Pickaxe	0.009	0.015	0.1	–	–	0.03	0.70	5.5	"
9755	"	0.003	0.05	0.06	–	0.006	0.5	0.25	2.5	"
9756	"	0.003	0.015	0.06	–	0.1	0.003	0.30	4.0	"
9757	"	0.003	0.15	0.015	–	0.01	0.02	0.15	5.0	"
9758	"	0.003	0.2	0.1	–	0.015	0.02	0.60	6.0	"
9759	"	0.001	0.2	1.0	–	0.075	0.006	0.40	2.5	"
9760	"	0.003	0.003	0.1	–	–	0.002	0.10	5.0	"

*After (Gevorkyan, 1980: 104, 106).

the chemical composition of metal of the items from the Yerevan hoard. Furthermore, the qualitative and quantitative determinations of the elements, which are carried out by the apparatus itself, are important for us. In addition, the spectrometer allows us to investigate the liquation of trace elements scattered in the body of the analyzed product, providing such information in the form of tables. The sensitivity of the device is 0.01 %, which is sufficient to determine the components in the alloy. It is not known what the degree of liquation is for elements with a content of less than 0.01 % and how much it can affect the statistical layouts in determining the composition of metal.

Is it possible to judge the ratio of trace elements in the composition of the analyzed item and of the original ore from the source? There is no definite answer to this question. To determine the relationship of the finished product with an ore base, data on lead isotopes are often used (Bobokhyan et al., 2014), but such studies have not been carried out for the hoards under consideration.

The analyzed tools from the Dvin hoard were made of arsenic bronze (Table 4). The arsenic content ranges from 1.43 to 6.26 %. In one case, it reaches 7.17 %. But this item is a piece of adze. The nature of the deformation shows that the product was bent severely, to the point of breaking. Why did they do it? It is hard to say. It is only clear that such a high arsenic content could have made the item rather fragile. Maybe the ancient craftsman took this into account and turned the adze casting into scrap.

Noteworthy is the evenly increased content of nickel and iron: Ni shows hundredths and tenths of a percent, but not more than 0.25 %, Fe 0.1–0.2 %. Lead impurities range from 0.10 to 0.89 %. The zinc content is hundredths and tenths of a percent, the maximum being 0.7 %. Impurities of tin, silver, bismuth, antimony, etc., the content of which is less than a hundredth of a percent, were not determined by the device.

The arsenic bronzes of the Dvin and Yerevan hoards are similar in terms of nickel and lead contents. However, no zinc impurities were found in metal of the items from the Yerevan hoard, which may indicate different sources of ore, unless this is a result of using different methods for determination of composition of the elements.

Discussion

Comparing the metal in the items from the Dvin and Yerevan hoards indicates that the craftsmen who made these items had similar skills in casting arsenic bronzes, knowing well the tolerable content of arsenic in the alloy (no more than 5–6 %). The original source or sources of the metal in both cases has not yet been solidly confirmed. For the Dvin hoard, an association with polymetallic copper-zinc or lead-copper-zinc deposits has not been ruled out.

Now let's consider the possible versions of the serviceable purpose of the tools from the Yerevan and Dvin hoards. A.A. Martirosyan and A.O. Mnatsakanyan

Table 4. **Elemental composition of metal of the tools from the Dvin hoard, %**

Item	Tool	Cr	Fe	Ni	Zn	As	Pb	Cu
1	Adze	0.07	0.13	0.16	0.05	4.37	0.10	95.13
2	"	0.07	0.15	0.19	0.13	1.43	0.89	97.14
3	"	0.06	0.11	0.25	0.04	3.33	0.07	96.14
4	"	0.08	0.15	0.20	0.03	2.57	0.15	96.83
5	"	0.07	0.20	0.18	0.09	4.38	0.36	94.71
6	"	0.07	0.14	0.15	0.10	3.68	0.10	95.76
7	"	0.08	0.15	0.24	0.07	7.17	0.35	91.95
8	Dagger	0.06	0.13	0.14	0.05	3.68	0.81	95.13
9	"	0.08	0.14	0.18	0.04	4.30	0.05	95.21
10	"	0.05	0.15	0.24	0.06	6.26	0.38	92.87
11	"	0.06	0.14	0.23	0.07	4.01	0.12	95.37
12	"	0.06	0.17	0.23	0.11	2.42	0.05	96.98
13	"	0.06	0.14	0.20	0.70	3.89	0.15	94.83
14	"	0.09	0.14	0.15	0.11	4.57	0.05	94.88

(1973) considered the heavy pickaxes as weapons; G. Areshian (2007) saw them as mining tools. All of these authors are probably right. Southern Caucasian pickaxes could have been used both for military purposes and for peaceful labor (Gambashidze et al., 2010: 254–259). However, the question arises: why was the shape of the pickaxe spread precisely in the Southern Caucasus, and was not accepted by the masters of the Danube region in the Chalcolithic, although they massively manufactured axe-hoes or axe-adzes? We can only answer this with a hypothesis. Probably, the Southern Caucasian pickaxes were more adaptable to work on stony soils, while the complex tools of the Chalcolithic era in the Danube region, alternatively, on the soft chernozems of the plains. Other alternatives cannot be ruled out. Those and other complex weapons were military-agrarian and reflected the level of development of military affairs, characteristic of the 5th millennium BC, when there were still no bladed weapons made of bronze.

For example, heavy hammer-axes served the Chalcolithic warriors in the Danube region. A set of figurines was found in the settlement of Stubline of the Vinča culture in Serbia, which depicted warriors apparently holding such weapons on long handles (Crnobrnja, 2011). Heavy axes, of course, were inferior in efficiency to lighter socketed short-butt axes, one of which was found in the Yerevan hoard. Distribution of the latter category of weapons in the 4th millennium BC coincides with the appearance of daggers in a broad range of territory, and is probably associated with the development of the art of close combat. Therefore, the presence of a socketed axe in the Yerevan hoard was under the influence of time.

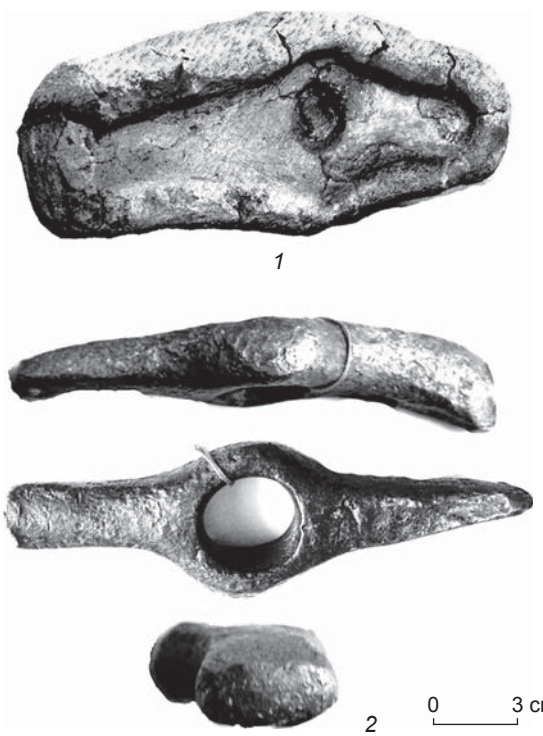

Fig. 8. Casting mold from Dzedzbebi IV (*1*) and an axe from Gyumri (*2*).

The interpretation of flat adzes from the Yerevan and Dvin hoards as woodworking tools is questionable. The reason for this is the blades of tools with coefficients of roundness of 0.2–0.3. With edges formed like this, the cutting effect inherent in a battle-axe is more pronounced. For example, we determined this coefficient for a flat battle-axe with flanges from Areni Cave of the late 3rd–2nd millennia BC (see Fig. 7, *1*). It turned out to be equal to 0.31. The coefficient of roundness for two pickaxes from the Yerevan hoard is 0.29, and for several others it is 0.22.

Thus, adzes from the Yerevan and Dvin hoards could be used as impact weapons. A sharply rounded, flanged blade is more characteristic of a battle-axe than a woodworking tool. It has the kind of extended blade that flat axes from the Nahal-Mishmar hoard have. On various standards from this hoard, the shape of such an axe, or its transformation into an axe with a long tubular socket, was often reiterated (Fig. 7, *6–8*). Therefore, one might surmise that for local warriors and foundry workers, flat axe was a familiar and well-known device for hand-to-hand combat (Bar-Adon, 1980: Fig. 27, 106, 148, 153).

Large daggers from the Dvin hoard were effective weapons with a piercing function when striking. Possession of such a means of attack gave a warrior an undeniable advantage over an enemy who did not have a similar weapon (Korenevskiy, 2017: 117–124). It is possible that the tangless blades could be attached to the handle and became spears with bronze tips.

All of the above about the possible functions of the tools from the Yerevan and Dvin hoards indicates that these were the complexes of the artisans who dealt directly with their manufacture. This conclusion is supported by the presence of foundry waste, scrap, and unfinished tools—a flat axe in the Dvin hoard and a pickaxe in Yerevan.

The age of both complexes is determined by analogy. First of all, one should pay attention to the fact that axe-adzes and copper hammer-axes were missing in the settlements of the Kura-Araxes culture 3500–3000 BC (Badalyan, 2018). The socketed axes found there had a cylindrical socket and a round butt. Casting molds for their manufacture were repeatedly found in the settlements of the Kura-Araxes culture. They testify to a qualitatively different technology of axe shaping, common to the Leyla-Tepe, Kura-Araxes, and Maikop-Novosvobodnaya cultures.

The casting mold for the pickaxe was found only at the Sioni-Tsopi settlement of Dzedzvebi IV 9 (Fig. 8, *1*),

near the town of Bolnisi (Georgia), on the northern periphery of the Alaverdy mining area (Gambashidze, Stollerr, 2010: 152, Add. 2). A hammer-axe or a pickaxe cast in a similar shape is known in Gyumri (Armenia) (Fig. 8, *2*). The Sioni-Tsopi culture dates back to the late 5th to early 4th millennia BC. (Sioni dates – 4055–3905 BC; 4065–3910, 4175–3955, and 4245–3975 BC) (Sagona, 2014: 36). The pit where the casting mold of the pickaxe was found, together with the ceramics of the Sioni-Tsopi culture, according to I. Gambashidze, refers precisely to the late 5th millennium BC (4318–4237 and 4327–4175 BC), which coincides with the dates of complex 17002 (hammer-axe and two adzes) from Ovchular-tepesi (Marro, Bakhshaliev, Ashurov, 2009, 2011) and axe-hoes of the Ariusht and Yasladan type of the tribes of the Danube region, Chalcolithic era (Ryndina, 2002: 257), late 5th to early 4th millennia BC (Tripolye BI-BII, BII).

The analogy given for the pickaxes of the Yerevan hoard can also be extended to the Southern Caucasian complexes with the adzes of Dvin type. To the south of Caucasus, such axes, being the weapons of the Eastern Mediterranean (Nahal-Mishmar) and Anatolian (Ilpinar) tribes, could have existed from the Late Chalcolithic to the Jemdet-Nasr (Ikiz-tepesi) period. But in the Southern Caucasus, at the monuments of the Kura-Araxes culture, they are unknown, as well as large daggers with a trapezoidal handle. These arguments allow us to consider the Yerevan and Dvin hoards as complexes of the pre-Kura-Araxes period, contemporaneous with the Sioni-Tsopi culture, early complexes of Areni Cave (layers IV, III, II) (Bobokhyan et al., 2014: 284, 285), Early Maikop, and Leyla-Tepe (in general, late 5th to the first half of the 4th millennia BC) (Museibli, 2020a; b: 279). They reflect a very ancient stage in the production of heavy hand-to-hand combat weapons and bladed weapons in the area of the Alaverdy mining area and adjacent territories.

Conclusions

An analysis of the materials from the Dvin and Yerevan hoards shows that they reflect a special pre-Kura-Araxes stage of metalworking of the Southern Caucasian tribes. This was during a period of expansion for clans of casters/artisans, who created military-agrarian weapons, in this region. Among them, new forms of light combat socketed axes and bladed weapons have already begun to appear. The spread of heavy flat axes in the areas where the hoards were found suggests their local manufacture and a special southern local area of metalworking within the Alaverdy mining field, about which A.A. Martirosyan and A.O. Mnatsakanyan wrote earlier (1973). This is also evidenced by the fact that the hoards were in relative proximity to one another.

The Dvin hoard was probably the sacrificial complex of a caster artisan, who buried his products on the hilltop as in a special sacred place. The items of the Yerevan hoard, apparently, were from the same series of sacrifices made by representatives of the blacksmith and foundry craft. After concealment, they were not intended for further use, just like the items that accompanied the dead to the country of "no return".

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References

Areshian G. 2007
From extended families to incipient polities: The trajectory of social complexity in the Early Bronze Age of the Ararat Plain (Central Near Eastern Highlands). In *Social Orders and Social Landscapes*, L.M. Popova, Ch.W. Hartly, A.T. Smith (eds.). Cambridge: Cambridge Scholars Publishing, pp. 26–53.

Badalyan R. 2018
The chronology of the Kuro-Araxes: New data and old problems of periodization and chronology of the Early Bronze Age materials in Armenia. *Armenian Journal of Near Eastern studies*, vol. XII (1): 51–57.

Bar-Adon P. 1980
The Cave of Treasure: The Finds from the Caves in Nahal Mishmar. Jerusalem: Israel Exploration Society.

Begemann F., Pernicka E., Schmitt-Strecker S. 1994
Metal finds from Ilipinar and the advent of arsenical cooper. *Anatolica*, vol. 20: 203– 220.

Bilgi O. 2005
Ikiztepe Erken Bronz çağı mezarliğindan ayricalikli mezarlar. *Anadolu Araştirmalair*, Cilt 18 (2): 15–113.

Bobokhyan A., Meliksetian Kh., Gasparian B., Avetisyan P., Chatainger Ch., Pernicka E. 2014
Transition to extractive metallurgy and social transformation in Armenia at the end of the Stone Age. In *Stone Age of Armenia*, B. Gasparyan, M. Arimura (eds.). Kanazawa: Kanazawa Univ., pp. 283–313.

Crnobrnja A.N. 2011
Arrangement of Vinča culture figurines: A study of social structure and organization. In *Documenta Praehistorica*, vol. 38. Belgrade: Belgrade City Museum, pp. 131–148.

Dzhavakhishvili A.I., Glonti L.I. 1962
Urbnisi I. Tbilisi: Mitsniereba.

Fazeli H. 2004
Chalcolithic archaeology of the Qazvin plain. In *Iran exhibition*. Bochum: Deutsches Bergbau-Museum, pp. 107–130.

Gambashidze I., Mindiashvili G., Gogochuri G., Kakhiani K., Dzhaparidze I. 2010
Drevneishaya metallurgiya i gornoye delo v Gruzii v VI–III tys. do n.e. Tbilisi: Nats. Muzey Gruzii. (In Georgian).

Gambashidze I., Stollerr T. 2010
Das prähisorische Siedlungsplateau Dzedzwebi nahe Balitschi in Unterkartli. In *Gold und Wein: Georgiens älteste Schätze*. Frankfurt: Nünnerich-Asmus, pp. 150–157.

Gevorkyan A.T. 1980
Iz istorii drevneishey metallurgii Armyanskogo nagorya. Yerevan: Izd. AN ArmSSR.

Korenevskiy S.N. 2011
Drevneishiy metall Predkavkazya: Tipologiya. Istoriko-kulturniy aspekt. Moscow: Taus.

Korenevskiy S.N. 2017
Oruzhiye v kompleksakh kultur nachala medno-bronzovogo veka (V–IV tys. do n.e.): Ocherki voyenizatsii drevnikh obshchestv po dannym arkheologii: Podunavye, yug Vostochnoy Yevropy, Kavkaz, Blizhniy Vostok. Moscow: IA RAN.

Majidzadeh Y. 1979
The Early Prehistoric Cultures of the central Plateau of Iran: An archaeological history of its development during the fifth and fourth millennia BC: Dissertation. Chicago: The Univ. of Chicago.

Marro C., Bakhshaliev V., Ashurov S. 2009
Excavations at Ovçular Tepesi (Nahichevan, Azerbaidjan). First Preliminary Report: 2006–2008 Seasons. *Anatolia Antiqua*, vol. XVII: 31–87.

Marro C., Bakhshaliyev V., Ashurov S. 2011
Excavations at Ovçular Tepesi (Nakhihichivan, Azerbaïdjan). Second preliminary report: 2009–2010 Seasons. *Anatolia Antiqua*, vol. XIX: 53–100.

Martirosyan A.A., Mnatsakanyan A.O. 1973
Priyerevanskiy klad drevney bronzy. *KSIA*, iss. 134: 122–127.

Museibli N. 2020a
Leilatepinskaya kultura Yuzhnogo Kavkaza: Na peresechenii traditsiy Peredney Azii i Yugo-Vostochnoy Yevropy. In *Kavkaz mezhdu Vostochnoy Yevropoy i Perednim Vostokom v bronzovom i zheleznom veke: Dialog kultur, kultura dialoga*. Berlin: Dietrich Rtimer Verl., pp. 55–83. (Archäologie Iran und Turan; Bd. 19).

Museibli N. 2020b
Leilatepinskaya kultura. Baku: Elm. (In Azerbaijani, with abstract in Russian and English).

Ryndina N.V. 2002
Medniye topory-molotki i topory-tesla Vostochnoy Yevropy (epokha eneolita). In *Problemy arkheologii Yevrazii*. Moscow: IA RAN, pp. 246–258.

Sagona A. 2014
Rethinking the Kuro-Araxes genesis. *Paleoorient*, vol. 40 (2): 23–46.

Schmidt E.F. 1933
Tepe Hissar excavations, 1931. Philadelphia: Univ. of Pennsylvania. (The Museum Journal; vol. 23 (4)).

Schmidt E.F. 1937
Excavations at Tepe Hissar, Damghan. Philadelphia: Univ. of Pennsylvania Press.

Videyko M.Y. 2004
Gorodnitsa II, skarb. In *Entsiklopediya tripilskoy tsivilizatsii*. Kiyv: Petroimpeks, pp. 126–127.

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Vengerovo-2—a Krotovo Culture Site in the Baraba Forest-Steppe: An Archaeozoological Study

This study addresses faunal remains from Vengerovo-2 in the Baraba forest-steppe—a Bronze Age site associated with the Krotovo culture. We describe the origin of the sample, the distribution of bones in the living space, the species and skeletal parts represented, and the age of the animals. The sample consists of small fragments, which are likely butchering and kitchen waste, as well as the leftovers of production and rituals. Bones of domesticated animals are more frequent (62 %) than those of wild ones. Skeletal parts from utility pits (pelvic bones, ribs, and appendicular bones) differ from those found in production areas—mandibles, crania, and entire skeletons. Presumably, pits contained food, and production areas were places where work was accompanied by rituals. The reconstructed animal breeding system indicates its domestic nature, centered on sheep and goats, with a small number of horses and cattle. Hunting large prey (elk and roe deer) was important, and the same is true about fur animals (fox and marten) and waterfowl. The procurement of peltry, hides, and leather were principal occupations. Bone tools were made mostly from elk bones. Results of correlation analysis suggest that in terms of composition, the faunal sample was largely similar to those from contemporaneous Krotovo and Yelunino sites.

Keywords: *Baraba forest-steppe, Bronze Age, Krotovo culture, archaeozoological studies, faunal sample composition, pastoralism.*

Introduction

V.I. Molodin identified the Krotovo culture of the Middle Bronze Age in 1975. During more than 40 years of large-scale study of the Krotovo culture in the Irtysh basin and Baraba forest-steppe, the following settlements were discovered and researched: Preobrazhenka-3 (Molodin, 1977), Cherno-Ozerye IV (Gening, Stefanova, 1982), Cherno-Ozerye VI (Stefanova, 1988: 55), Inberen X (Stefanova, 1985; Stefanov, Stefanova, 2001), Saranin II (Glushkov, 1984), etc. One of the largest settlements of this culture studied to date is Vengerovo-2. This settlement is located on the edge of the second floodplain terrace on the left bank of the Tartas River, on the territory of the Vengerovsky District of the Novosibirsk Region (Fig. 1). Today, the site is located 0.8 km of the shoreline, but during the period of its use (the Bronze Age), the settlement was located immediately near the river. In

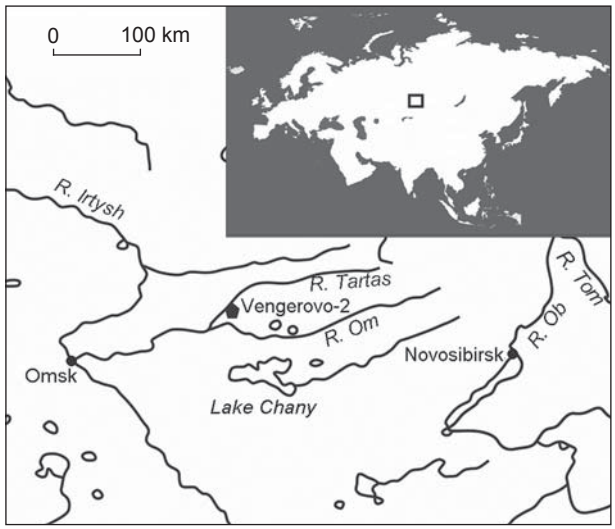

Fig. 1. Location of the Vengerovo-2 site.

the stratigraphic sequence, the surf zone, and traces of destruction of some pits as a result of flooding, are clearly recorded.

The settlement of Vengerovo-2 was discovered in 1966 by T.N. Troitskaya (Troitskaya, Molodin, Sobolev, 1980). In 1973 and 1975, it was investigated under the supervision of Molodin: two dwellings were excavated (No. 1 and 2), on the basis of which the Krotovo culture was distinguished and characterized (Molodin, 1977; 1985; Molodin, Polosmak, 1978). In 2011–2017, eight more residential structures (No. 3–10), as well as several facilities of various purposes, have been researched at the site. Thus, deposits on an area of 2064 m^2 were uncovered here, ten structures and a significant part of the space between the dwellings were studied (Molodin et al., 2016).

Based on coal samples from burnt structures and hearths, as well as bones from utility pits, a large series of radiocarbon dates was obtained, according to which the settlement functioned in the interval of approximately 1950–1700 /600 cal years BC (Molodin et al., 2013: 280).

Paleofaunal materials traditionally serve as the basis for re-creating the structure of carnivorous consumption, as well as for studying the dynamics of the faunal environment and the importance of hunting, and for assessing the composition of the herd and the role of cattle breeding in the economy of the ancient population (Antipina, 2016: 99; Kosintsev, 2004; Kosintsev, Varov, 1996; Kosintsev, Gasilin, 2006; Roslyakova, Kosintsev, 2013; and others). The results of this analysis can be discussed both in a local context (for example, in comparison with those of the nearby Krotovo sites and other cultural formations of the Early, Middle, and Late Bronze Age in Western Siberia), and in a broader context when analyzing stable isotopes to reconstruct the diets of various populations of this time (Marchenko et al., 2015, 2017). Data on the composition of animal bones from Vengerovo-2 are important for consideration of the general trends in the distribution of domesticated animals from the territory of Central Asia in Siberia (Kosintsev, 2004; Benecke, 2017; Kiryushin, Gaiduchenko, Makarevich, 2020).

The purpose of this study is to reconstruct, on the basis of the results of paleozoological analysis, the elements of the subsistence system of the population of Vengerovo-2.

Materials and methods

The research methodology of the site called for the horizontal opening of the excavation areas with the adjacent space between the dwellings, and the obligatory fixation of all finds (including osteological remains) in a three-dimensional coordinate system, using a tacheometer. As a result, significant paleofaunal material of more than 2.5 thousand fragments of bones was obtained. However, only a part of the faunal remains (1029 spec., as established in the course of planigraphic and stratigraphic analysis) belonged to the layer of the Krotovo culture. This is due to the fact that the upper horizons of the site were disturbed both by the exploitation of the terrace by the population of the Early Iron Age, the Middle Ages, and the Modern Age, and by modern anthropogenic activity. The inclusion of materials from these horizons could significantly distort the results of the frequency statistical analysis. The species of the bones were determined, including those presented in the form of calcined fragments from the fillings of hearth facilities, and also the ones that served as the basis for a few bone tools. Results of the study of the osteological collection from the excavations of 1973–1975 (dwellings No. 1, 2) were published earlier (Molodin, 1985: Tab. 3) and were not included in the sample for this study.

The collection is dominated by the bones that were the waste of carcass processing, cooking, and making tools. These are characterized by a high degree of fragmentation; only a few whole bones are found. Therefore, the species identification was made only for a part of the collection (445 spec., 43.2 %). As noted above, finely fragmented calcined bones (8332 spec.) from the filling of smelting furnaces were analyzed separately. Species identification was carried out for 451 specimens (5.8 %).

Thus, the total sample of bone fragments from Vengerovo-2, identifiable to the species level, was 896 specimens. Statistically, such a sample is considered sufficient to establish the species composition of the animals most significant in the economy of a particular settlement, as well as to determine the real ratio of their bones in kitchen remains (Antipina, 1997; Cemych, Antipina, Lebedeva, 1998). Statistical counts were mainly

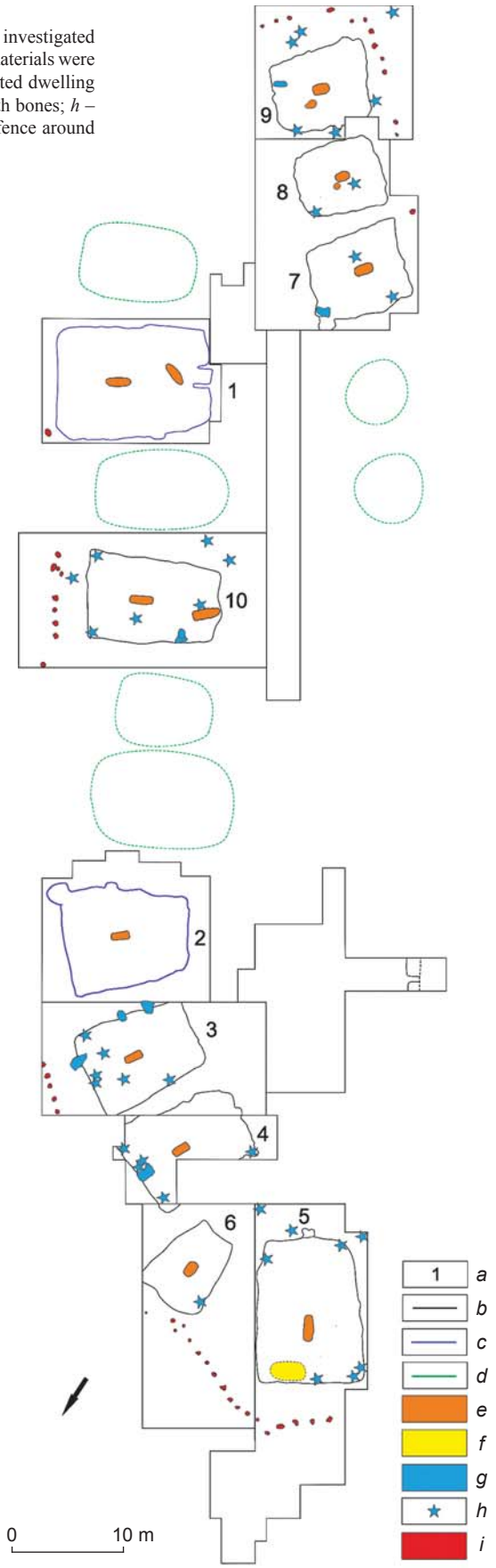

Fig. 2. Plan-scheme of the Vengerovo-2 settlement.
a – serial number of the dwelling; *b* – boundary of excavations and dwelling pits investigated in 2004–2017; *c* – boundary of dwelling pits investigated in 1973–1975, which materials were not included in the paleofaunal sample; *d* – conditional boundary of unexcavated dwelling pits; *e* – smelting furnace; *f* – facility No. 2; *g* – utility and production pits with bones; *h* – location of identifiable animal bones; *i* – pole pit marking the location of the fence around the settlement.

based on the number of identifiable bones (NISP). This was due to their prevalence throughout the site, high fragmentation, and low preservation, which made the reliable calculation of the minimum number of individuals (MNI) difficult.

Bones were found, as a rule, on the floor of dwellings, in pole or utility pits, hearths, filling of production facilities and clusters (Fig. 2). Most of the identifiable bones, 358 specimens, or 80 % (of which most (314 spec.), were studied as part of production facility No. 2 of dwelling No. 5), were found during the exploration of production areas. In the space between the dwellings, 26 identifiable bones were found; on the floor of the dwellings, there were 22; in the filling of the pole pits, there were 20; and in the filling of the utility pits, there were 14 specimens (Molodin et al., 2013, 2014).

Production areas were located in the northwestern part of each dwelling. They yielded accumulations of household and technical ceramics (crucibles, ladles, fragments of casting molds), bones, stone and bone tools, and pits with bones. Spatial analysis of finds in the structure of the dwelling made it possible to identify these zones as areas for storing bronze casting and other implements, and to reveal their connection with the hearth zone (Molodin et al., 2012, 2013, 2014).

Among the studied complexes, production facility No. 2 in dwelling No. 5 stands out (Fig. 3, *1*): at the northwestern wall of the excavation, at the floor level, an accumulation of bone fragments was found, 428 spec.; among them, 314 spec. were identified as species: pine marten *Martes martes* – 261/6*, sable *Martes zibellina* – 2/1, roe deer *Capreolus pygargus* – 6/2, elk *Alces alces* – 9/1, horse *Equus caballus* – 11/2, sheep/goat *Ovis capra* – 20/2, cow *Bos taurus* – 2/1. Fox *Vulpes Vulpes*, dog *Canis familiaris*, and saiga *Saiga tatarica* were isolated finds. Thus, in this cluster, 88.3 % of the identifiable bones belong to fur animals. Since the bones of the pine marten belong mainly to nearly intact skeletons of six individuals, these were not taken into account when calculating the proportion of different species in the osteological spectrum, because these would distort the results of the frequency distribution (see *Table*). On the territory of production facility No. 19, in dwelling No. 7, 22 fox bones were found in a pit (a whole humerus, fragments of the ulna, tibia, calcaneus, lumbar and cervical vertebrae,

*Number of bones/minimum number of individuals.

Fig. 3. Production facilities of the Vengerovo-2 settlement. *1* – No. 2 (dwelling No. 5); *2* – No. 19 (dwelling No.7): *a* – fragments of skulls, *b* – jaws of foxes in the filling of the facility.

at least two skulls, and two mandibles (Fig. 3, *2*)) and a horse splint bone. In dwellings No. 3, 4, 6, 9, at production areas, in pits, fragments of the mandibles of a sheep/goat and a fox were recorded.

The number of bone tools in the settlement is small: only nine specimens. The handle from dwelling No. 5 was made from the diaphysis of the long bone of a large mammal (Fig. 4, *1*). The raw material for the chisel tool and the cylindrical handle from dwelling No. 3 was the antler of an elk (Fig. 4, *2*, *3*), and for the tool of the blunt knife type, the pelvic bone of an elk was used. Another elk antler tool was found in dwelling No. 10 (Fig. 4, *5*). Deep cuts were recorded on the bone of a bear, and drilling marks on one of the sheep/goat's talus bones (Fig. 4, *4*).

The bones of domestic animals in the osteological collection of the Vengerovo-2 settlement make up 62 % of the identified remains. This suggests that cattle breeding was the basis of the economy of the inhabitants of the settlement at the time of its functioning; in addition, meat was an important component of the diet of the Krotovo people. Four types of domestic animals have been identified: sheep/goat*, cattle, horse, and dog (see *Table*).

The most abundant bones are from small ruminants; their share is 88.6 % of the remains of domestic species and 55 % of the total amount of the osteological collection. Notably, more than 80 % of small ruminant bones were found in the hearths in a calcined state. This can be explained by the fact that in small bones of a sheep/goat, with strong fragmentation as a result of exploitation, during burning, morphological signs for diagnosis are better preserved than in large bones of large mammals. Morphological differentiation of sheep and goats was possible only in five cases (four bones belonged to individuals of *Ovis aries* and one to *Capra hircus*). Analysis of the remains by skeletal elements for these species showed that the bones of all sections were present. Owing to the small size of the fragments, it is difficult to determine the age of the animals. It was found that six bones belonged to immature or young individuals under two years old, and eight bones belonged to adult animals.

The horse is represented by 38 bones and it is the second most numerous animal in the collection, after the small ruminants. However, the question of whether all the horse bones belong to domestic animals, and not to wild individuals, remains open. The morphological features of all the bones of the skeleton of wild and native domestic horses are extremely similar (Antipina, 2016: 101). Analysis of the distribution of skeletal elements revealed the predominance of limb bones. Vertebrae, ribs, and jaw fragments come in fewer numbers. Epiphyseal fusion indicates that most of the horses were adults at the time of slaughter. The jaw of the horse from the filling of facility No. 2 of dwelling No. 5 belonged to a young individual, which makes it possible to classify it as a domestic species, since, as some researchers believe, hunters of wild horses did not kill young individuals (Amalrik, Mongayt, 1966; Bökönyi, 1991), although this situation requires further research (Nurushev, 2018). Perhaps, the inhabitants of Vengerovo-2 were finding the bones of wild horses. This assumption is based on the results of radiocarbon dating of the horse bone from the household pit of dwelling No. 10; its calibrated age corresponds to the 6th millennium BC. It should be added that the presence of domesticated horses among the members of the Krotovo culture is clearly evidenced by the image of a skier driving a bridled horse on the top of a single-edged dagger from the Rostovka burial ground (Irtysh region of the Om) (Matyushchenko, 1970). The authors are aware that the problem of horse domestication remains relevant for the West Siberian

*The bones of a sheep and a goat are very similar morphologically. In cases where they lack diagnostic signs or are highly fragmented, such bones are referred to the same category as small ruminants (see, e.g., (Yanish, 2018: 107)).

region; its solution requires numerous analyses of bone material, including paleogenetic.

Cattle is represented by only three bones, which are associated with different parts of the skeleton. One of the bones, a lower end of the large left metacarpal (78 mm wide), was originally attributed to a cow, but eventually diagnosed as the bone of an auroch *Bos primigenius*; it possibly belongs to the paleofauna.

Domestic dog is represented by four bones: the vertebra of an adult, fragments of the humerus and heel bones.

Wild mammals and *birds* are associated with 38 % of the identifiable bones in the osteological collection of Vengerovo-2 (see *Table*). This indicates that the meat of this group of animals and birds was included in the diet of the inhabitants of the settlement, and the bones served as raw materials for the manufacture of tools and fuel. Since a significant part of the remains of large mammals is highly fragmented and cannot be identified, it can be assumed that the role of meat of such animals as elk or roe deer in the diet of the Vengerovo-2 population was higher than the bones identified to the species level suggest.

Nine species of wild mammals have been identified: elk *Alces alces*, roe deer *Capreolus pygargus*, brown bear *Ursus arctos,* saiga *Saiga tatarica*, fox *Vulpes vulpes*, hare *Lepus timidus*, marten *Martes martes*, sable *Martes zibellina*, and beaver *Castor fiber.* Most of the wild animals are fur-bearing species (80 %), which indicates the hunting specialization of the inhabitants of the settlement. The proportion of fox bones is high (75 %); these were most often found in the filling of the hearths. Analysis of the distribution of skeletal elements revealed the predominance of limb bones. Recall that in the filling of facility No. 2 of dwelling No. 5, bones of at least six practically complete skeletons of the pine marten *Martes martes*

Species composition of the bones from the Middle Bronze Age settlements of the forest-steppe zone of Western Siberia, spec.

Site	Small ruminants	Horse	Cattle	Dog	Elk	Roe deer	Bear	Wolf	Boar	Fox	Marten	Hare	Sable	Beaver	Aurochs	Bird	Area, m²	Source
Vengerovo-2*: 2011–2017	56	37	2	3	23	7	1	–	–	29	3**	5	3	1	1	13	2064	This article
from hearths	294	1	1	1	–	–	–	–	–	152	1	–	–	–	–	1	–	Ditto
Inberen X	35	84	64	2	96	2	–	–	–	–	–	–	–	–	–	–	405	Stefanova, 1988
Saranin II	35	84	36	–	26	–	13	–	–	1	–	–	–	–	–	–	< 800	Ditto
Cherno-Ozerye IV	356	82	25	–	8	–	2	–	–	1	–	2	–	–	–	–	< 300	Smirnov, 1975
Cherno-Ozerye VI	4415	1189	504	–	45	6	64	6	5	35	1	6	–	–	–	8	2255	Ditto
Preobrazhenka-3, Abramovo-10A, Vengerovo-2 (1973–1975)	130	319	122	3	126	56	34	19	2	19	–	74	15	4	–	58	–	Molodin, 1985
Berezovaya Luka	17,941	7719	5139	219	51	5	–	39	3	36	7	127	–	94	–	96	< 2000	Grushin, 2012; Kosintsev et al., 2005; Kosintsev, Yavsheva, Devyashin, 2011
Kolyvanskoye I	159	278	436	8	4	–	10	–	1	1	–	4	–	5	–	18	2500	Grushin, 2012, 2015
Kostenkova Izbushka	62	251	114	135	748	33	99	–	9	19	–	13	–	128	–	–	1414	Grushin, 2012

*Identifications by N. Benecke and S.K. Vasiliev.

**The bones from facility No. 2, dwelling No. 5, are not taken into account, because these belong to six almost intact skeletons of marten.

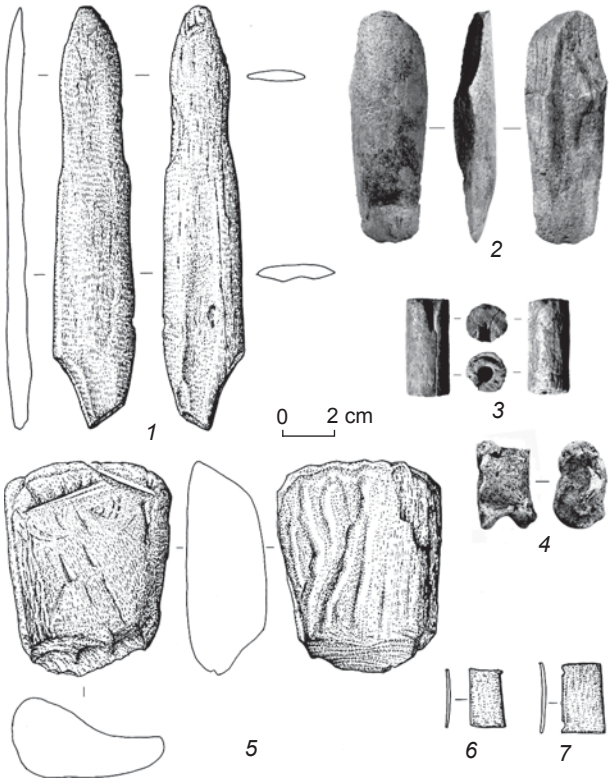

Fig. 4. Antler and bone tools from the Vengerovo-2 settlement.
1 – handle with bronze oxides (dwelling No. 5, facility No. 2); *2* – adze (dwelling No. 3); *3* – cylindrical handle with a rounded groove (dwelling No. 3); *4* – talus with traces of drilling (dwelling No. 5); *5* – a tool of the hoe type (dwelling No. 10); *6*, *7* – plates (dwelling No. 5, facility No. 2).

were found, deliberately not taken into account when calculating the proportion of different species in the osteological spectrum.

Avian bones belong to various types of ducks. The collection contains mostly long tubular bones with diagonal cleavages, which appear when a whole bird carcass is cut into pieces (Antipina, 2016: 108).

The fillings of the hearths show extensive evidence of fish consumption by the inhabitants of the settlement, which will be addressed in a special work.

Discussion of the results

The collection under study is relatively scarce, taking into consideration the excavated space. The entire sample of finds from the eight investigated dwellings (No. 3–10) (excluding the calcined bones found in the filling, which are usually not subjected to archaeozoological analysis) totals 1000 specimens, although the excavated area is over 2000 m^2 (0.5 spec. per 1 m^2 of area). The bones from dwellings No. 1 and 2 were not included in this calculation. Collections of animal bones from other settlements of Western Siberia of this time are much larger (see *Table*). For example, the osteological collections of the settlements of the Krotovo culture, Cherno-Ozerye IV and VI, located on the Irtysh River, include 476 and 6284 specimens, with excavation areas of <300 and 2200 m^2, respectively (Gening, Stefanova, 1982; Stefanova, 1988: Tab. 1, 9) (1.6 and 2.8 spec./m^2, respectively). During the excavation of the settlement of the Yelunino culture Berezovaya Luka in the Kulunda forest-steppe, on an area of about 2000 m^2, more than 30,000 bones were recorded (Kosintsev, Yavsheva, Devyashin, 2011: 140) (15 spec./m^2). The relatively small size of the collection of bones from Vengerovo-2 can be explained by the special method of waste disposal (these were used as fuel or buried outside the settlement) or the short life of the settlement. The latter, taking into account the concentration of arckostenkhaeological finds, thickness of the cultural layer, traces of restructuring, and obtained radiocarbon dates, is unlikely. The tradition of a complete utilization of bones was recorded among carriers of the Kulai culture at the Krokhalevka-7A settlement of the Early Iron Age (Sumin et al., 2013: 211). The use of bones as a fuel by the inhabitants of Vengerovo-2 is evidenced by the results of the analysis of the hearths' filling (Nesterova, 2019: 129–131).

The analysis showed that in the settlement herd, the small ruminants outnumbered horses and cattle. Animal husbandry, apparently, had the domestic characteristic in which animal shelters were part of each household structure. Earlier, it was suggested that the fence located 3–5 m of the rear walls of the dwellings may have served as a support for the shed under which the animals were kept in winter (Molodin et al., 2016). The total area of the settlement to be reconstructed is at least 3770 m^2, the area between the fence and the dwellings is nearly 500 m^2. During a selective study of the latter, a large amount of humic organic matter was recorded in the layer, which indirectly confirms the proposed assumption. If we proceed from modern sanitary requirements (1.5–3.0 m^2 per sheep (Metodicheskiye rekomenatsii…, 2012: Tab. 10)), the village could contain 200–300 heads of cattle. The flooded meadows located in the immediate vicinity of the settlement (the Tai locality) with abundant herbage constantly provided the sheep with food, and made it possible to harvest it for the winter under any weather conditions (drought, watering) (Molodin, 2016).

Hunting activity was focused on the fur trade, as evidenced by the predominance of wild species among the osteological remains: foxes and martens. The authors have noted the role of leather production in the structure of the economy of the Krotovo population (Molodin et al., 2020; Nesterova, 2019: 112). Noteworthy is the peculiarity of the distribution of bones according to the functional purpose of facilities: the pelvic bones, ribs,

and the bones of the legs of animals were found mainly in household pits; jaws, skulls, and whole skeletons* were at production areas. The former can be interpreted as the remains of carcasses intended for cooking. The latter, perhaps, should be considered as traces of some ritual actions that could accompany production or hunting operations. The basis for this assumption is the presence of identical species (fur-bearing animals) and skeletal composition, as well as the localization of such finds in the northwestern part of the dwelling, behind the hearth. Noteworthy is the specific composition of osteological finds in smelting furnaces: these are mainly the bones of sheep/goats and foxes. Interpretation of such a sample is still questionable.

Evidence that the industrial (in particular the bronze casting) activities were accompanied by cult/ritual practices (including the use of animal bones) can be found in the research works on the Bronze Age and the Early Iron Age settlement complexes (see, e.g., (Chernykh, 2007; Efremova et al., 2020; Troitskaya, Borodovsky, 1994: 8; Troitskaya, 1979: 59)). The use of the bones of wild animals in hunting rituals was recorded among the natives of Siberia (Kulemzin, 1984; Basilov, Sokolova, 1999; Ivasko, Lobanova, 2003). For example, the Khanty, in order to ensure good luck in the hunt, kept certain parts of the carcasses and limbs of animals. As a rule, various bones of an otter, fox, sable, bear were kept, and "only two hind legs are kept from a hare" (Kulemzin, 1984: 83). For the same purpose, the Lower Ob Ostyaks kept the skulls of hares and partridges (Ivasko, Lobanova, 2003: 70). The Kets believed that the revival of an animal could occur only if its skull and some parts of its skeleton were preserved (Alekseenko, 1967: 175). Notably, the materials from the Vengerovo-2 settlement contain a significant number of fox limb bones. N.V. Lukina noted that among the Khanty, the skins from fox's paws, which were distinguished by their great strength, were considered especially valuable. According to the Khanty, the legs of fur-bearing animals contributed to a successful hunt (Lukina, 1985: 150).

For the manufacture of tools, the Vengerovo-2 people most often used the long bones and the antlers of large mammals, mainly elk. This conclusion can be drawn from the materials of all Krotovo culture settlements (Molodin, 1985: 73; Stefanova, 1988: 65).

Wild species represented in the analyzed osteological spectrum usually belong to forest fauna. This is consistent with the complex reconstruction of the climate of the Baraba forest-steppe, carried out on the basis of the analysis of lacustrine sediments: at the turn of the 3rd–2nd millennia BC, there was a humidification and cooling, as well as an expansion of the taiga vegetation zone (Zhilich et al., 2017; Molodin, Zakh, 1979).

In the burial grounds of the Odino and Krotovo cultures Sopka-2A, -2/4B, C in the Baraba forest-steppe, which are contemporaneous to the Vengerovo-2 settlement, the bulk of the bone artifacts were also made from the bones of elk and other large mammals (Molodin, 2012; Molodin, Grishin, 2016). Among these finds, there are jewelry items made from the bones of hare, beaver, teeth of bear, sable, fox, and wolf. In the burials, the talus bones of small ruminants are present in various quantities (up to 15 units); in rare cases, of cattle and horses.

Correlation analysis demonstrated that the osteological collections of the Vengerovo-2 settlement in terms of species composition are generally identical to the collections of the Krotovo settlements Preobrazhenka-3 and Abramovo-10A (Baraba forest-steppe), Cherno-Ozerye VI (Irtysh basin) (Molodin, 1985: 73, tab. 3) (Fig. 5). On the basis of osteological finds, Molodin defined the economy of the people of the Krotovo culture as diversified, with a productive livestock-raising basis and a significant role of hunting. Cattle (bulls and cows) and horses dominated the herd; a smaller proportion were sheep (Ibid.). The paleofaunal materials of the Inberen X settlement also confirm that the basis of the herd were cattle and horses; the share of small ruminants was also significant (Stefanova, 1988). In the Yelunino settlement Kolyvanskoye I (northeastern foothills of Altai), herd was also dominated by cattle; according to the head of the excavations, this was due to the mining and metallurgical specialization of the village: bulls were used as a draft force (Grushin, 2012: 174). The osteological collection of Vengerovo-2 is distinguished from the collections of other Krotovo sites by a small proportion of horse and cattle bones. This may indicate both specialized livestock breeding, focused on sheep and goat breeding, and the specific composition of the meat diet (with a greater proportion of meat from small ruminants). A similar situation was recorded while studying the settlements of Cherno-Ozerye IV and VI: the basis of the livestock, according to V.F. Gening and N.K. Stefanova, consisted of small ruminants (up to 85 %), cattle and horses were represented in equal amounts (1982: 62). At the Yelunino settlement Berezovaya Luka (left bank of the upper Ob River), among the identifiable bones, the remains of small ruminants are 17,941 spec., or 58.3 %, horses – 7719 spec., or 25.1 %, cattle – 5139 spec., or 16.6 % (Grushin, 2012: 172).

In the osteological spectrum of the Krotovo settlements, the proportion of wild animals reaches approximately 40 %. This testifies to the significant role of hunting in the economic system of the population. On this basis, only the collections of the Cherno-Ozerye IV and VI settlements are distinguished (Gening, Stefanova, 1982: 62), in which single bones of wild animals were found. According to

*Unsatisfactory macroscopic preservation of bones does not allow us to reliably determine the features of their "exhibition" in the form of whole carcasses or in skeletonized form.

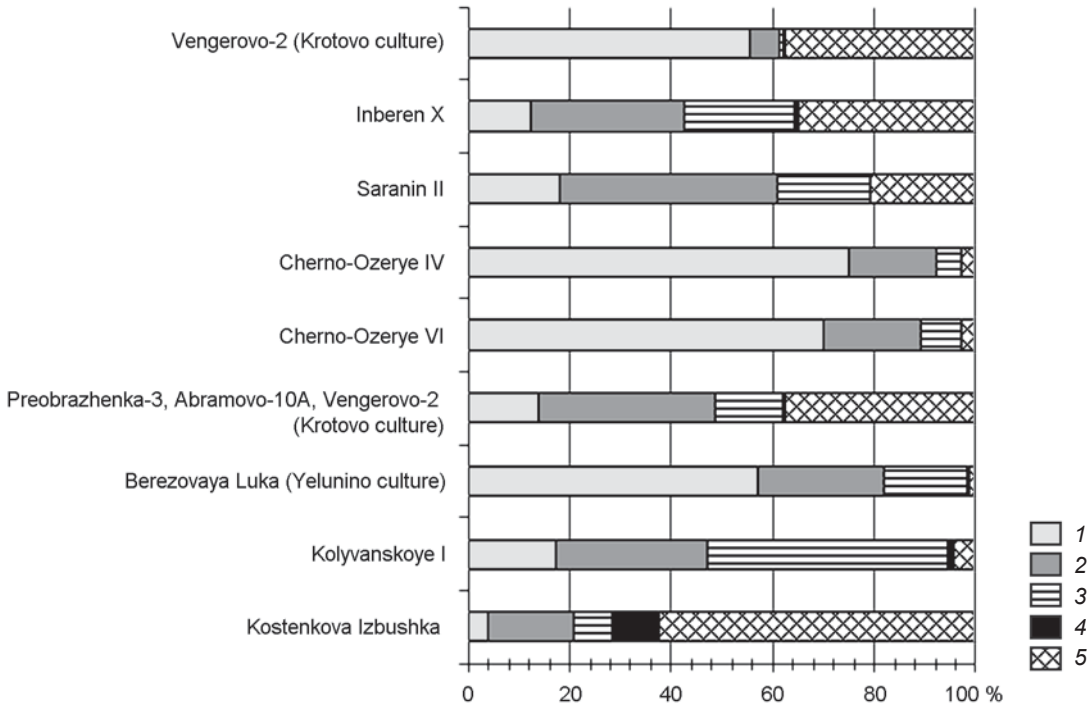

Fig. 5. The ratio of the bones of wild and domesticated species of animals from the Middle Bronze Age settlements in the forest-steppe zone of Western Siberia, %.
1 – small ruminants; *2* – horse; *3* – cattle; *4* – dog; *5* – wild species.

the results of the osteological analysis of materials from the Yelunino settlement Kostenkova Izbushka (right bank of the upper Ob River, the shore of Lake Itkul), the main occupations of its inhabitants were fishing and hunting; bones of wild animals make up more than 60 % of the osteological collection (Grushin, 2012: 176).

Thus, the results of archaeozoological analysis indicate the economic variability of the settlement population of the Western Siberia forest-steppe zone. This was due to the natural landscape conditions, economic characteristics, and elements of material culture (Levin, Cheboksarov, 1955; Andrianov, 1968; Arutyunov, Khazanov, 1979; and others). Among the settlements of the Yelunino culture located in the Altai forest-steppe, S.P. Grushin distinguished three economic and cultural types: forest, hunting, fishing, and cattle breeding, diversified, with a predominance of hunting and fishing (the 1st type); forest-steppe, cattle breeding, with an insignificant role of hunting and fishing (the 2nd type); foothill, metallurgical, with a leading role of cattle breeding and with an insignificant role of hunting and fishing (the 3rd type) (2012: 175–176). The materials presented in the article make it possible to classify the Vengerovo-2 settlement as a variant between 1st and 2nd type, in which the significant role of hunting remains, but the basis of the economy is the local breeding of small ruminants livestock.

The distribution of domesticated animal species in Western Siberia has been recorded at least from the middle of the 3rd millennium BC. It probably originated from the centers of domestication of sheep, goats, and cattle that had been functioning in the western regions of Central Asia since the 6th–5th millennia BC (Benecke, 2017). The oldest remains of domesticated bovids in Siberia were found in the Altai; they belonged to the Afanasyevo period (late 4th millennium BC). The appearance of Western Asian domesticated animals and pastoralism with nomadic herds in the steppe and forest-steppe zones of Western Siberia dates back to the early 3rd millennium BC. In the Baraba forest-steppe, this is associated with the carriers of the Odino culture. Domesticated small ruminants came to them from the western regions of Central Asia as a result of migration processes, such as *Contacts* (contacts within the interregional trade relations) (Molodin, 2019). This is evidenced not only by the sheep bones found at the Odino sites (see, e.g., (Molodin, 2012; Marchenko et al., 2016)), but also by the appearance of imported items of southern origin (jewelry). Cattle phalanges with the signs of deformation recently discovered at the Novoilyinka VI site (Kulunda forest-steppe) indicate that the populations that lived at a distance of about 450 km southwest of Baraba, apparently by the end of the 4th millennium BC, switched to a nomadic lifestyle,

with seasonal movement (Kiryushin, Gaiduchenko, Makarevich, 2020). To determine how far north this trend has spread is a challenge for future research. The materials of such settlements as Vengerovo-2 give grounds to draw a conclusion about the stationary way of life of their inhabitants, who were engaged in local household animal husbandry, with a predominance of small ruminants in the herd.

Conclusion

The study of archaeozoological collections of the Vengerovo-2 settlement showed that animal resources were the most important element of the population subsistence system. Household animal husbandry was focused on breeding mainly small ruminants, with a small proportion of horses and cows. Hunting for large mammals, such as elk and roe deer, as well as fur-bearing animals, played a significant role. Elk bones served as the main raw material for making tools. The procurement of furs, hides, and skins was probably one of the main economic activities of the population, along with bronze casting, pottery making, and other household crafts. The presence of whole skeletons, as well as the skulls of fur-bearing animals, at production areas is possibly associated with ritual activities.

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References

Alekseenko E.A. 1967
Kety: Istoriko-etnograficheskiye ocherki. Leningrad: Nauka.

Amalrik A.S., Mongait A.L. 1966
V poiskakh ischeznuvshikh tsivilizatsiy. Moscow: Nauka.

Andrianov B.V. 1968
Khozyaistvenno-kulturniye tipy i istoricheskiy protsess. *Sovetskaya etnographiya*, No. 2: 22–34.

Antipina E.E. 1997
Metody rekonstruktsii osobennostey skotovodstva na yuge Vostochnoy Yevropy v epokhu bronzy. *Rossiyskaya arkheologiya*, No. 3: 20–32.

Antipina E.E. 2016
Sovremennaya arkheozoologiya: Zadachi i metody issledovaniya. In *Mezhdistsiplinarnaya integratsiya v arkheologii (po materialam lektsiy dlya aspirantov i molodykh sotrudnikov)*. Moscow: IA RAN, pp. 96–117.

Arutyunov S.A., Khazanov A.M. 1979
Arkheologicheskiye kultury i khozyaistvenno-kulturniye tipy: Problemy sootnosheniya. In *Problemy tipologii v etnografii*. Moscow: Nauka, pp. 140–147.

Basilov V.N., Sokolova Z.P. 1999
Religiozniye verovaniya narodov Sibiri. In *Religii narodov sovremennoy Rossii: Slovar*. Moscow: Respublika, pp. 273–282.

Benecke N. 2017
Subsistence economy, animal domestication, and herd management in prehistoric central Asia (Neolithic–Iron Age). In *The Oxford Handbook of Zooarchaeology*, U. Albarella, M. Rizzetto, H. Russ, K. Vickers, S. Viner-Daniels, N. Benecke (eds.). Oxford: Oxford Univ. Press, pp. 1–13.

Bökönyi S. 1991
Late Chalcolithic horses in Anatolia. In *Meadau R.H., Uermann H.-P. Equids in the Ancient World*. Wiesbaden: Ludwig Reichert Verl., pp. 123–131. (Beih. zum Tübinger Atlas des Vorderen Orients: Reihe A.: Naturwissenschaften. N.R. 19; vol. 2).

Cemych E.N., Antipina E.E., Lebedeva E.Ju. 1998
Produktionsformen der Urgesellschaft in den Steppen Osteuropas (Ackerbau, Viehzucht, Erzgewinnung und Verhuttung). In *Das Karpatenbecken und die Osteuropaische Steppe. Nomadenbewegungen und Kulturaustausch in den vorchristlischen Metallzeiten (4000–500 v. Chr.)*. Hrsg. B. von Hansel, J. Machnik. München, Rahden (Westphalia): M. Leidorf, pp. 233–252.

Chernykh E.N. 2007
Kargaly. Vol. V: Fenomen i paradoksy razvitiya; Kargaly v sisteme metallurgicheskikh provintsiy; Potayennaya (sakralnaya) zhizn arkhaichnykh gornyakov i metallurgov. Moscow: Yazyki slavyan. kultury.

Efremova N.S., Molodin V.I., Kravtsova A.S., Kudinova M.A., Durakov I.A. 2020
K voprosu o variativnosti obryadov zhertvoprinosheniya v epokhu pozdney bronzy. In *Problemy arkheologii, antropologii, etnografii Sibiri i sopredelnykh territoriy*, vol. XXVI. Novosibirsk: Izd. IAET SO RAN, pp. 421–427.

Gening V.F., Stefanova N.K. 1982
Chernoozerye IV – poseleniye krotovskoy kultury. In *Arkheologicheskiye issledovaniya severa Yevrazii*. Sverdlovsk: Ural. Gos. Univ., pp. 53–64.

Glushkov I.G. 1984
Krotovskaya kultura na Irtyshe (po materialam poseleniya Saranin II). In *Problemy etnicheskoy istorii tyurkskikh narodov Sibiri i sopredelnykh territoriy*. Omsk: Izd. Om. Gos. Univ., pp. 33–57.

Grushin S.P. 2012
Khozyaistvenno-kulturnaya variativnost lesostepnogo Altaya v rannem bronzovom veke. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 11. Iss. 3: Arkheologiya i etnografiya: 171–179.

Grushin S.P. 2015
Itogi i perspektivy issledovaniya poseleniya Kolyvanskoye I v Rudnom Altaye. In *Teoriya i praktika arkheologicheskikh issledovaniy*, iss. 2 (12). Barnaul: Izd. Alt. Gos. Univ., pp. 40–51.

Ivasko L.V., Lobanova T.V. 2003
Otrazheniye nekotorykh ritualov promyslovykh kultov severnykh ostyakov v osteologicheskikh materialakh Nadymskogo gorodishcha (po dannym kompleksnykh

issledovaniy 1999–2002 gg.). In *Ugry: Materialy VI Sib. simp. "Kulturnoye naslediye narodov Zapadnoy Sibiri"*. Tobolsk: pp. 69–71.

Kiryushin K.Y., Gaiduchenko L.L., Makarevich S. 2020

Vtoriye falangi krupnogo rogatogo skota so sledami deformatsiy v materialakh poseleniya Novoilyinka VI (Severnaya Kulunda). *Sokhraneniye i izucheniye kulturnogo naslediya Altaiskogo kraya*, iss. XXVI: 51–56.

Kosintsev P.A. 2004

Tipologiya arkheozoologicheskikh kompleksov i modeli zhivotnovodstva u drevnego naseleniya yuga Zapadnoy Sibiri. In *Noveishiye arkheozoologicheskiye issledovaniya v Rossii: K stoletiyu so dnya rozhd. V.I. Tsalkina*. Moscow: Yazyki slavyan. kultury, pp. 157–174.

Kosintsev P.A., Gasilin V.V. 2006

Okhota v khozyaistve drevnego naseleniya Volgo-Uralskoy lesostepi. *Voprosy arkheologii Povolzhya*, iss. IV: 484–490.

Kosintsev P.A., Kiryushin Y.F., Maloletko A.M., Tishkin A.A. 2005

Zhivotnovodstvo i okhota naseleniya Berezovoy Luki. In *Berezovaya Luka – poseleniye epokhi bronzy v Aleiskoy stepi*, vol. I. Barnaul: Izd. Alt. Gos. Univ., pp. 150–164.

Kosintsev P.A., Varov A.I. 1996

Ranniye etapy zhivotnovodstva v Volgo-Uralskom regione. In *Vzaimodeistviye cheloveka i prirody na granitse Yevropy i Azii: Tezisy dokl. konf*. Samara: pp. 29–31.

Kosintsev P.A., Yavsheva D.A., Devyashin M.M. 2011

Kompleks kostnykh ostatkov zhivotnykh iz raskopok poseleniya Berezovaya Luka. In *Berezovaya Luka – poseleniye epokhi bronzy v Aleiskoy stepi*, vol. II. Barnaul: Izd. Alt. Gos. Univ., pp. 139–148.

Kulemzin V.M. 1984

Chelovek i priroda v verovaniyakh khantov. Tomsk: Izd. Tom. Gos. Univ.

Levin M.G., Cheboksarov N.N. 1955

Khozyaistvenno-kulturniye tipy i istoriko-etnograficheskiye oblasti (k postanovke problemy). *Sovetskaya etnographiya*, No. 4: 3–17.

Lukina N.V. 1985

Formirovaniye materialnoy kultury khantov. Tomsk: Tom. Gos. Univ.

Marchenko Z.V., Orlova L.A., Panov V.S., Zubova A.V., Molodin V.I., Pozdnyakova O.A., Grishin A.E., Uslamin E.A. 2015

Paleodiet, radiocarbon chronology, and the possibility of freshwater reservoir effect for Preobrazhenka 6 burial ground, Western Siberia: Preliminary results. *Radiocarbon*, vol. 57 (4): 595–610.

Marchenko Z.V., Panov V.S., Grishin A.E., Zubova A.V. 2016

Rekonstruktsiya i dinamika struktury pitaniya odinovskogo naseleniya Barabinskoy lesostepi na protyazhenii III tys. do n.e. *Vestnik arkheologii, antropologii i etnografii*, vol. 34 (3): 42–45.

Marchenko Z.V., Svyatko S.V., Molodin V.I., Grishin A.E., Rykun M.P. 2017

Radiocarbon chronology of complexes with Seima-Turbino type objects (Bronze Age) in Southwestern Siberia. *Radiocarbon*, vol. 59 (5): 1381–1397.

Matyushchenko V.I. 1970

Nozh iz mogilnika Rostovka. *KSIA*, iss. 123: 103–105.

Metodicheskiye rekomendatsii po tekhnologicheskomu proyektirovaniyu ovtsevodcheskikh obyektov. 2012

RD-APK 1.10.03.02-12. Moscow: [s.n.].

Molodin V.I. 1977

Epokha neolita i bronzy lesostepnogo Ob-Irtyshya. Novosibirsk: Nauka.

Molodin V.I. 1985

Baraba v epokhu bronzy. Novosibirsk: Nauka.

Molodin V.I. 2012

Pamyatnik Sopka-2 na reke Omi: Kulturno-khronologicheskiy analiz pogrebalnykh kompleksov odinovskoy kultury, vol. 3. Novosibirsk: Izd. IAET SO RAN.

Molodin V.I. 2016

Prirodniye oazisy v Barabinskoy lesostepi kak osnova zhizneobespecheniya drevnego cheloveka. In *Ekologiya drevnikh i traditsionnykh obshchestv*, iss. 5.4.2. Tyumen: pp. 121–124.

Molodin V.I. 2019

Migratsii i ikh proyavleniya v epokhu bronzy na yuge tsentralnoy chasti Zapadno-Sibirskoy ravniny. Osnovniye modeli. In *Mobilnost i migratsiya: Kontseptsii, metody, rezultaty: Materialy V mezhdunar. simp. "Mobilnost i migratsiya: Kontseptsii, metody, rezultaty" (Denisova peshchera, Altay, Rossiya). 19–24 avg. 2019 g*. Novosibirsk: Izd. IAET SO RAN, pp. 27–35.

Molodin V.I., Durakov I.A., Mylnikova L.N., Nesterova M.S. 2012

Proizvodstvenniy kompleks krotovskoy kultury na poselenii Vengerovo-2 (Barabinskaya lesostep). *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 11. Iss. 5: Arkheologiya i etnografiya: 104–119.

Molodin V.I., Grishin A.E. 2016

Pamyatnik Sopka-2 na reke Omi: Kulturno-khronologicheskiy analiz pogrebalnykh kompleksov krotovskoy kultury, vol. 4. Novosibirsk: Izd. IAET SO RAN.

Molodin V.I., Mylnikova L.N., Nesterova M.S., Borzykh K.A., Ivanova D.P., Golovkov P.S., Selin D.V., Orlova L.A., Vasiliev S.K. 2013

Konstruktivniye i planigraficheskiye osobennosti zhilishcha No. 5 poseleniya krotovskoy kultury Vengerovo-2. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XIX. Novosibirsk: Izd. IAET SO RAN, pp. 276–281.

Molodin V.I., Mylnikova L.N., Nesterova M.S., Efremova N.S. 2016

Osobennosti struktury poseleniya krotovskoy kultury Vengerovo-2 (Barabinskaya lesostep). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXII. Novosibirsk: Izd. IAET SO RAN, pp. 339–342.

Molodin V.I., Mylnikova L.N., Nesterova M.S., Nenakhov D.A., Selin D.V., Borzykh K.A. 2014

Noviye danniye o domostroitelstve i organizatsii zhilogo prostranstva u nositeley krotovskoy kultury. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XX. Novosibirsk: Izd. IAET SO RAN, pp. 223–260.

Molodin V.I., Mylnikova L.N., Nesterova M.S., Selin D.V. 2020

Planigraficheskiye, khronologicheskiye i khozyaistvenniye aspekty izucheniya poseleniya epokhi bronzy Vengerovo-2 (Barabinskaya lesostep). In *Trudy VI (XXII) Vseros. arkheol.*

syezda v Samare. In 3 vols., vol. 1. Samara: Samar. Gos. Sots.-Ped. Univ., pp. 313–314.

Molodin V.I., Polosmak N.V. 1978

Vengerovo-2 – poseleniye krotovskoy kultury. In *Etnokulturniye yavleniya v Zapadnoy Sibiri*. Tomsk: Izd. Tom. Gos. Univ., pp. 17–29.

Molodin V.I., Zakh V.A. 1979

Geomorfologicheskoye raspolozheniye pamyatnikov epokhi neolita i bronzy v basseinakh rek Obi, Ini, Omi i ikh pritokov. In *Osobennosti estestvenno-geograficheskoy sredy i istoricheskiye protsessy v Zapadnoy Sibiri*. Tomsk: Izd. Tom. Gos. Univ., pp. 51–53.

Nesterova M.S. 2019

Ochazhniye ustroystva v epokhu paleometalla (Zapadnaya Sibir). Novosibirsk: Izd. IAET SO RAN.

Nurushev M.Z. 2018

Ob evolyutsii aborigennykh populyatsiy loshadey, ili gde vperviye odomashnena loshad? *Bulleten Orenburg. nauch. tsentra UrO RAN*, No. 1. URL: http://elmag.uran.ru:9673/magazine/Numbers/2020-4/about.htm/

Roslyakova N.V., Kosintsev P.A. 2013

Arkheozoologicheskoye izucheniye kompleksov pogrebalnogo inventarya iz pogrebeniy srubnoy kultury lesostepnogo Povolzhya. *Izvestiya Samar. nauch. tsentra RAN*, vol. 15 (1): 211–218.

Smirnov N.G. 1975

Landshaftnaya interpretatsiya novykh dannykh po faune andronovskikh pamyatnikov Zauralya, iss. 13. In *Voprosy arkheologii Urala*. Sverdlovsk: pp. 32–41.

Stefanov V.I., Stefanova N.K. 2001

K voprosu o svyazyakh naseleniya Zauralya i Srednego Priirtyshya v doandronovskiy period. *Vestnik arkheologii, antropologii i etnografii*, No. 3: 15–22.

Stefanova N.K. 1985

Noviy pamyatnik krotovskoy kultury na Irtyshe. In *Arkheologicheskiye issledovaniya v raoynakh novostroyek*. Novosibirsk: Nauka, pp. 54–62.

Stefanova N.K. 1988

Krotovskaya kultura v Srednem Priirtyshye. In *Materialnaya kultura drevnego naseleniya Urala i Zapadnoy Sibiri*. Sverdlovsk: Ural. Gos. Univ., pp. 53–74.

Sumin V.A., Evteeva E.M., Anufriev D.E., Roslyakov S.G. 2013

Arkheologicheskiye pamyatniki Kochenevskogo rayona Novosibirskoy oblasti. Novosibirsk: Nauch.-proizvod. tsentr po sokhr. istoriko-kultur. naslediya Novosibirskoy obl.

Troitskaya T.N. 1979

Kulaiskaya kultura v Novosibirskom Priobye. Novosibirsk: Nauka.

Troitskaya T.N., Borodovsky A.P. 1994

Bolsherechenskaya kultura lesostepnogo Priobya. Novosibirsk: Nauka.

Troitskaya T.N., Molodin V.I., Sobolev V.I. 1980

Arkheologicheskaya karta Novosibirskoy oblasti. Novosibirsk: Nauka.

Yanish E.Y. 2018

Rezultaty opredeleniya arkheozoologicheskikh materialov iz raskopok knyazheskogo dvortsa ("peshcherniy gorod" Mangup-Kale). *Zbirnik prats Zoologichnogo muzeyu*, iss. 49: 105–113.

Zhilich S., Rudaya N., Krivonogov S., Nazarova L., Pozdnyakov D. 2017

Environmental dynamics of the Baraba forest-steppe (Siberia) over the last 8000 years and their impact on the types of economic life of the population. *Quaternary Science Review*, vol. 163: 152–161.

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The Emergence and Formation of a Proto-Urban Civilization in Azerbaijan: Certain Issues in the Transition to Class Society

The objective of this article is to clarify certain important issues relating to early urban culture. The complexity of the task stems from the absence of early written sources. This is why the study draws on archaeological materials. It especially focuses on the incipient proto-urban sites—the sources of the proto-urban culture. Certain Bronze Age settlements in Azerbaijan meet the criteria of the early urban civilization. On the basis of the facts cited here, hypotheses about the factors underlying the emergence of proto-urban centers (the harbingers of the first class societies) are put forward. The main features of proto-urban settlements are surface area, structure, fortifications, population size, and population density. The evolution of crafts in such centers is reconstructed along with other aspects. It is argued for the first time that nearly all cultural values typical of the advanced ancient Near Eastern centers were borrowed by South Caucasians. Monumental Late Bronze Age burial mounds of Karabakh are viewed in the context of proto-urban evolution. The idea that elite burials were connected with early urban centers is based on the fact that only powerful chiefs of large tribal unions and early class societies could afford monumental burials on such a scale.

Keywords: *Proto-town, Azerbaijan, Karabakh, Nakhchivan, Kultepe, Uzerliktepe, Garatepe.*

Introduction

The problem of the emergence of the so-called early urban culture is one of the complex historical issues of the preliterate period; it has long been discussed in archaeological literature (Adams, 1966: 48–75; Adams, Nissen, 1972: 156–210; Masson, 1967; 1976: 65–70, 95–148; 2004) and became a debated topic among Azerbaijan archaeologists (Aliyev V.H., 1991: 23–24; 1992: 24–28; Jafarov, 2000: 69; 2020: 133–134). Scholars have proposed various hypotheses regarding the role of the early proto-urban culture, its origins and development, as well as initial stages of the settlements of the early urban type. The criteria for identifying such stages include the structure and area of the settlements, presence of defensive structures, number and density of population, development level of craftsmanship, presence of artisans' quarters, instances of exchange and trade with the outside world, etc. (Masson, 1976: 65–70).

A great role in this process was played by the first large social divisions of labor—separation of agriculturalists from cattle breeders in the 3rd millennium BC and artisans from other manufacturers in the first half of the 2nd millennium BC, emergence of merchants as intermediaries between producers and consumers from the artisans' circle, and unification of numerous tribes into single entities and formation of large tribal alliances—the harbingers of class society, etc. The process of property differentiation in the Southern Caucasus, which began

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in the Late Chalcolithic to Early Bronze Age, gradually intensified in the 2nd millennium BC and reached a high level in the Late Bronze Age.

Noteworthy is also such a transitional stage in the history of ancient society as the so-called military democracy. In our opinion, almost all peoples who passed through the period of disintegration of the tribal system had that stage. At this time, the power of military leaders increased; wars, which eventually acquired a predatory nature, became more frequent. Constant warfare contributed to the development of military techniques, improvement of offensive and defensive tactics, and fortification of settlements with earthen ramparts, stone walls, and ditches (Reder, Cherkasova, 1979: 79–80). In classical understanding, the emergence of the military democracy, which was one of the vivid indicators of early class society, occurred in the second half of the 2nd millennium BC, and according to some scholars, in the 3rd millennium BC (Brentjes, 1976: 62).

In the recent period, the Azerbaijan archaeologists have accumulated significant factual evidence, which require discussion of a number of issues related to the initial stages of the early urban culture. The main sources of this article are large settlements of the early urban type, with defensive walls, public and residential buildings, citadels, artisans' quarters, etc. These sites are located mainly in Nakhchivan and Karabakh. The chronological framework covers the Early (late 4th to 3rd millennia BC) and Middle (first half of the 2nd millennium BC) Bronze Age, Late Bronze, and Early Iron Age (14th–8th centuries BC), although the origins of settlements of the early urban type go back to the Late Chalcolithic.

Problem of proto-urban traces

Various studies have established that the emergence of proto-towns was associated with the formation of the earliest states in the subtropical zone. Precisely early urban settlements were the centers where the first class societies emerged. Factual evidence makes it possible to identify various features of the proto-urban civilization. For example, according to V.M. Masson, a necessary condition for the emergence of ancient towns was the availability of primitive "money" in circulation, used in exchange and trade operations (1976: 77–85). Masson also wrote that "in essence, the emergence of the first towns meant the emergence of civilization. Therefore, the most general definition of civilization is its definition as a culture of literate citizens" (Masson, 2004: 6–7).

An important indicator of early towns is the presence of defensive structures. In Azerbaijan, defensive walls have been found around the Chalcolithic settlement of Geitepe (Tovuzsky District) (Quliyev, Nishiyaki, 2013). Similar fortifications, only much more powerful, appear at the sites of the Early Bronze Age in Garakepektepe (Fizulinsky District) (Ismailzade, 2008: 23–25), Daire (Qobustan) (Muradova, 1979: 12–15), and Yanygtepe (near Lake Urmia, Southern Azerbaijan) (Kushnareva, Chubinishvili, 1970: 92).

However, the problem is whether the fortified settlements can be identified as proto-towns. There are several opinions about this. It is believed that settlements with a population of under a hundred persons can be considered as seasonal camps and small villages, settlements with over a thousand population (up to 5000 maximum) as fortified settlements or seeds of proto-towns. The signs of a proto-town are the presence of a citadel, temples, and to a certain extent, the development of artisanal production (Masson, 1976: 141). According to V.G. Childe, a settlement with a population of 5000 or more could have had town status at its early stage (1950). The ancient settlements of this type include Kara-Tepe in Turkey, Altyn-Depe and Namazga-Depe in Turkmenistan, etc. According to J. Mellaart, they can be considered as manifestations of the early stages of proto-towns (1960). This point of view was repeatedly expressed by Masson (1967; 1976: 66–148; 2004). The issues of early urban culture have been analyzed in the works of such Azerbaijan scholars as V.H. Aliyev (1991: 23–56), I.A. Babaev (1990: 29–61), H.F. Jafarov (2000: 47–71; 2020: 92–101, 130–136), V.G. Kerimov (2007: 85–100), and V. Bakhshaliev and S. Ashurov (Bakhshaliev, Ashurov, Marro, 2009; Ashurov, 2005). In our opinion, there are sites in Azerbaijan which correspond to some of the above criteria.

Settlements of the proto-urban type in Azerbaijan

The available evidence makes it possible to include Azerbaijan in the list of regions with early urban culture. This is confirmed by the presence of some settlements that differ from others in many respects, including the Bronze Age sites of Garakepektepe (Karabakh, Fizulinsky District), Ovchulartepe (Nakhchivan), Yanygtepe (near Lake Urmia, Southern Azerbaijan), Kultepe II, Oglangala (Nakhchivan), Uzerliktepe, and Chinartepe (Karabakh, Agdam), as well as Garatepe and Misir-Gishlagy (Karabakh, Agdam). V.H. Aliyev was the first Azerbaijani archaeologist who focused on that problem. He made a suggestion about the emergence of the proto-urban culture in this region based on the evidence from the Middle Bronze Age sites of Kultepe II and Oglangala, where defensive wall, artisans' district, public buildings, etc. were discovered (Aliyev V.H., 1991: 25–39) (Fig. 1, *1*). The sites with the main features of the initial stage of early urban civilization include Garakepektepe

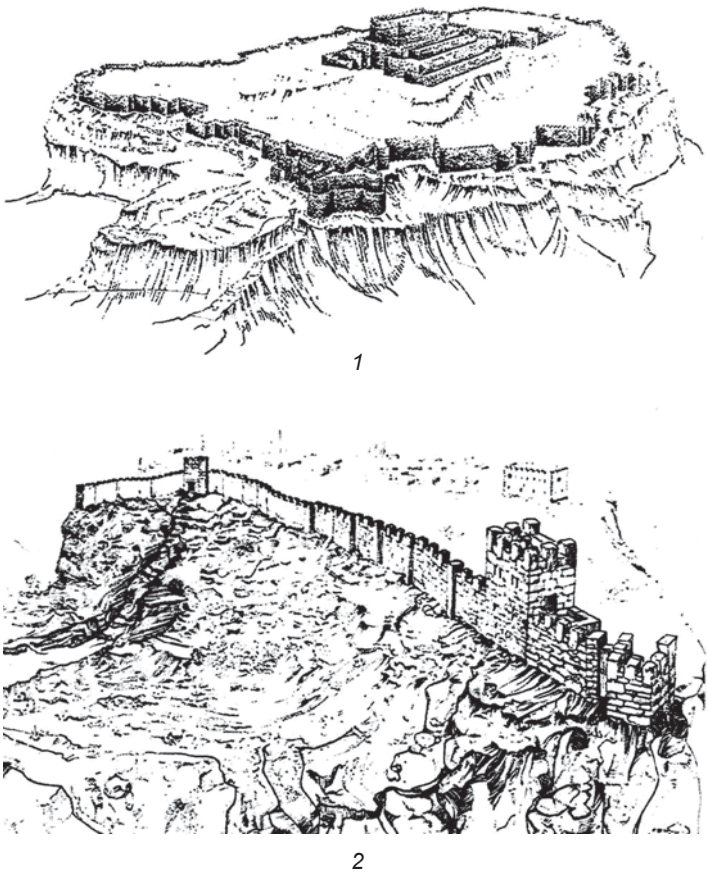

Fig. 1. Drawing reconstructions of the Oglangala (*1*) and Chalkhangala (*2*) fortresses of the 2nd to 1st millennia BC (by V.G. Kerimov and D.A. Akhundov, respectively).

in Karabakh (Ismailzade, 2008: 23–25), Yanygtepe in Southern Azerbaijan (Kushnareva, Chubinishvili, 1970: 89–92), and the Early Bronze Age settlement of Daire in Qobustan (Muradova, 1979: 12–15).

Studies have established that social and economic and social and political changes were reflected in the choice of permanent residence, as well as the planning and construction of buildings and defensive wall around the settlement. The separation of cattle-breeding from agriculture, development of artisanal production, emergence of leaders of tribal unions, and the formation and expansion of ties and exchange are some of the indicators pointing to intensification of the early urban culture and to the process of transition to early class society. The development of the main industries of the economy, advances in metallurgy and metalworking, general intensive nature of craftsmanship, and finally, its separation from agriculture should be considered as additional features of transition.

This process can be traced using the example of the settlement of Kultepe II. Its total area originally reached 10 hectares, but only a part of about 3 hectares has been well preserved (Aliyev V.H., 1991: 25–26). On the basis of the study of building horizons and archaeological evidence, V.H. Aliyev identified four stages in the functioning of Kultepe II: first stage in the 20th–19th centuries BC, second stage in the 18th–17th centuries BC, third stage in the 17th–16th centuries BC, and fourth stage (transitional from the Middle to Late Bronze Age) in the 15th–14th centuries BC (Ibid.: 38). The settlement had a bipartite structure and consisted of a citadel and the territory outside of it, where the main population lived. The citadel was surrounded by powerful fortress walls reinforced with rectangular towers and buttresses (Fig. 2, *4*). Judging by the layout, the remains of public buildings, residential premises, and artisans' districts, as well as archaeological finds, V.H. Aliyev believed that Kultepe II was a settlement of the early urban type (Ibid.). Such a structure could reflect complex processes in the emergence of several social groups: noble, wealthy families mostly lived in the citadel, while people engaged in production lived outside of it.

The Uzerliktepe settlement of the Middle Bronze Age in the Southern Caucasus is very important for studying the origins of early towns. This site was investigated by the joint archaeological expedition from the Institute of Archaeology of the USSR Academy of Sciences and the Institute of History of the AzSSR Academy of Sciences in 1954–1956 (Kushnareva, 1957, 1959b; Iessen, 1965: 18–19). The settlement, with an area of about 4 hectares, was built on a natural hill 3.5 m high. In the second cultural layer, numerous houses, utility buildings, pottery and foundry workshops, and a powerful defensive structure encircling the settlement were discovered, as well as remains of two more wide walls outside of that structure (Fig. 2, *1*, *2*).

The results of archaeological research at Kultepe II, Uzerliktepe, and other Middle Bronze Age sites reveal many aspects of a new stage in the development of the early urban culture. These data prove that starting from the Late Chalcolithic to the Early Bronze Age, there were important changes caused by the development of productive forces and production relations in many areas of life for the population that lived in the territory of Azerbaijan. These innovations included the emergence of early urban culture.

Analysis of the sites according to their external features and location helps to identify some of their distinctive aspects. For example, according to the classification of fortified settlements by the layout of their defensive systems, most of the sites under consideration

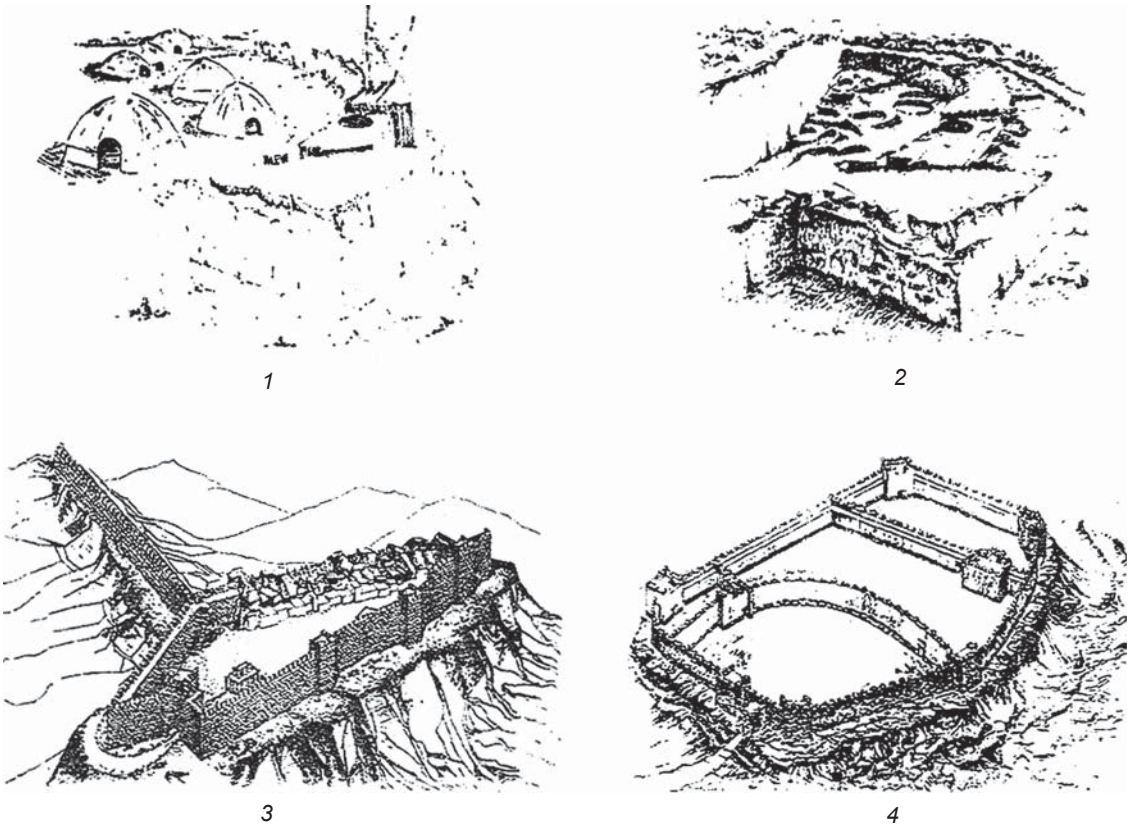

Fig. 2. Drawing reconstructions of fortresses of the 2nd to 1st millennia BC.
1, *2* – Uzerliktepe (V.G. Kerimov); *3* – Vaikhyr (D.A. Akhundov); *4* – Kultepe II (D.A. Akhundov).

were of the cape type (Kultepe II, Garatepe, etc.). Usually, they were located on small promontories jutting into the river's floodplain. However, some settlements belong to the so-called insular type, such as Garakepektepe, Uzerliktepe (Kerimov, 2007: 98–100), and the recently discovered Chinartepe and Misir-Gishlagy.

Rich burials as indicators of social differentiation and transition to class society

Social and property differentiation, which took place from the Early Bronze Age (late 4th to 3rd millennia BC) and gradually intensified in the Middle Bronze Age (second half of the 2nd millennium BC), reached its peak in the Late Bronze Age and Early Iron Age (14th–8th centuries BC). The development of productive forces during that period acquired a wide scale. New fields of craftsmanship emerged; metallurgy and metalworking developed; skills of producing weaponry improved; a layer of merchants acting as a link between artisans and consumers was formed.

Fundamental changes occurring in the Late Bronze and Early Iron Ages over a relatively short period overshadowed the results of a gradual process of development. The emergence and strengthening of large, powerful tribal unions uniting several tribes led to the need to concentrate the power in the hands of one person. These "kings" controlled vast territories; they were autocratic rulers of large ethnic and cultural associations. In order to confirm that assumption, we need to analyze the burial sites on the territory of Azerbaijan in addition to the settlements. Unfortunately, to date, it has not been possible to synchronize these: in some cases, burial mounds located in the influence zone of the settlements have not been excavated, while in other cases, settlements near the "elite" burial mounds (Borsunlu, Beyimsarov, Sarychoban, etc.) have not been investigated. Nevertheless, using the evidence from these burial mounds, we can obtain the required information for reconstructing ethnic and cultural processes in the period under discussion.

Burial sites of Karabakh, explored in the 1980s, are monumental structures. These include the Borsunlu burial mounds of the 14th–13th centuries BC, Sarychoban of the 12th–11th centuries BC, and Beyimsarov of the 10th–9th centuries BC (Fig. 3).

Near the village of Borsunlu, in the Tertersky District of Azerbaijan, three burial mounds are located.

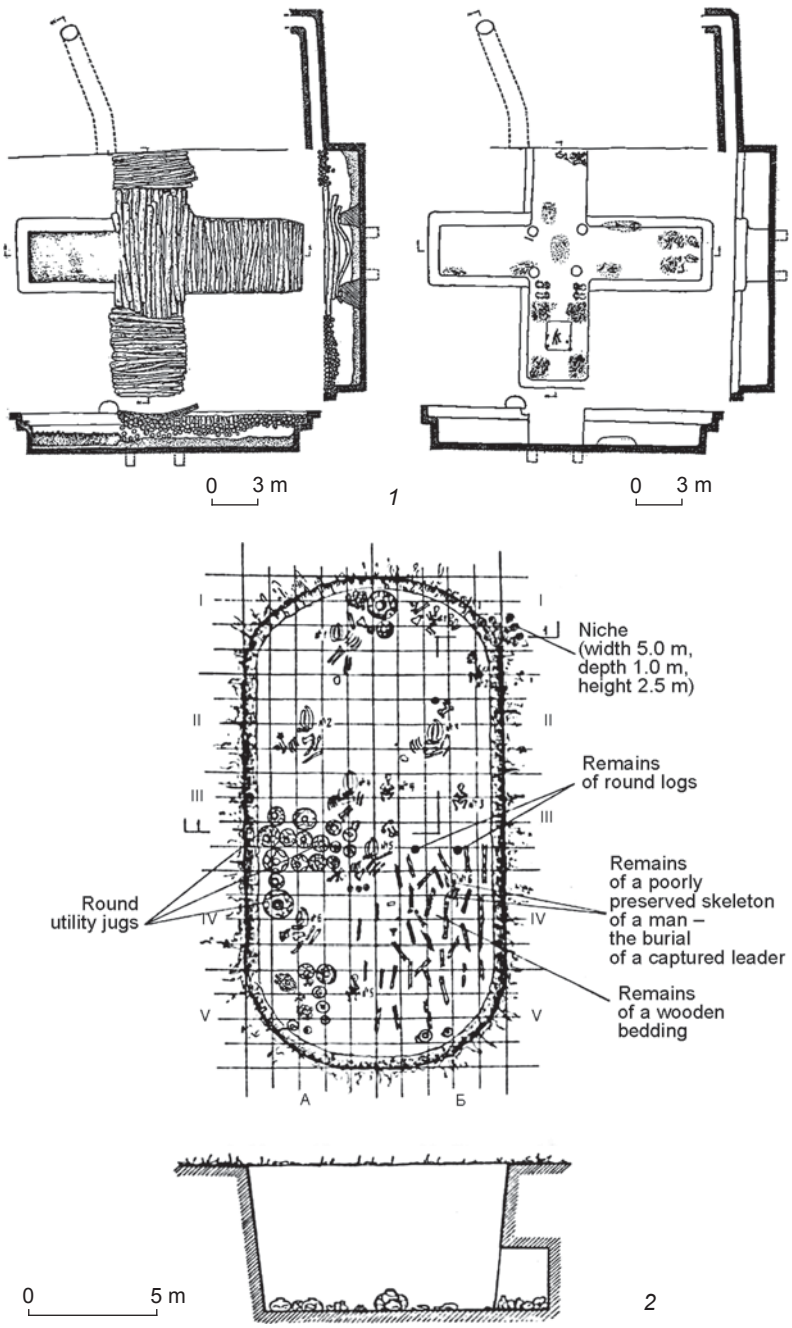

Fig. 3. Ground plans and cross-sections of the elite burial mounds of Sarychoban (*1*) and Beyimsarov (*2*).

A giant burial chamber with a total area of 256 m^2 was found under the earthen embankment in one of the kurgans, which was 80 m in diameter and 7 m in height. The chamber was covered with more than two hundred pine and spruce logs in two, three, or four layers. The logs of each subsequent layer closed the gap between the logs of the previous layer. Matting made of reeds and tree branches has survived between the layers of logs. The grave was plundered in the ancient times. The "king" was buried in a tomb of sophisticated structure on a platform bed, surrounded by nine sacrificed people. Burials of horses with bridles and other items of horse harness, bones of cattle, and numerous objects of material culture were found in the burial (Jafarov, 2000: 102–108; 2020: 196–209).

Another burial of an ancient ruler was found under the mound of the kurgan in the village of Beyimsarov, in Tertersky District of Azerbaijan (Jafarov, 2000: 109–114; 2020: 210–220). The burial chamber, with a total area of 200 m^2, was covered with long trunks of coniferous trees. In contrast to the Borsunlu royal grave, the walls of that burial structure were faced with longitudinally sawn logs covered with layers of reeds. Although the burial was destroyed and plundered in ancient times, the remaining objects of material culture have made it possible to reconstruct the original order and funeral rite. The "king" was buried in the center of the burial hall, on a special "throne bed" inlaid with bronze plates. He was accompanied to the afterlife by five sacrificed people. Six horses with items of horse harness were buried in the eastern part of the grave.

The Sarychoban kurgan in the Agdamsky District of Azerbaijan is also of interest. The ground plan of its burial chamber is a regular cross oriented to the cardinal points. Similarly to Borsunlu, the chamber was covered with large logs in several layers. The burial bed of the "king" in the form of a "throne bed" was located in the center of the tomb. The complex was plundered in the ancient times. Burials of sixteen horses with bridles and a large number of sundry items were found there (Jafarov, 2000: 112–114; 2020: 220–233).

The huge sizes of the investigated burial mounds in Karabakh are not accidental. This fact should be viewed in the context of fundamental changes in the life of society. At the time of the transition to class society, local "kings", who controlled a vast territory, used all available means to build grandiose sophisticated tombs. Rich burials have also been found in other complexes of Azerbaijan, including Dovshanly-Ballygaya, Khojaly, Qarabulaq, Gyanjachai, Mingachevir, etc.

Fortified settlements of the Late Bronze Age as proto-towns

Undoubtedly, the leaders lived in the fortified settlements surrounded by powerful defensive walls. Such settlements of the Late Bronze Age differed from the previous periods in their larger areas, more sophisticated internal structure, presence of protective structures, public, residential, and religious buildings, artisans' quarters, a square, premises for soldiers and cavalry, etc. Most of these features are present at the Garatepe site (Agdamsky District, Azerbaijan). The total area of the settlement is over 5 hectares. The foundations of a defensive wall reaching 4 m in width have been found along the entire perimeter. It was additionally reinforced with square-shaped corner towers. Garatepe has been dated to the 12th–11th centuries BC (Jafarov, 2000: 67–69; 2020: 130–134). Similar settlements of the early urban type include Misir-Gyshlagi (Agdamsky District, Azerbaijan) with an area of about 3.5 hectares and well-preserved defensive wall. The site belongs to the same period as the settlement of Garatepe (Jafarov, 2000: 69–70; 2020: 134–135).

An example of a sophisticated structure near the Khojaly necropolis is important for describing early town planning in the Bronze Age, in particular the architecture of Karabakh. This structure was first reported in the 1920s by I.I. Meshchaninov (1926). Subsequently, it was mentioned in the work of K.K. Kushnareva (1959a: 372–376, fig. 6). Many details were clarified by H.F. Jafarov (1997; 2000: 131–133; 2020: 160–161) and D.H. Jafarova (2008: 131–134). The "labyrinth" is an oblong building over an area of 9 hectares. The wall, 1–2 m high, was built of stone blocks; gaps between these were filled with small stones. There was a "micro-complex", which united buildings of various types inside the "labyrinth" and the remains of elongated elliptical walls in the central part of the "labyrinth." A 40–45 m long access road-corridor 6 m wide was added to this complex from the southwest. It is interesting that the remains of various buildings were also found outside the "labyrinth".

Judging by the size, structure, ground plan, construction equipment, and other factors, scholars believe that the "labyrinth" was built to protect the population during warfare (Jafarov, 1997) or for permanent residence (Jafarova, 2008: 133–134). This huge complex, located in the necropolis area, apparently performed an applied function. All conditions for long-term defense of a large number of people during enemy attacks were created there, including large area, thick wall, long corridor, and labyrinth, which could mislead the enemy, etc.

Various construction techniques, skilled craftsmen, human resources and leaders, as well as military and executive authorities, were needed to build such a sophisticated and large complex. In some respects, the Khojaly "labyrinth" resembles cyclopean structures widespread in the mountainous zone of the Southern Caucasus, including Azerbaijan (see Fig. 1, 2). Scholars have proposed different hypotheses regarding the purpose of these structures (Meshchaninov, 1932: 14–68; Jafarzade, 1938: 22–50; Abilova, 1953; Xelilov, 1959: 21–44; Kesamanly, 1999: 30–41; Aliyev T.R., 1993: 34–93; Kerimov, 2007: 85–100). On the basis of analysis of the evidence, we are inclined to believe that some of the structures (including the fortresses of Oglangala, Chalkhangala (see Fig. 1) in Nakhchivan, Lashkyar in Gadabay, and the Khojaly "labyrinth") were the prototypes of fortified settlements of the early urban type. All these facts are further evidence of the development of early fortification in the territory of Azerbaijan.

The idea of a connection between the settlements of the early urban type and the "elite" burials of the Southern Caucasus is suggested for the first time. The hypothesis that the members of the "elite" of society, who had a high position among the inhabitants of the early urban settlements, were buried in the huge burial mounds, seems logical. Regarding the association of the "elite" kurgans with any of the settlement sites, such as Karakepektepe, Kultepe II, Uzerliktepe, Garatepe, etc., note that burial mounds where the ruling elite of the time could have been buried are located next to these fortified settlements. We hope that further archaeological research will provide additional evidence to confirm this hypothesis.

Conclusions

Thus, archaeological evidence confirms that there were significant changes in the life of the population of the entire Southern Caucasus starting from the Final Chalcolithic to Early Bronze Age. In the subsequent Middle and especially Late Bronze Age, these changes encompassed social and economic, social and political, and cultural aspects. In the Early Bronze Age, the first large social division of labor occurred, and cattle breeders separated from agriculturalists. In the Middle Bronze Age, artisanal production became a separate industry. In the Late Bronze Age, merchants who linked producers and consumers emerged from the artisans. The presence of defensive walls in the settlements of Garakepektepe (Ismailzade, 2008: 23–25), Daire (Qobustan) (Muradova, 1979: 12–15), Goitepe and Yanygtepe (Southern Azerbaijan) (Kushnareva, Chubinishvili, 1970: 92) is remarkable in terms of the origins of early fortification in Azerbaijan. Such structures reached significant development in the Middle and Late Bronze Age, as evidenced by the well-known sites of Kultepe II, Galajig, Oglangala, Uzerliktepe, Chinartepe, and Garatepe (Aliyev V.H., 1991: 25–28; Kushnareva, 1959b; 1965; Jafarov, 2020:

99–101, 130–134). Such settlements might have laid the basis for the early urban culture on the territory of Azerbaijan.

The emergence of early urban settlements in the region under study became possible as a result of the formation of large tribal unions, which united several tribes. These tribes, which lived in the peripheral zone, were later absorbed by stronger tribal alliances. Towns of the ancient period originated and strengthened in the following centuries on the basis of the early urban settlements. Notably, the ancient state of Caucasian Albania emerged in Northern Azerbaijan, including the zone of foothill and lowland Karabakh, where, according to ancient written sources, many towns were located (Babaev, 1990: 11–17, 51–52).

The rich burial mounds of Karabakh are an important source for studying the emergence of early urban civilization, the disintegration of the primitive communal system, and the transition to class society. Huge burial chambers reminiscent of burial structures of the ancient Eastern rulers, a sophisticated and original burial rite, a large number of accompanying artifacts, human sacrifices, etc. clearly distinguish these monuments from the rest of the sites in the region. Burial complexes such as Borsunlu, Beyimsarov, and Sarychoban reflect the stage of the ancient society when the foundations of the primitive communal system were significantly undermined, and the main elements of class society were emerging. Factual evidence proves that at this stage, all prerequisites for transition to class society existed in Northern Azerbaijan. The processes that began in the Early Bronze Age were developed intensely in the Middle and Late Bronze Age, and reached their peak in the period of the so-called military democracy.

References

Abilova G.A. 1953
Megaliticheskiye sooruzheniya Zakavkazya: Cand. Sc. (History) Dissertation. Baku.

Adams R. McC. 1966
The Evolution of Urban Society: Early Mesopotamia and Prehispanic Mexico. Chicago: Aldine Press.

Adams R. McC., Nissen H.J. 1972
The Uruk Countryside: The Natural Setting of Urban Societies. Chicago: Univ. of Chicago Press.

Aliyev T.R. 1993
Tsiklopicheskiye sooruzheniya na territorii Azerbaidzhana. Baku: Elm.

Aliyev V.H. 1991
Kultura epokhi sredney bronzy Azerbaidzhana. Baku: Elm.

Aliyev V.H. 1992
Azerbaycanda qedim sheherlerin meydana gelmesi. In *Azerbaycanda arxeologiya ve etnoqrafiya elminin son neticelerine hesr olunmush elm konfransın materialları*. Baku: Baki Dovlet Universitetinin neshri, pp. 24–28.

Ashurov S.G. 2005
An introduction to Bronze Age sites in the Šarur Plain. *Archäologische Mitteilungen aus Iran und Turan*, Bd. 37: 92–99.

Babaev I.A. 1990
Goroda Kavkazskoy Albanii. Baku: Elm.

Bakhshaliev V., Ashurov S., Marro K. 2009
Arkheologicheskiye raboty na poselenii Ovchular Tepesi (2006–2008 gg.): Perviye rezultaty i noviye perspektivy. In *Azerbaidzhan – strana, svyazuyushchaya vostok s zapadom: Obmen znaniyami i tekhnologiyami v period "pervoy globalizatsii" VII–IV tys. do n.e.: Materialy Mezhdunar. simp*. Baku: pp. 59–63.

Brentjes B. 1976
Ot Shanidara do Akkada. Moscow: Nauka.

Childe V.G. 1950
The urban revolution. *The Town Planning Review*, vol. 21 (1): 3–17.

Iessen A.A. 1965
Iz istoricheskogo proshlogo Milsko-Karabakhskoy stepi. In *Trudy Azerbaidzhanskoy arkheologicheskoy ekspeditsii*, vol. 2: 1956–1960 gg. Moscow, Leningrad: Nauka, pp. 10–36. (MIA; iss. 125).

Ismailzade G. 2008
Azerbaidzhan v sisteme rannebronzovoy kulturnoy obshchnosti Kavkaza. Baku: Nafta-press.

Jafarov H.F. 1997
Arkheologicheskiye issledovaniya v Khodzhalakh v 1984 g. *Tarix və onun problemləri*, No. 1: 153–162.

Jafarov H.F. 2000
Azerbaycan eradan evvel IV minilliyin akhiri – I minilliyin evvellerinde (Qarabaghın Qarqarchay və Tartarchay hovzelerinin materiallari esasinda). Baku: Elm.

Jafarov H.F. 2020
Qedim Qarabakh. Baku: Elm.

Jafarova D.H. 2008
Oruzhiye plemen Karabakha v epokhu pozdney bronzy i rannego zheleza. Baku: Khazar.

Jafarzade I.M. 1938
Tsiklopicheskiye sooruzheniya Azerbaidzhana. *Trudy Azerbaidzhanskogo filiala AN SSSR*, vol. 55: 5–54.

Kerimov V.G. 2007
Istoriya razvitiya oboronitelnogo zodchestva Azerbaidzhana (s drevneishikh vremen do XIX veka). Baku: Elm.

Kesamanly G.P. 1999
Arkheologicheskiye pamyatniki epokhi bronzy i rannego zheleza Dashkesanskogo rayona. Baku: Agridag.

Kushnareva K.K. 1957
Raskopki na kholme Uzerlik-tepe okolo Agdama (iz rabot azerbaidzhanskoy ekspeditsii 1954 g.). *KSIIMK*, iss. 69: 129–135.

Kushnareva K.K. 1959a
Arkheologicheskiye raboty 1954 g. v okrestnostyakh seleniya Khodzhaly. In *Trudy Azerbaidzhanskoy (Oren-Kalinskoy) arkheologicheskoy ekspeditsii*, vol. 1: 1953–1955 gg. Moscow: Nauka, pp. 370–387. (MIA; iss. 67).

Kushnareva K.K. 1959b
Poseleniye epokhi bronzy na kholme Uzerlik-tepe okolo Agdama. In *Trudy Azerbaidzhanskoy (Oren-Kalinskoy) arkheologicheskoy ekspeditsii*, vol. 1: 1953–1955 gg. Moscow: Nauka, pp. 388–430. (MIA; iss. 67).

Kushnareva K.K. 1965
Noviye danniye o poselenii Uzerlik-tepe okolo Agdama. In *Trudy Azerbaidzhanskoy arkheologicheskoy ekspeditsii*, vol. 2: 1956–1960 gg. Moscow, Leningrad: Nauka, pp. 74–102. (MIA; iss. 125).

Kushnareva K.K., Chubinishvili T.N. 1970
Drevniye kultury Yuzhnogo Kavkaza. Leningrad: Nauka.

Masson V.M. 1967
Protogorodskaya tsivilizatsiya yuga Sredney Azii. *Sovetskaya arkheologiya*, No. 3: 165–190.

Masson V.M. 1976
Ekonomika i sotsialniy stroy drevnikh obshchestv (v svete dannykh arkheologii). Leningrad: Nauka.

Masson V.M. 2004
Perspektivy metodologicheskikh razrabotok v istoricheskoy nauke (formatsii, tsivilizatsii, kulturnoye naslediye): Otkrytaya lektsiya, prochitannaya v Luganskom natsionalnom pedagogicheskom universitete. St. Petersburg: Akadem-Print.

Mellaart J. 1960
Excavations at Hacılar: Third preliminary report. *Anatolian Studies*, vol. 10: 83–104.

Meshchaninov I.I. 1926
Kratkiye svedeniya o rabotakh arkheologicheskoy ekspeditsii v Nagorniy Karabakh i Nakhichevanskiy kray, snaryazhennoy v 1926 g. Obshchestvom izucheniya Azerbaidzhana. *Soobshcheniya GAIMK*, No. 1: 217–240.

Meshchaninov I.I. 1932
Tsiklopicheskiye sooruzheniya Zakavkazya. Leningrad: Pechatniy dvor. (Izv. GAIMK; vol. XIII, iss. 4–7).

Muradova F.İ. 1979
Qobustan tunj devrinde. Baku: Elm.

Quliyev F., Nishiyaki Y. 2013
Geytepe ve Hacellemhanlı yashayısh yerlərinde arheoloji tedqiqatlar. In *Azerbeycanda Arxeoloji Tedqiqatlar (2012)*. Baku: Arxeologiya ve Etnografiya Institutu, pp. 309–327.

Reder D.R., Cherkasova E.A. 1979
Istoriya drevnego mira, pt. I. Moscow: Prosveshcheniye.

Xelilov J.A. 1959
Qerbi Azerbeyjanın tunj ve demir devrinin evvellerine aid archeoloji abideleri. Baku: Azerbeyjan SSR Elmler Akademiyasi Neshriyyeti.

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Pottery from the Barsov Gorodok III/6 Early Iron Age Fortified Settlement in the Surgut Stretch of the Ob: A Technological Analysis

This article outlines the findings of a technological study of the Kulai ceramics from Barsov Gorodok III/6 near Barsova Gora, on the right bank of the Ob River, Tyumen Region, Khanty-Mansi Autonomous Okrug. We describe the site, its stratigraphic sequence and planigraphy, and the layout of the dwellings. The analysis was performed using binocular microscopy of traces in fresh transverse and longitudinal fractures of potsherds. Results were compared with those relating to the experimental sample. The examination of 50 specimens revealed a conservative tradition typical of the potters' substrate skills. Its characteristics included the use of homogeneous clay mined near reservoirs in one and the same area, and the technology was based on bottom-to-body or body-to-bottom coiling. The body was constructed by side coiling. Adaptive skills were variable. Four mixed recipes for clay paste are described, making up one-fifth of the total number of recipes: clay + broken stone + chamotte; clay + broken stone + liquid organics; clay + + chamotte + sand; clay + broken stone + sand; and two unmixed recipes: clay + broken stone; and clay + chamotte. The mechanical processing of surface is variable, being based on 16 techniques and their combinations. Techniques used at various stages of pottery manufacture are listed. Simple paste recipes indicate groups of potters representing various traditions. Mixed recipes attest to a blend of traditions. Those using them might have been monocultural or multicultural groups of potters using different techniques and skills.

Keywords: *Early Iron Age, Surgut, Ob River, Kulai culture, pottery, technological analysis.*

Introduction

Barsova Gora is located on the high right bank of the Ob, between the Bartsevka and Kalinka (Kalinina) rivers, near the city of Surgut, Khanty-Mansi Autonomous Okrug, Tyumen Region (Fig. 1). The area of 6 km^2 contains a great number of archaeological sites dating from the Neolithic to the Late Middle Ages (Chemyakin, Zykov, 2004: 6). The abundance of finds, ceramics in particular (Chemyakin, 2008), makes it possible to trace the features of pottery-manufacturing within a single landscape in various times. Of particular interest are the ceramic collections from the Kulai culture sites: these contain the greatest amount of

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pottery, and the culture itself is the best-studied of the archaeological cultures present at Barsova Gora.

Until recently, the Surgut region of the Ob has been a "blank spot" on the archaeological map of Russia. In the late 19th century, V.F. Kazakov and F. Martin carried out excavations at Barsova Gora (Arne, 1935; Arne, 2005; Zykov, 2008). In 1925, S.A. Kuklin and N.Y. Pavlov headed a topographic survey of the ancient fortified settlements, among which there could have been the settlement of Barsov Gorodok III/6.

Large-scale archaeological works at Barsova Gora began in 1971 in connection with the construction of a railway bridge across the Ob River. In 1973–1974, students of the Physics Department of Ural State University under the supervision of Y.P. Chemyakin carried out a topographic survey of the Barsova Gora site allocated for the railway bridge's construction, including the settlement of Barsov Gorodok III/6. In 1974, M.V. Elkina excavated this site. The excavation area of 525 m^2 contained the inner area of the fortified settlement; some parts of the defensive system were also explored. The rampart was subjected to excavations "in some areas, because it did not contain finds and was covered with trees" (Elkina, 1975: 3).

To date, a series of works describing the ancient pottery of the Late Bronze to Early Iron Ages at Barsova Gora has been published (Barsova Gora…, 2008; Dubovtseva, Yudina, 2010, 2011; Zykov, 2008, 2012; Serikov, Chemyakin, 1998; Chemyakin, Zykov, 2004; Chemyakin, 2008; Chemyakin, Koksharov, 1984, 1991; Posrednikov, 1969; and others).

The purpose of this study is to present a reconstruction of the clay pastes, vessel design, and surface processing techniques. The analysis of the stages of pottery manufacture was carried out via binocular microscopy (Leica M80), with a subsequent comparison of technological traces noted on the artifacts under study and on the experimental sample.

The number of artifacts recovered at Barsova Gora provides solid grounds for reconstruction of almost all stages of pottery manufacture (see (Bobrinsky, 1978, 1994, 1999; Tsetlin, 2012)) and for tracing its development over time. The fortified settlement of Barsov Gorodok III/6 is one of the earliest Kulai sites in the Surgut stretch of the Ob; therefore, its ceramics collection was chosen for the technical and technological analysis: the results of its study will make it possible to consider the pottery from this site as a reference sample, and then to compare other ceramic assemblages from this region and adjacent territories with it (for example, from the Novosibirsk region of the Ob (Troitskaya, 1979)).

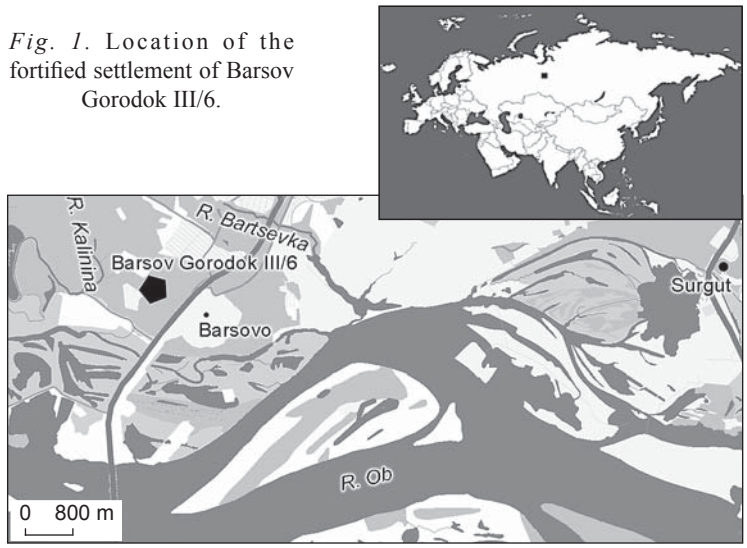

Fig. 1. Location of the fortified settlement of Barsov Gorodok III/6.

Description of Barsov Gorodok III/6

The site is located on a flat forested area, 460 m from the edge of the bank of the Utoplaya channel, 33.5 m above the level of the Ob. The area with dimensions of 27 × 27 m, of parallelogram shape, was oriented almost to the cardinal points (with a deviation of 10° to the west) (Fig. 2). The settlement was surrounded by a ditch 1 m wide and 0.3–0.5 m deep, as well as with a rampart up to 3 m wide and 0.4–0.6 m high. On the southern side, the rampart was slightly smoothed. A narrow (0.5 m) and shallow (5–10 cm) groove ran along the inner side of the rampart. In the corners of the settlement, the groove formed subtriangular pits 0.2–0.4 m deep. The exit from the fortified settlement was located in its southern part. In the interior zone, there were two embanked depressions, 12 × 8 to 9 m, surrounded by grooves. The research was carried out at an area of 525 m^2; both dwellings were excavated to the virgin layer, and the defensive system was excavated partly.

The stratigraphic sequence is the following:

1. Modern soil layer contains forest mulch and podzol; thickness 0.05–0.15 m.

2. Cultural layer is yellow and grayish-yellow sandy loam of varying shades; at the bottoms of dwellings it varies in color from gray to brown; this sandy loam fills the dwelling's foundation trenches and some pits; average thickness 0.2–0.6 m.

3. Redeposited yellow sand is the remains of dwellings and rampart strew; thickness 0.05–0.3 m; sterile.

4. Buried soil is leached light gray sand (podzol); thickness 0.05–0.2 m; separated by yellow sand strew.

5. Virgin soil is yellow sand.

6. Spots of burnt soil contain red sand.

7. The hearth layer is a loose humic brown sandy loam, with inclusions of charcoal pieces and burnt bones; thickness 0.05–0.35 m.

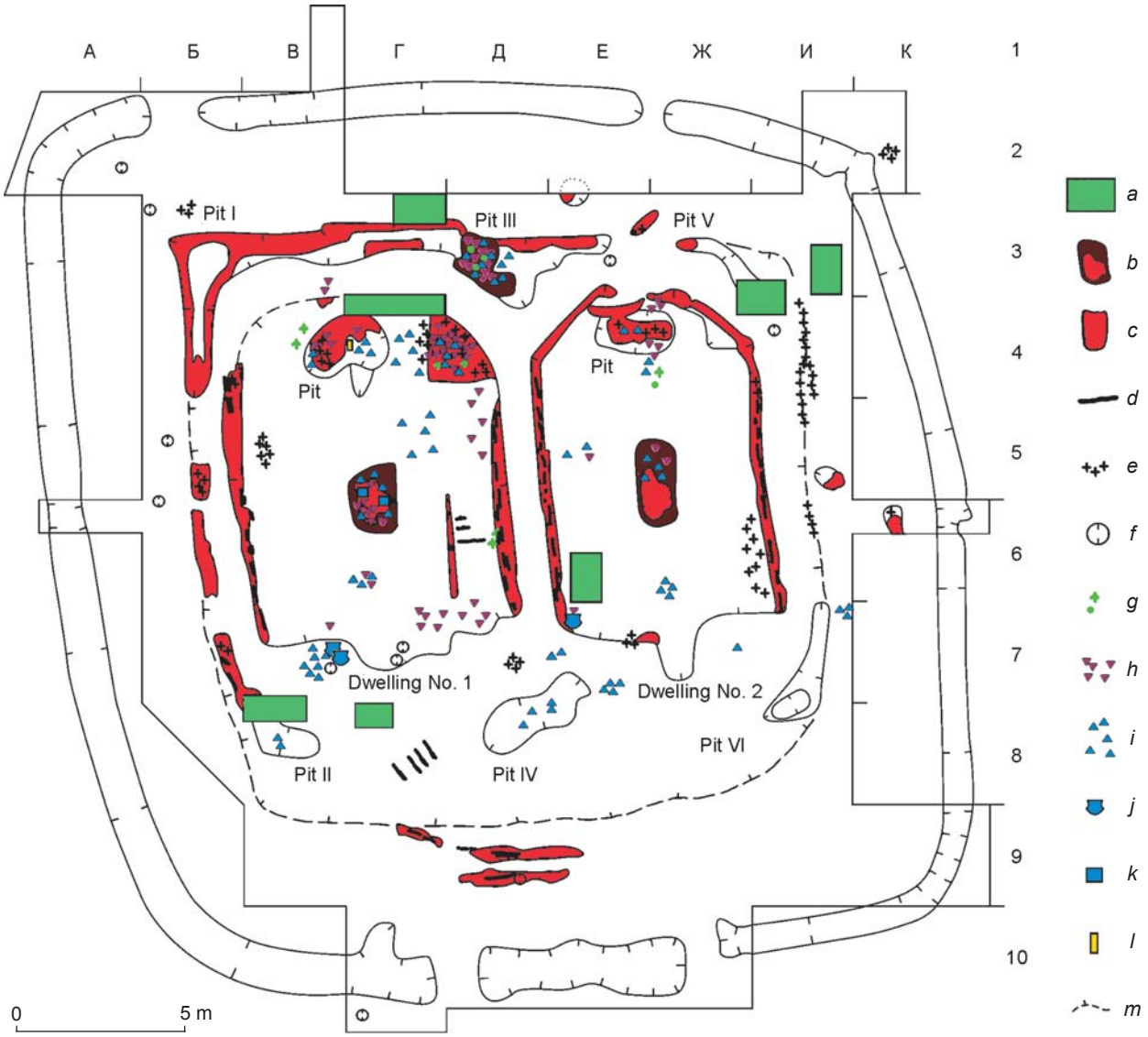

Fig. 2. General plan of the fortified settlement of Barsov Gorodok III/6.
a – unexcavated area; *b* – hearth; *c* – spot of burnt soil; *d* – burnt wooden boards; *e* – charcoal pieces; *f* – hole; *g* – scarp and a bronze item; *h* – crucible; *i* – ceramics; *j* – disintegrated vessels; *k* – pebble; *l* – horse-tooth; *m* – strew residual; earth mounds.

The ditch surrounding the settlement was filled with light gray podzol. Elkina reported that it was 0.7–0.9 m wide on average, 0.5–0.75 m deep from the ancient surface; the walls were gently sloping, the bottom was rounded*. The rampart consisted of yellow sand with thin layers of buried podzol. The rampart was 3.0–3.5 m wide and 0.2–0.3 m high above the level of the buried soil. Two parallel stripes of red calcined sand, with remains of charcoal from burnt structures, were recorded in the southern part of the rampart surrounding the settlement (sq. Г–Е/9) (Fig. 2). The stripes are about 3 m long and 0.3–0.4 m wide. Several pits, possibly from pillars, were revealed below the rampart.

A shallow discontinuous groove, 0.5–0.7 m wide and 0.1–0.4 m deep, with a fired bottom, filled with podzolic soil, was noted along the inner border of the northern and western sides of the rampart. The greatest depth was recorded in the northern part of the groove. In the interior zone, the remains of two sub-rectangular dwellings, slightly dug into the ground and with long

*Possibly, the dimensions of the ditch were larger. In the early years of excavations, the yellow sandy filling of ditches, pits, and other depressions was not always distinguished from virgin sand; the podzol soil in depressions was often perceived as a feature of the site.

walls almost adjoining each other (the distance between being about 0.5 m) and oriented along the N-S line, were uncovered.

The foundation pit of dwelling No. 1 is 10.0 × 8.0 m, the depth is 0.25–0.3 m below the ancient surface level. The exit, in the form of a short corridor, measuring 3 × 1 m, deepened to the floor level, faced south. In the middle of the exit, two pits, possibly remaining from the pillars, were noted. One meter to the west of the exit, there was another pit, near which two vessels were standing upside down. The walls of the dwelling pit are slightly sloping, the bottom is even. Near the walls, a layer of dark gray sandy loam 0.05–0.08 m thick covered the bottom. In the center, around the hearth, this layer was absent. Traces of the burnt wooden walls in the form of stripes of bright-red calcined sand with charcoal pieces were recorded along the western and eastern walls of the foundation pit. These were 0.5–0.7 m wide and 0.1–0.3 m thick.

The corners of the foundation pit in its southern part are almost straight. The northern boundary of the pit had been partially destroyed by the growing trees; the corners in this part were probably rounded or beveled. In the northeastern corner, a triangular ledge protruding with its right angle inside the dwelling was uncovered. A layer of intensely burnt, buried podzolic soil, with inclusions of charcoal pieces and fragments of crucibles (sq. Г–Д/4) (Fig. 2), covered the ledge. The foundation pit was filled with grayish-yellow sand, which was not very different from the virgin land. In the middle of the foundation pit, there was a subrectangular hearth, elongated along the long axis of the dwelling (sq. Г/5–6), lenticular in cross-section. Its size is 2.0 × 1.25 × 0.1 m. The hearth is filled with brown humic sandy loam, with inclusions of calcined bones and pieces of charcoal. It contained fragments of crucibles, small charred pottery fragments, and cracked and smoked pebbles. The sandy loam layer overlay a layer of burnt soil 0.05–0.1 m thick.

At the northern wall of the foundation (sq. В–Г/4), a pit 2.2 × 1.6 × 0.5 m was uncovered. Its walls are slightly sloping, the bottom is even. An interlayer of charcoal 0.03–0.05 m thick was found at the pit bottom. The filling of the pit is heterogeneous: a light gray calcinated podzol in the upper part, and grayish brown sandy loam, with inclusions of charcoal, in the middle and lower part. The filling contained horse teeth, fragments of crucibles and potsherds. Near the pit (sq. В/4), a bronze plate bearing contour images of two animals in high relief and a bronze arrowhead of the Kulai type were found (Chemyakin, 2008: Fig. 79, *12*, *37*).

At the eastern foundation wall, on the floor, sooty black stripes and areas of calcined sand from burnt structures were recorded. These ran parallel and perpendicular to the dwelling wall. Two bronze plates were found in sq. Д/6.

The foundation pit of dwelling No. 2 is almost identical to that of dwelling No. 1. It is 10.0 × 6.5 × 0.2–0.3 m in size, the walls are slightly sloping, and the bottom is even. A corridor-shaped exit (1.0 × 1.2 m) was placed in the southern wall and had been deepened to the level of the pit. At a distance of 1 m to the west from the exit, a hole for a pillar was found. A patch of calcined sand 0.06 m thick was noted near the exit. On the floor, near the pit walls, an interlayer of gray sandy loam 0.03–0.05 m thick was revealed, which was colored less intensely than in dwelling No. 1. Along the western and eastern foundation walls, remnants of burnt walls in the form of stripes of calcined sand with charcoal pieces were noted; the stripes were 0.5–0.7 m wide and 0.1–0.3 m thick. In the southwestern corner of the dwelling, a crushed vessel was found overlain by a layer of calcined sand with charcoal pieces.

The southern corners of the pit are almost straight. The top of a semicircular (or with beveled corners) northern wall was identified through a calcined stripe 0.3 m wide and 0.1–0.2 m thick on the surface of the buried soil, and the lowermost part of the wall was determined through a layer of gray sandy loam at the bottom of the pit. In the center of the dwelling, there was a sub-rectangular hearth dug into the ground to 0.1 m (sq. Е–Ж/5–6), measuring 2.5 × 1.1 × 0.15 m and stretching along the long axis of the dwelling. The hearth layer was lenticular in cross-section; it consisted of brown, humic loose sandy loam, with inclusions of burnt bones and charcoal pieces. Below, a layer of burnt soil 0.06–0.08 m thick was uncovered. The filling of the hearth contained fragments of crucibles, small charred potsherds, and split pebbles.

Near the northern foundation wall, a pit was found (sq. Е–Ж/4), similar to the pit in dwelling No. 1. It was sub-oval in shape, measuring 2.3 × 1.3 × 0.35 m. The pit was semicircular in cross-section and filled with grayish-yellow sandy loam and burnt sand; a black carbonaceous interlayer 0.05–0.07 m thick was traced at the bottom. Fragments of crucibles and potsherds were found in the filling of the pit. In sq. Ж/4, close to the pit, bronze ornitho- and zoomorphic figurines in the style of flat single-sided castings were found (Chemyakin, 2008: Fig. 79, *2*, *24*), and a fragment of a flat bronze ring. In the southern part of the dwelling, next to the eastern wall, on the floor, small inclusions of charcoal were located—the remains of burnt wooden structures.

The exterior surfaces of the walls of both dwellings were strewn with sand, which led to the formation of grooves and external pits on the outside. Elkina noted that "the base of the rampart was reinforced with wood from the inside; this is suggested by a surviving groove with burnt soil and pieces of charcoal" (1975: 18)*. In

*We believe that along the walls an earth mound was probably made, for reinforcement.

front of the dwellings on the southern side, i.e. opposite the exits, there was a free area 4.5–5.0 m wide. The pits at the northern walls of the dwellings could be used both in the process of bronze casting and during ritual activities. This assumption is confirmed by the presence of spots of burnt soil, pieces of charcoal, and fragments of crucibles in the filling of the pits, as well as cast cult objects, an arrowhead, and pieces of bronze next to them. The area where the metal-working production was located seems to have included also the ledge in the northeastern corner of dwelling No. 1. About 150 fragments of crucibles and a thick layer of burnt soil with charcoal inclusions were noted in that area. Over 70 fragments of crucibles were found in or near the central hearth in dwelling No. 1. Another bronze casting area may have been associated with the outer pit III located between the dwellings in the northern part (sq. Д/3). In this pit, a thick (up to 0.45 m) lens of the hearth layer overlying a layer of burnt soil was revealed. The filling yielded more than 200 potsherds, 200 fragments, and two intact crucibles with droplets of bronze, splashes of bronze, fragments of clay figurine, fish bones, and split charred pebbles. In dwelling No. 2, there were much fewer traces of metalworking; these were noted in and around the pit near the northern wall, as well as in the central hearth.

In the outer pits II at the corner of dwelling No. 1 (sq. В/8) and IV between the buildings (sq. Д–Е/7–8), a large number of pottery fragments and fish bones were

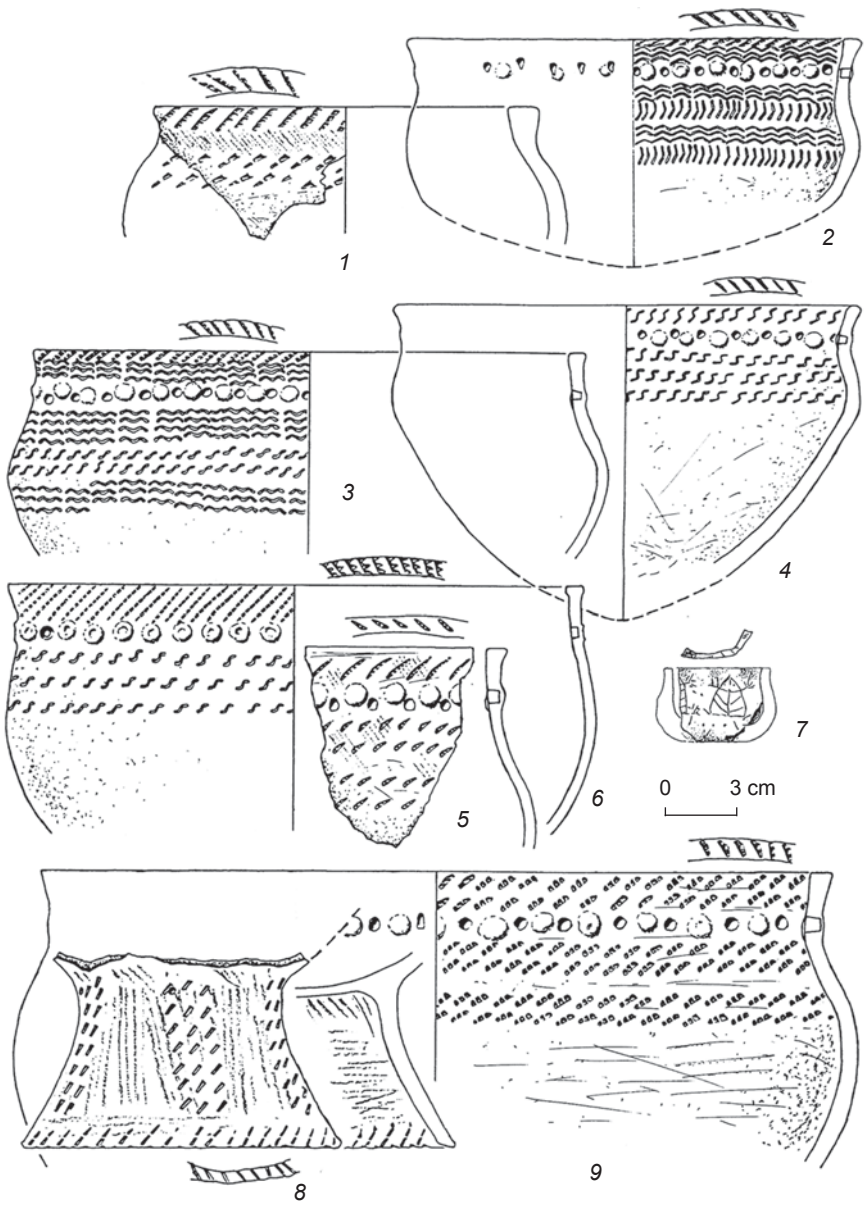

Fig. 3. Pottery of the Kulai culture.

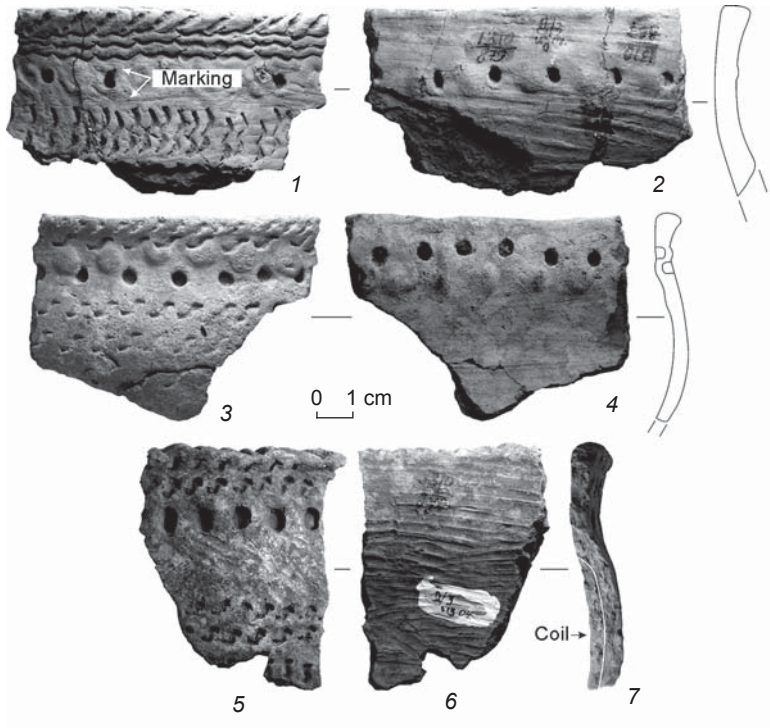

Fig. 4. Ceramic fragments showing signs of surface processing and construction of a hollow body.
1 – traces of smoothing with fingers, polishing, and horizontal marking on the exterior surface; *2* – interior surface smoothing with a comb tool; *3*, *4* – smoothing with soft material; *5*, *6* – smoothing with a comb tool; *7* – side coiling technique.

found. Elkina reported two gates to the settlement in the southern wall, where the rampart was almost untraceable (1975: 18). The gates were 1.0 and 1.2 m wide.

The finds recovered from the settlement include pottery (Fig. 3–5), fragments, and intact crucibles (Chemyakin, 2008: Fig. 78, *1–4*), fragments of clay figurines, and stone and bronze items, including cast cult objects.

A preliminary generalized description of the ceramics of the Surgut version of the Kulai culture has been previously published by one of the co-authors in a summarizing monograph (Ibid.: 84–86).

Study results

A total of 1853 fragments of various vessels was uncovered at the site. Samples for technical and technological analysis were collected from 50 vessels retaining traces of technological features. Surfaces and fractures of the artifacts were analyzed through binocular microscopy of the products' (Fig. 6, 7).

The clay pastes of pottery from Barsov Gorodok III/6 consist of ferruginous clays with low (70 %) and medium (30 %) sand content. Natural impurities in the raw material are brown iron ore – 54 % of the total number of the samples (see Fig. 6, *3*), solitary small plates of mica – 10 %, rare inclusions of vegetative organic matter – 4 %, small rounded limestone pieces – 2 %, large rounded sand grains – 2 %, and solitary fish bones – 2 %. In 38 % of the samples, the clay paste has not revealed any natural impurities. Fractions of brown iron ore are rounded (96 %) and angular (4 %). These are subdivided into small (38.5 %), small and medium (19.2 %), various-sized (34.6 %), and large (7.7 %). The degree of sand content

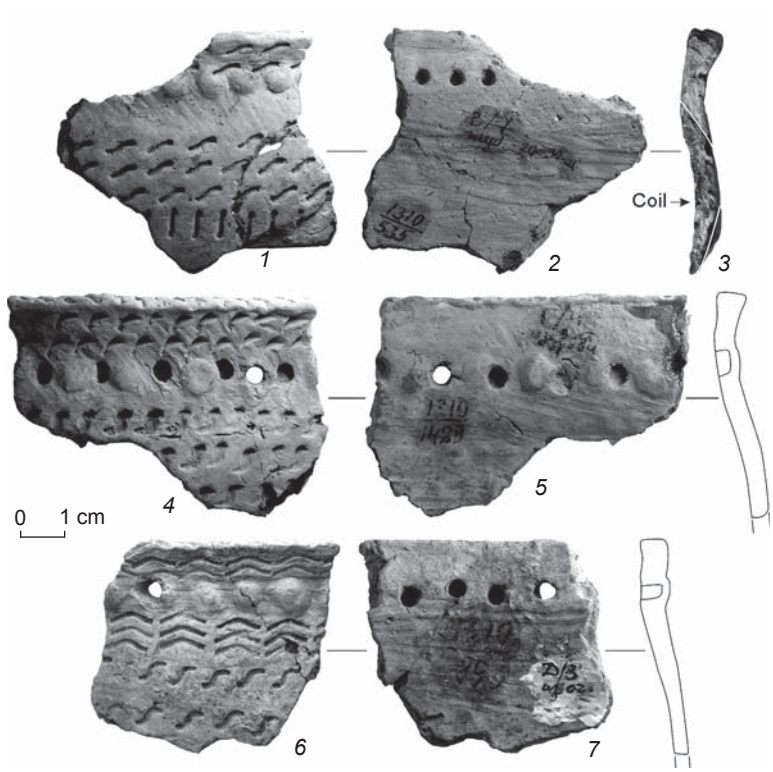

Fig. 5. Ceramic fragments showing signs of surface processing and construction of a hollow body.
1 – exterior surface smoothing with a comb tool and burnishing; *2* – interior surface smoothing with a comb tool; *3* – side coiling; *4*, *5* – smoothing with a comb tool; *6* – smoothing with fingers; *7* – interior surface smoothing with a comb tool.

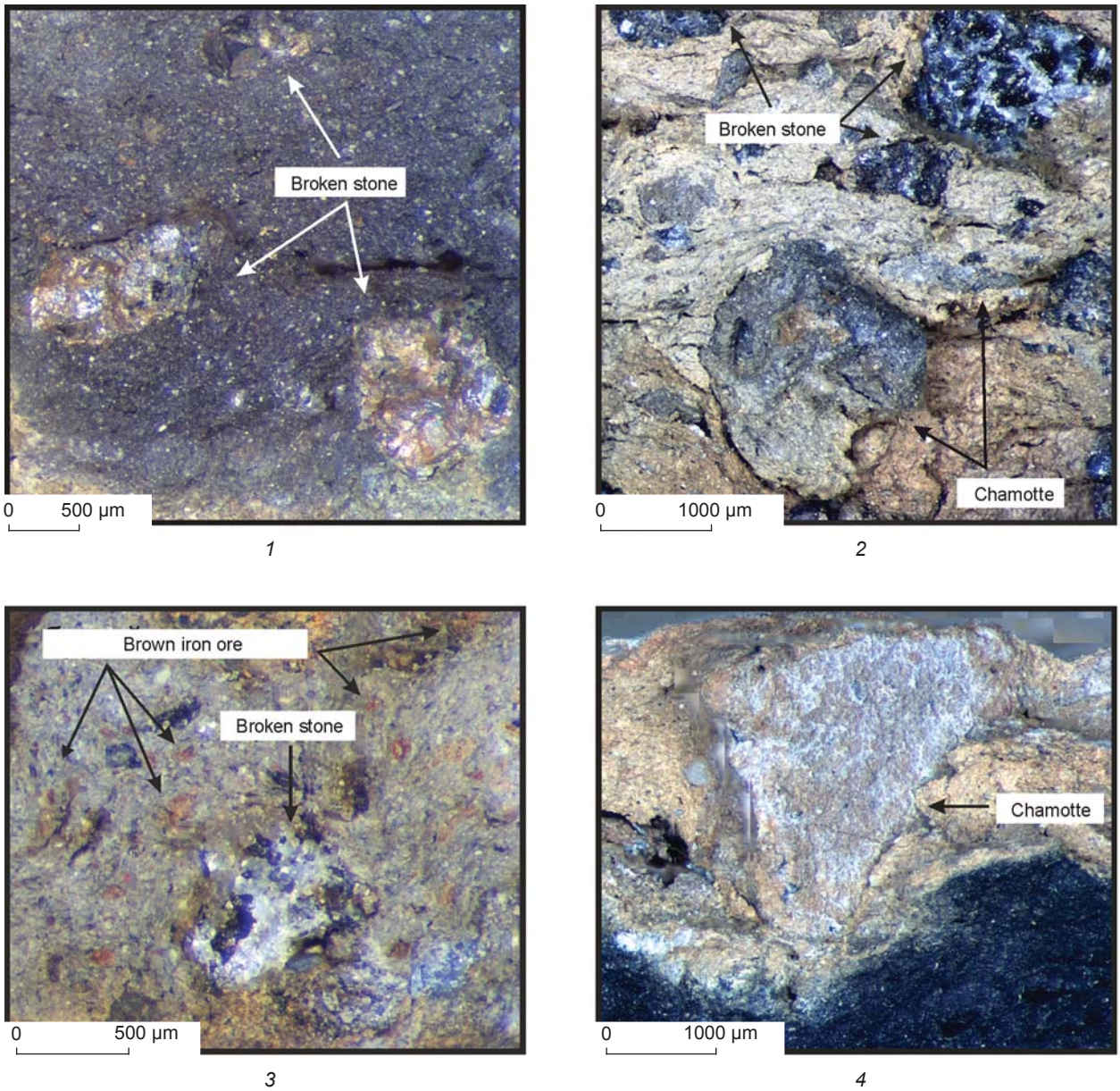

Fig. 6. Microphotographs of the areas of clay paste.
Artificial additives: *1* – broken granitoid stone; *2* – chamotte and broken stone; *3* – broken quartzite stone and brown iron ore grains as a natural additive in clay; *4* – chamotte.

and the nature of natural impurities indicate the use of raw ductile materials from various sources. The absence of any specific impurities and the sufficient homogeneity of the clay suggest that these clay deposits were situated within one and the same region; judging by the inclusions of vegetative organic matter, solitary large sand grains, and fish bones, the clay sources were located near water bodies.

Different preferences in the choice of raw materials are indicated by inclusions of variously shaped fractions of brown iron ore in the clay paste, or their complete absence. Since the Neolithic, the bearers of the Barsova Gora archaeological cultures preferred ferruginous clays with low sand content and a natural admixture of brown iron ore (Dubovtseva et al., 2016: 63). Various sizes of the brown iron ore fractions may be associated with the tradition of preparation and purification of clay before mixing the paste, which led to crushing of large inclusions into smaller ones. This assumption is supported by the potsherds whose paste yielded no natural impurities; this category makes up 38 % of the analyzed samples.

The clay paste included organic and mineral components (see Fig. 6, 7). Organic components (traces of liquid organic matter, noted in 4 % of the samples) are

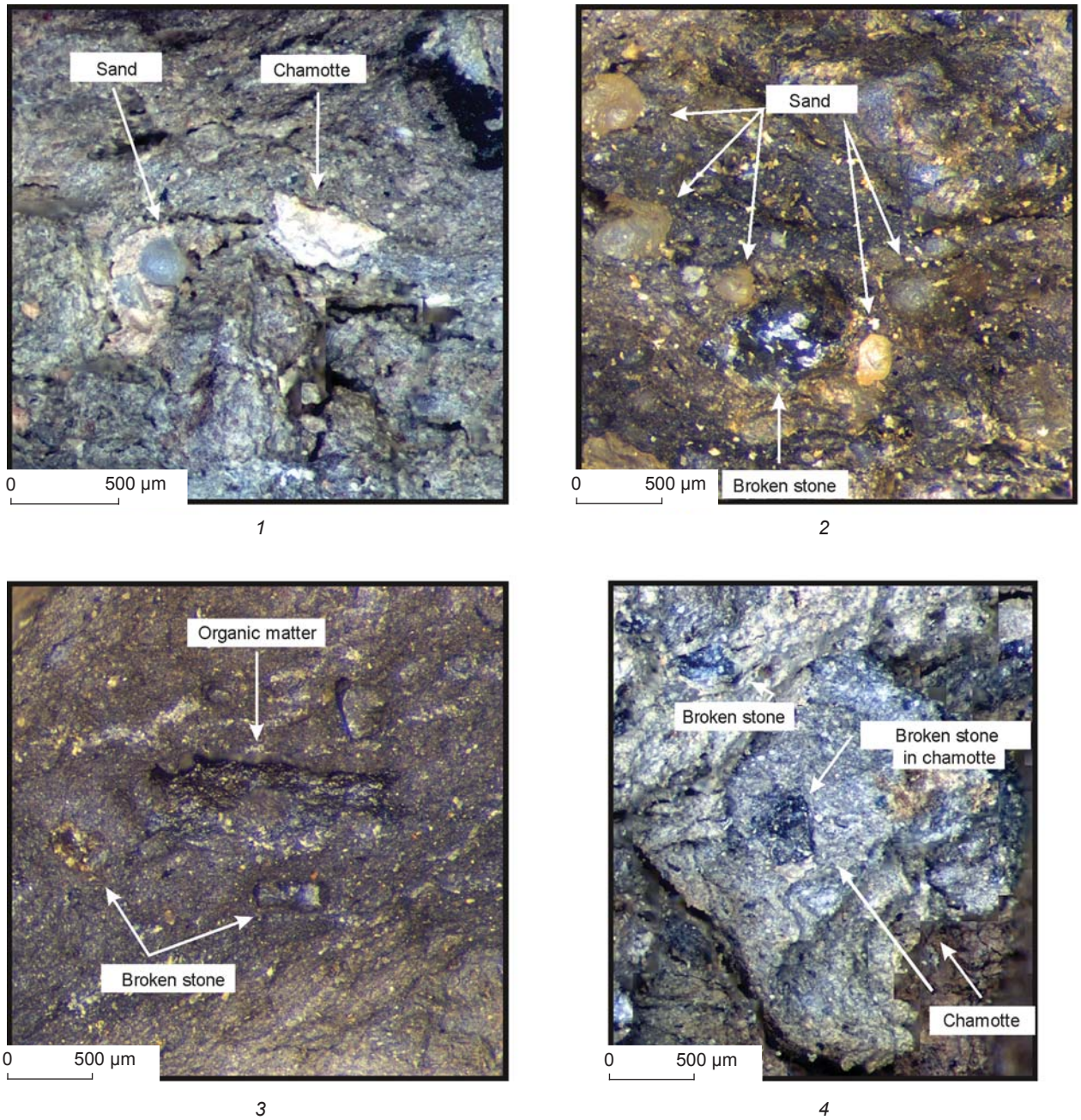

Fig. 7. Microphotographs of the areas of clay paste.
Artificial additives: *1* – sand and chamotte; *2* – sand and broken stone; *3* – organic matter and broken stone; *4* – broken stone, chamotte, and broken stone in chamotte.

represented on the fracture surfaces in the form of cavities filled with a black glossy coating (see Fig. 7, *3*).

Mineral additives (broken stone, chamotte, and sand) were noted in the clay paste of all the samples under consideration (see Fig. 6; 7, *1*, *2*, *4*). Broken stone as an additive in the raw material was noted in 62 % of the samples (see Fig. 6, *1*, *3*), in combination with chamotte in 14 % (Fig. 6, *2*), and in combination with sand in 2 % (see Fig. 7, *2*). Fired igneous rocks were used for crushing: granitoids – 76 % (see Fig. 6, *1*) and quartzite – 4 % (see Fig. 6, *3*). In 78.5 % of the detected cases, the fragments were not calibrated before being introduced into the clay paste; in 16.6 % they were calibrated up to the upper limit (≤1.9 mm), in 4.9 % to the lower limit (≥1 mm). The following concentration rates were recorded: 1 : 2 (2.4 %), 1 : 3–4 (4.9 %), 1 : 4 (36.6 %), 1 : 4–5 (9.8 %), 1 : 5 (14.6 %), 1 : 6 (4.9 %), 1 : 6–7 (9.8 %), 1 : 7 (4.9 %), 1 : 7–8 (4,9 %), 1 : 8–9

(4.9 %), 1 : 10 (2.4 %). Thus, there are two main groups of rock debris proportions: 1 : 3–5 (65.9 %) and 1 : 6–8 (29.4 %). This may indicate that the potters (bearers of the Kulai culture) adhered to two traditions of mixing raw material and broken stone. The use of igneous rocks in manufacturing various tools at Barsova Gora was widespread both in the Early Iron Age and in earlier periods (Serikov, Chemyakin, 1998). However, no granite outcrops were found either at Barsova Gora or in its environs; granite intrusions were recorded only in deep drilling wells (in the ranges of 2992–3021 and 2920–2958 m deep) (Novikova et al., 2017: 38). Possibly, the raw materials were delivered from areas rich in rock outcrops, or from as yet unknown sources of igneous rocks in the area under study or the surrounding areas. It is known that broken stone was also added to the clay paste in the manufacture of Kulai ceramics in the Tomsk region of the Ob (Stepanova, Rybakov, 2016: 423; Rybakov, Stepanova, 2013: 89; 2017: 52). The stability of this tradition is evidenced by the presence of this admixture in chamotte (see Fig. 7, *4*).

The second most common artificial mineral additive is chamotte: it was identified in 30 % of the samples (see Fig. 6, *2*, *4*; 7, *1*, *4*). In 16 % of the samples, it is included as the only additive (see Fig. 6, *4*), in 14 % in combination with broken stone (see Fig. 6, *2*), and in 2 % in combination with sand (see Fig. 7, *1*). In terms of grain calibration, it can be subdivided into uncalibrated (60.1 %), calibrated up to the upper limit (≤1.9 mm, 33.3 %), and up the lower limit (≥2 mm, 6.7 %). The following chamotte concentration rates were recorded: 1 : 2 (6.7 %), 1 : 2–3 (6.7 %), 1 : 4 (6.7 %), 1 : 4–5 (6.7 %), 1 : 5 (6.7 %), 1 : 5–6 (13.3 %), 1 : 6 (13.3 %), 1 : 6–7 (13.3 %), 1 : 7 (6.7 %), 1 : 7–8 (6.7 %), 1 : 9 (6.7 %), 1 : 9–10 (6.7 %). The ratio of 1 : 5–7 can be regarded as a typical concentration; it accounts for more than half (53.3 %) of the cases detected. The variety of concentration ratios indicates the instability of the tradition of introducing chamotte into the clay paste. This conclusion is confirmed by the fact that in 14 % of the samples, chamotte is presented as a temper in combination with another mineral additive—broken stone. In the clay paste of the Kulai culture in the Tomsk region of the Ob and Altai, chamotte is rarely found; some researchers consider its use a non-local tradition (Stepanova, Rybakov, 2016: 423; Rybakov, Stepanova, 2017: 51; Stepanova, Bobrova, 2018; Kazakov, Stepanova, 2019; Pletneva, Ragimkhanova, Stepanova, 2019). We can hardly agree with this opinion, since the available information is incomplete: in some publications, the number of analyzed ceramics for each site is not indicated, or the data only on four to eight samples are provided (see, e.g., (Stepanova, Rybakov, 2019; Kazakov, Stepanova, 2020)), which does not make the samples representative.

Rounded sand as an artificial additive was noted in 4 % of the samples, along with rock debris (see Fig. 7, *2*) or chamotte (see Fig. 7, *1*). In one case, the sand was calibrated to the lower boundary (≥1 mm), in the second to the upper boundary (≤1 mm); the concentration was 1 : 4–5.

Thus, the following clay paste recipes have been identified: 1) clay + broken stone (62 %); 2) clay + + chamotte (16 %); 3) clay + broken stone + chamotte (14 %); 4) clay + broken stone + liquid organic matter (4 %); 5) clay + chamotte + sand (2 %); 6) clay + broken stone + sand (2 %).

The technology of pottery manufacture was based on bottom-to-body (possibly, body-to-bottom) coiling. The hollow bodies of vessels were also constructed by side coiling. The coils were 0.4–1.0 cm thick on average; the overlapping height could reach 3 cm. One sample shows the technique of rim formation through a separate coil up to 1.5 cm high. According to preliminary data, a similar technique was used in the manufacture of the Kulai ware uncovered at Barsov Gorodok I/4. The exterior surfaces of four fragments of the lower body part shows traces of stamping with a plain (3 spec.) or relief (1 spec.) beater.

Techniques of mechanical processing of surface are varied and occur in various combinations (see Fig. 4, 5). A zonation of surface processing was recorded on 30 % of the products: functionally different parts of the vessel were finished with different techniques and tools. Traces of horizontal marking for ornamentation (see Fig. 4, *1*) were noted on the exterior surfaces of 6 % of the samples. The exterior and interior surfaces of the vessels had been processed differently. For example, the exterior side of 64 % of the vessels was smoothed in a wet state with a comb tool, which was probably used to make an ornament (see Fig. 4, *5*, *6*; 5, *1*, *4*). On five vessels, the smoothing lines form regular parallel rows without ornamentation, which suggests that these were a kind of technical decoration (see Fig. 5, *1*, *4*). The wet exterior surface of 22 % of the samples was smoothed with a soft material—cloth, leather (?) (see Fig. 4, *3*). The surface of 12 % of the samples bear traces of smoothing with fingers (see Fig. 5, *7*), 8 % traces of burnishing with a hard item (pebble?) over the dried surface after ornamenting (see Fig. 4, *1*). On one vessel, the surface in the bottom part had been smoothed with a bunch of grass. In 80 % of cases, the interior surface of the items was smoothed in a wet state using a comb tool (see Fig. 4, *2*, *6*; 5, *5*, *8*). 14 % of the samples show signs of processing with a soft material (see Fig. 4, *4*), 6 % of smoothing with fingers. In 28 % of cases, the rim was smoothed separately with fingers (26 %) or with a soft material (2 %) (see Fig. 5, *7*). Perhaps this skill was developed as a result of the use of a swivel stand, when the upper part of the vessel was additionally smoothed in the course of rotation. The portion between the shoulder and the bottom part of the

body was specially smoothed with a comb tool on the wet interior side; signs of the use of this technique are recorded on 20 % of the products (see Fig. 5, *2*, *5*, *8*).

Various techniques of surface processing have been identified; one vessel can show the use of several techniques. In total, 16 processing techniques and their combinations have been noted:

Both surfaces are smoothed with a comb tool (30 %).

Both surfaces are smoothed with a comb tool + the rim with fingers (16 %).

The interior surface is smoothed with a comb tool, the exterior with a soft material (10 %).

Both surfaces were smoothed with a comb tool + the rim with fingers + the transition part from shoulder to body additionally smoothed with a comb tool (8 %).

Both surfaces are smoothed with a comb tool + the exterior side with a soft material (6 %).

Both surfaces are smoothed with a soft material + + the transition part from shoulder to neck additionally smoothed with a comb tool (6 %).

The interior surface is smoothed with a comb tool, the exterior with fingers (4 %).

Both surfaces are smoothed with a soft material (4 %).

The interior surface is smoothed with a comb tool, the exterior side is polished (2 %).

Both surfaces are smoothed with a comb tool + + the transition part from shoulder to neck additionally smoothed with a comb tool (2 %).

The exterior surface is smoothed with a comb tool, the interior surface with a soft material + the rim smoothed with fingers (2 %).

Both surfaces are smoothed with fingers + the transition part from shoulder to neck additionally smoothed with a comb tool (2 %).

Both surfaces are smoothed with fingers (2 %).

The interior surface is smoothed with a comb tool, the exterior with fingers (2 %).

Both surfaces are smoothed with a comb tool + the bottom part with grass (2 %).

The rim is smoothed with a soft material (2 %).

Thus, the surface processing of the vessels was carried out using various techniques and tools. The most common technique was smoothing with a comb tool (exterior surface 64 %, interior 80 %) or soft material (22 and 14 %, respectively). In some cases, smoothing with fingers, grass, or polishing with a hard item was performed. Notably, surface processing techniques are adaptive; when bearers of different traditions are mixed, these change very quickly, often during the life of one generation (Bobrinsky, 1978: 222; Tsetlin, 2017: 152). The total of 16 varieties of surface processing techniques suggests the instability of this technological skill among potters.

The vessels were fired at temperatures exceeding the incandescence temperature (from 550–650 to 900–1100 °C), which is confirmed by the absence of the residual ductility characteristic of low-temperature firing, and traces of clay sintering to a glassy state. According to the color of the fracture, the products are subdivided into one-colored (brown 18 %, dark gray 16, gray 6 %), two-colored with light edges and a sharp transition to a dark center (50 %), and three-colored (10 %). The presence of dark gray and gray one-colored fractures is an indicator of firing in a neutral atmosphere. Two-colored fractures with a sharp border between colors and three-colored fractures indicate firing in a semi-reducing gas atmosphere, followed by rapid cooling of the fired products. In general, firing could have been carried out in fireplaces or hearths, as well as in special smelting furnaces (Volkova, Tsetlin, 2016).

Conclusions

The technical and technological analysis of the ceramics of the Kulai culture (Surgut version) from Barsov Gorodok III/6 suggests several main conclusions on the pottery technology:

The sources of the raw ductile materials were clay deposits located within the same area.

The main artificial additives in the clay paste were broken stone and chamotte.

The dominant recipes for clay pastes were: clay + + broken stone (64 %), clay + chamotte (16 %), and one mixed recipe: clay + broken stone + chamotte (12 %).

The bottoms and bodies of vessels were constructed by side coiling.

Up to 16 different techniques of surface processing and combinations thereof were recorded.

Firing of products could be carried out in fireplaces or hearths in a reducing or semi-reducing environment, with subsequent rapid cooling, as well as in special smelting furnaces.

The potters' substrate skills, which are most stable under the conditions of mixing pottery traditions, demonstrate a conservative trend. The analyzed collection is characterized by the use of similar ductile raw materials and techniques of constructing the bottom and hollow body. Adaptive skills, which are subject to rapid change during the interaction of bearers of various pottery traditions, are more variable. Apart from two dominant unmixed recipes of clay pastes, four mixed recipes were identified, which constitute 1/5 of the total number of the samples under study. The methods of mechanical processing of surface also demonstrate instability: 16 combinations of various techniques have been identified. This is typical of the initial stages of mixing of pottery traditions, which led to the emergence of compromise techniques, often within the life of one generation (Tsetlin, 2012: 242).

Thus, the pottery technology of the Kulai population of Barsov Gorodok III/6 demonstrates a variety of methods of pottery manufacture at various stages of production. The revealed one-component recipes of clay paste suggest the activities of several groups of artisans, who adhered to different pottery traditions. Vessels with mixed recipes have also been identified, which makes it possible to draw a conclusion about the mixing of pottery traditions or of bearers of different traditions at this settlement. This population might have included the people of the same culture with various pottery traditions or the people of different cultures with different pottery traditions. However, this assumption requires a thorough review; it is necessary to carry out a comparative analysis of the examined materials with other collections of the Late Bronze to Early Iron Ages from Barsova Gora.

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References

Arne T.J. 1935
Barsoff Gorodok. Ein westsibirisches Gräberfeld aus der Jüngeren Eisenzeit. Stockholm.

Arne T.J. 2005
Barsov Gorodok. Zapadnosibirskiy mogilnik zheleznogo veka. Yekaterinburg, Surgut: Ural. rabochiy.

Barsova gora: Drevnosti tayezhnogo Priobya. 110 let arkheologicheskikh issledovaniy. 2008
Surgut: Barsova gora.

Bobrinsky A.A. 1978
Goncharstvo Vostochnoy Yevropy. Istochniki i metody izucheniya. Moscow: Nauka.

Bobrinsky A.A. 1994
Otrazheniye evolyutsionnykh i migratsionnykh protsessov v osobennostyakh drevney goncharnoy tekhnologii. In *Paleodemografiya i migratsionniye protsessy v Zapadnoy Sibiri v drevnosti i srednevekovye*. Barnaul: Izd. Alt. Gos. Univ., pp. 14–16.

Bobrinsky A.A. 1999
Goncharnaya tekhnologiya kak obyekt istoriko-kulturnogo izucheniya. In *Aktualniye problemy izucheniya drevnego goncharstva*. Samara: Izd. Samar. Gos. Ped. Univ., pp. 5–109.

Chemyakin Y.P. 2008
Barsova Gora: Ocherki arkheologii Surgutskogo Priobya. Drevnost. Surgut, Omsk: Om. dom pechati.

Chemyakin Y.P., Koksharov S.F. 1984
Poseleniye nachala I tysyacheletiya do n.e. na Barsovoy gore. In *Drevniye poseleniya Urala i Zapadnoy Sibiri*. Sverdlovsk: Ural. Gos. Univ., pp. 115–130.

Chemyakin Y.P., Koksharov S.F. 1991
Novoye poseleniye barsovskoy kultury (predvaritelnaya publikatsiya). In *Zhilishcha narodov Zapadnoy Sibiri*. Tomsk: Izd. Tom. Gos. Univ., pp. 106–114.

Chemyakin Y.P., Zykov A.P. 2004
Barsova Gora: Arkheologicheskaya karta. Surgut, Omsk: Om. dom pechati.

Dubovtseva E.N., Tonkushina M.O., Yudina E.A., Kosinskaya L.L., Ostroushko A.A., Kulesh N.A. 2016
Noviye danniye po pervomu pogrebeniyu Barsovskogo II mogilnika (opyt kompleksnogo analiza). In *Sedmiye Bersovskiye chteniya*. Yekaterinburg: KVADRAT, pp. 61–69.

Dubovtseva E.N., Yudina E.A. 2010
Raskopki obyektov kulyoganskogo tipa selishcha Barsova Gora II/19. In *Khanty-Mansiyskiy avtonomniy okrug v zerkale proshlogo*, iss. 8. Tomsk, Khanty-Mansiysk: Izd. Tomsk. Gos. Univ., pp. 221–240.

Dubovtseva E.N., Yudina E.A. 2011
Neoliticheskiye kompleksy selishcha Barsova Gora II/19. In *Khanty-Mansiyskiy avtonomniy okrug v zerkale proshlogo*, iss. 9. Tomsk, Khanty-Mansiysk: Izd. Tomsk. Gos. Univ., pp. 239–254.

Elkina M.V. 1975
Otchet o raskopkakh poseleniy na Barsovoy gore v Surgutskom rayone Tyumenskoy oblasti, provedennykh v 1974 g. Sverdlovsk, 1975. *Archives of the IA RAN*. R-1, No. 5613.

Kazakov A.A., Stepanova N.F. 2019
K voprosu o kulturno-khronologicheskikh osobennostyakh keramicheskogo kompleksa s poseleniya Ust-Chumysh. In *Poleviye issledovaniya v Verkhnem Priobye, Priirtyshye i na Altaye (arkheologiya, etnografiya, ustnaya istoriya i muzeyevedeniye): Materialy XIV Mezhdunar. nauch.-praktich. konf*. Barnaul: pp. 54–59.

Kazakov A.A., Stepanova N.F. 2020
Keramicheskiy kompleks rannego zheleznogo veka gorodishcha Allak 1. *Izvestiya Altaiskogo gosudarstvennogo universiteta*, No. 5 (115): 113–119.

Novikova L.P., Vlasov A.I., Zozulina T.I., Krivenkova G.G., Sukhanov A.I., Chistyakova A.I. 2017
Gosudarstvennaya geologicheskaya karta Rossiyskoy Federatsii. Masshtab 1 : 200 000. Ser. Zapadno-Sibirskaya. Podser. Tyumensko-Salekhardskaya: Obyasnitelnaya zapiska. Moscow: VSEGEI.

Pletneva L.M., Ragimkhanova I.J., Stepanova N.F. 2019
Rezultaty tekhniko-tekhnologicheskogo analiza keramiki iz mogilnika Shelomok I, poseleniy Kizhirovo, Samus II. *Tomskiy zhurnal lingvisticheskikh i antropologicheskikh issledovaniy*, No. 4 (26): 120–127.

Posrednikov V.A. 1969
Arkheologicheskiye raboty na r. Vakh. In *Iz istorii Sibiri*, iss. 2. Tomsk: Izd. Tom. Gos. Univ., pp. 76–85.

Rybakov D.Y., Stepanova N.F. 2013
Rezultaty tekhniko-tekhnologicheskogo analiza kulaiskoy keramiki poselencheskogo kompleksa Ryuzakovo (Dukhovoye). *Vestnik Tomskogo gosudarstvennogo universiteta*. Istoriya, No. 2: 86–90.

Rybakov D.Y., Stepanova N.F. 2017
Rezultaty tekhniko-tekhnologicheskogo analiza keramiki pamyatnikov kulaiskoy kulturno-istoricheskoy obshchnosti

iz Tomskogo i Narymskogo Priobya. *Vestnik Tomskogo gosudarstvennogo universiteta.* Istoriya, No. 49: 46–53.

Serikov Y.B., Chemyakin Y.P. 1998

Kamenniy inventar beloyarskogo poseleniya Barsova gora I/40. In *Voprosy arkheologii Urala*, iss. 23. Yekaterinburg: Izd. Ural. Gos. Univ., pp. 241–256.

Stepanova N.F., Bobrova A.I. 2018

Osobennosti iskhodnogo syrya i sostava formovochnykh mass keramicheskikh kompleksov iz Tomskogo Priobya. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIV. Novosibirsk: Izd. IAET SO RAN, pp. 324–328.

Stepanova N.F., Rybakov D.Y. 2016

Perviye rezultaty tekhniko-tekhnologicheskogo analiza keramiki gorodishcha Timiryazevo III kulaiskoy kulturno-istoricheskoy obshchnosti. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXII. Novosibirsk: Izd. IAET SO RAN, pp. 420–423.

Stepanova N.F., Rybakov D.Y. 2019

Osobennosti iskhodnogo syrya i formovochnykh mass drevney keramiki iz Tomskogo i Narymskogo Priobya. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXV. Novosibirsk: Izd. IAET SO RAN, pp. 607–613.

Troitskaya T.N. 1979

Kulaiskaya kultura v Novosibirskom Priobye. Novosibirsk: Nauka.

Tsetlin Y.B. 2012

Drevnyaya keramika: Teoriya i metody istoriko-kulturnogo podkhoda. Moscow: Izd. IA RAN.

Tsetlin Y.B. 2017

Keramika: Ponyatiya i terminy istoriko-kulturnogo podkhoda. Moscow: Izd. IA RAN.

Volkova E.V., Tsetlin Y.B. 2016

O razrabotke metodiki opredeleniya temperatury obzhiga drevney keramiki. *KSIA*, No. 245–II: 254–264.

Zykov A.P. 2008

Perviye issledovateli Barsovoy Gory. In *Barsova Gora: Drevnosti tayezhnogo Priobya*. Yekaterinburg, Surgut: Ural. kn. izd., pp. 6–15.

Zykov A.P. 2012

Barsova Gora: Ocherki arkheologii Surgutskogo Priobya. Srednevekovye i Novoye vremya. Yekaterinburg: Ural. rabochiy.

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The Study of Non-Ferrous Metal Artifacts of the Early Iron Age and Medieval Cultures in the Western Amur Basin

We describe the morphological and quantitative characteristics, and the elemental composition, of 23 bronze artifacts, seven silver ones, and a gold adornment, spanning the period from late 11th century BC to 15th century AD. These items (adornments and tools) belong to the Uril and Talakan cultures of the Early Iron Age, Mikhailovka, Mohe, and Central Asian cultures of the Early Middle Ages, and the Ducher culture of the Late Middle Ages. Elemental analysis of the bronze items at the SB RAS Institute of Nuclear Physics Siberian Center for Synchrotron and Terahertz Radiation Station of Local and Scanning X-Ray Fluorescence Elemental Analysis showed that over about 2.5 thousand years, tin-lead or lead-tin bronze was used for manufacture. Also, the best convergence of concentrations of chemical elements for Talakan and Mikhailovka artifacts testifies to evolutionary continuity between the Talakan and Mikhailovka cultures. Analysis of the elemental composition of Mohe silver and gold items from the Amur basin was carried out for the first time, revealing the high purity of precious metals used for manufacturing early medieval jewelry.

Keywords: *Western Amur basin, jewelry, bronze, silver, gold, elemental analysis.*

Introduction

The first bronze artifacts were found in the Western Amur region in 1961. A bronze lobulated plaque was found in the same layer as knife-like blades and flakes in the mouth of the Ango River at its confluence with the Zeya River, and a palmate plaque-pendant was found on Urilsky Island. A smelting hearth with slag residues, apparently remaining from bronze-casting, was examined at the settlement on the Zeya River, near the village of Berezovka. A.P. Okladnikov and A.P. Derevianko dated these objects to the late 2nd millennium BC (1973: 203). The discovery in the early 1960s of the Uril culture of the Early Iron Age, whose carriers used bronze, iron, and cast iron for manufacturing personal adornments, knives, fishhooks, and celt axes, has made it possible to attribute the above-mentioned plaque from the Ango River, as well as bronze cranked knife with a large rib from the first (upper) cultural layer of the Ust-Ulma I site on the Selemdzha River (Derevianko A.P., Zenin, 1995: 5–6), to this very culture. Thus, the earliest known bronze artifacts from the Western Amur basin (Amur Region) are associated with the Uril culture.

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Reconstruction of technology used for the manufacture of bronze plaques from dwelling 2 of the early medieval settlement of Osinovoye Ozero and their elemental chemical composition has revealed that the absence of an available copper source in the Western Amur basin forced the Mohe jewelry casters to remelt secondary raw materials, mainly bronze plaques from the Turkic-type belts (Nesterov, Savin, Kolmogorov, 2016). This conclusion has led to conducting a similar study of items of non-ferrous metals (bronze, gold, and silver) of the Uril and Talakan cultures of the Early Iron Age, the Mikhailovka, Naifeld, and Troitsky groups of the Mohe culture of the Early Middle Ages, and the Ducher culture of the Late Middle Ages. Such a study, covering the period from the emergence of the first bronze items in the turn of the 2nd–1st millennia BC till about the 15th century AD, was performed for the first time for the Western Amur basin. Earlier, a similar work on bronze-casting production in the Russian Far East had been carried out by L.V. Konkova. Materials from the Amur Region included 15 bronze artifacts from the early medieval Troitsky burial ground of the Mohe culture (Konkova, 1989: 111).

This multidisciplinary analysis was performed for 23 bronze items (adornments, a Chinese coin, and a knife) and eight adornments (earrings) made of silver and gold, originating from the archaeological sites of the Early Iron Age and the Middle Ages (Fig. 1).

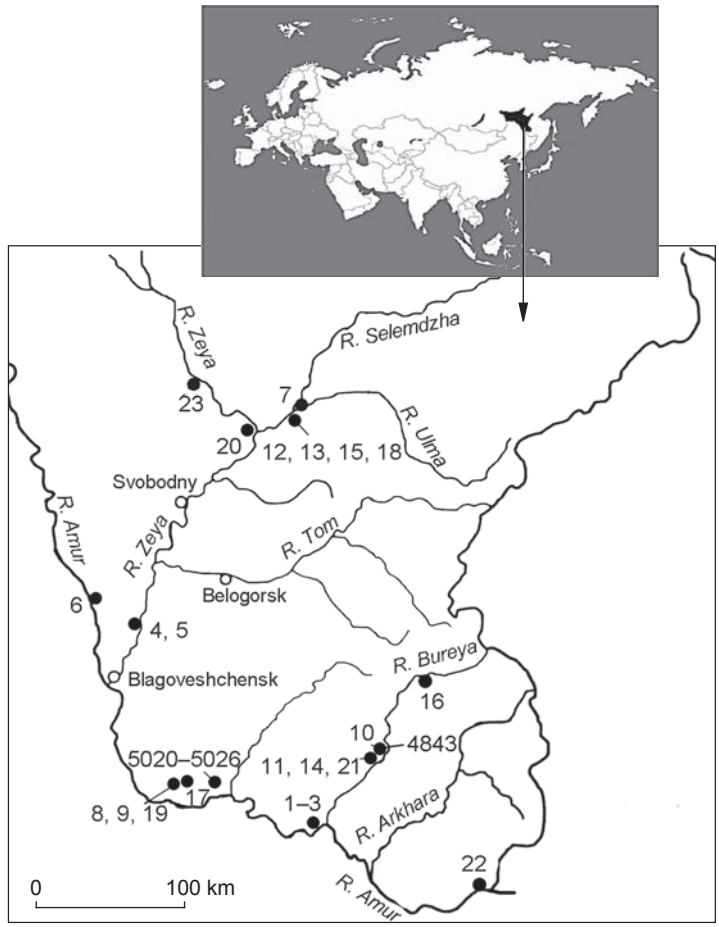

Fig. 1. Location of items made of non-ferrous metals in the southern part of the Amur Region.

Bronze: No. 1–3 – Pad Pribrezhnaya; No. 4, 5 – Pryadchino-3; No. 6 – Alekseyevsky Bugor; No. 7 – Ust-Ulma I; No. 8, 9, 19 – Osinovoye Ozero; No. 10 – Bukinsky Klyuch-2; No. 11, 14, 21 – Bolshiye Simichi; No. 12, 13, 15, 18 – Bogoslovka; No. 16 – Ust-Talakan; No. 17 – Lake Gnedkovo; No. 20 – Novorybachy; No. 22 – Urilsky Island; No. 23 – Ango. Silver: No. 5020–5026 – Shapka burial ground. Gold: No. 4843 – Bukinsky Klyuch-1.

Description of the items

Items from the 11th–10th centuries BC, the Uril culture. *The palmate plaque-pendant* (No. 22*) from Urilsky Island on the Amur River is a slightly convex sub-triangular plate (maximum length 4.8 cm, width 2.6 cm), with two small holes in the upper part (Fig. 2, *1*) (Derevianko A.P., 1973: 288, pl. XV, *8*). A similar palmate plaque was found at the site of Bukinsky Klyuch-1 in 1997 (Nesterov, 2017).

The lobulated plaque from the site on the Ango River (No. 23) consists of two ovals (2.5 × 1.6 cm in size), connected by a belt 1.2 cm wide (Fig. 2, *2*). The length of the item is 3.7 cm; the thickness 0.5 mm (Derevianko A.P., 1973: 279, pl. VI, *6*; Nesterov, 2017).

The knife from the Ust-Ulma I site (No. 7) is a curved double-edged blade 8.2 cm long, 1.9 cm of maximum width, and about 0.8 mm thick (Fig. 2, *3*). One side of the blade is flat, and the other side has a rib 2.5 mm high. The tang (1 cm long and 1 cm wide) is flat; its edge is rounded (Derevianko A.P., Zenin, 1995: 5–6, 97, fig. 5, *2*).

Items from the 2nd century BC to 3rd century AD, the Talakan culture. *The openwork pendant* (No. 16) from the filling of dwelling 1 at the Ust-Talakan site on the Bureya River has a length of 2.38 cm, maximum width of 1.45 cm, and thickness of 2.1 mm (Fig. 2, *4*) (Drevnosti…, 2000: 268, fig. 40, *3*).

The openwork pendant (No. 6) is one of the three identical adornments from the surface finds at the Alekseyevsky Bugor site (Drevneye iskusstvo…, 2012: 13, No. 24). In the location of holes, it is similar to pendant No. 16 from the Bureya River, but is slightly

*Hereafter, the sample number for establishing the elemental chemical composition is provided.


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different in shape and size (Fig. 2, *5*). Its length is 2.67 cm; the maximum width is 1.3 cm, and the thickness is 2.4 mm.

The lobulated plaque (No. 5) from the Pryadchino-3 site belongs to adornments in the form of small round hemispheres connected by edges or small belts three or four in a row (Fig. 2, *6*) (Ibid.: No. 23). Its length is 2.4 cm; diameter of three hemispheres is 6.0, 6.1, and 6.3 mm.

The bent awl (No. 4) used for untying knots was accidentally found at the settlement of Pryadchino-3 (Ibid.: 12, No. 19). Its length is 5.6 cm (Fig. 2, *8*) (Bolotin, Alkin, 1996: 108).

Items from the 3rd–6th centuries, the Mikhailovka culture. One of the three *openwork bells* (No. 10; Fig. 2, *9*) was found in the cultural layer at Bukinsky Klyuch-2; two were discovered in dwelling 3 and one between the dwellings (No. 11; Fig. 2, *10*) (No. 21; Fig. 2, *11*) at the Bolshiye Simichi seasonal site (Drevnosti…, 2000: 134, fig. 56, *11*; p. 152, fig. 63, *9*; p. 336, App. 2, fig. 110, *9*). These are small bell-shaped adornments, each with a concave base (diamond-shaped in cross-section) and a loop for hanging. On their lateral surfaces, there are two (No. 10), three (No. 11), or four (No. 21) holes of elongated sub-quadrangular shape. The bells are 1.9–2.7 cm high, 1.9–2.2 cm long, and 1.2–1.4 cm wide.

The openwork pendant (No. 20) of triangular shape, with three holes and a loop on a leg, was found in a layer with the Mikhailovka pottery at the Novorybachy site, on the right bank of the Zeya River, opposite the mouth of the Selemdzha River. The total height of the adornment is 3.5 cm; height of the loop is 1.5 cm; width of the lower part is 1.9 cm (Fig. 2, *13*).

Items from the 8th–10th centuries, the Mohe culture. *The button* (No. 14) from the Mohe layer at Bolshiye Simichi (Drevnosti…, 2000: 349, App. 2, fig. 125, *3*) has a diameter of 1.6 cm and thickness of 1.4 mm. On the outer surface, there is ornamental decoration of three parallel striped depressions and two small ridges. A loop with round hole is on the reverse side (Fig. 2, *7*).

The Chinese coin "Kaiyuan Tongbao" (No. 19) comes from the dwelling of the Mohe Troitsky group in a settlement near Lake Osinovoye (excavations of 1965) (Derevianko E.I., 1975: 46). Its diameter is 2.4 cm; thickness along the edge is 1.7 mm. In the center of the coin, there is a square hole (0.69 × 0.69 cm). Four convex hieroglyphs are represented crosswise on the obverse; the reverse is smooth, without additional signs (Fig. 2, *12*).

The openwork bells (No. 8, 9) from dwelling 3 at Osinovoye Ozero have rounded bases, two opposite arched cutouts in the lower part, and two subrectangular holes in the upper third (Fig. 2, *14*, *15*). The height of the items is 4.0–4.1 cm (Nesterov, Savin, Kolmogorov, 2016: 89, fig. 10).

The gold earring (No. 4843), found in the filling of dwelling 2 of the Mikhailovka culture at Bukinsky Klyuch-1, on the Bureya River, is a deformed wire ring from a combined Mohe-type adornment (Fig. 2, *31*). The diameter of the wire is 1.5–1.8 mm; its unfolded length is 12.6 cm, which corresponds to a ring with a diameter of 4 cm. The ends of the earring are flattened; holes of about 0.5 mm in diameter were drilled in the ends (Shelomikhin, Nesterov, Alkin, 2017: 49, 172, fig. 47, *12*).

Adornments of the Naifeld group of Heishui Mohe are silver earrings from the Shapka burial ground (8th–9th centuries). *The earring from grave 183* (No. 5020) has oval shape and size of 2.7 × 3.0 cm. The diameter of the wire is 1.5 mm. One round eyelet was broken off at the end; the stone disc-suspension is missing (Fig. 2, *27*).

The earring from grave 23d (No. 5023) is also oval and measures 2.9 × 3.2 cm. It is made of wire 1.5–1.8 mm thick. A disc-shaped pendant made of white jade with an oval hole elongated from the center to the edge has survived. The ends of the ring are overlapped and tightly compressed (Fig. 2, *25*).

The earring from grave 45 (No. 5024) has an oval shape and a size of 3.10 × 3.25 cm. The diameter of the wire is 2.6 mm. Its ends are cut, and there is a small gap between them. There is no stone pendant (Fig. 2, *24*).

The earring fragment from grave 17 (No. 5026) is a wire 2.1 mm in diameter, which becomes thinner towards the sharp end, which is bent outwardly into a small oval loop. The opposite end is ragged, i.e. the earring must have been broken by hand through repeated bending. The length of the fragment is about 4.1 cm (Fig. 2, *30*).

The earring with jasper disc from the space between the graves (sq. 8-Г; No. 5025), made of wire 1.9 mm thick. There are holes on its flattened ends. The earring is strongly crumpled; the ends are twisted (Fig. 2, *26*).

Fig. 2. Samples of items made of bronze (*1–23*), silver (*24–30*), and gold (*31*) from the sites of the Amur Region (different scales; sizes are given in the description).

1 – palmate plaque-pendant, No. 22; *2* – lobulated plaque, No. 23; *3* – knife, No. 7; *4* – openwork pendant, No. 16; *5* – openwork pendant, No. 6; *6* – lobulated plaque, No. 5; *7* – button, No. 14; *8* – bent awl, No. 4; *9* – openwork bell, No. 10; *10* – openwork bell, No. 11; *11* – openwork bell, No. 21; *12* – Chinese coin, No. 19; *13* – openwork pendant, No. 20; *14* – bell, No. 8; *15* – bell, No. 9; *16* – belt scalloped plaque, No. 13; *17* – belt plaque, No. 17; *18* – hanging strap plaque, No. 12; *19* – hanging strap plaque, No. 15; *20* – hanging strap plaque, No. 18; *21* – openwork triangular plaque, No. 2; *22* – openwork pendant, No. 3; *23* – pendant-ring, No. 1; *24* – earring, No. 5024; *25* – earring with jade disc, No. 5023; *26* – earring with jasper disc, No. 5025; *27* – earring, No. 5020; *28* – earring, No. 5021; *29* – earring, No. 5022; *30* – earring fragment, No. 5026; *31* – earring, No. 4843. *1–4*, *7*, *9–20*, *24–31* – Museum of the History and Culture of the Peoples of Siberia and the Far East of the IAET SB RAS; *5*, *6*, *8*, *21–23* – Sapunov Museum of Archaeology of the Blagoveshchensk State Pedagogical University.

Two earrings from a pit in sq. 12-Ж apparently were specially made for commemoration (apart from these, there was also a vessel in the pit) (Nesterov, Roslyakov, Teterin, 1987). One standard earring could have been used for this, since the thickness of the wire in both items is the same (1.2 mm). The outer diameter of one earring (No. 5021) is 0.9–1.0 cm (Fig. 2, *28*), that of the other earring (No. 5022) is 1.0–1.2 cm (Fig. 2, *29*).

Belt set from the Central Asian outlook, 9th–10th centuries. *The belt plaque* of a portal-like shape with a slot for attaching a pendant strap (No. 13) was used to decorate a leather belt found in a "hoard" from the Selemdzha River (Nesterov, Maksimov, 1990). A vertical band runs along the center of the plaque (Fig. 2, *16*). Three pins for attaching the item to the belt were broken off during its use: the plaque retained the remains of a rope with which it was attached to the base through the slot (1.67 × 0.65 cm) for hanging straps. The width of the item at the base is 2.8 cm; height is 2.5 cm, and thickness is 1.4 mm.

The plaques of hanging straps (No. 12, 15, 18) of the belt described above (Fig. 2, *18–20*) were attached to the base with a single pin. There is a vertical band on the front side. The plaques are of the same shape; their lengths are 1.36; 1.29, and 1.32 cm, respectively; widths 1.1, 0.8, and 1.3 cm, and thicknesses 1.5, 1.1, and 1.3 mm.

The belt plaque (No. 17) of a semi-oval shape, with a straight bottom and a rectangular hole (1.7 × × 0.5 cm) for attaching a hanging strap, was accidentally found in 2003 under a small hill on the northern shore of Lake Gnedkovo, in Konstantinovsky District of the Amur Region. Its length is 3 cm, the width is 2 cm, the thickness is 1.1 mm. The front side is smooth; the back side has three pins for fastening the item to the belt (Fig. 2, *17*).

Items from the 13th–15th centuries, the Ducher culture. *The openwork triangular pendant* (No. 2) from the Pad Pribrezhnaya burial ground on the Amur River (Drevneye iskusstvo…, 2012: 25, No. 50) has two protrusions on lateral sides. Notches and marks were made along the edges on the convex front surface; the back side is flat and smooth. The base of the triangle is 4 cm long; the lateral sides are 3.5 and 3.3 cm long; the thickness is 2.2–2.8 mm (Fig. 2, *21*).

The openwork pendant (No. 3) is from the same site (Ibid.: 24, No. 47). It has a sophisticated shape based on the oval, the same maximum diameter as the oval, a total height of 3.4 cm, and a thickness of 1.5–2.0 mm (Fig. 2, *22*).

The pendant-ring with a loop (No. 1), also from Pad Pribrezhnaya, is grooved on the front side (Ibid.: 27, No. 57); the back side is flat and smooth (Fig. 2, *23*). The outer diameter of the ring is 2.6 cm; the inner diameter is 1.7 cm, and the thickness is 2.7 mm.

Elemental analysis of the items

Analysis of the archaeological artifacts of bronze was carried out at the SB RAS Institute of Nuclear Physics Siberian Center for Synchrotron and Terahertz Radiation, using the VEPP-3 electron-positron storage ring, at the Station of Local and Scanning X-Ray Fluorescence Elemental Analysis (Piminov et al., 2016). While preparing the items for SR-XRF analysis, patina was mechanically removed from their surfaces over an area of ca 5–10 mm^2. Then, these areas were ground and polished, after which they were cleaned with ethyl alcohol. A bronze item was placed in the measuring chamber of the station in such a way that the beam of monochromatic synchrotron radiation fell on the cleaned surface. The radiation energy was 33.5 keV. Secondary radiation from the sample (emission spectrum) was recorded by an energy dispersive spectrometer. The measured emission spectra were processed using the AXIL software.

For calculating the concentrations of chemical elements in the bronze artifacts, the method of external standard was applied, this being a reference bronze sample from the ARTAX-400 spectrometer kit. The sample had the following content of chemical elements: P (phosphorus) – 0.01 %, S (sulfur) – 0.03 %, Fe (iron) – 0.02 %, Ni (nickel) – 1.5 %, Cu (copper) – 76.8 %, Zn (zinc) – 1.1 %, As (arsenic) – 0.02 %, Sn (tin) – 8.0 %, Sb (antimony) – 0.5 %, Pb (lead) – 12.0 %, and Bi (bismuth) – 0.01 %. The spectra of the tested sample and the reference sample were measured and then compared.

The elemental composition of three items from the *Uril culture* corresponds to two bronze alloys—tin-lead and tin alloys. The palmate plaque from Urilsky Island and the knife from the Ulma River were cast of tin-lead alloy. The metal of the knife contained more lead and silver, while the plaque contained more tin. A distinctive feature of the tin-bronze alloy in the lobulated plaque from the Ango River was a higher content of iron as compared to arsenic (4.54 % versus 3.1 %) (Table 1). A significant admixture of iron is clearly visible on the surface of the item in a form of small spots and grains of oxide—rust (Fig. 2, *2*).

All four items of the *Talakan culture* were cast of tin-lead bronze (Table 1). However, samples 4 and 6—the bent awl from Pryadchino-3 (Fig. 2, *8*) and the openwork pendant from Alekseyevsky Bugor (Fig. 2, *5*)—showed an increased content of antimony (1.6 % and 1.95 %) and lead (11.8 % and 12.7 %, respectively). The largest percentage of tin (15.9 %) was present in the metal used for making the lobulated plaque from Pryadchino-3 (Fig. 2, *6*). The openwork pendant from Bolshiye Simichi (Fig. 2, *4*) differed from these three items by the

Table 1. **Elemental composition of the items according to X-ray fluorescence elemental analysis, using synchrotron radiation, %**

Sample / Figure No.	Fe (iron)	Ni (nickel)	Zn (zinc)	As (arsenic)	Ag (silver)	Cd (cadmium)	Sn (tin)	Sb (antimony)	Pb (lead)	Bi (bismuth)
Uril culture										
7 / Fig. 2, *3*	0.03	0.22	0.3	0.07	**1**	0.003	**4.3**	0.33	**7.9**	0.11
22 / Fig. 2, *1*	0.02	0.07	0.06	0.05	0.28	0.016	**14**	0.39	**9.3**	0.31
23 / Fig. 2, *2*	**4.54**	0.03	0.05	**3.1**	0.28	0.024	**13.9**	0.02	0.13	0.13
Talakan culture										
4 / Fig. 2, *8*	0.04	0.43	0.33	N/D	0.25	0.002	**4.5**	**1.6**	**11.8**	0.16
5 / Fig. 2, *6*	0.02	0.06	0.05	0.12	0.09	0.017	**15.9**	0.56	**4.3**	0.21
6 / Fig. 2, *5*	0.06	0.65	0.38	0.04	0.43	0.002	**2**	**1.95**	**12.7**	0.24
16 / Fig. 2, *4*	0.1	0.38	0.48	0.25	0.18	0.003	**3.8**	0.72	**4**	0.11
Mikhailovka culture										
10 / Fig. 2, *9*	0.32	0.36	0.37	N/D	0.22	0.0001	**3.4**	**1.53**	**13.7**	0.16
11 / Fig. 2, *10*	0.29	0.21	0.29	"	0.88	0.005	**5.9**	**1.38**	N/D	**1.06**
21 / Fig. 2, *11*	0.21	0.18	0.31	"	0.29	0.005	**5.3**	**1.78**	**12.5**	0.15
20 / Fig. 2, *13*	0.1	0.08	0.17	"	0.09	0.011	**9.9**	0.17	**28.2**	0.31
Mohe culture										
8 / Fig. 2, *14*	0.56	0.14	0.09	"	0.26	0.029	**15.2**	0.28	**11.9**	0.31
9 / Fig. 2, *15*	0.15	0.07	0.06	"	0.23	0.02	**13.1**	0.49	**13.4**	0.46
14 / Fig. 2, *7*	0.04	0.28	0.27	"	0.18	0.005	**6.4**	**1.2**	**8.2**	0.18
19 / Fig. 2, *12*	**1.36**	0.1	0.16	"	0.1	0.005	**4**	0.5	N/D	0.25
Items of the Central Asian outlook										
12 / Fig. 2, *18*	0.05	0.08	0.1	"	0.28	0.02	**12.8**	0.58	**11.6**	0.31
13 / Fig. 2, *16*	0.45	0.34	**12.8**	"	0.12	0.006	**5.7**	0.43	**8.9**	0.1
15 / Fig. 2, *19*	0.21	0.15	**1.33**	"	0.16	0.013	**8.8**	0.48	**13.1**	0.2
18 / Fig. 2, *20*	0.27	0.11	0.13	"	0.19	0.012	**10.6**	0.48	**12.2**	0.24
17 / Fig. 2, *17*	N/D	0.1	0.09	"	0.22	0.014	**11.3**	**1.35**	**18**	0.31
Ducher culture										
1 / Fig. 2, *23*	0.02	0.12	0.17	"	0.06	0.009	**8**	0.35	**11.1**	0.23
2 / Fig. 2, *21*	0.01	0.13	0.15	"	0.08	0.011	**11**	0.68	**7.8**	0.15
3 / Fig. 2, *22*	0.03	0.09	0.13	"	0.05	0.013	**7.4**	0.27	**21.6**	0.3

Note. The content of alloying additives of ≥ 1 % is designated in bold font.

significant amount of copper in the alloy's composition, reaching about 90 %.

The three adornments from the *Mikhailovka culture*—two bells (Fig. 2, *9*, *11*) and the openwork pendant (Fig. 2, *13*)—were cast of lead-tin bronze, and one bell (Fig. 2, *10*) was cast of tin bronze (lead was completely absent in its alloy). The bronze of all the bells was doped with antimony (from 1.38 % to 1.78 %); sample No. 11 also contained 1.06 % of bismuth (Table 1). The metal of the openwork pendant contained a significant amount

of lead (28.2 %); the tin content was also high reaching 9.9 %, while the proportion of other impurities was less than 1 % (Table 1).

The composition of the metal in the two bells from the *Mohe culture* was essentially tin-lead bronze. At the same time, the difference in the proportions of tin and lead was small (Table 1). One bell (No. 8) from dwelling 3 at Osinovoye Ozero contained more tin than lead, while in the other bell (No. 9), their proportions were almost equal (lead is 0.3 % more). The metal from which the button (No. 14), found at the Bolshiye Simichi site, was cast was lead-tin bronze with the addition of 1.2 % of antimony, which makes it similar to the composition of the metal in the openwork bells from the Mikhailovka culture (No. 10, 21). The Chinese coin (No. 19) was cast in tin bronze with an admixture of 1.36 % of iron, which is well visible on the surface in the form of oxide (Fig. 2, *12*).

Four plaques (No. 12, 13, 15, and 18) decorated one belt of the *Central Asian type*, but they were cast from bronze of different compositions (Table 1). The belt plaque (of the portal shape, No. 13) was made of metal with a high content of zinc (12.8 %), lead (8.9 %), and tin (5.7 %). Three plaques of the same shape from the hanging straps slightly differed from each other in the elemental composition of bronze. Sample No. 12 contained slightly more tin than lead, sample No. 18 vice versa (12.2 % of lead and 10.6 % of tin). The bronze composition of the third plaque (No. 15) showed a significant predominance of lead over tin, and contained 1.33 % of zinc, which brings it closer to the metal of the belt plaque (Table 1).

The semi-oval belt plaque (No. 17) was made of lead-tin bronze with a significant admixture of antimony (1.35 %). The latter feature distinguishes its metallic composition from the plaques of the Selemdzha belt, where the amount of antimony was less than 1 %.

The adornments of the late medieval *Ducher culture* were cast of lead-tin (No. 1, 3) and tin-lead (No. 2) bronze. The first alloy had quite significant lead content (11.6 % and 21.6 %), while the proportions of tin were approximately the same (8 % and 7.4 %).

Examination of the early medieval ring-shaped earrings made of silver and gold has shown that seven silver rings of the Naifeld group of the Heishui Mohe were made of high-grade metal (in the modern metric system, the smallest number of fineness is 800, and the highest number is 999 (Spravochnik antikvariata…, (s.a.)): six items had 990, one item had 980 (Table 2). Moreover, their mass in chemical purity coincided with the ligature mass or differed by 0.02–0.05 g. The gold earring from Bukinsky Klyuch-1, which most likely was made by an artisan from the Mohe Troitsky group, was cast from metal with a fineness of 750, which corresponds to the middle position in the modern metric system of fineness (the lowest is 375; the highest is 999). Judging by the yellow color of the jewelry, silver (17 %) and copper (8 %) were used as alloying additives (Pokrovskiy Yuvelirnyi zavod…, (s.a.)).

Conclusions

X-ray fluorescence analysis of the elemental composition of 23 bronze artifacts from the Uril and Talakan cultures of the Early Iron Age, the Mikhailovka, Mohe, and Central Asian cultures of the Early Middle Ages, and the Ducher culture of the Late Middle Ages in the Western Amur basin has shown that for about 2500 years, mainly tin-lead or lead-tin bronze was used for their production. Only two items were cast of tin bronze—a lobulated plaque of the Uril culture from the Ango River (Fig. 2, *2*) and a Chinese coin of

Table 2. **Parameters of earrings made of precious metals**

No. of the item in the book of admission to the museum / figure	Site	Mass, g	Metal	Fineness	Ligature mass, g	Chemical purity mass, g
4843 / Fig. 2, *31*	Bukinsky Klyuch-1	4.44	Gold	750	4.44	3.33
5020 / Fig. 2, *27*	Shapka burial ground, grave 183	1.35	Silver	990	1.35	1.34
5021 / Fig. 2, *28*	Ditto, sq. 12-Ж	0.34	"	990	0.34	0.34
5022 / Fig. 2, *29*	Ditto	0.43	"	990	0.43	0.43
5023 / Fig. 2, *25*	Ditto, grave 23d	5.14	"	990	2.13	2.11
5024 / Fig. 2, *24*	Ditto, grave 45	5.83	"	990	3.83	3.79
5025 / Fig. 2, *26*	Ditto, sq. 8-Г	3.77	"	980	2.7	2.65
5026 / Fig. 2, *30*	Ditto, grave 17	2.5	"	990	2.5	2.48

the Early Middle Ages (Fig. 2, *12*); in both cases, with a significant admixture of iron.

Some difference in the elemental composition of the bronze in the items from the Uril culture can be explained by the recasting of various bronze scrap metal or by the functional purpose of the items (adornments and a knife). The presence of 14 % of tin in the metal of the palmate plaque from Urilsky Island provided a silvery surface and increased the fragility of the item (Konkova, 1989: 45). Approximately the same elemental composition was identified in the State Hermitage Museum in St. Petersburg for a palmate plaque from the Bukinsky Klyuch-1 site on the Bureya River: this was made of bronze that contained additives (25–30 % of tin, 8–12 % of lead, <1 % of arsenic, <1 % of silver, and <0.6 % of antimony), which gave a dark gray or white color, reminiscent of silver, to the item (Nesterov, Durakov, Shelomikhin, 2008: 39). It was found that despite the morphological and ornamental similarity of these items, they were made from the imprints of two models (Nesterov, 2017). In addition to their similar outlook and composition of tin-lead bronze, they are apparently united by the same prototype. In 1960, V.V. Volkov and E.A. Novgorodova divided the palmate pendants from Mongolia known by that time into three groups. In their opinion, "pendants of the second group became the initial form for three-pawed pendants. The second group is the most numerous and distinctive; it differs from the first group by the presence of horizontal partitions between the paws, which gives some openness to these adornments" (Volkov, Novgorodova, 1960: 158). They have parallels neither in Southern Siberia nor Northern China. Unlike Mongolian pendants, the majority of two-pawed pendants from Northern China have the loop not at the top, but on the reverse side (Ibid.). Thus, the Amur three-pawed plaques resulted from the morphological mixing of the Mongolian and Northern Chinese pendants. On the one hand, they have the imitation of a small loop in the form of a solid protrusion in the upper part. On the other hand, there are fastening loops on the back of the adornments (however, in both cases they were broken off, and two holes for fastening were drilled in the plaques). It is possible that these two items were produced by the local Amur casters as opposed to the lobulated plaque from the Ango River (most likely, with a natural admixture of iron), the origin of which can be linked to the metropolis of the proto-Uril migration conglomerate—the area of Western Manchuria and Inner Mongolia (Nesterov, Girchenko, 2018).

Statistical processing of the results of X-ray fluorescence energy dispersive elemental analysis of alloys in the bronze items (see Table 1) has revealed the best convergence (with a standard deviation of about 7.6 %) of the concentrations of chemical elements Ni, Zn, Ag, Sn, Sb, Pb, and Bi (most informative according to their content) for the bent awl (No. 4) of the Talakan culture and for the bell (No. 10) of the Mikhailovka culture. This can be explained by the origin of the Mikhailovka culture from the Talakan culture as a result of the evolutionary development of the latter (Mylnikova, Nesterov, 2005).

Among the artifacts from the Troitsky group of the Mohe culture, noteworthy is the tin-lead composition of bronze in two bells from the same dwelling in the Osinovoye Ozero settlement on the Amur River. The composition is approximately the same in both items, but some difference between the amounts of tin and lead indicates that these were not cast from the same melt. One bell (No. 9) turned out to be defective owing to a short run in the mold. In terms of bronze composition, these items differ from jingles and bells found at the Troitsky burial ground on the Belaya River (basin of the Zeya River), one of which was made of high-tin (over 20 %) bronze, the other one was made of almost pure copper, and the third one was made of copper-arsenic alloy with an increased content of antimony, bismuth, and silver (Konkova, 1989: 57). Despite the fact that the distance between these two archaeological sites is about 130 km in a straight line, the inhabitants of the settlement on the shore of Lake Osinovoye and the population who buried the dead at the Troitsky burial ground had typologically similar bronze adornments. But they were made by the local casters, who apparently had their own sources of bronze scrap of various elemental compositions, as well as knowledge and skills of using alloying additives. Therefore, the composition of bronze in these items was also different. The tin-lead alloy of the bells under consideration also differs by the content of additives from the lead-tin bronze of the openwork plaque from dwelling 2 from the same settlement. In the bronze of the bells, it was 3.3–3.6 times higher in tin impurity and 1.9–2.1 times higher in lead, which gave the items a silvery color (Nesterov, Savin, Kolmogorov, 2016: Pl. 1). This difference may have also been related to the purposes of the items: the bell was supposed to ring.

As far the Chinese coin is concerned, it could have been made outside the Amur basin, presumably on the territory of Manchuria, and reached the Amur region with the Bohai Sumo Mohe who migrated there no earlier than the 8th century (Nesterov, 2011), possibly already as an adornment and not a means of payment. This origin is indicated by the presence of a significant amount of iron (1.36 %) in the bronze alloy, just as in the lobulated plaque of the Uril culture from the Ango River and in some adornments from the Troitsky burial ground (Konkova, 1989: 95, pl. 2).

As opposed to the Mohe bells under analysis, the button of the Mohe shape (No. 14) from the filling of the pit in dwelling 3 at Bolshiye Simichi, on the Bureya

River (Drevnosti…, 2000: 187), has more lead than tin in the alloy, as well as a high proportion of antimony. By these indicators, it is closer to the bronze artifacts of the Mikhailovka culture. It is possible that the button was cast according to the available Mohe model, but from the bronze alloy typical of the Mikhailovka culture.

All objects of the Central Asian outlook were most likely made outside the Amur region and came there with the Sumo Mohe migrants or Uyghurs, such as, for example, a combat belt from the Selemdzha "hoard", or as a commodity. The Amur artisans used precisely the scrap of such things for recasting and making the Mohe-type adornments. There are still no data on the casting of plaques of the Central Asian type. The elemental composition of these bronzes reflects most likely the bronze-casting production of the Central Asian region or southern regions of Manchuria in the upper Songhua River region. Comparison of alloys in belt decorations from the Selemdzha River and from dwelling 2 of Osinovoye Ozero has shown that these were made of lead-tin bronze with approximately the same content of additives (Nesterov, Savin, Kolmogorov, 2016).

Currently, it is not possible to carry out a comparative analysis of the elemental composition of the late medieval bronze adornments from the Amur basin, because this study of three samples was done for the first time. It can only be mentioned that they are also within the range of the basic elemental composition of bronze alloy typical of bronze-casting in the Western Amur basin in the earlier periods, starting from the turn of the 2nd and 1st millennia BC.

Unlike bronze, which was obtained in the Amur region usually from bronze items unfit for further use, gold and silver in the Early Middle Ages could most likely be mined locally. The first Mohe migrants to the Western Amur basin (the Heishui and Sumo) might have included jewelers who could work for some time using supplies of gold and silver brought with them from the metropolis (Manchuria) and recast the broken jewelry. While settling in the region, the Mohe jeweler casters not only discovered placer deposits of gold and silver, and learned the properties of the metal from them, but also mastered the skills of using alloying additives to obtain high-quality noble metal suitable for casting jewelry. Comparison of the elemental composition of the Mohe gold and silver jewelry with other data on the early medieval noble metals from the Western Amur basin is not possible, since such work has been performed for the first time and only using the evidence from the Shapka burial ground and Bukinsky Klyuch-1 site. Notably, items made of gold and silver are not yet known in the indigenous Mikhailovka culture of the northern Shiwei people, despite a significant number of excavated settlement sites.

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References

Bolotin D.P., Alkin S.V. 1996
Unikalnaya nakhodka iz serii ordosskikh bronz v basseine r. Zeya. *Gumanitarnye nauki v Sibiri*, No. 3: 107–112.

Derevianko A.P. 1973
Ranniy zheleznyi vek Priamuriya. Novosibirsk: Nauka.

Derevianko A.P., Zenin V.N. 1995
Paleolit Selemdzhi (po materialam stoyanok Ust-Ulma I–III). Novosibirsk: Izd. IAET SO RAN.

Derevianko E.I. 1975
Mokheskie pamyatniki srednego Amura. Novosibirsk: Nauka.

Drevneye iskusstvo Priamuriya. 2012
Blagoveshchensk: Izd. Tsentra po sokhraneniyu istoriko-kulturnogo naslediya Amur. obl.

Drevnosti Burei. 2000
S.P. Nesterov, A.V. Grebenshchikov, S.V. Alkin, D.P. Bolotin, P.V. Volkov, N.A. Kononenko, Y.V. Kuzmin, L.N. Mylnikova, A.V. Tabarev, A.V. Chernyuk. Novosibirsk: Izd. IAET SO RAN.

Konkova L.V. 1989
Bronzoliteinoye proizvodstvo na yuge Dalnego Vostoka SSSR (rubezh II–I tys. do n.e. – XIII vek n.e.). Leningrad: Nauka.

Mylnikova L.N., Nesterov S.P. 2005
Mikhailovskaya kultura v Zapadnom Priamuriye. In *Rossiyskiy Dalniy Vostok v drevnosti i srednevekoviye: Otkrytiya, problemy, gipotezy*. Vladivostok: Dalnauka, pp. 394–408.

Nesterov S.P. 2011
Bokhaiskaya kolonizatsiya Zapadnogo Priamuriya i vzaimootnosheniya etnicheskikh grupp naseleniya vo vtoroi polovine I tys. In *Trudy III (XIX) Vserossiyskogo arkheologicheskogo syezda*, vol. II. St. Petersburg, Moscow, Veliky Novgorod: IIMK RAN, pp. 74–75.

Nesterov S.P. 2017
Bronzovye lapchatye blyashki urilskoi kultury iz Zapadnogo Priamuriya. *Gumanitarnye nauki v Sibiri*, vol. 24 (2): 33–36.

Nesterov S.P., Durakov I.A., Shelomikhin O.A. 2008
Early Urilsky Culture assemblage from Bukinsky Kluch, Bureya River. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 36 (4): 32–42.

Nesterov S.P., Girchenko E.A. 2018
Kontseptsii proiskhozhdeniya urilskoi kultury v Priamuriye. In *Vostok Azii: Problemy izucheniya i sokhraneniya istoriko-kulturnogo naslediya regiona: K 15-letiyu Tsentra po sokhraneniyu istoriko-kulturnogo naslediya Amurskoi oblasti*. St. Petersburg: Rostok, pp. 201–209.

Nesterov S.P., Maksimov S.M. 1990
Srednevekovyi klad s r. Selemdzhi. In *Voyennoye delo drevnego i srednevekovogo naseleniya Severnoi i Tsentralnoi Azii*. Novosibirsk: Poligraf, pp. 121–128.

Nesterov S.P., Roslyakov S.G., Teterin Y.V. 1987
Mogilnik Shapka – pamyatnik epokhi srednevekoviya na Srednem Amure (po materialam raskopok 1983 g.). In *Novye pamyatniki epokhi metalla na Srednem Amure*. Novosibirsk: IIFF SOAN SSSR, pp. 46–72.

Nesterov S.P., Savin A.N., Kolmogorov Y.P. 2016
Early medieval jeweler's kit from the Western Amur region. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 44 (2): 81–90.

Okladnikov A.P., Derevianko A.P. 1973
Dalekoye proshloye Primoriya i Priamuriya. Vladivostok: Dalnevostochnoye kn. izd.

Piminov P.A., Baranov G.N., Bogomyagkov A.V., Berkaev D.E., Borin V.M., Dorokhov V.L., Karnaev S.E., Kiselev V.A., Levichev E.B., Meshkov O.I., Mishnev S.I., Nikitin S.A., Nikolaev I.B., Sinyatkin S.V., Vobly P.D., Zolotarev K.V., Zhuravlev A.N. 2016
Synchrotron radiation research and application at VEPP-4. *Physics Procedia*, vol. 84: 19–26. doi:10.1016/j.phpro.2016.11.005.

Pokrovskiy yuvelirnyi zavod Zolotye Kupola. (s.a.)
URL: https://pokrovgold.ru (Accessed September 8, 2020).

Shelomikhin O.A., Nesterov S.P., Alkin S.V. 2017
Dolina Burei v epokhu paleometalla: Materialy i issledovaniya pamyatnikov Bukinskiy Klyuch-1 i Bezumka. Blagoveshchensk: Izd. Blagoveshch. Gos. Ped. Univ.

Spravochnik antikvariata. (s.a.)
URL: https://lermontovgallery.ru/spravochnik-antikvariata/ (Accessed September 8, 2020).

Volkov V.V., Novgorodova E.A. 1960
Karasukskiye priveski iz Mongolii. *Sovetskaya arkheologiya*, No. 4: 155–160.

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Changes in Wooden Defensive Structures at Fort Umrevinsky (Based on Archaeological and Written Sources)

This study focuses on the southern line of wooden defensive structures (palisade, platform, and two towers) at Fort Umrevinsky (first third of the 18th century), based on the findings of archaeological excavations. Continuous development in this borderline fort are reconstructed over a period of 30 years. Initially, during the era of Peter the Great, Fort Umrevinsky was a regular, subrectangular fortification, enclosed by a palisade, and somewhat similar to a field redoubt. A few decades later, two towers were built on pile foundations at the corners of the palisade enclosure on the fort's southern face. One of them was subquadratic, the other subrectangular in plan view. As a result, Fort Umrevinsky became a bastion-type fortification. The strengthening of the southern face was motivated by the presence of gates in the palisade wall between the towers, by the proximity of transportation routes (roads and waterways), and by the fact that fortifications were arranged parallel to the borderline. Fortification changes in the 1730s were caused by a number of factors. These included the spread of European fortification principles to Siberia, the political situation in southwestern Siberia, and the beginning of large-scale military engineering works in the region. The southern line of wooden fortifications at Fort Umrevinsky helps to estimate the number of towers there.

Keywords: *Russian forts, Siberia, fortification, Early Modern Age, wooden fortification, Fort Umrevinsky.*

Introduction

Archaeological research of traces remaining from wooden defensive structures has been carried out at Fort Umrevinsky (Moshkovsky District, Novosibirsk Region) over the past two decades (Fig. 1). During the archaeological survey in 2000, A.V. Shapovalov identified the corners of palisade walls on the northern side of the fort. In 2002, on the opposite side, the current author discovered the pile-and-strip foundation of one of the corner (southwestern) towers, which covered the junction of the western and southern palisade walls. Large-scale archaeological research was subsequently carried out in this most promising area, and made it possible to fully unearth the remains of western and southern palisade walls of the fort, as well as the foundation of another (southeastern) tower. Not only the location and degree of preservation of these defensive structures (palisade and two towers), but also the sequence of their construction over several building periods (Fig. 2) have been established.

The contradictory features mentioned in the written sources of the first third of the 18th century create a serious problem in studying the wooden defensive structures at Fort Umrevinsky. This is why well-stratified and relatively well-dated archaeological data on fort defensive structures are of particular importance in the process of reconstructing the historical dynamics of their development.

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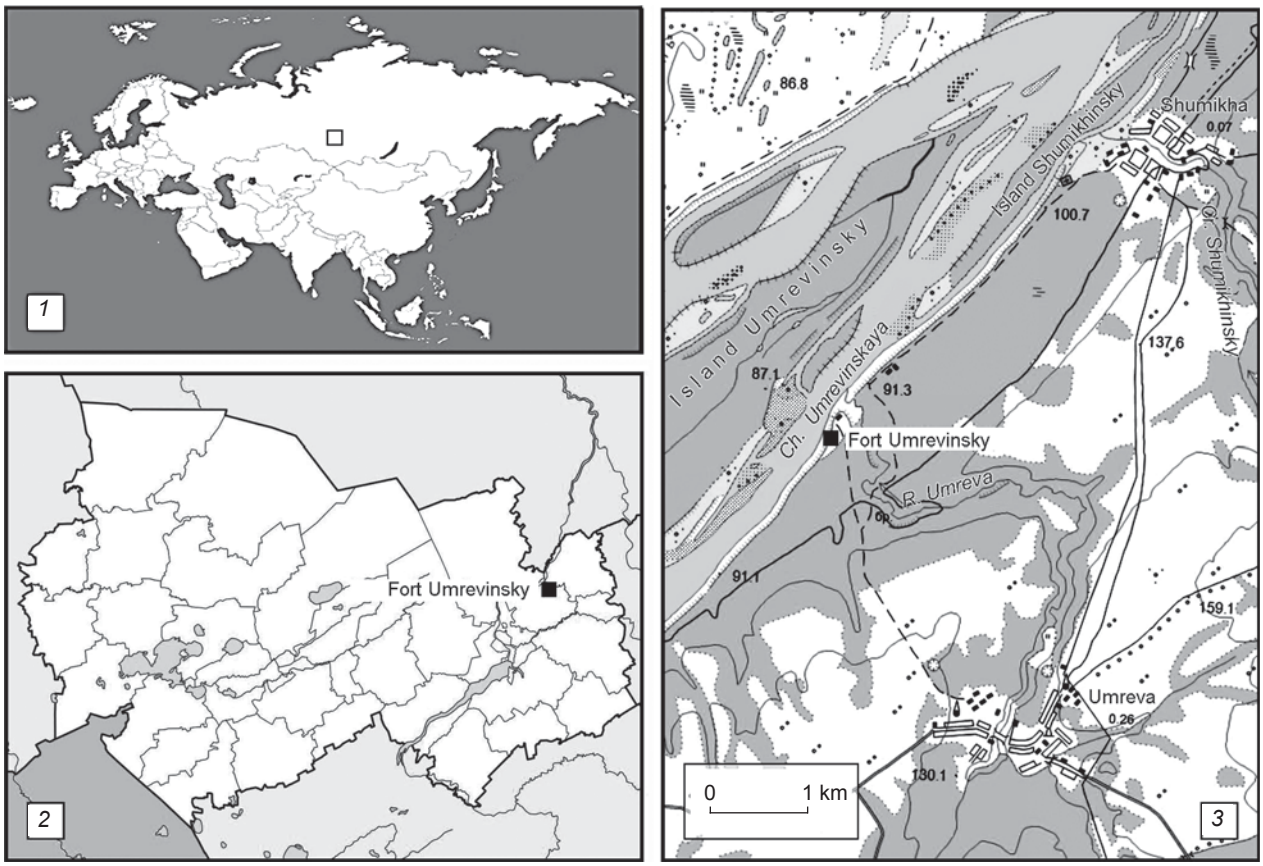

Fig. 1. Location of Fort Umrevinsky.
1 – Novosibirsk Region on the map of Eurasia; *2* – location of the fort in Moshkovsky District of Novosibirsk Region; 3 – environs of the fort.

Research results

According to modern historians, written sources on Siberian forts usually suffer from obvious oversimplification and are not particularly informative (Ellert, 1988: 59). This is not entirely true for Fort Umrevinsky. First of all, the earliest period of the existence of this defensive post (the beginning of the 18th century) is not even mentioned in a number of documents. These include those compiled in 1706, including the "Report of Tomsk voevodas on fortifications, amount of weaponry and ammunition in Tomsk and forts subordinate to it" (Iz istorii…, 1978: 30–32) and the Record Book of the Ymrevinsky (Umrevinsky) *stan* from 1707 (RGADA. F. 214, Inv. 1, Bk. 1452, fol. 411). It is curious that the founder of the Fort, the boyar son Alexei Kruglik (Kruglikov), was directly connected to this document.

Descriptions of the construction and condition of fortifications at Fort Umrevinsky have survived for the following decades of the 18th century, dating to 1721, 1725, 1734, and 1741 (Messerschmidt, 1962: 79; Russko-kitaiskiye otnosheniya…, 1990: 195; Miller, 1734; 1750: 274; Gmelin, 1752: 77, 76; Gorokhov, in press) (RGADA. F. 199, Portf. 481, Pt. 4, fol. 152). Considering that the foundation date of this defensive point is believed to be 1703 (Minenko, 1984: 4, 5), not only the sequence is noteworthy, but also significant chronological "density" of such descriptions, which cover the entire first third of the 18th century and have the chronological range of 18, 9, and 7 years, which is quite consistent with the main criteria for the preservation of wooden structures (Varfolomeev, Shapovalova, 1991). In addition to these written descriptions, the evidence obtained in the course of archaeological study of the wooden defensive structures at Fort Umrevinsky makes it possible to distinguish several construction periods. They were identified from a variety of features, including stratigraphic data, construction sequence of the main wooden fortifications in the fort (palisade and towers), and differences between structural wooden elements of the palisade and foundation of the tower (cross-section of palisade poles and piles), typical of different construction periods. Numismatic evidence was used to determine more narrow dating for these structures.

The most promising area for studying the building sequence of various wooden defensive structures

Fig. 2. Foundations of the corner southwestern (*1*, *2*) and southeastern (*4*, *5*) towers and ground plan of wooden defensive structures at Fort Umrevinsky (*3*).
a – excavation; *b* – tower; *c* – ramparts and hills; *d* – ditches and pits; *e* – palisade.

(palisade, towers) was the southern side of the fort (Fig. 2), where a gateway was discovered. Such an entrance, being one of the most vulnerable places, always required appropriate fortification (Nosov, 2009: 80, 81). The palisade wall at Fort Umrevinsky was supplemented by two corner towers.

According to the description by J.G. Gmelin from 1741, the length of the southern palisade wall was about 24 *sazhens* (Gmelin, 1752: 77, 76). Taking into account that the three-*arshin sazhen*, equal to 2.1336 m, became widespread after 1736, the length of that wall could have reached 53.34 m (Shostyin, 1975: 259). However, it could

Fig. 3. Sub-rectangular palisade structures in the Siberian forts of the early 18th century on the maps by S.U. Remezov (2003).
1 – Fort Urtamsky; *2* – Fort Ketsky.

have also been different owing to ambiguity in the length of the Russian *sazhen* in the first half of the 18th century (Ibid.: 100, 101; Kusov, 2004: 24). For example, in the course of archaeological research, the southern palisade wall, which was most likely built in the very beginning of the 18th century, was identified by a palisade ditch up to 50 cm wide, deepened into the ground up to 87 cm, and 47 m long (excluding the gate opening). At the earliest stage of its existence, wooden defensive structures at Fort Umrevinsky were limited to a sub-rectangular fence, consisting of one row of palisade poles. Until the late 18th century, precisely such fortifications characterized forts (Pallas, 1786: 410). Judging by the cartographic evidence from the turn of the 17th–18th centuries, fortifications of this type were present at forts Ketsky and Urtamsky (Fig. 3).

Notably, preservation of the foundations of palisade poles was somewhat worse on the southern side of Fort Umrevinsky than on its western side. First, only 11 wooden foundations have survived on the southern side; 22 more were represented by decay, and only depressions have remained from 11 more poles (Fig. 4), whereas 46 foundations have been discovered on the western side, out of which 20 were in the form of decay (Borodovsky, Gorokhov, 2008: 75). Second, there were practically no areas with compact arrangement of the bases of nine poles with the same cross-section on the southern side as opposed to the western side (Ibid.: Fig. 7) (Fig. 5). Third, the spatial orientation of the southern palisade ditch practically coincided with the long axis of the later graves of the necropolis on the territory of the fort. This circumstance resulted in a much larger scale of destruction of the remains of the southern wall and using its ditch for burials.

However, there was also a certain similarity between the southern and western palisade walls, manifested by the presence of poles of various cross-sections, made both of full logs and logs

Fig. 4. Depressions remaining from the bases of palisade posts in the southern wall at Fort Umrevinsky, covered by a later necropolis.

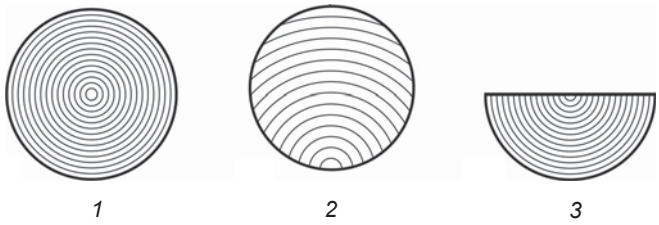

Fig. 5. Cross-sections of palisade posts made of tree trunks.
1 – whole, unhewn tree trunk; *2* – hewn tree trunk; *3* – split tree trunk.

split in half. This feature reflects reconstruction and repair of palisade walls. In this regard, the testimony of D.G. Messerschmidt on partial destruction of wooden defensive structures at Fort Umrevinsky in 1722 is pertinent (1962: 78, 79).

Information from written sources about the state of wooden defensive fortifications should still be taken into account when it is correlated with the archaeological evidence, but should be considered critically. First of all, this concerns the information of S. Raguzinsky, who mentioned in 1725 that "there was no fortress" at Fort Umrevinsky (Russko-kitaiskiye otnosheniya…, 1990: 195), since this testimony of a contemporary should be interpreted as the absence of a defensive structure of a certain type, namely a "fortress", and not of the fortifications of a fort. As an example, we can cite an almost contemporaneous description of another fortification in Western Siberia—the Yamyshevskaya fortress. It was built according to all canons of European fortification, which clearly was not the case with Fort Umrevinsky. Moreover, according to the testimony of Colonel I.D. Buchholz (1715–1716), a small artillery fort was built next to the Yamyshevskaya fortress (Borodaev, Kontev, 2015: 131, fig. 22). This is why, several decades later in the 18th century, G.F. Miller specifically explained that "a small wooden fort was built near the fortress for artillery" (Pamyatniki…, 1885: Doc. No. 39-6, p. 146). No less important is the fact that the military position of a commandant was introduced to Fort Umrevinsky in 1717 (S bytnosti…, 1891: 14). However, it clearly did not correspond to the fortification features (palisade walls, sub-rectangular ditch) of Fort Umrevinsky, since it was not a fortress built according to all the requirements of Peter the Great's time. Moreover, in the 18th century, the term "fortress" ultimately lost the meaning of a local fortification, and began to designate a long-term structure intended for independent defense (Nosov, 2009: 129).

Second, the repeated mention of the degree of destruction of palisade walls at Fort Umrevinsky in the written testimonies for 1721, 1725, 1734, and 1741 may be important for establishing a conventional chronological range of repair works and for clarifying the chronology of construction periods. For example, the archaeological evidence reveals instances of using palisade poles of various cross-sections (round and semicircular) for the wooden walls of the fort, as well as covering the corners of the palisade by the foundations of the towers.

Third, the information on the actual time when Fort Umrevinsky was repaired in the written sources probably does not correspond to real events. For instance, according to an apt observation made by S.V. Gorokhov (in press), the date of repairing works in 1738 indicated by Gmelin (1752: 78) is most likely erroneous, since the numismatic evidence (*denga* of 1730 used as a ritual coin in the foundation of the southeastern tower) makes it possible to date one of the construction periods to a time not earlier than the first third of the 18th century. Thus, according to archaeological sources, as opposed to the written evidence, the repair of the wooden defensive structures at Fort Umrevinsky was carried out several years earlier than 1738. In this regard, it should also be mentioned that the dates when Fort Umrevinsky was founded are also not particularly accurate in the surviving written sources of the 18th century (Miller, 1734; Gmelin, 1752: 78; Geograficheskiy leksikon…, 1773: 418) (RGADA. F. 214, Inv. 1, Bk. 1452, fol. 411).

Nevertheless, some of structural features mentioned in the written sources are extremely important for establishing construction periods when interpreting the archaeological evidence. This primarily concerns the remark of Gmelin from 1741 about the presence of palisade walls made of "evened" logs (1752: 78). This fact may be correlated with two types of cross-sections in the surviving foundations of palisade poles, revealed by archaeological research. Some palisade poles were made of logs hewn on one side, and some were made of half logs (logs split lengthwise into two halves). The latter kind is the most promising for being correlated with the description by Gmelin, since a fragment of the foundations of a wooden wall made of half logs tightly fitted against one another has survived in a section of the western palisade wall (Borodovsky, Gorokhov, 2008: 75, fig. 7) (Fig. 6). In addition, identification of such piles and posts of the southwestern tower, which were also made of logs split in half, suggests a certain seasonality of their manufacturing. Under natural conditions, it is optimal to carry out this technological operation in the winter period of timber harvesting, since timber splits well when it has maximum moisture loss.

It is no less important that the identification of piles used as supports for the base of the logwork in the southeastern tower, which were similar to the palisade posts, opens up certain opportunities for their synchronization. The ritual coin (*denga* of 1730) on the foundation of this tower is a solid argument in favor of

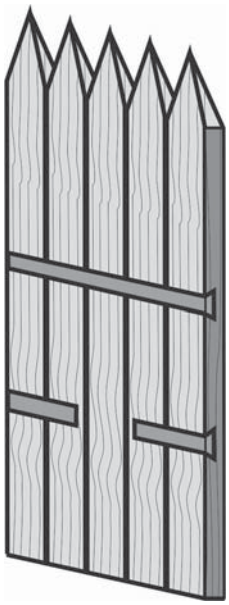

Fig. 6. Reconstruction of the palisade made of split tree trunks that were discovered on the western side of the wall at Fort Umrevinsky.

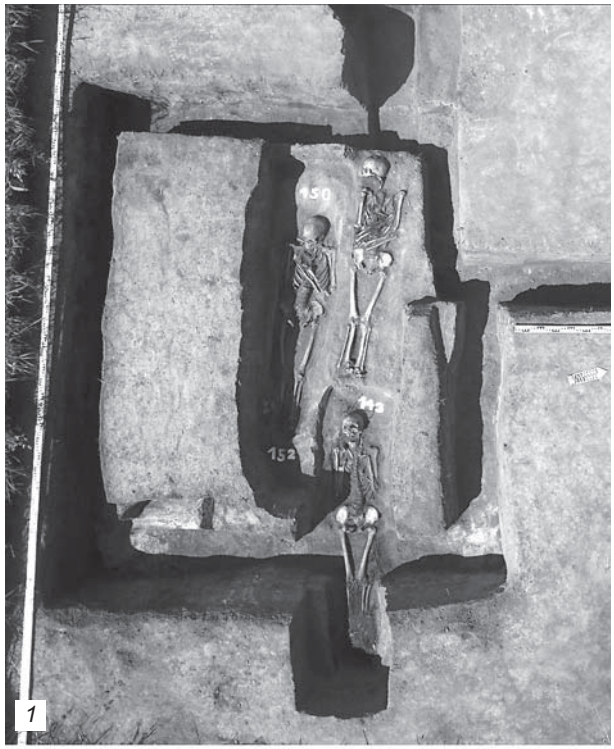

Fig. 7. Foundation of the corner southeastern tower at Fort Umrevinsky, covered by a later necropolis.

attributing all wooden structures made of half logs to the same construction period. However, taking into account the conflicting written data and possible deviations between the minting year of the coin and time of its actual use, its exact date still remains problematic. Nevertheless, we should take into consideration that large-scale funding of fortification works in Tobolsk Governorate began precisely in 1730 (Slovtsov, 2006: 231). For example, in 1746, an order was made to restore part of the wooden defensive structures at Fort Urtamsky (GANO. F. D-104, Inv. 1, D. 1, fol. 52).

Written sources also provide contradictory information on the towers of Fort Umrevinsky (Miller, 1734; Gmelin, 1752: 77, 76), whereas archaeological research has revealed two foundations of corner towers. Fort Urtamsky, which the founders of Fort Umrevinsky came from in 1706, also had two towers (Iz istorii…, 1978: 31), and therefore it is quite possible to assume that the same fortification structure was reproduced several decades later at Fort Umrevinsky.

The tower foundations have survived in different states of preservation. The strip-and-pile foundation of the southeastern tower has been less well preserved because of high density of graves in the later necropolis in that part of the fort's interior space. If only one corner of the foundation in the southwestern tower was covered by a collective burial, almost the entire base of the foundation was cut by several graves in the southeastern tower (Fig. 7). In addition, only a few, very poorly preserved piles have survived in the foundation ditch of that tower. Taking into account the time when the two corner towers of Fort Umrevinsky were built, we may accept their attribution as bastions, although this term had not yet come into use until the late 17th century (Nosov, 2009: 65, 66).

The literature of the late 19th century mentioned that written instructions on building fortifications according to European models had been sent to Siberia as early as 1700 (Pamyatniki…, 1885: X, 38–49). However, in southwestern Siberia, such European fortification traditions took root only in the first quarter of the 18th century (Maloletko A.A., Maloletko A.M., 2001: 82, 84; Muratova, 2013: 112). The Zmeinogorsk fortress, built in 1745, whose bastions were in the form of storage

towers, can be cited as an example (Sergeev, 1975: 29), while, according to the written sources of 1687, "state grain barns were built under the towers" at Fort Urtamsky (Iz istorii…, 1978: 60).

Thus, up to the first quarter of the 18th century, wooden towers of various frontier fortifications (forts, outposts, and redoubts) in Siberia intrinsically combined the principles of fortification of the European type and archaic, traditional methods of building defensive structures. For instance, European-type ditches coexisted with logwork fort towers built into the palisade wall at the Omsk fortress, judging by its ground plan of the first half of the 18th century (Kochedamov, 1960: 5, fig. 2, 6, 7). The very fact of the appearance of towers in forts is usually associated with increase in their size (Kradin, 1988: 50). However, this was not the case with Fort Umrevinsky, where the towers were simply shifted to the corners of the ditch. This arrangement led to several important changes in fortifications. The corner towers protruding beyond the southern palisade wall acquired the function of bastions; fire sectors significantly increased; distances from wooden palisade defensive structures to the outer ditch of the early 18th century substantially changed. The proximity of the pile-and-pole foundations of the towers to the corners of the ditch is one of the signs of various construction periods among the fortifications of Fort Umrevinsky.

Conclusions

Archaeological studies of wooden defensive structures at Fort Umrevinsky have revealed two main construction periods. The palisade of subrectangular outline was built at the time of Peter the Great (first quarter of the 18th century). Defense structures of this type in Western Siberia appeared at several forts, which correspond to fortification traditions of the Tsardom of Muscovy (16th–17th centuries). Another construction period (building the corner towers on a pile-and-pole foundation) corresponds to the first third of the 18th century. At that time, the wooden fortifications of Fort Umrevinsky acquired a bastion-like outlook. The technological similarity in manufacturing piles for the foundations of the towers and palisade posts (from logs split in half) makes it possible to attribute them to the same construction period. The need for such reconstruction in a number of forts in the north of the Upper Ob region is confirmed by written sources from the reign of Empress Anna Ioannovna.

Generally, the changes in wooden defensive structures fully reflect archaism and a relatively large delay in spreading European fortification traditions to the forts located in southwestern Siberia.

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References

Borodaev V.B., Kontev A.V. 2015
Formirovaniye rossiyskoy granitsy v Irtyshsko-Yeniseiskom mezhdurechye v 1620–1720 gg. Barnaul: Alt. Gos. Ped. Univ.

Borodovsky A.P., Gorokhov S.V. 2008
Defense constructions of Fort Umrevinsky (based on 2002–2004 archaeological excavations). *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 36 (4): 70–82.

Ellert A.K. 1988
Istoriko-geograficheskoye opisaniye Tomskogo uyezda G.F. Millera (1734 g.). In *Istochniki po istorii Sibiri dosovetskogo perioda*. Novosibirsk: Nauka, pp. 59–101.

Geograficheskiy leksikon Rossiyskogo gosudarstva. 1773
Moscow: Imp. Mosk. Univ.

Gmelin J.G. 1752
Reise durch Sibirien, von dem Jahr 1740 bis 1743. Göttingen: Verlegts A. Vandenhoecks seel. Wittwe.

Gorokhov S.V. (In press)
Integratsiya pismennykh i arkheologicheskikh istochnikov po istorii Umrevinskogo ostroga (Novosibirskaya oblast). *Vestnik Tomskogo gosudarstvennogo universiteta.*

Iz istorii zemli Tomskoy 1604–1917 gg.:
Sbornik dokumentov i materialov. 1978
Iss. 1. Tomsk: Zap.-Sib. kn. izd.

Kochedamov V.I. 1960
Omsk: Kak ros i stroilsya gorod. Omsk: Kn. izd.

Kradin N.P. 1988
Russkoye derevyannoye oboronitelnoye zodchestvo. Moscow: Iskusstvo.

Kusov V.S. 2004
Zemli Moskovskoy gubernii v XVIII veke: Karty uyezdov. Opisaniye zemlevladeniy, vol. 1. Moscow: Moskoviya.

Maloletko A.A., Maloletko A.M. 2001
Voinstvo Altaiskogo gornogo okruga (1726–1917). Tomsk: Tom. Gos. Univ.

Messerschmidt D.G. 1962
Forschungsreise durch Sibirien 1720–1727. Bd. 1: Tagebuchaufzeichnungen, 1721–1722. Berlin: Akademie-Verlag.

Miller G.F. 1734
Opisaniye Tomskogo uyezda Tobolskoy provintsii v Sibiri v nyneshnem yego polozhenii, v oktyabre 1734 g. URL: http://www.vostlit.info/Texts/rus16/Miller/text6.phtml?id=9713 (Accessed December 25, 2020).

Miller G.F. 1750
Opisaniye Sibirskogo tsarstva, bk. 1. St. Petersburg: Izd. Imp. Akademii nauk.

Minenko N.A. 1984
Perviye russkiye derevni i goroda na territorii Baraby i Novosibirskogo Priobya. In *Gorod i derevnya Sibiri v dosovetskiy period*. Novosibirsk: Nauka, pp. 3–32.

Muratova S.R. 2013
Geograficheskoye opisanie Irtyshskoy linii. *Vestnik Tomskogo gosudarstvennogo universiteta*, No. 373: 108–114.

Nosov K.S. 2009
Russkiye kreposti kontsa XV–XVII v. St. Petersburg: Nestor-Istoriya.

Pallas P.S. 1786
Puteshestviye po raznym provintsiyam Rossiyskogo gosudarstva, pt. 2. Bk. 2: 1770 god. St. Petersburg: Imp. Akademiya nauk.

Pamyatniki sibirskoy istorii XVIII veka. 1885
Bk. 2: 1713–1724. St. Petersburg: [Tip. Min. vn. del].

Remezov S.U. 2003
Chertezhnaya kniga Sibiri, vol. 1. Moscow: Roskartografiya.

Russko-kitaiskiye otnosheniya v XVIII veke: Materialy i dokumenty. 1990
Vol. 2: (1725–1727). Moscow: Nauka.

S bytnosti gubernatorskoy komendanty i Tomskogo uyezda v ostrogakh i slobodakh prikazchiki kto byli i v kotorykh godekh i po kakim ukazam. 1891
I.P. Kuznetsov (comp.). Tomsk: Tipo-lit. V.V. Mikhailova i P.I. Makushina.

Sergeev A.D. 1975
Tainy altaiskikh krepostey. Barnaul: Alt. kn. izd.

Shostyin N.A. 1975
Ocherki istorii russkoy metrologii XI–XIX vv. Moscow: Izd. standartov.

Slovtsov P.A. 2006
Istoriya Sibiri: Ot Yermaka do Yekateriny II. Moscow: Veche.

Varfolomeev Y.A., Shapovalova L.G. 1991
Obespecheniye dolgovechnosti pamyatnikov derevyannogo zodchestva pri ekspluatatsii. In *Problemy issledovaniya, restavratsii i ispolzovaniya arkhitekturnogo naslediya Rossiyskogo Severa*. Petrozavodsk: Petrozavod. Gos. Univ., pp. 150–155.

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The Festive Culture of Mining Plants in the Urals: The Dobryanka Case

On the basis of documentary ethnographic sources from the late 19th to early 20th centuries, the study reconstructs calendar festivals and rites of that period, recorded at one of the mining plants in the Urals—Dobryanka, in the western part of the Perm Governorate. Common festivals celebrated at Uralian mining plants include the greeting of birds (kashke-plishke), "sending off" water (seeing off the Kama), Day of St. Sergius, Pentecost, etc. The industrial calendar was related to the main household and holiday cycles; special "corporate" festivals emerged at private plants, coinciding with name-days of the plants' owners; archaic forms of traditional ritualism were preserved; calendar festivals were more and more regarded as forms of leisure with less and less religious meaning; multiple calendar traditions coexisted; and new urban forms of festive culture were adopted. The holiday culture of plant settlements was intermediate between rural and urban forms of calendar ritualism. Each peculiarity of industrial calendar rites is described using ethnographic examples from the corresponding holiday cycle. The findings indicate rather unusual features of folk culture in the industrial settlements of the Urals.

Keywords: *Urals, Russian rites, plant culture, calendar festivals, rites, folk calendar, local traditions.*

Introduction

Calendar festivals and rites are a traditional topic of ethnographic and folklore research. Russian calendar festivals and rites have been studied for several centuries, and have an extensive historiography. In different periods, various approaches and methods have been used for analyzing the phenomenon of the folk calendar; studies on methodological problems (Chicherov, 1957; Propp, 1963; Sokolova, 1979; Bernshtam, 1988; Baiburin, 1993; Agapkina, 2002; and others), regional complexes (Tultseva, 2001; Tolstaya, 2005; Fursova, 2002, 2003; Korepova, 2009; Zolotova, 2017; Chernykh, 2006, 2008, 2010, 2014; and others), and individual festive cycles and rites (Makashina, 1982; Agapkina, 2000; Lobkova, 2000) have been published. Even today, calendar topics are one of the most important areas of research in both Russian and international scholarship (The Ritual…, 2015). It seems important to pursue the objectives of identifying and assembling the corpus of sources, and also studying regional complexes, local traditions, and modern forms of rites and festive culture. The analysis of historiography shows that publications on calendar rites include a large amount of works that analyze peasant tradition (which is the most archaic, traditional, and attractive for ethnographers) in great detail. Another group of studies focuses on urban festive culture (Nekrylova, 2004; Kotlyarchuk, 2001; Keller, 2001; Andriets, 2013). The topic of how rites functioned in non-urban plant settlements and social groups has hardly been studied. Calendar traditions and the complex of festival days and rites that evolved in plant settlements of the Urals have so far remained outside the scope of research.

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The "plant" culture of the Urals is extremely important in ethnographic research of the region: in the second half of the 19th century, the residents of plant settlements accounted for 23.5 % of the total population of the Perm Governorate. According to the observation of a contemporary, they lived "in conditions which were distinctive and significantly different from the living conditions of peasants and townspeople" (Khlopin, 1891: 278). The festive culture of people living in plant settlements in the Urals contains important information on the development dynamics of festive and ritual culture as a whole, patterns and causes of changes, and the transformation of its forms and main functions. However, only a few studies have addressed some features of calendar customs at the Uralian plants (Krupyanskaya, Polishchuk, 1971; Krupyanskaya et al., 1974; Kruglyashova, 1974; Golikova, 2006: 181–209; Chernykh, 2008: 307–312; 2020). Undoubtedly, even taken together, these do not reveal the entire diversity of the phenomenon. In this context, it seems relevant to present the current research.

This article analyzes specific features in the calendar cycle of festivals and rites using the example of a local tradition that emerged in one of the plant settlements in the Urals—Dobryanka (now the town of Dobryanka in the Perm Territory). The history of the settlement of Dobryanka Plant is typical for the Urals, which underwent rapid mining and smelting development in the 18th century. The Dobryanka Plant was founded in 1752 (according to the decree of the Collegium of Mining as of March 2 in that year) by S.G. Stroganov on the Dobryanka (Domryanka) River, near its confluence with the Kama River, and was put into operation in 1754 (Metallurgicheskiye zavody…, 2001: 183). This plant was arranged on the site of the village of Dobryanka (Domryanka), which was first mentioned in the record book of 1623/24, on the lands that were a part of the Stroganovs' estate (Kalinin, 1990: 21). Built as a copper-smelter, the Dobryanka Plant quickly turned into iron-smelting plant, since local sources of copper ore turned out to be poor. In the first third of the 19th century, it already functioned as an iron-making plant, producing mainly sheet metal, roofing and boiler iron, anchors and chains, iron dishware, and wire (Materialy…, 1994: 70). In addition, another plant economically connected with the first plant and named "Sofiysky" ('Sophia's') after Countess Sophia Stroganov or Nizhny ('the Lower') plant was built half a mile towards the Kama River.

In the second half of the 19th to early 20th century, Dobryanka was a typical industrial settlement of the Urals' mining industry. It was built and rebuilt according to a regular plan, with straight blocks of equal sizes. The plant was located in the center of the village in a depression bordered by steep hills, just below the plant dam. The plant administration and stone church of the Nativity of the Mother of God was nearby. Private houses were on the hills around the plant and on the bank of a vast pond. The population of Dobryanka in 1869 was 3800 people, who lived in 708 households (Spiski…, 1875: 60) (in 1863, 763 people were employed in main plant works and 700 people in auxiliary works (Metallurgicheskiye zavody…, 2001: 184)). Development and expansion of production in the second half of the 19th century triggered the growth of plant settlement. In 1911, the Dobryanka Plant was considered one of the largest and best iron-making enterprises in the Kama region in terms of its equipment (Illyustrirovanniy putevoditel…, 1911: 44); it employed 4850 workers of whom 1266 were involved in main production and 3584 in auxiliary works (Metallurgicheskiye zavody…, 2001: 185). The total number of households in Dobryanka Plant was 1447; its population was 7548. In addition to plant workshops and production facilities, there were two churches, five schools, library, two volost administrations, 64 trade shops, two state wine and six beer shops, 31 smithies, two carpentry shops, four leather and shoe shops, two saddleries, two dye-houses, one wheeled carriage facility, and six bakeries on the territory belonging to the plant (Illyustrirovanniy putevoditel…, 1911: 45).

The inhabitants of the plant settlement were mainly the population of old residents, which emerged on the basis of serfs from the huge Stroganov estates in the Middle Kama region. For this reason, people were united with the surrounding peasant population by common origin and complexes of traditional culture. The residents of the plant settlement were divided into several social groups. One of these consisted of serving employees—managers, clerks, staff of plant offices, etc. The other group included plant workers and miners—the main category of settlement's inhabitants. There was also a large category that included the dwellers in the plant settlement and plant peasants employed in auxiliary works (production of charcoal, transportation of raw materials and finished products, etc.).

Sources

One important reason for choosing festive culture among the residents of Dobryanka Plant as a research subject is a sufficiency of sources from the late 19th to early 20th century, collected by several local historians in different years and kept in museum and archival collections. These include a description of individual festivals, with a record of customs and rites performed on Radunitsa, which was compiled in the 1880s by P.I. Syuzev, who was an administrator at the Dobryanka Plant (State Archives of the Perm Territory (GAPK). F. 714, Inv. 1, D. 17). Interesting ethnographic

information about the life of the plant settlement in the early 20th century is available in a voluminous manuscript by a resident of the town of Dobryanka, A.G. Zatoplyaev, entitled "Stories about the Dobryanka Plant" (Dobryanka Museum of Local History (DIKM). No. 1720/2). We should also mention the manuscript of an unidentified author (dated to 1928), "Materials on Creative Folk Arts of the Dobryanka Plant…" from the archives of the Perm folklorist Prof. P.S. Bogoslovsky; it also contains interesting ethnographic descriptions of festive and ritual culture (GAPK. F. 973, Inv. 1, D. 296). Information on the calendar cycle of festivals and rites among the residents of Dobryanka Plant in the early 20th century appears in a section of the manuscript entitled "The Year in Dobryanka" by the local historian and history teacher V.M. Batanov (1897–1966) (GAPK. F. 551, Inv. 1, D. 4, 5). Individual stories about the festivals of the "old Dobryanka" in the early 20th century are present in the manuscript "Materials on the History of the Dobryanka Plant" (State Archive of the Sverdlovsk Region (GASO). F. R-318, Inv. 1, D. 79).

This body of sources on a single plant settlement, different in their origin and belonging to different time periods, is unique. We do not have such extensive and complete ethnographic sources on calendar rites and festive culture for plant settlements in the western Urals.

Plant industry and folk calendar

The peasant calendar of Russians emerged as an agrarian calendar closely related to agricultural cycles, with their environmental and economic rhythms. The nature of production at plants was somewhat different. Some plant technological cycles, for example blast furnace and open-hearth furnaces, were continuous; other cycles could stop in the summer season, and some plant operations, such as water logging, transportation, and procurement of firewood, etc., were of a seasonal nature. It would be logical to assume that production at plants had a significant effect on specific features of alternation of weekdays and holidays, and was decisive in the formation of calendar rhythm. However, ethnographic evidence shows a more sophisticated relationship of plant production cycles to the economic cycles of workers and the system of the folk calendar.

The most complete and detailed information on the plant schedule is contained in the materials for 1832. According to the "List of the Staff in the Dobryanka and Sophia Plants", 250 days were the working days during the year, while 52 Sundays and 32 days of Church festivals were non-working, including four days of Nativity, six days of the Easter Week, two days of St. Nicholas the Wonderworker, three days of the Passion Week, one day for New Year and Theophany, eight days of festivals associated with the Royal family, three days "for fasting and confession", and 26 days for "haymaking" (Mukhin, 1994: 12). In total, there were 121 days free from plant work (in fact, there were less of them, since some of the festivals coincided with Sundays). This schedule of working days and holidays was valid until the first third of the 20th century. Before and after Easter, the plant did not work for over a week: "At Easter, the plant was closed for the whole week". On Christmastide between December 25 and January 6, "the plant… was stopped for 3–4 days". The Day of the Holy Spirit on Monday after the Pentecost was a non-working day (GAPK. F. 551, Inv. 1. D. 5, fol. 52–70).

The calendar of non-working days at the Dobryanka Plant only partially coincided with the calendar officially established for the plant and mining industry (O prodolzhitelnosti…, 1910). The local features were the inclusion of the local festivals, for example, St. Sergius' Day (September 25 of the Julian calendar), into non-working days. On the occasion of St. Sergius' Day (the name day of the plant owner) "the plants stopped except for continuously operating workshops: blast-furnaces and open-hearth furnaces. And here in Dobryanka, the administration stopped both plants—the upper and the lower…" (DIKM. Mss. f. 720/2, fol. 176).

The Uralian plants were stopped in the summer—this time was given to the workers for haymaking (Golikova, 2006: 112). At the Dobryanka Plant, works were also stopped for several weeks: "From 'the Holy Apostles' Day', that is, from June 29 of the Julian calendar, the plant was stopped for haymaking. This means—go out to grasslands and mow grass to make hay for the livestock. The plant was closed for two weeks" (DIKM. Mss. f. 1720/2, fol. 165). The timing of the shutdown of the plants apparently differed in some way in different years: sources indicate both different dates of the beginning of haymaking and different durations. If one source indicates a two-week break for household maintenance works, another source mentions a month: "For haymaking, the plant was shut down on the evening of the first Saturday in July for a whole month; such a custom was since long ago" (GAPK. F. 551, Inv. 1, D. 5, fol. 62). The change in the timing of haymaking might have also been caused by the reluctance of plant administration to stop production with increased orders; already in the late 19th century, it was trying to minimize the shutdown time of the plant, and some shops worked without interruption (Ibid.).

Thus, the plant calendar included relatively many holidays associated both with important festivals of the Church calendar and folk calendar, and household works in the summer. Such a production "schedule" contributed to the preservation of the set of calendar festivals and rites in plant settlements; calendar festivals and honored days, as well as rites performed during these periods, not only did not conflict with the production working cycle

of the Uralian plants, but also organically fit into existing system of calendar cycles.

Traditionalism and archaism: *Kashke-plishke*

The interaction of tradition and innovation is one of the important aspects of studying traditional culture. The orientation of plant life to urban forms implies not only the emergence of new features, but also the displacement and disappearance of archaic forms of ritual culture. Nevertheless, archaic rituals persisted until the late 19th century in the plant environment, and the active penetration of innovations fell in the second half of the 19th–early 20th century.

The rites called *kashke-plishke,* performed on Radunitsa on Mount Mendach within the boundaries of the plant settlement, stand out in the spring cycle of rites at Dobryanka Plant. A rather detailed and previously unpublished description of the *kashke-plishke*, which reveals the details of the rite, has survived in two different handwritten versions:

"…As early as Holy Week, elderly women discussed the organization of the festival day; prepared 'travnik' [a low-alcoholic beverage based on a decoction of herbs – *A.C.*], beer, and home-made brew; bought vodka; and baked fish pies, eggs, and whatever anyone desired to cook. The meetings, which were often crowded, began around noon"*. "…At the Dobryanka Plant, there was a custom of organizing a festival on Radolnitsa. At about noon, men, women, and children participating in the festival day gathered on Mount 'Mendach', next to the village. Each of the women brought whatever they could: fried fowl, shanga round breads, eggs, milk, beer, wine, travnik, and some certainly brought a fish pie. The festival began under a tree, which was carefully examined beforehand to determine whether it was healthy, and if there were dry branches, they were broken off. The selected tree was hung around with ribbons, towels, lace, colored scarves, handfuls of the best hackled flax, seeds of garden vegetables tied in rags, etc. After decorating the tree and placing food and drinks under it, the guests started the festival with a prayer facing the east. After praying, they said: 'Fathers, parents, please have some bread and salt with us!' Then each person took a small piece of pie and ate it after drinking the drink of choice. At the same time, it was required to treat the tree, for which people took a mouthful of drink and sprayed it. The elderly people continued to eat, while young people started circle dancing with songs and different games"**. "After the festival reached its climax, the guests danced around the fir tree with songs. The festival ended before sunset"*. "Old women believed that it was necessary to celebrate kashke-plishke for a good harvest of flax and vegetables. Hanging up flax and seeds, they said: 'As these haystacks are high, so be my flax high'"**. "Such a celebration of 'kashke-plishke' was considered by old women to be necessary for a good harvest, and this is why women brought with them 'handfuls' of heckled flax, flaxseed, and seeds of all garden vegetables, tied in rags, and hung these on the same fir tree, saying 'as a fir tree grows, so grow my flax, my carrots' and so on"* (GAPK. F. 714, Inv. 1, D. 17, fols. 15r–15v, 20–21).

The study of this custom in a wide ethnographic context makes it possible to link it with the rite of greeting birds in the spring, widespread in the Kama region. Its name *kashke-plishke*/*kashki-plishki* well matches the name of similar rites of *meeting of plishka*, *plishka*, *burial of plishka*, derived from the widespread name of wagtail (*plishka*) in Perm dialects (Chernykh, 2007: 52–54). Similar rites were performed in the spring in different areas of the Kama region and were timed to different calendar dates from Easter to Pentecost. In a number of places, just as in Dobryanka Plant, they were performed on Radunitsa. The rite of *meeting the plishka* was associated with good weather and fruitful year (Chernykh, 2006: 164–170). Usually it was performed on a hill; the rite involved collective meal, ritual feeding of the birds, or burying pieces of food in the ground.

The description of this rite in Dobryanka Plant is one of the earliest in the Kama region. The author described the tradition of the 1860s in the late 19th century. Field evidence and other sources testify to the disintegration and disappearance of the rite in the Middle Kama region already in the early 20th century, when it became limited to collective meal on the hills and was usually not accompanied by other rites (Ibid.).

The local features in Dobryanka Plant included the performance of rites aimed at ensuring the productivity of garden crops. Actualization of gardening and performance of the rite exclusively by women may be associated with the specific features of the plant environment. The workers employed in production virtually did not participate in land cultivation; women from the families of workers were engaged exclusively in household work: they worked in the garden and cultivated land.

Thus, the evidence on the *kashke-plishke* rites in Dobryanka Plant testifies to the functioning and relatively long preservation of archaic rites of the folk calendar in the plant environment.

Festivals in plant industrial culture: *Day of St. Sergius*

The annual calendar cycle of the plant included a special festival day established in honor of the name day of the

*Quotation from the first version of the description.
**Quotation from the second version of the description.

current owner of the plant. Such festivals were typical of private Uralian plants (Golikova, 2006: 193–195). At the Dobryanka Plant, in the early 20th century, the autumn Day of St. Sergius (September 25th of the Julian Calendar), or the name day of Serge Stroganov, the owner of the plant, was celebrated: "Every year, Count Serge Stroganov celebrated his name day at his Uralian plants, on the so-called Day of St. Sergius" (DIKM. Mss. f. 1720/2, fol. 176) (this is the owner of the plant Serge Stroganov, 1852–1923). The importance of this holiday was emphasized by the fact that the plant stopped working for this celebration (Ibid.).

The name day of the plant owner was perceived as one of the main local festival days, so people carefully prepared for it. At the Dobryanka Plant, for example, on the eve of the Day of St. Sergius, "garlands were made from the fir branches which were brought there, and all shops were decorated with greenery", while all workers "walked around the plant in festive clothes" (Ibid.).

The main event of the festival day—*the count's tables*—was preceded by church services and cross processions with blessing of water to the plant workshops: "in the morning, a divine service was performed in the church of the Mother of God, after which a short *moleben* service was held for the health of 'Boyarin Sergius', then the icons were 'raised', and all those who were in the church went in cross procession to the plant. A short prayer service was performed there in each workshop, and the workshops and those present in them as well as the food and drinks placed on the tables were sprinkled with the previously blessed holy water" (Ibid.).

The main element of the festival day, its distinctive feature, was a meal for all workers organized at the expense of the plant owner—the *tables*: "People set up tables and benches in all shops, brought vodka and fish pies for eating after drinking. And there, in turn, the workers of the shops came to the 'cupbearer', drank a glass of 'state monopoly' vodka to the health of the name day celebrant, and sat down at the table to have a fish pie. And those for whom it was not enough went to the tavern in the marketplace. Such was the treat for the workers. A so-called count's dance evening with free refreshments was arranged for office employees…" (Ibid.).

Thus, the *tables* were the culmination of the entire celebration in the plant settlement. Notably, these were prepared for manual workers—the main category of plant employees; festive celebrations and the "count's ball" for non-manual employees were arranged the next day.

The origins of this tradition can be seen in the customs of organizing collective festive meals associated with the name days of the members of the Imperial House. The celebration of Day of St. Sergius was one of the features of festive culture among the population employed in mining plants and industries of the Urals. The collective meal as a rite served as a basis for paternalistic ideas about the good owner of the plant, and brought about a sense of unity in the plant environment (Golikova, 2006: 197).

From rite to leisure time: *Seeing off the Kama River*

Customs associated with the beginning of ice drift and spring high water on rivers were widespread in different areas of the Kama region. Ritual activities performed during ice drift involved apotropaic, prognostic, and purifying symbolism. By the movement of water and ice, people determined whether the coming year would have a good harvest. The river was often given gifts: people threw bread and coins "in order not to drown", and washed themselves with river water "to wash away sins and sores" (Chernykh, 2006: 154–156). As the analysis of the evidence has shown, ritual forms in the customs corresponding to the beginning of ice drift prevailed in the traditions of the rural population of the Kama region, while customs timed to spring high water were typical of plant settlements of the region located near large rivers and settlements economically linked with them. The tradition of gathering on the Kama River on the day of its release from ice turned into an annual large-scale celebration among the Dobryanka residents. The ritual complexes associated with this natural phenomenon were no longer the main elements in the structure of the festival day: "…Only once a year, the plant population gathered together to visit their native river, take a walk along its banks, and celebrate the victory of the Kama over winter. <…> People said: 'Let's go to see off the Kama!' It went like this: as soon as high water receded and the banks dried up, on the very first Sunday, the plant population of all ages, as if by agreement, rushed to the bank of the Kama River above the pier areas at noon. People hurried up: some on foot, some in carriages or on simple carts covered with the canopy where a lot of all kinds of food and drink lay: 'what holiday can be at the plant without alcohol!' Of course, mostly people walked, with large and small bundles and fardels, in which there was also something to 'see off the Kama'—to perform the 'funeral commemoration festival' for the Kama's ice. Many held copper samovars polished with brick in their hands: it was customary at the plant to organize tea-drinking during the outdoor festivities. Small traders set up their tents with groceries: spice cakes, sweets, pretzels, nuts, sunflower seeds, and other goods. Plant female traders of alcohol set their large pots with alcoholic brew made of oat malt, which was the favorite home drink for the rural population of the Kama region. The festivities began with folk dances and circle dances. Here and there, the air was torn apart by Saratov accordions with bells, and squealing squeezeboxes. The people got divided

into groups according to the number of neighborhoods in the plant village: Rynok, Komarovo, Zakholshevka, Zadobryanka, Zalog, Vshivaya Gora. Each group celebrated apart from other groups, especially young people. Each group had its own suitors, its own brides; no one came close to a girl from another group: such a guy would be beaten up right there. 'Kama is seen off – spring is welcomed!'—this is how the old people explained the meaning of the first spring festival day…" (DIKM. Mss. f. 1720/2, fol. 148).

The rite of "seeing off the Kama River" described above reflects the transformational processes in the calendar rites of plant settlements: it became filled with leisure pastime forms and turned into public outdoor festivities. Manifestations of such processes can be observed in the evidence on other festivals and rites. For example, the Day of the Holy Spirit in Dobryanka Plant in the early 20th century, was celebrated with "picnics"; on this day, "many families also celebrated the 'Earth Festival' on shore meadows in the upper part of the Dobryanka pond… <…> People came there in boats, shitiks [flat-bottomed river boats – *A.C.*], 10–15 people at once, with samovars, drinks, foods, and fish pies made of fresh bream" (Ibid.). This feature of the plant calendar rite (replacement of ritual and magical functions by purely entertaining aspects) has been already pointed out by scholars (Krupyanskaya, Polishchuk, 1971: 162; Golikova, 2006: 152–163). Similar processes took place in the peasant environment, yet they happened in a more active manner in plant settlements.

Traditional and urban forms in festive culture: *The Pentecost outdoor festivities*

The complex social composition of the population living in industrial settlements, which entailed different versions of festive culture (traditional peasant and urban), as well as dynamics in the development of cultural forms, led to the coexistence of ritual and festive traditions different in origin, and stadially dissimilar, in the structure of the holiday. This feature was most clearly manifested in the celebration of Pentecost.

Until the early 20th century, the main elements of the traditional Pentecost rite typical of the northern regions of the Kama region were actively used in Dobryanka Plant, and included decorating a birch tree and circle dance outdoor festivities. Young birch trees were also used in decorating the space in front of the house: "The day before, on Saturday, several young snow-white birches were stuck into the ground in front of almost every house. On some of these, people hung stripes of multi-colored calico instead of ribbons" (DIKM. Mss. f. 1720/2, fol. 157). Decorating houses and grounds in front of the homestead was the main action with the birch tree in the Pentecost set of rites in the north of the Perm Territory (Chernykh, 2006: 136–137). Birches were also set in the glades and grounds of the plant village, where circle dance festivities took place: "On Pentecost, birches decorated with colorful ribbons were placed on the best glades, and after noon, the girls who were not old enough to go to the garden did their circle dances around the birches. Later, they were joined by the grown-ups, who had returned from the garden" (GAPK. F. 551, Inv. 1, D. 5, fol. 12). Circle dance outdoor festivities took place in several locations of the plant village: "A large birch tree was set on the grounds where round dances were usually done, and girls and boys did the Pentecost circle dances around it. <…> Young people did a large circle dance on the ground. Only plaintive songs were sung during circle dancing. The evening was approaching. They stopped dancing by the evening. When circle dance ended, those who came to festivities went back go to their streets" (Ibid.: Fols. 11–12).

The main round dance outdoor festivities for grown-ups took place in the "count's garden"—the plant park. After the round dances, an orchestra of employees and plant workers, peasants, and students of the Dobryanka two-grade school performed marches, quadrilles, waltzes, opera overtures, and folk music in the garden. The choir of some tailor Shilov also performed there (Kalinin, 1995: 94).

The above evidence indicates the existence of both traditional forms of Pentecost rites associated with decorating birch trees and round dance outdoor festivities, and urban forms of festive leisure time, such as festivities in the "Count's Garden" with choir and orchestra performance, coexisting in the plant environment. According to data from other festive cycles, such coexistence of different forms of festive culture was common in the Uralian mining plants (Chernykh, 2008: 310–311).

Conclusions

Analysis of individual festivals and rites of the local tradition using the evidence from one of the plant settlements of the Urals—the settlement of the Dobryanka Plant—makes it possible to get an idea about specific aspects of the existence and development of calendar festivals and rites in plant settlements of the Urals in the late 19th to early 20th centuries. The study has revealed the preservation of the main festive and ritual cycles of the Russian folk calendar, as well as the similarity of customs and rituals in Dobryanka Plant to regional forms of calendar rites; for example, the customs of decorating the space in front of the house and homestead with the birch tree and the spring "seeing off the Kama River", which was also typical of the Russian population

living in the adjacent ethnographic area. Specific plant features included the emergence of a special industrial calendar associated with main economic and festival cycles, the establishment of special "corporate" plant festival days at private plants, the preservation of archaic forms of traditional rites, the evolution of calendar rites with a tendency to reinforce leisure forms, loss of sacred meaning by many rites, the multi-layered nature of calendar traditions, and active assimilation and adaptation of new urban forms of festive culture. These features make it possible to conclude that some aspects of traditional culture with unique specific features existed in the plant settlements of the Urals.

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References

Agapkina T.A. 2000
Etnograficheskiye svyazi kalendarnykh pesen: Vstrecha vesny v obryadakh i folklore vostochnykh slavyan. Moscow: Indrik.

Agapkina T.A. 2002
Mifopoeticheskiye osnovy slavyanskogo narodnogo kalendarya: Vesenne-letniy tsikl. Moscow: Indrik.

Andriets G.A. 2013
Povsednevnaya i prazdnichnaya kultura dalnevostochnykh gorodov: Sfera dosuga (vtoraya polovina XIX – nachalo XX v.). *Vestnik Dalnevostochnogo otdeleniya RAN*, No. 4 (170): 114–124.

Baiburin A.K. 1993
Ritual v traditsionnoy kulture. Strukturno-semanticheskiy analiz vostochnoslavyanskikh obryadov. St. Petersburg: Nauka.

Bernshtam T.A. 1988
Molodezh v obryadovoy zhizni russkoy obshchiny XIX–nachala XX v.: Polovozrastnoy aspekt traditsionnoy kultury. Leningrad: Nauka.

Chernykh A.V. 2006
Russkiy narodniy kalendar v Prikamye: Prazdniki i obryady kontsa XIX – serediny XX v. Pt. 1: Vesna, leto, osen. Perm: Pushka.

Chernykh A.V. 2007
Narodniy kalendar v russkikh traditsiyakh Permskogo Prikamya (konets XIX – pervaya polovina XX v.). Pt. 1: Obryady vstrechi ptits. *Traditsionnaya kultura*, No. 1 (25): 52–59.

Chernykh A.V. 2008
Russkiy narodniy kalendar v Prikamye: Prazdniki i obryady kontsa XIX – pervoy poloviny XX v. Pt. 2: Zima. St. Petersburg: Mamatov.

Chernykh A.V. 2010
Russkiy narodniy kalendar v Prikamye. Pt. 3: Slovar khrononimov. Perm: Pushka.

Chernykh A.V. 2014
Russkiy narodniy kalendar v Prikamye. Prazdniki i obryady kontsa XIX – pervoy poloviny XX v. Pt. 4: Mestniye prazdniki. St. Petersburg: Mamatov.

Chernykh A.V. 2020
Spetsifika kalendarnoy obryadnosti na uralskikh gornykh zavodakh v kontse XIX – pervoy polovine XX v. In *Aktualniye problemy izucheniya istoricheskikh gorodov-zavodov: Materialy Vseros. nauch.-praktich. konferentsii (22–23 sentyabrya 2020 g., Izhevsk)*. Izhevsk: pp. 200–206.

Chicherov V.I. 1957
Zimniy period russkogo narodnogo zemledelcheskogo kalendarya XVI–XIX vv. Ocherki po istorii narodnykh verovaniy. Moscow: Izd. AN SSSR. (TIE. Nov. ser.; vol. XL).

Fursova E.F. 2002, 2003
Kalendarniye obychai i obryady vostochnoslavyanskikh narodov Novosibirskoy oblasti kak rezultat mezhetnicheskogo vzaimodeistviya (konets XIX – pervaya tret XX v.). In 2 pts. Pt. 1: Obychai i obryady zimne-vesennego perioda. Pt. 2: Obychai i obryady letne-osennego perioda. Novosibirsk: Izd. IAET SO RAN.

Golikova S.V. 2006
"Lyudi pri zavodakh": Obydennaya kultura gornozavodskogo naseleniya Urala XVIII – nachala XX v. Yekaterinburg: Bank kulturnoy informatsii.

Illyustrirovanniy putevoditel po reke Kame i po r. Vishere s Kolvoy. 1911
[Perm]: [Tipolit. Perm. gub. pravleniya].

Kalinin M.A. 1990
Ocherki po istorii Dobryanki i kraya s drevneishikh vremen do kontsa XIX v. Dobryanka: [Dobryan. tip.].

Kalinin M.A. 1995
Obshchestvennaya zhizn Dobryanki (vtoraya polovina XIX – nachalo XX v.). In *Istoriko-kulturnoye naslediye gorodov i zavodskikh poseleniy Urala*. Perm: Perm. Gos. Univ., pp. 89–97.

Keller E.E. 2001
Prazdnichnaya kultura Peterburga: Ocherki istorii. St. Petersburg: Mikhailov.

Khlopin G. 1891
Dvizheniye naseleniya Kusye-Aleksandrovskogo zavoda Permskoy gubernii i uyezda. In *Sbornik rabot Permskoy zemskoy sanitarnoy stantsii*, iss. 2. Perm: pp. 278–326.

Korepova K.E. 2009
Russkiye kalendarniye obryady i prazdniki Nizhegorodskogo Povolzhya. St. Petersburg: Tropa Troyanova.

Kotlyarchuk A.S. 2001
Prazdnichnaya kultura v gorodakh Rossii i Belorussii XVII v.: Ofitsialniye tseremonii i krestyanskaya obryadnost. St. Petersburg: Peterburg. vostokovedeniye.

Kruglyashova V.P. 1974
Trudoviye obryady rabochikh gornozavodskogo Urala po materialam narodnykh rasskazov. In *Folklor i etnografiya: Obryady i obryadoviy folklor*. Leningrad: Nauka, pp. 42–51.

Krupyanskaya V.Y., Budina O.R., Polishchuk N.S., Yukhneva N.V. 1974
Kultura i byt gornyakov i metallurgov Nizhnego Tagila (1917–1970). Moscow: Nauka.

Krupyanskaya V.Y., Polishchuk N.S. 1971
Kultura i byt rabochikh gornozavodskogo Urala (konets XIX – nachalo XX v.). Moscow: Nauka.

Lobkova G.V. 2000
Drevnosti pskovskoy zemli: Zhatvennaya obryadnost: Obrazy. Ritualy, khudozhestvennaya sistema. St. Petersburg: Dmitriy Bulanin.

Makashina T.S. 1982
Ilyin den i Ilya-prorok v narodnykh predstavleniyakh i folklore. In *Obryady i obryadoviy folklor*. Moscow: Nauka, pp. 83–101.

Materialy po Permskoy oblasti k Uralskoy istoricheskoy entsiklopedii. 1994
Iss. 1. Perm: [s.n.].

Metallurgicheskiye zavody Urala XVII–XX vv.: Entsiklopediya. 2001
Yekaterinburg: Akademkniga.

Mukhin V.V. 1994
Dobryanskiy zavod. God 1832. In *Istoriya i kultura Dobryanskogo kraya v XIX–XX vekakh*. Dobryanka: [s.n.], pp. 5–15.

Nekrylova A.F. 2004
Russkiye narodniye gorodskiye prazdniki, uveseleniya i zrelishcha. Konets XVIII – nachalo XX v. St. Petersburg: Azbuka-klassika.

O prodolzhitelnosti i raspredelenii rabochego vremeni v zavedeniyakh fabrichno-zavodskoy i gornoy promyshlennosti: Vysochaishe utverzhdennoye mneniye Gosudarstvennogo Soveta ot 02.06.1897. 1910
Polnoye sobraniye zakonov Rossiyskoy imperii. Sobraniye 3, No. 14231, vol. 17. St. Petersburg: [Gos. tip.], p. 355.

Propp V.Y. 1963
Russkiye agrarniye prazdniki: Opyt istoriko-etnograficheskogo issledovaniya. Leningrad: Izd. Leningr. Gos. Univ.

Sokolova V.K. 1979
Vesenne-letniye kalendarniye obryady russkikh, ukraintsev i belorusov. XIX – nachalo XX v. Moscow: Nauka.

Spiski naselennykh mest Rossiyskoy imperii, sostavlenniye i izdavayemiye Tsentralnym statisticheskim komitetom Ministerstva vnutrennikh del. 1875
Vol. XXXI: Permskaya guberniya: Po svedeniyam 1869 goda. St. Petersburg: [Tip. K. Vulfa].

The Ritual Year 10: Magic in Rituals and Rituals i n Magic. 2015
Innsbruck, Tartu: ELM Scholarly Press. (The Yearbook of the Société Internationale d'Ethnologie et de Folklore, T. Minniyakhmetova, K. Velkoborská (eds.)).

Tolstaya S.M. 2005
Polesskiy narodniy kalendar. Moscow: Indrik.

Tultseva L.A. 2001
Ryazanskiy mesyatseslov: Krugliy god prazdnikov, obryadov i obychayev ryazanskikh krestyan. Ryazan: Ryaz. obl. nauch.-metod. tsentr narod. tvorchestva. (Ryazanskiy etnograficheskiy vestnik; iss. No. 30).

Zolotova T.N. 2017
Traditsionniy prazdnichniy kalendar vostochnoslavyanskogo naseleniya Zauralya i Zapadnoy Sibiri. Moscow: Institut naslediya.

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Happy Marriages Are Blessed in the Heavens, Unhappy Ones Cause Poverty: A View on Women in Usun-Debeskertu-Khan's Instructions

This study examines traditional ideas of women and marriage, based on the instructions attributed to one of the rulers of the epoch of the "Religious Kings"—Usun-Debeskertu-Khan, and his ministers. The focus is made on female virtues, the most important of which is adherence to duties in relation to the husband and children. The standards that noble women had to comply with were higher than those concerning other women, but still quite realistic, as attested to by historical records. Negative female traits were said to be caused by untamed emotions, which cause one to forget about commonly accepted norms of behavior. The analysis of the instructions relating to marriage suggests that they were especially influenced by Buddhism, which, using various forms of instruction, including didactic writings, endowed marriage with a new, spiritual content. There were three forms of marriage, tentatively described as "divine", "earthly", and "infernal". The causes of happy and unhappy marital unions were believed to be mainly related to women's properties mentioned in the instructions. Marital harmony was said to depend mostly on the woman.

Keywords: *Kalmyks, Usun-Debeskertu-Khan, instructions, woman, happy marriages, unhappy marriages.*

Introduction

One of the trends in modern social development is associated with a new image of women, the emergence of which has succeeded not only in depriving men of their monopoly on leadership, but also for women in gaining a certain economic independence. The question of whether such standards will become commonly accepted concepts remains open, since the social and cultural space of the modern world is unstable in many of its manifestations. In real life, the perception of women continues to be linked with traditional ideas, which developed in the distant past and, in spite of everything, continue to dominate the mass consciousness. In this sense, the former nomads—the Kalmyks—are no exception. I.A. Zhitetsky associated the origin of the traditional perception of women among the nomads with the division of labor, when female craftsmanship, in his opinion, acquired a "narrow, family nature": "While the belief in the unity of blood was the basis of any organization, women were the core of the family organization. Yet with the increasing prevalence of male craftsmanship, the latter came to the fore and made men leaders not only in the tribal group, but also in the family" (1892: 69).

The fact that a traditional view on male leadership in family life continues to persist in modern society is confirmed by the data of a sociological survey conducted among the students of the Kalmyk State University in 2018 for identifying the perception of family among the younger generation. When asked who should be the head of the family, the majority (55.3 %) of the respondents answered "the husband", and only insignificant part

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(1.3 %) answered "the wife". According to the majority (55.3 %) of the respondents, the man should be the real initiator for creating the family, and only a small part (2.6 %) believed that the initiative should come from the woman (Goryaev, Okonov, 2018: 62–63).

One of the sources behind the idea that the man is the head of the family are the ancient texts that shaped such a traditional view on the basis of economic, mythological, and religious notions. There is a writing of the Old Kalmyk literature, where several sections address this topic. It is known under the name of the "History of Usun-Debeskertu-Khan" ("*Üsün debiskertü xāni tuuǰi orošiboi*") (Kalmytskaya khrestomatiya…, 1927). Since its appearance in the second half of the 17th century, this text existed only in handwritten form. Its popularity and widespread acceptance are testified to by the existence of thirteen copies (both individual manuscripts and as a part of four literary collections) kept in scientific archives and private collections in Russia, Mongolia, and China (Bicheev, 2019a).

This text is a collection of instructions attributed to Usun-Debeskertu-Khan, a ruler who lived during the epoch of the ancient "religious kings", and his ministers. This name means the Tibetan King Tri Ralpachan (815–836) or Tritsuk Detsen (Tibetan, *Khri gtsug lde brtsan Ral-pa-can*); historical literature has preserved some information on his reign. He is considered to be the third "king of dharma", who made a significant contribution to the development of Buddhism in Tibet (Pagsam-Dzhonsan, 1991: 24–26). However, Ralpachan's instructions took written form not during his lifetime, but most likely much later. In 836, Ralpachan was assassinated by two of his ministers. His brother Dharma ascended the throne and initiated the persecution of Buddhism, followed by the disintegration of Tibet into a number of principalities. The revival of Buddhism took place only in the 15th century with the beginning of the unification of the country and religious reforms of Je Tsongkhapa (1357–1419). Apparently, during that period, Buddhist monks compiled the text of the instructions.

The Oirat translation of the text was made in the mid 17th century. The colophon that is present in all known copies of this work mentions the Tibetan king Ralpachan (Kalmyk, *Üsün Debeskertü xān*) as the author of the instructions, Aryadeva Guusi (*Aryādevā Güüši*) as the translator from the Tibetan language, and Kendulen-Khurmusta-Khan (*Kündölöng Xurmusta xān*) as the initiator of the translation. Aryadeva Guusi was the well-known Oirat leader Gushi-Nomin-Khan, recognized in Tibet as "the king of dharma" and "holder of the Teaching" (Tibetan, *bstan 'dzin*). In 1637, he defeated the Khalkha Tsoghtu-Tayiji, who was hostile to the Gelug school; in 1642, he captured the Jang king, subjugated Kam to his power, and became the Tibetan king (Ibid.: 129). Kendulen-Khurmusta-Khan was the brother of Güshi-Khan known in the history of the Oirats as Köndölön-Ubashi. Güshi-Nomin-Khan died in 1654; consequently, the translation of the work was completed no later than this year. Thus, the instructions of the Tibetan king Ralpachan, who lived in the 9th century, were compiled by Tibetan monks in the 15th century and were translated into the Oirat language in the mid 17th century.

In the collection, instructions are presented in a poetic form in proverbs, sayings, triads, and quatrains. Structurally, they are built on the opposition of the virtuous and sinful, wise and foolish, good and bad. The instructions are addressed to different social strata, but they are all similar in one thing: each instructs a person in worldly wisdom and requires him to comply with generally accepted norms of behavior. For example, the triad with the thesis of "*loss of honoring*" condemns the behavior of the representatives of the upper class—monks, rulers, and women of noble origin. The introductory section of the instructions ends with the statement that the morning of a well-behaved person should begin with prayer, and daily activities should be performed according to the norms established in the society (Bicheev, 2019b). The collection contains sections with statements about positive and negative character traits of women from the upper, middle, and lower classes, as well as views regarding the relationship of spouses and reasons for happy or unhappy marriages.

Instructions on the positive traits of a woman

Instructions concerning positive and negative traits of character and behavior of women were put into the mouths of three out of 12 wise ministers-tushimels of Ralpachan. In the rest of the instructions, they are present only in the form of individual statements, which describe women in an indirect way. For example, one of the instructions is as follows:

> Pierce the tongue of a lying person,
> Cut off the nose of a quick-tempered woman,
> Tie the mouth of a gluttonous woman,
> Stay away from a depraved woman.
>
> *yeru xudal keleqči kümüni kelēni xaγal:*
> *kiling yeketü xatun kümüni xamariyini kirγa:*
> *idēdü xolmoi emeyin amayini bō:*
> *ičiüri ügei eme kümün-ēce xolo yabuxu* (fol. 12r)*.

*Hereafter, the translation is by the author of this article. Transliteration of the text is based on the manuscript "*Üsün debiskertü xāni nomloqson šaštir kemekü orošiba*" (Scientific archive of KSC RAS. F. 15, Inv. 3, Item 148).

Another instruction concerning whom should be shown respect in society and how, says that the wife who follows what her husband tells her to do is worthy of respect:

A precious mentor is honored with reverence and worship,
Parents and the elderly are honored with food and clothing,
An owner is honored as a state ruler,
Relatives are honored with drinks and treats.
A marriageable girl is endowed with possessions and is instructed.
A wife who follows her husband's instructions is honored.

očirtu baqši youγan mörgün takīd biširen kündülkü:
ečige eke kigēd küqšin-narani idēn xubcasun-yēr kündülkü:
ulušiyin noyoni töröyin yosōr kündülkü:
uruq elkeni arki maxa-yēr kündülkü:
kümün-dü üdeǰi ökü küükēn ed-yēr takād soun suryaqdaxu:
eme kümün nököriyinōn ügēr yabuxula kündüdüyü (fol. 8v).

The first section of the instructions of the minister-tushimel Yedeng cecen focuses on the same topic, and edification is hidden under the form of praising a "noble woman" (*sayin boqdo xatuni*), who firmly adheres to her duty of revering her husband and honoring his parents.

Honoring her husband's parents like celestial dwellers,
A woman who treats her husband like her own heart,
With her caress and tenderness she is
Like the light of the sun illuminating a snowy peak.
The essence of such a noble woman
Is akin to a precious pearl.
A wife filled with such wisdom
Will be honored by all her relatives.

xadam ečige eke youγān tenggeri metü kündülküi:
nökürōn zürken metü sanād:
šoulun tangsuq beyen barid:
casutu oulada narani gerel tusuqsan metü:
gegēn sayixan uxātai tiyimi xatuni činār-inu
arγa zali ügei subuud erdeni metü:
amurliqsan cecen gegēn tiyimi xatun bolxula
uruq eligen bügüdedü xayirtai kemēyü (fol. 16v).

The instructions of the minister-tushimel Onisutu the Sage (*Onisutu cecen*) are fully devoted to positive and negative qualities of men and women of the upper and middle classes. According to his statements, a man of noble birth has sixteen positive qualities, which distinguish him as a socially responsible person on whom the well-being of the whole society depends. In short instructions for the middle class, the emphasis is placed on spiritual practice. The instructions for the lower class are formulated in extremely brief form:

Do not give your property to anyone,
Do not claim anyone else's property,
Do not commit armed robbery, theft, or profit-seeking,
Do not succumb to laziness and idleness.

öböriyin idē kümün-dü ülü ögün
busudiyin ideyigi öbörön ülü iden:
bulāxu tataxu xulaγayigi ülü ken:
budangγui arγa zali ülü öüskekü (fol. 5r).

The instructions for women are more specific: a woman of noble origin should have fifteen positive character traits, while an ordinary woman should have eight. As opposed to positive traits, eighteen qualities that defame a woman are indicated. Interestingly, many of the fifteen instructions include two or more logically linked precepts. For example, the first trait of a woman of noble origin (*erken sayin aγas emesetü*) is wisdom in matters of social management and external attractiveness:

Wise in public administration,
She has an attractive appearance – that is first.

ünün šaǰin törödü cecēn:
üzeküi önggüni sayin bolxulā nigen (fol. 5v).

In this instruction, the notion of "wisdom" (*cecēn*) indicates a quality originally inherent in the nature of each person and manifested through upbringing corresponding to its development. Attractiveness (*üzeküi önggeni*) does not mean the traditional idea of female beauty, but the capacity to use one's natural looks. One of the sections of the instruction says that a woman's "face should be clean, without pimples and blackheads" (*čirini ariun bolod urbaxu odxu ügeilüge zuryān*). Thus, according to the instructions of Onisutu the Sage, a woman should not only be intelligent, but also possess natural wisdom and, if not be beautiful, she should remain attractive.

At the same time, a woman is expected to be shy and bashful, not talkative, look well-groomed, manage household chores, and be a friendly hostess:

Not talkative, always well-groomed,
She will not allow for embarrassment and shame – that is second.
She performs all her assigned duties,
Welcomes all guests who come [to the house] – that is third.

kelekü ügeni cön bolod: ürgüldui/de beyebēn xadaγalan
ayixu ǰiqšöüri ičiüri medekü-luγā xoyor.
üyile-bēn üyiledün čidād:
učiraqsan bügüdeyigi teǰīn čidaxui-luγā γurbun (fol. 5v).

The known historical chronicles, archival documents, and oral legends confirm that the wives of some Oirat and Kalmyk rulers really did possess such qualities. In this case, we are speaking about the period when the Oirat translation of the instructions was not yet available. For example, in 1637, the wife of the Dzungarian ruler Batur-Khuntaiji Yum-Agas-Khatun received the Russian ambassador on her own, when her husband was on a military campaign against the Mongols. After receiving the news that the Oirats were defeated, she independently made a decision to roam with her subjects "to the Irtysh

and Lake Yamyshev, wareful of the Mungal people" (Zlatkin, 1983: 128). In 1643, Yum-Agas-Khatun also received the Russian ambassador on her own, since Batur-Khuntaiji was on a campaign against the Kazakhs (Fisher, 1774: 442–443).

The biography of the Oirat Zaya-Pandita provides information that Saikhanchzhu-Khatun, the mother of the Khosheut Ablai-Taisha, who possessed a philosophical mind and poetic gift, contributed to reconciliation between warring brothers (Radnabhadra, 1999: 78). When Echzhi-Tsagan, the mother of the Derbet ruler Malai-Batur, was returning from her pilgrimage to Tibet, on the way she met Zaya-Pandita—the head of the monastic community of the Dzungar Khanate, famous Oirat enlightener and founder of the national written language—and gave him an honorable reception (Kalmytskiye istoriko-literaturniye pamyatniki…, 1969: 104).

From later testimonies, one can cite the notes of the Orthodox priest and missionary P. Smirnov about the reception of the headquarters' officials by the wife of the owner of the Kharakhus-Ednievsky ulus of the Kalmyk steppe: "We entered. The princess, dressed in a luxurious ethnic outfit, was sitting on a wide ledge near a high bed covered with a Persian carpet. …After the usual greetings and congratulations on her newborn son, the hostess asked us to be seated. In her yurt, her husband sat as a guest, giving no orders. The princess called her servants… and at her call two decently dressed Kalmyk women entered the yurt. The hostess ordered them to serve tea prepared in another yurt, which they immediately did" (1999: 75–76).

The logical continuation of the above instructions are the fourth and fifth instructions, which do not allow for empty pastimes, deceit, licentiousness, and require a woman to be well-balanced, have discretion and the ability to reflect and not say too much.

She does not lie, does not lead a dissolute life,
Does not wander around visiting people – that is fourth.
She is unhurried, has discretion,
Not loose-tongued, does not say more than she needs – that is fifth.

alǰiyās xudal kigēd
ayil uluši ülü kerün yabuxui-luγā dörbön:
udān uta uu sedkiltei bolod
amani batu bolxu-luγā tabun (fol. 6r).

All of these character traits imply strict self-discipline and constant efforts to develop the qualities that are initially implanted in the process of upbringing the girl in her parents' home, which are mainly directly borrowed from her mother. It is no accident that when choosing a future bride, the Kalmyks were primarily interested in the character of her mother.

This is followed by instructions that directly relate to practical skills, such as raising children, maintaining the family, and managing the household.

She raises children correctly,
Skillfully maintains the family – that is seventh.
She manages the household,
Knows how to suppress anger in herself – that is eighth.
Not stingy, not annoyed,
She treats guests with food and drink – that is ninth.
She greets and shows reverence
Toward arriving and departing guests – that is tenth.
She goes to bed late, rises early,
Tidies herself up – that is eleventh.
She examines the household,
Takes care of maintaining it – that is twelfth.

küüken kigēd aru bülēn asurxu yosor teǰikü-luγā dolōn:
ed malan xurān xumin čidād:
our kilinggen darun čidaxui-luγā nayiman:
idēn undāgi zočid(tu) ögün čidad xor ügei-lügei yesün:
xuran xumin čidād: odxu irekü zočidi
kündülen čidaxu-luγā arban:
oroi untan erte bosod
nöür züsēn arčin šürčikü-lugē arban nigen:
xubacasu xunurān ömüsün xoni ükürēn büridken üzēd
teǰin üyiledkü-lügē arban xoyor (fol. 4v).

Pointing to the narrow, family nature of women's activities, I.A. Zhitetsky observed that "in addition to caring about food, warmth, and raising children, with minor exceptions, all craftsmanship work is concentrated" in the hands of women (1892: 70). Although the representatives of the noble class were not burdened with household chores like ordinary women, they also had to manage the household and domestic servants. Describing the everyday life of the Kalmyks from the Khosheutovsky ulus, P.I. Nebolsin wrote: "Women among the Kalmyks have their own special advantages, although their freedom and superiority over men have limitations" (1852: 117).

It is interesting that the instructions for women lack specific guidelines concerning Buddhist practices. According to the established tradition, a woman's commitment to her duty, reverence for her husband, and devotion to her family define her as a true believer. The general instructions, which conclude the precepts for women of the upper class, confirm this traditional view of women.

To do good deeds for others
Without regret – that is thirteenth.
Committed to the deeds of her ancestors,
She honors her husband like a celestial dweller – that is fourteenth.
To be infallible in thoughts,
Pious in deeds – that is fifteenth.

xayiran ügei sedkil-yēr
xamaqtu uran arγatai geülkü-lügē arban γurban:
dēdüšiyin yabudaldu uran bolād öböriyin nöküri
tenggeri metü kundülekü-luγā arban dörbün
ariun sayin sedkil-yēr
arγā zali ügei-lugē arban tabun (fol. 5r).

In a metaphorical and artistic form, Onisutu the Sage gives instructions for the women of the middle class. These instructions are based on the principle of artistic parallelism natural for the oral speech of the Mongols, when specific qualities of a woman are described in comparison with images of animals. In these eight points, as in the previous case, instructions regarding external appearance and behavior are logically linked:

She is beautiful like a swan – that is first,
She is silent like a lamb – that is second,
She is tidy like a mouse – that is third,
She flies lightly and comes down like a bird – that is fourth.
She is devoted to her husband like a female camel (young camel) – that is fifth.
She keeps her belly clean like a fish – that is sixth.
She is sinless in her disposition like a baby bird – that is seventh.
She is like a tigress in accomplishing her deeds – that is eight.

toγos metü üzüskülüngtei bolxulā nigen:
xonin metü üge cötöi bolxulā xoyor:
xulγu/na metü xurangγui/tai bolxula γurbun:
tolimon metü nisxulon sou/xui-luγā dörbön:
temēn metü öböriyin nökür-ese ülü ui/daxui-lüγā taban:
zaγasun metü kebeli ariun bolxu-luγā zurγān
yolǰimar metü sayin ayilγutai bolxu-luγā dolon:
bars metü öbörön tusa-bēn
bütēn čidaxu luγā nayiman (fol. 6v).

None of the above recommendations for women expressed any idealized requirements. All of them were quite acceptable and were naturally embodied in the character of the Kalmyk women. In his essay describing a trip to the Kalmyk steppe in 1886, Professor K.F. Golstunsky wrote: "The predominant and almost exclusive role of women is primarily notable in the Kalmyk household; the lady of the house and her daughters, despite their age, are decisively in charge of the entire household. I have rarely observed that her husband would take any part in it. It is remarkable, however, that with this hard work imposed on a woman, in no way she can be called a slave to her husband: I have never noticed that a husband treats his wife rudely or pushes her around; a woman simply considers caring for the household to be her indispensable duty and resignedly fulfills it without requiring help from her husband" (2014: 83). It is no coincidence that researchers of Kalmyk everyday life noted that an ordinary Kalmyk woman is distinguished by "passionate love for her children, devotion to her family, and to her hearth and home, attachment to her husband and complete absence of criminality among women" (Prozritelev, 1912: 8).

Instructions on negative traits of a woman

Eighteen negative feminine qualities are also indicated in the instructions of the minister Onisutu. However, they are not subdivided into instructions intended for the upper and middle classes. In the understanding of people of the past, there were no moral gradations in sinful deeds by definition; everyone (noble and common) was equal in terms of sin. In essence, these instructions reveal those affects that cannot be resisted in the consciousness of a hot-tempered, selfish, self-indulgent woman. Her nasty character is combined with a gloomy and unfriendly look, laziness, licentiousness, and inclination to idleness.

She has a nasty character, is talkative,
Is subject to unfounded laughter – that is first.
She wanders around visiting people in search of food and drinks – that is second.
Heavy-laden by sleep, she does not watch over the servants – that is third.
She has a gloomy look and nasty character – that is fourth.
She does not know respect and does not achieve what she intends to do – that is fifth.
Without knowing shame, she commits defiling actions – that is sixth.
When there is enough of everything, she does not care about saving,
When there is not enough, she quarrels with her husband,
She throws herself on her son and daughter – that is seventh.

alini mouxai bolōd nidün amā olo küdölgün
inekü̈i-dü amaraq bolxu-luγā nigen:
ayil keren idē xōl erikui-luγā xoyor:
noyirtu daruqdan bol šibeqčin-yēn orilon nalixui-luγā γurbun:
anisxa kümüskü̈i-bēn buulγan
atariqsan zang-yēr yabuxui-luγā dörbön:
kündülekü̈i ülü čidan küsekü metüyigi ülü medekü-luγā taban:
ičekü̈i ülü meden: yekengki üyile-inu burataq-luγā zurγān:
bii caqtu ülü xayirlān oun ideqči ügei caqtu nökürtön ourlan
küböün okōn nalixui-luγā dolon (fol. 7r).

The reasons for asocial and immoral actions of such a woman are hidden in her emotions, which have not been curbed by commonly accepted norms and make her forget about her duty to her husband, children, and relatives. Desires driven by anger, passion, and ignorance foster selfishness and, most importantly, rejection of those around them who are guided by such norms.

She praises herself and denigrates others – that is ninth.
She covets everything and has a heart of stone – that is tenth.
She is fierce like a dog and a pig – that is eleventh.
She is stingy and does not pay back debts to her daughter – that is twelfth.
Not understanding her guilt, she sheds naive tears – that is thirteenth.
She is frivolous like a female animal in heat – that is fourteenth.
She easily accepts gossip and lies – that is fifteenth.
After quarreling with everyone,
She cannot get a husband – that is sixteenth.

öbörön beyebēn maqtan busudi moudxan inēkui-lügē yesün:
bügüdedü xuricaxu-du bayartai bolōd
beki metü züreketü bolxu-luγā arban:
noxoi γaxai metü ourtai bolxu-luγā arban nigen:
iden-dü xolmoi bolōd küükünēsen abuqsun youmā
öüri ülü kücēkü-luγā arban xoyor:
gemēn ülü / meden genen uulixu-luγā arban γurban:
ölöqčin noxoi metü salkilan yabuxui-luγā arban dörbön
xadxa xob kigēd zengken üge-dü bayartai bolxui-luγā arban tabun:
xamuγā kerülded
xanilxu nökör ülü olxu-luγā arban zuryan (fol. 7r).

Thus, the instructions of the minister-tushimel Onisutu reflect very realistic requirements for a woman, which have emerged in society since ancient times. However, with the spread of Buddhism, traditional ideas acquired a new meaning, when the good deeds of the body, speech, and mind were not simply opposed to sinful ones, but began to be perceived as a means of saving oneself, one's loved ones, and all living beings. Ideas about the marriage union and well-being of family life were also linked to these requirements.

On happy and unhappy marriages

The impact of Buddhism is most clearly manifested in the notions related to family life. The marriage union began to be perceived not only as a natural calling of man and woman, but also as a kind of spiritual choice of joint entry on the path of doing good, leading to enlightenment. On this path, a happy and harmonious coexistence is more dependent on the woman. Her love supported by mercy and compassion, strengthens her willingness to self-sacrifice. This is the hidden meaning of the instructions by minister-tushimel Onisutu, where he points to four types of women who find happiness in marriage with their chosen one (*učiraqsan nökürön amaran ǰiryaxu yosotu dörbün xatun bui*).

The wife who perceives her husband as a celestial dweller
Takes care of him like a mother,
Honors him like an older sister and brother,
Behaves like a servant and slave,
The husband sees her like a celestial maiden,
She will live in happy prosperity.

nökürōn tengeri metü sanaxu
eke metü asaraxu sedkil-tei bolxula amaran ǰiryaxu:
egeči döü metü kündülkülē sedkiltei bolxula amaran ǰiryaxu:
bōl šibeqčin metü zang-yēr yabuxula amaran ǰiryaxu:
okin tenggeri metü sedkil-dü zokistoi bolxula amaran ǰiryaxu (fol. 8r).

For better understanding of how the essence of these instructions has become a natural phenomenon for a Kalmyk woman, we should cite one testimony dating back to the late 19th century: "The owner's wife usually prepares tea or other food… According to the steppe custom, she does not have the right to eat the food prepared by her until she treats all men sitting in the yurt, starting with her husband. It is considered to be the greatest courtesy on his part, if he leaves half a cup of tea or soup and, throwing a *togush* (twisted bread) or a piece of boiled lamb meat into it, serves his wife in front of all the visitors! She accepts this surprise from her husband with extraordinary delight as an expression of special love and affection!" (Smirnov, 1999: 69).

Until recently, the marriage culture of the Mongolian peoples had the tradition of matchmaking children before birth (*öndögön xuda* – 'prenatal matchmaking'), which was consolidated by the ritual of offering milk, eggs, and an oath of good wishes (J̌amca, 2014). In oral and written literature, there are stories about a groom's search for his bride (*өndgn siit*), whose parents, owing to various circumstances, left their traditional place of roaming. The groom's right to the bride who was arranged to marry him by his parents from before birth was unshakable. Even the ruler could not dissolve such a marriage union (Bayaka, 1989).

A fact is known from Oirat history, when the violation of a marriage contract made an impact on the course of historical events. The daughter of the Dzungarian ruler Batur-Khuntaiji (according to oral tradition, her name was Sayin-Mende) was arranged to marry Eseljan, the son of the Khoyt prince (Noyon) Eselbiyn-Sayin-Ka, when she was still a child. However, pursuing favorable military and political options for himself, Batur-Khuntaiji gave his daughter to Puntsuk (Monchak), the son of the Torghut ruler Shukur-Daichin, in spite of the agreement. Not daring to contradict her father, she went to the Torgut nomadic camps, and a year later returned to Dzungaria with a son in her arms (the future Kalmyk Ayuka Khan). Sayin-Mende handed her firstborn child to her mother and told her father that she had fulfilled his will by marrying Puntsuk, but would not violate the marriage contract, and was reunited with Eseljan (Batučoluun…, 2015). The great ruler of Dzungaria did not have the right to argue with his daughter. However, Batur-Khuntaiji took full advantage of the fact that not just his grandson, but the main contender for the seat of the ruler of the Volga Torguts was in his house. Apparently, this circumstance forced the Torgut ruler Shukur-Daichin to spend almost ten years in Dzungaria before he managed to return his grandson to his lands (Palmov, 1992: 41).

In contrast to women who are happy in their family life, the minister Onisutu lists four types of women who are doomed to unhappy life in marriage (*ǰiryal ülü üzekü dörbün xatun bui*). This is a logical consequence of those

eighteen negative character traits that were mentioned in his previous instructions:

There is no happiness if a woman is like a she-wolf,
Knowing no embarrassment, shame, and fear.
There is no happiness if a woman subjects
Their property acquired to theft, fire, and plunder.
There is no happiness if a woman is like
A terrifying, ferocious hawk.
There is no happiness if a woman is like the
Insatiable female devil rakshasa.

ayixu emēkü ügei ičiri ülü medekü čino metü bolxula ǰirγal ügei:
xurān xumiqsan xulaγayidu abatan
γaldu tülen noxoi-du idöülkülē ǰirγal ügei:
bürin bügüdeyigi butorouluqči xarcaγa metü bolxula ǰirγal ügei:
mou üyiledü erkešin amani xatou rakxa
metü bolxula ǰirγal ügei (fol. 8r).

The instructions of Onisutu the Sage logically complete the precepts of the minister-tushimel Zarliq cecen. He distinguishes three types of marriage bonds, which can be conventionally designated as "heavenly", "earthly", and "infernal". And while the first two unions presuppose family prosperity and happy procreation, the last type dooms a married couple to hellish torments already in their earthly life.

In the instructions of the minister-tushimel Zarliq, a man and woman in marriage that is blessed by the heavens are figuratively presented as buddha and dakini, who have met in the earthly generation. Being highly developed spiritual persons who have managed to overcome earthly attachments, they find each other in order to rise together to an even higher level of spiritual development:

The heavens bless a noble husband and wife,
Who have met like buddha and dakini,
At the same hour, having acquired a single essence,
In happiness, they will complete years and months of life together.

sayin ere emeyi tenggeri xamtudxayu:
burxan kigēd ragini metü učirād saca
nigen činar-tai bolun odoyu:
ǰil saraiyigi ǰirγal-yēr dousuyu (fol. 13r).

The "earthly union" of an ordinary man and woman implies that in the course of their joint, happy existence they will relentlessly practice compassion in order to acquire *bodhicitta*—the necessary quality without which spiritual realization in the earthly generation is impossible:

An ordinary husband and wife are crowned by people,
After finding each other, practicing compassion relentlessly,
They will not notice how the years and months of life together will fly by.

dumdadu ere emeyi kümün xamtudaxayu:
učirād saca enerikü sedkil ülü tasurayu:
on sarayigi önggüreküyini ülü medeyu (fol. 13r).

An "infernal union" condemns a husband and wife to terrible suffering in the earthly life. Their consciousness is scorched by the fire of anger, poisoned by the venom of ignorance, and suppressed by the thickness of ice of cold indifference:

An unhappy husband and wife are driven together by poverty,
Like creatures with rabies,
With drooping eyes and a grimace on their face,
Years and months of their life together will pass in quarrels.

mou ere emeni külčin xamtudxayu:
āli ada učiraqsan metü
nüdēn buulγan xabaran murčilzan
on ǰili kerülden dousuyu (fol. 13v).

The influence of Buddhism can be most clearly seen in the instructions on the three types of marriage. The traditional ideas about marriage as a natural union of man and woman serving for procreation, are supplemented with new spiritual content. The family is regarded as a means to achieve spiritual enlightenment.

Conclusions

In the cultures of many peoples, the husband and wife were traditionally expected to preserve mutual love and respect throughout their life together. It is believed that a happy and harmonious coexistence in the family union largely depends on the woman's attitude regarding her duty to her husband and children. Similar views are also typical of the Kalmyks. One of the sources that shaped the traditional views on women and marriage union are the instructions of Usun-Debeskertu-Khan and his twelve ministers-tushimels. The collection of instructions of different kinds contains some precepts concerning positive and negative character traits of women, as well as reasons for happy or unhappy marriages. These instructions reflect realistic requirements in relation to women, which emerged in society from olden times. With the adoption of Buddhism by the Mongolian peoples, traditional ideas were supplemented with new meaning. Using different forms of preaching, including instructions in the form of verbal edification, Buddhism gave the marriage union new spiritual content.

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References

Batučoluun ükürdei-yin gerēs bičiq. 2015
In *Tarbaγatai-yin arban sumun mongγol-yin soyol tüüki-yin material*. Urumqi: Šinǰiyang aradiyin keblel-yin xoro, pp. 145–153.

Bayaka O. 1989
Sidtüküür-yin üliger. Arban nige. Xarbuulči Mergen bolun Buuči Mergen. *Haan Tenggeri*, No. 3: 57–77.

Bicheev B.A. 2019a
Spiski rukopisey i istoriya publikatsii "Istorii Usun Debeskertu-khana". *Oriental Studies*, No. 3: 441–449.

Bicheev B.A. 2019b
"Utro nachni s molitvy, den provedi v mirskikh deyaniyakh" (buddiyskaya etika v nastavleniyakh Usun Debeskertu-khana). *Oriental Studies*, No. 5: 872–882.

Fisher I.E. 1774
Sibirskaya istoriya s samogo otkrytiya Sibiri do zavoyevaniya sey zemli rossiyskim oruzhiyem, sochinennaya na nemetskom yazyke i v sobranii Akademicheskom chitannaya chlenom Sanktpeterburgskoy akademii nauk i professorom drevnostey i istorii, tak zhe chlenom Istoricheskogo Gettingskogo sobraniya Iogannom Ebergardom Fisherom. St. Petersburg: Imp. Akad. nauk.

Golstunsky K.F. 2014
Ocherk poyezdki v Kalmytskuyu step, sovershennoy v leto 1886 goda. In *Mongolica XIII*. St. Petersburg: Peterburg. Vostokovedeniye, pp. 81–86.

Goryaev M.S., Okonov B.A. 2018
Predstavleniya o semye i strategii brachnogo vybora u molodogo pokoleniya (po materialam sotsiologicheskogo oprosa). *Vestnik Instituta kompleksnykh issledovaniy aridnykh territoriy*, No. 1: 60–64.

J̌amca T. 2014
Öndögön xuda-yin učir. In *Tüdübeyin Jamca: Ögüleliyin tüübüri*. Urumqi: Šinǰiyang-giyin suryan kümüǰil-yin keblel-yin xoro, pp. 416–429.

Kalmytskaya khrestomatiya dlya chteniya v aimachnykh i v mladshikh otdeleniyakh ulusnykh shkol. 1927
S. Boldyrev (comp.). Prague: KKKR v ChSR. (Khonkho; iss. III).

Kalmytskiye istoriko-literaturniye pamyatniki v russkom perevode. 1969
A.V. Badmaev (comp., intro., ed.). Elista: KNIIYaLI.

Nebolsin P.I. 1852
Ocherki byta kalmykov Khoshoutovskogo ulusa, sostavlenniye Pavlom Nebolsinym. St. Petersburg: [Tip. K. Kraiya].

Pagsam-Dzhonsan: Istoriya i khronologiya Tibeta. 1991
R.E. Pubaev (transl. and comm.). Novosibirsk: Nauka.

Palmov N.N. 1992
Ocherk istorii kalmytskogo naroda za vremya yego prebyvaniya v predelakh Rossii. 2nd ed. Elista: Kalm. kn. izd.

Prozritelev G.N. 1912
Voyennoye proshloye nashikh kalmyk: Stavropolskiy kalmytskiy polk i Astrakhanskiye polki v Otechestvennuyu voynu 1812 goda. Stavropol: [Tip. gubern. pravleniya].

Radnabhadra. Lunniy svet: Istoriya rabdzham Zaya-Pandity: Faksimile rukopisi. 1999
G.N. Rumyantsev, A.G. Sazykin (trans.), A.G. Sazykin (intro. and comm.). St. Petersburg: Peterburg. Vostokovedeniye. (Pamyatniki kultury Vostoka).

Smirnov P. 1999
Puteviye zametki po Kalmytskim stepyam Astrakhanskoy gubernii. Elista: Kalm. kn. izd.

Zhitetsky I.A. 1892
Astrakhanskiye kalmyki (nablyudeniya i zametki). Astrakhan: [Tip. "Astrakhanskogo listka"].

Zlatkin I.Y. 1983
Istoriya Dzhungarskogo khanstva. 1635–1758. 2nd ed. Moscow: Nauka.

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Mythologizing History in Buryat Shamanic Rites

This study explores the regional specificity of Buryat rites with regard to the variable manifestation of mythological and historical components, and late innovations. The first attempt is made to reconstruct the mythological component of spoken texts accompanying these rites in the historical and ethno-cultural context. On the basis of field and archival data, contamination and transformation of myth and history in ritual is demonstrated. The principal characters such as deities, shamans, tribal and clan chiefs are described, and the semantics and pragmatics of ancestor and master-spirits in the historical context are discussed. The mythological status of supernatural characters of the rite is assessed. Specific ethnic criteria of turning real personalities into mythological characters in the historic context are listed. Universal features traceable in the process of turning history into myth include a regular mixture of mythological motifs with historical facts, interchange of temporal planes, and especially the reincarnation theme. The conclusion is made that pragmatic rites are the most stable, whereas the general tendency is that rites become less and less connected with mythology and progressively less hyperbolic.

Keywords: *Rite, history, myth, tradition, semantics, semiotics.*

Introduction

A diachronic cross-section of ritual evidence from one region and synchronic cross-section of evidence from different regions in a comparative context is widely used for identifying social-demographic aspects, worldview, and historical facts in modern Russian ethnology and folklore studies. Interdisciplinary research from a broad historical and ethnic-cultural perspective is also actively pursued. Comparative and typological studies have come to the fore in international scholarship for studying traditional values and mental features of a particular ethnic group. Folklore-ethnographic and historical approaches supplement the study of the processes of objectification of scholarly integration. In this article, the comparative method is based on the findings of structural-semiotic analysis. As S. Langer observed, language, myth, and rite are the semiotic means of culture, and "the material of myth is the already familiar symbolism of dreams and reveries" (2000: 159–160).

This study intends to identify historical, ethnologic, and mythological components in shamanic ritual activities using the accompanying verbal evidence. Comparing the variants of rites and texts implies interpretation of protagonists' images and their transformation in the course of historical and religious changes in the worldview. The theoretical conclusions of scholars concerning the functioning of symbols, myths, and ritual ceremonies are taken into account while studying local ethnic rites. The opinion of the famous English ethnographer, anthropologist, and folklorist V. Turner is particularly relevant for our research: "Performers of different age,

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sex, ritual role, status, degree of esoteric knowledge, etc. provide information of varying completeness, explanatory power, and internal consistency. From this information, the researcher must deduce a conclusion as to what the members of the given society think about the rite" (1983: 41). We also agree with K. Klakkhon, according to whom, "strict definition of 'myth' as 'sacred history' does not yet give grounds to assume that myths only serve as descriptions of rites that are correlated with them. Rose rightly asserts that 'there are many myths whose connection with the rite needs to be proven, and not simply assumed'" (2003: 159). Therefore, in the course of comparative analysis, texts will be considered in conjunction with ritual ceremonies.

The content of shamanic texts mainly depends on the extra-textual mythological structure, where the myth is present as obligatory background. It accompanies the ritual action and reveals the content and structure of the rite being performed. In this study, the myth is viewed as a "ritualized text" (D.D. Fraser). We follow the point made by Russian and international anthropologists, ethnologists, and folklorists who stated that religion has inherited the functions of the archaic continuum of myth and rite. This work follows comparative-contrastive, semantic-hermeneutic, and structural-semiotic methods.

Mythologization of protagonists in ritual action

Ancestral spirits. For the first time, specific shamanic practices of the western Buryats are analyzed using the evidence of contemporary field research compared with archival sources of the earlier period. The genealogy of shamans and continuous connection with celestial ancestors play one of the most important roles in ritual activities in the Buryat and Mongolian traditions. Establishing a connection between the worlds is a prerequisite for any rite. According to the informants, spirits as ephemeral creatures, most often the souls of deceased ancestors, but precisely those who were close to the old men or shamans conducting the rite, act as a connecting link. As it turns out from numerous stories of the Buryats, the soul of a shaman in the sky watches over his descendants and helps them during the rite. The ancestral spirits belong to local deities and establish a connection between the world of the living and the highest celestial dwellers who do not contact people. Each Buryat tribe has its own totemic first ancestor; different clans in the tribe may also have their own first ancestors. In modern practice during the rite, people address the spirits of recently deceased ancestors who are closely linked with historical reality.

Precisely the ritual action, during which a connection with the other world is established, introduces all events of the rite into mythological time and space. "In the mythopoetic chronotope, time condenses and becomes a form of space… Space, on the other hand, becomes 'charged' by the internally-intensive properties of time ('temporalization' of space), is drawn into its movement, becomes inherently rooted in the myth and plot (that is, in the text), unfolding in time" (Toporov, 1983: 232). In this regard, a mythological chronotope with specific rules of behavior is introduced during the ritual action.

Each locality has its own revered spirits whose names are mentioned in all rites of local importance. They can be both great shamans and leaders of clans and tribes. The mythological history of clan spirits is closely related to real personalities and their biographies. As T.D. Skrynnikova observed: "A general tribal and ethnic cult of the ancestors of chiefs and princes, whose persons were deified by many peoples during their lifetime, emerges in the process of posthumous deification of the heads of clans and tribes" (1997: 182). In the legends and stories about shamans, the biography of the protagonist is told with mythological additions about his supernatural abilities during his lifetime and after his death. It is notable that as with shamans, historical figures acquire magical properties when they become the protagonists of legends and stories.

While performing any shamanic rite, each Buryat clan first of all mentions its ancestor by whose name the clan is often called and who is considered its protector and guardian. According to the records of the ethnologist S.P. Baldaev, numerous representatives of the Gotol clan in Bokhansky District of the Irkutsk Region began the ceremony by invoking their ancestor, calling him "the venerable father Gotol" (1970: 18). The contemporary descendants of Gotol in the village of Krasnaya Buret address *goyokhon Gotol təədei* – 'the beautiful grandmother Gotol' (informant Mikhail Ubugunov, born 1928, clans of Bulagat and Gotol, village of Krasnaya Buret, Bokhansky District, Irkutsk Region. FMA* 2011). According to the informants, her spirit comes to help them; she has the ability to keep the connection between the worlds. How could such a substitution occur and was there really such a woman? The image of the mythological old woman is clarified by the records of Baldaev on the history of the Gotol clan: "Gotol was the illegitimate son of Alagui from Amarkhan, who came from the Abzai clan of the Ekhirite tribe, at the time living in the valley of the Lena (Zulkhe) River. She was smart, agile, and hard-working. Gotol was narrow-minded, clumsy, and weak…" (1970: 66). As is known, special events become engrained in the mass consciousness and acquire mythological features over time. It seems

*Field materials of the author.

that a strong, real-life female protagonist with a special charisma was the basis for the legends about the clan ancestor. In the mythological version, there happened a substitution of names (the mother received the name of her less interesting son).

A protagonist endowed with mythical, supernatural properties is summoned as a protector of the clan in specific ritual action when the spirits of ancestors are invocated. In shamanic legends, real historical events are interspersed with fictional inserts about the supernatural deeds of a shaman. If a shaman had high authority and possessed esoteric knowledge during his lifetime, his abilities after death would acquire incredible epic scope in the stories about him. The stories about the activities of shamans' spirits were distinguished by specific features, distinctive for each of them, which were correlated both with the real biography of the protagonist and mythological prehistory of the entire clan.

Reincarnation into a bird. Functions of the protagonists in ritual action are completely subordinate to mythological and symbolic components of the rite. In this situation, real social-historical and spatial-temporal landmarks naturally shift. Notably, "myth and rite are symbolic procedures, and they are intertwined with each other, along with other things, much more closely in this respect. Myth is a system of verbal symbols, while rite is a system of symbolic objects and actions" (Klakkhon, 2003: 168).

A combination of real and mythological stories is typical of the modern traditions and legends about the revered ancestors. "The shaman Semyon would turn into a goose; he had such abilities that he could stir boiling salamat with his bare hands and could lift a table of food with his teeth. Grandma Romashka would turn into a dove and visit us. She could simultaneously bind sheaves and bake bread at home" (informant Mikhail Ubugunov. FMA 2011). In the first episode, the traditional motif of shaman stories, associated with the gift of shamans from the blacksmith clans to hold red-hot iron with their bare hands, is supplemented with elements showing a clear combination of the real and fictional. The unreal, confirmed by the authority of the shaman, becomes reality. We should mention that organization of artistic space and time plays a special role in constructing the mythological discourse. Images of heroes in the popular consciousness gradually become magnified and acquire mythological features with the help of the traditional motif of reincarnation and coincidence of times. Ritual texts manifest a steady mixture and interaction of myths and stories of a different temporal continuum. Later legends about the ancestors contain real names and events, but they show a connection with the early myth of the first ancestors. A mythological motif about the origin of a certain tribe or clan from some animal, bird, or reptile is widespread in shamanic legends and traditions.

A distinctive mythological motif of reincarnation into a bird is present in the above text about the Tarasa shamans. The spirits of the shamans from this area are referred to as the Tarasa elders, who in the invocations are designated by encoded names: *akhanuts* – 'the elders', *tarasain eheshyγl* – 'the Tarasa greats', *ynderei γbged* – 'elders of the heights'. Baldaev, who collected extensive evidence on the system of shamanic genealogies of the western Buryats, came to the conclusion that "the cult of the Akhanuts has transformed over time into the cult of ancestors. In the ancient times, three main clans of the Akhanuts—the Ardai Akhanuts… Obusa Akhanuts… and Tarasa Akhanuts… emerged" (1940: No. 1091, pp. 3–4). It was believed that the Tarasa great shamans could reincarnate during their lifetime and travel to other worlds, and after death could return in the form of a bird. According to the records of the ethnographer M.N. Khangalov, made in the late 19th century, "…the Tarasa Akhanuts turn into wolves, eagles, geese, and camels. They cannot be transformed into other animals, from which they do not originate" (1959: 180). We are especially interested in the image of the goose.

Contemporary stories of informants mention a white bird with a special immanent power. In the tradition of the Mongolian peoples, birds of white color are most closely associated with the celestial world. It is interesting that according to the study of V. Turner, among the African tribes this color personifies harmony and purity of the ancestors: "Ancestors are considered to be even purer, and albinos enjoy special respect, since they are regarded as 'carriers of whiteness of the ancestor-spirits'" (1983: 36).

Transformation of the original mythologeme. Comparative analysis of our own data and archival materials reveals the preservation of the original code of the bird in the motif of reincarnation, but transformation of the mythologeme. According to the records of Baldaev from the 1960s, the formula about the geese is consistently repeated in the shamanic "poems" about the Tarasa spirits. The invocation of Egor, the son of Fedot, the last shaman from the great Tarasa clan emphasizes the differences of clans, and mentions reincarnation into a goose and eagle: *Alandara tolgoydon* / *Arban galuun bolozho*, / *Ganganhan udkhamnai*, / *Budeneee tolgoidon* / *Burged shubuun bolozho,* / *Elihen udkhamnai!* (Baldaev, 1912: 3) – 'On the summit of Alandar / Turning into ten geese, / Our honking clan, / On the summit of Budenei / Turning into a bird-eagle, / Our soaring clan!'

The image of a bird as a messenger of the upper world and symbol of the ancestor's soul is typical of the entire Turkic-Mongolian mythology. Ancestors communicate with the earthly world through a bird. Owing to the loss of the original data, the image of the goose transformed into a white bird, swan, or dove is the most popular of all reincarnations according to the

modern interpretation. In this case, the mythological version of the origin of the Tarasa shamans is preserved in the context of real stories, mythologizing the entire narrative. Thus, we can observe contamination of the images of the chosen real ancestor and totemic first ancestor, summoned during the rite.

The studies in historical poetics conducted by N.A. Krinichnaya concerning the problem of reconstructing motifs in folklore texts are extremely important for our work. "The transformation of motifs from archaic forms to later forms occurs primarily in the direction of their demythologization, dehyperbolization, and filling with various kinds of realities, which ultimately results in displacement of the mythological and epic-related content by specific historical content" (Krinichnaya, 1987: 24). Thus, we can observe oblivion and generalization of more ancient versions of the myth and a dominant role of modern realities associated with historical changes in the life of the Buryats, including household innovations adopted from the Russians, such as binding sheaves or baking bread.

Combining history and myth

A historical fact sometimes becomes the basis of a myth in shamanic verbal evidence. The serpent as a progenitor is quite common in the mythology of various peoples of the world. The myth of the first totemic ancestor most frequently appears as a fact without explanation; in rare cases, the reason for the appearance of a particular totem is mentioned. According to stable formulaic expressions in the poetic texts of summoning the ancestors, the Buryats from the Khordut clan derive their totem from snakes. Shamanic legends recorded by Khangalov describe the myth about the ancestors of that clan in a more sophisticated way: "The Ongo-Khorduts turn into a bear, and snakes go out of their mouths, nose, ears, and fingers" (1959: 180). In real stories, they appear as snake hunters, but over time, the object of their hunt turned into the totem of the clan, while the image of the snake is preserved in different variations, including sophisticated mythological contaminations of zoomorphic totems.

The metamorphosis of the snake, which played an important role in the shamanic tradition, becomes mythologized: *Narin mogoi ilbimnai* / *Namtar bakha unaamnai* – 'The thin snake is our magic, / The short frog is my horse' (Ksenofontov, Batorov, 1975). Real history is forgotten in the formulaic expression of the clan-related difference, and connection with the advanced mythological semantics of the snake image is consistently preserved. In this case, the myth about the totemic first ancestor becomes combined with historical fact.

Mythologization of historical figures

In shamanic practice, if the spirit of an ancestor is identified as being a famous, historical person, this implies the image of a mythological warrior, protector, and hero with supernatural qualities. A vivid example of contamination of real events and mythological components of the rite are the revered spirits of the Ekhirite Buryat tribe, called the "black riders" (Azharai Bukhe and Kharamsai Mergen). The archival materials of Baldaev have preserved numerous versions of both real and mythological biographies of the main characters. Notably, the mythological versions seem natural in folklore narratives, while versions of the real life stories raise doubts as to their reliability. Analysis of the available folklore and ethnographic evidence proves that Azharai Bukhe and Kharamsai Mergen were real leaders of the Ekhirite clans, who participated in historical events (internal wars with the Mongols, resistance to the Cossacks) in the 1840s–1870s. After their tragic death, they were both included into the circle of formidable shamanic deities (although they were not shamans) and turned into revered mythological spirits. The Buryats from the Ekhirite clans worshiped them as clan ancestors during the shaman initiation ceremony and as warriors and protectors during the rites on the occasion of all events associated with military operations. These spirits were revered as masters of the Lena River (the historical dwelling place of the Ekhirites), mythologizing their wealth and power. There is also a legend about the "black riders" as formidable guards, keeping the entrance to the kingdom of the dead of Erlen-Khan. Accumulation of new mythological stories was accompanied by "code-switching" of the same characters in different ritual events. It is as if the rite dictates new myths, and here it is appropriate to cite the opinion of E. Cassirer: "A myth is not a system of dogmatic beliefs: it consists not only of images and beliefs, but to a much greater extent of actions. <…> Rite is primary in relation to dogma both in a historical and psychological sense" (1998: 532).

Modern field research in the Kachugsky District of the Irkutsk Region, where the Ekhirite clans historically lived and where the cult of the "black riders" was the most elaborate, show that rites dedicated to formidable spirits are only performed by shamans when it is absolutely necessary. The shaman initiation rite (conducted by the Zaarin shaman Boris Bazarov, born 1946, of the blacksmith Galzut clan of the Ekhirite tribe, Ulan-Ude. FMA 2009), which was recorded by the author of this article, is of particular interest. A prerequisite for the rite was preparation of special trees and fires for communicating with the ancestors. The Buryats from the Ekhirite tribe dedicate four personalized bonfires to the deities; the largest bonfire is intended for a sacrificial

ram. Each element of the rite has hidden information. It is pertinent for our discussion that the sacrificial ram is covered with black silk, which is dedicated to the "black riders" as the clan, ancestral celestial dwellers of the Ekhirites. For understanding the meaning of the rite, it is necessary to decipher its semiotic aspect preserved in the "collective memory".

Thus, we can conclude that the image of the "black riders" with their polysemantic function emerged at the junction of two worlds—the real world (during their lifetime) and mythological world (after death). In this case, myths canonize the protagonists pushing aside the history of real persons, which is often present only in the background. In some cases, an entirely new myth is composed, preserving the principal image of a formidable spirit.

Myth and history in rites dedicated to the sacred space

This section discusses the rites associated with specific topographic realities. The sacred space outlines the domain of the local master-spirit to whom seasonal rites are dedicated. Sacred places require a special attitude towards them and adherence to specific rules. Most often, the "master" of a cultic place is a real historical person, usually the first of those who settled in that area, and after death he becomes a revered spirit. In the Mongolian world, mainly outstanding male or female shamans are endowed with sacred status. Modern field evidence confirms that periodic and occasional rites of today are carried out systematically; legends and traditions of the master-spirit are actively used and modified. Rites associated with the cult of the mountains seem to be pertinent to our research.

The mythological masters of the mountains with no real prototypes stand out in the sacred space. They may belong to the most archaic rites of worship; only a strong clan with ancient shamanic history may have higher deities as patrons. In such a rite, gender-related, occasional, temporal, spatial, and color codes are observed in strict accordance with the rules of the action.

Each individual clan in each settlement has its own revered mountain or summit. For example, the Shosholok clan in the Zakamensky District of Buryatia worships Mount Uran Dushe ('Skillful Anvil'). According to the legend, ninety nine or thirty three celestial blacksmiths descend on it and engage in blacksmithing, since the Shosholok clan worships these deities. In the celestial pantheon, they stand out as the most powerful patrons associated with iron and fire. "Fifty five western tengerins led by Khan Khurmast Tengeri, forty four eastern tengerins led by Atai Ulan Tengeri, thirteen northern khats led by Bukha Noyon, seventy seven celestial blacksmiths led by Damdin Dorlig Sakhyusan, the keeper of faith and protector of warriors and warfare Khisan Ulan Tengeri, and the spirits and masters of localities were summoned for the rite on Mount Uran Dushe. Each shaman-blacksmith participating in the rite summoned his ancestral blacksmith spirits—Ongon Tengeri" (informant Semyon Tsyrenov, born 1938, Shosholok clan, shepherd, village of Sanaga, Zakamensky District. FMA 2012). As can be seen from this example, not only the celestial dwellers of the highest rank from the shamanic pantheon are summoned. The lamaized character Damdin Dorlig Sakhyusan is the leader of the blacksmith deities. In modern rites, depending on religious preferences, both shamanic characters and characters with modified names can be addressed at the same time.

Field research on ethnic Buryatia have revealed the largest number of mountain masters associated with the names of shamans who lived in the area and were endowed with mythological functions in the status of spirits. For example, people in the Barguzin Valley revere Shinalzhan, the summit of the Ikat Ridge. The Buryats from the Khonkho Sengelder clan worship a female deity there—their patron spirit who, according to their beliefs, lives in a cave and when necessary comes out and communicates with the descendants. The origin of the spirit is similar to numerous biographies from shamanic legends: a girl fell ill with the shamanic disease; her father refused to initiate her as a shaman, beat her, and locked her up with the sheep; from hunger she drank the blood of a ram; she suffered for twenty days; when her mother brought food, the girl broke free, ran away, and hanged herself in the foothills of Shinagalzhan. The Buryats from the Khonkho Sengelder clan perform an annual ritual sacrifice of a sheep to her as the daughter of Isgei named Zagalan (*Isgein basagan Zagalan gezhe neretei*). It is believed that an angry, innocently offended spirit must be propitiated. And if the spirit is not angry, then, as a female with maternal protective functions, she protects and helps her descendants. The invocation includes a text in a standard form of offering and a request with the following appeal:

Narin Burgal selgeetei,
Namtar Daakhin guideltei,
Doloon narhan sergetei,
Dongoin Maryaan huudaltai
Iisgiin basagan Zagalan.

With the narrow (river) Burgal in coolness,
With the place of being in the low-lying Dakhin,
With seven pines – hitching posts,
With the place of stay in Dongoin Maryaan
The daughter of Isgi Zagalan.

(Shamanizm…, 2003).

As is customary in the tradition of shamanic rites, ancient places of worship by the inhabitants of the

Barguzin Valley—*Daakhin*, *Doloon narhan*, *Dongoin Maryaan*—are mentioned here. The Evenks of the entire valley celebrate their summer *boldir* festival every year in a scenic area surrounded by mountains. During the festival, they performed a circular dance around a fire singing *yahii*, and therefore this whole depression is called Yassy (Buryat *Yahii*). Notably, the Evenks marked their places of worship by the name of the trees: *Doloon narhan* – 'seven pines', *Khuhan barisa* – 'birch place of offerings', *Shenehen barisa* – 'larch place of offerings' (informant Mikhail Sandanov, born 1958, Khonkho Sengelder clan, village of Urzhil, Barguzinsky District, FMA 2009).

The rites dedicated to mountains are accompanied by mythological stories that enhance the sacred function of mountains and their masters as guides between the worlds. Mount Dongoin Maryaan is famous for a deep hole into the underground, located on its bald summit. The Buryats call this place *Gazaray urkhe* (lit. 'chimney of the earth'), that is, the junction of the two worlds, a narrow abyss for transiting to the underworld. The legend of a mighty hunter supplements the mythological picture associated with the specific features of the mountainous terrain: when following a dwarf, he found himself in the underworld and saw little people there serving Erlen Khan (informant Shagdur Badmaev, born 1924, Buga Shono clan, artist, village of Bayangol, Barguzinsky District, FMA 2009).

For comparison, we should turn to the legends of the Zakamensky Buryats about the other world of Yagshad, where shamans and people with a special gift can enter. There was a great shaman Yampil podroda mooskha from the Shosholok clan. Once he disappeared for a month and returned bringing the fur of animals of five species with him. His whole subclan became rich; people said that their shaman visited the promised land and returned blessed. There are legends according to which the blessed country of Yagshad is located exactly between five magnificent mountains surrounding the village (informant Klavdia Budazhapova, born 1957, Sabar Khongoodor clan, history teacher, village of Sanaga, Zakamensky District. FMA 2012). It is believed that one can get to the other world from the mountainous area as the promised land and prototype of the divine land of Divazhan. After the death of shamans, additional mythological stories, which affect the course of ritual actions, appear along with realistic stories about their lives. Depending on specific mythological stories, the rites are performed either by old people or by shamans. Ritual actions dedicated to master-spirits fulfill a pragmatic function.

We have also recorded the rites in which shamanic places of worship with changes in religious traditions received a Buddhist status of sacred objects. The revered spirit-masters of the area acquire corresponding names, and rites are carried out according to the canons of Buddhism, although, as it turned out in the course of the conversation, the rites secretly preserved their shamanic roots. Therefore, in some cases, ritual acts are performed according to both shamanic and Buddhist rules.

Instances of sacralization of mountains associated with changes in historical realities have been identified in the course of field research. Joint life with the Russians and their role in the life of the indigenous population has led to emergence of a cult of new master-spirits in accordance with the necessities of the time. In the same Zakamensky District, a Russian Cossack is considered to be the master of Mount Baatar-khan. Ritual worship is dedicated to that master-spirit before going to serve in the army; during war, special rites of his worship as master-warrior and protector of warriors were performed. According to the notes taken by G.-D. Natsov in the early 20th century, "Bagatur Khan was offered a toolei (head) of a cow, and a fish was placed on top. The legend says that this deity had the appearance of a man with a black face wearing Russian clothes" (1995: 73). The black face means a bearded Cossack, who guarded the border in this area. Notably, the Russian warrior is mythologized according to the shamanic tradition. Pragmatism begins to be involved here: precisely such a master-spirit is needed for performing the transitional rite associated with departing for the army. It is worth mentioning that in this case there is no detailed mythological history of the patron and no definite, real protagonist, but only a generalized image.

Modern records emphasize the persistence of a basic code that determines the status of the master-spirit. A standard, ritual set of food is enriched by fish: "Along with traditional Buryat dishes such as salamat, milk skin, khuruut, milk, and vodka, such local fish as Asiatic trout is definitely served, based on the belief that fried fish is the best food for Russians" (informant Klavdia Budazhapova. FMA 2012). Notably, the meaning of each gift that is offered to a certain spirit and acquires an "ethno-semiotic status" (Baiburin, 2005: 31), correlates with a supposed real protagonist.

The rites dedicated to the sacred space manifest a restructuring of the traditional system of revered protagonists, associated with religious and historical changes in the worldview, although the overall pattern of the ritual action remains unchanged. Ancient rites involved a monumental picture when thirty three mighty warriors made a forge out of thirty three mountain peaks and conducted blacksmith rites. The main protagonist in the later rites is an ordinary Russian Cossack with real facial features, and he is worshiped as a military man. Thus, we come to the conclusion that clear demythologization and dehyperbolization occurs in modern ritual activities. Spirit-masters of local mountains as religious and mythological characters with protective power turn out to be closely related to historical figures.

Conclusions

On the basis of the results of numerous expeditions and archival evidence, we have come to the conclusion that the composition of ritual actions is influenced both by the mythological component and historical events. The historical context sets a measure of reality and authenticity to the protagonist, while the paradigm of sacred beliefs behind it determines the mythological component. The analysis of the composition of ritual actions has shown that the ritual pattern remains unaltered even when the summoned mythological protagonists change. Indeed, "striving for uniformity and continuity of the models developed by culture has found expression in the entire complex of means that ensure the maximum stability of these models" (Baiburin, 2005: 12).

This research has made it possible to establish a model for mythologizing historical facts in the most stable elements of the rite. The mythological status of protagonists of ritual actions is primarily determined by the motif of reincarnation into the spirit of the ancestor, master-spirit of the area, while their role and function are determined by historical and mythological events. Comparison of modern field evidence with earlier records reveals both actualization of the archaic semantics of some stable motifs, and replacement of an autochthonous mythological tradition with new mythologized versions associated with the flow of historical information. Instances when the mythological content was replaced by specific historical content and vice versa have been described in this study.

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References

Baiburin A.K. 2005
Zhilishche v obryadakh i predstavleniyakh vostochnykh slavyan. 2nd rev. ed. Moscow: Yazyki slavyan. kultury.

Baldaev S.P. 1912
Prizyvaniye Yegora, syna Fedota (Pidoodoi Yegoroi durdalga): Zapisano ot Tosona Petukhova, Bokhanskiy rayon, 1912 g. CVRK IMBT SO RAN. F. 36, Inv. 1, D. 1268.

Baldaev S.P. 1940
Zayany: Zapisano ot P. Petrova, s. Khadakhan, Alarskiy raion, 1940 g. CVRK IMBT SO RAN. F. 36, Inv. 1, D. 11/53.

Baldaev S.P. 1970
Rodoslovniye predaniya i legendy buryat, pt. I. Ulan-Ude: Buryat. kn. izd.

Cassirer E. 1998
Izbrannoye: Opyt o cheloveke. Moscow: Gardarika.

Khangalov M.N. 1959
Sobraniye sochineniy, vol. 2. In 3 vols. Ulan-Ude: Buryat. kn. izd.

Klakkhon K. 2003
Mify i obryady: Obshchaya teoriya. In *Obryadovaya teoriya mifa*. St. Petersburg: Izd. Sankt-Peterburg. Gos. Univ., pp. 157–176.

Krinichnaya N.A. 1987
Russkaya narodnaya istoricheskaya proza: Voprosy genezisa i struktury. Leningrad: Nauka.

Ksenofontov G.V., Batorov P.P. 1975
Po shamanskim verovaniyam buryat. 1975 g. Yakutskiy filial SO RAN. F. 4, Inv. 1, Item 52a, fol. 105–108.

Langer S. 2000
Filosofiya v novom klyuche. Moscow: Respublika.

Natsov G.-D. 1995
Materialy po istorii i kulture buryat, pt. I, G.R. Galdanova (trans. and notes). Ulan-Ude: Izd. BNC SO RAN.

Shamanizm barguzinskikh i kudarinskikh buryat na sovremennom etape. Avgust 2003 g. 2003
CVRK IMBT SO RAN. Obshchiy fond, shamanstvo. No. 2647.

Skrynnikova T.D. 1997
Kharizma i vlast v epokhu Chingis-khana. Moscow: Vost. lit.

Toporov V.N. 1983
Prostranstvo i tekst. In *Tekst: Semantika i struktura*. Moscow: Nauka, pp. 227–284.

Turner V. 1983
Simvol i ritual. Moscow: Nauka.

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The Tiger-Dog and its Semantics in the Nanai Shamanic Sculpture: Cultural and Cognitive Aspects

This article describes the Nanai shamanic set, combining two images—a dog and a tiger. The Nanai shamanic sculpture is viewed as a phenomenon reflecting both the subjective and the objective reality constructed by traditional cultural practices. Parallels with Siberian and Pacific cultures reveal the significance of the domestic animal and the wild predator for the people of the Lower Amur. Using folkloric and lexical data, findings of field studies, and ethnographic evidence, folk images of the dog and the tiger are reconstructed. Viewing the problem in the context of collective knowledge about the world reveals the archetypical and modified layers in the image's construction. The idea of the dog, typical of all the peoples of Siberia and the Russian Far East, is that of a draft animal, assistant, sacrifice, and guide to the afterworld. Its image in the Nanai shamanic sculpture was meant to enhance the power of the spirit. It was often combined with the image of the tiger, personifying shaman's power and the progenitors. The analysis of the terminology relating to the tiger attests to the Southeast Asian roots of its cult. The tiger semantics in the Nanai culture resulted from a blend of Tungus, Paleoasiatic, and Manchu (Chinese) elements. These images were used by shamans not only as assistants in "capturing" spirits and holding them in "detention", but also as a means of communicating with the world of spirits.

Keywords: *Ritual sculpture, Nanai people, dog, tiger, semantic field, shaman.*

Introduction

Shamanic sculpture of the Nanai people is an understudied cultural phenomenon. Its meanings reflect both individual and collective knowledge of the world; and the semantic field of this experience determined the cultural space of the Lower Amur society, comprising many components and manifesting features typical of both egalitarian and stratified communities with animistic views and sophisticated religious cults. The area of this cultural phenomenon includes Siberia with the lifestyle of taiga hunters and reindeer breeders, the Pacific coast where the population practiced sea animal hunting, and some regions of East Asia with agricultural and trade traditions of the population with whom the Amur Valley inhabitants maintained close cultural ties and practiced trade exchange. Studying the examples of the combined cultural elements of the "north" and "south" in the Amur Valley makes it possible to see the cultural syncretization in a wider context and to identify not only its cultural and historical aspects, but also the cognitive factors which gave rise to it (Artemieva, 1999; Campbell, 2002: 90–95; Flier, 2012; Geertz, 1973).

This article analyzes some syncretic images from the ritual realm of the Nanai people, and creates a collective mental portrait of the carriers of traditional culture in terms of its multicomponent composition. The difficulty of studying the ritual sculpture of the Nanai

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people is caused by a decline of shamanic traditions in the Lower Amur region with the establishment of Soviet power in the Far East. Most of the studies that are used by modern scholars as reference guides on Nanai shamanic sculpture were carried out in the late 19th–early 20th centuries. Their authors—P.P. Shimkevich (1896), L.I. Schrenck (1903), S.M. Shirokogoroff (1919, 1935), and I.A. Lopatin (1922)—contacted shamans and even witnessed their ritual practices. Since the 1930s, the study of shamanic complexes among the peoples of the Amur region has often been carried out without consideration of their centuries-old spiritual experience. Some scholars have described and analyzed museum objects collected by their predecessors (Zelenin, 1936; Ivanov, 1937, 1970; Sem, 2002; Titoreva, 2012; Nanaitsy, 2019). Many other scholars, while doing their research, have communicated with the carriers of traditions, but unfortunately the specific features of the old way that they have encountered have been perceived as the echoes of the past and interpreted as vestiges (Bereznitsky, 2003; Ostrovsky, 2009, 2019; Ostrovsky, Sem, 2019). The instances when ritual complexes were moved to the attics of people's dwellings, secluded places behind courtyards, and dense thickets of forests, which have been witnessed by the scholars, testify to transition of shamanism to the stage of latency. Yet, even the evidence collected in the 20th century contains valuable information for reconstructing the semantic field of the ritual realm and the mechanism of the sacred space of the Nanai people. The results of field studies by A.V. Smolyak and T.D. Bulgakova make it possible to identify the settlements of the Nanai area with the surviving shamanic traditions (Bulgakova, 2016; Smolyak, 1991). All of the settlements are located in the present-day Nanaisky District of the Khabarovsk Territory, and are associated with places of residence of powerful shamans. This list includes the villages of Verkhniy Nergen, Naikhin, Daerga, Dzhari, and Dada, as well as the disappeared villages of Mukha, Iskra, Torgon, and the adjacent small encampments. V.A. Timokhin from the Institute of History, Philology, and Philosophy of the Siberian Branch of the USSR Academy of Sciences conducted a survey in these locations during archaeological and ethnographic expeditions (1963, 1967, 1971–1972) in the Khabarovsk Territory. In his field journals, he recorded the facts of using ritual items by people with the shamanic gift (Maltseva, 2008).

Stylistically similar sets of wooden figurines have also been known from other locations in the Lower Amur region, which suggests the transmission of shamanic knowledge through intercultural communication (Kubanova, 1992). According to a survey among the indigenous population in these areas, such connection emerged during funerary rites. For example, among the Gorin Nanai people, there were no powerful shamans; therefore, for the final stage of the funerary rite—the ceremony of sending the soul of the deceased to the afterworld—they invited the shamans from the Nanai people living directly in the Amur Valley. It was believed that these shamans knew the structure of the world and funeral and commemorative customs of the majority of the Amur clans (FMA, village of Kondon, I.K., L.F., and V.V. Samar, November 22–23, 1998). In this way, contacts between the population of the Amur and Gorin valleys were maintained. The established tradition of the shaman's invitation also contributed to the emergence of a universal shamanic set "for all occasions". Although such sets (consisting of wooden figurines) belonging to the shamans of various categories had a common basis, they also had their own distinctive features (Smolyak, 1991: 54–56). In the process of his formation, the shaman not only adopted the main methods of entering into contact with spirits from his mentor, but also often established his own line of communication with the invisible world through improvisations, which resulted in appearance of syncretic imagery (Ibid.: 132–154) (FMA, village of Naikhin, R.A. Beldy, August 28, 2011). To interpret such imagery, we should consider the hypothesis that the wooden figurines that were a part of the ritual sets, were not only the receptacles of the spirits subordinate to the shaman. In order to "decipher" each image, it is desirable to analyze not only its semantics, but also the nature of its connection with other images in the set.

Some sets retained their importance also in the Soviet period. According to the journal materials of V.A. Timokhin, in the 1970s, among the Nanai people of the Khabarovsk Territory, there still were shamans who continued healing practices using wooden sculptures called *sewens*. The records of Timokhin, among the wooden containers of diseases, mentioned *sewen Buchile*, which, together with "two men" and "a dog" (*indavla/endaula*), was used as a remedy (Maltseva, 2008: 167). Approximately twenty years later, a similar selection of wooden items from the shaman set was described by T.A. Kubanova, relying on information from the Kevur group of the Kondon Nanai people, who adhered to the same shamanic traditions as the Amur Nanai people. She observed that the cultic composition of *Buchile* was formed according to the principle of dichotomy, uniting the figures of ancestors—a tiger and tigress (the female *Buchile* is smaller in size)—depicted in the sitting position, which denoted a male and female *Buchile*. Each of these *Buchile* had its own groups of *sewens*: a set of the "ancestor-tiger" included *sewens* rendering the images of a tiger (*Mokhe*) and tigress (*Khapo*); in a pair, they are called *indavla totkorpani* ("the dog that hits the target"); and a set of the "ancestor tigress" included two flattened figures representing her children—tiger cubs (*sangarav*) (Fig. 1) (Kubanova, 1992: 33–43).

In order to analyze the stylized image with the double name, which was a part of this set and conveyed

Fig. 1. Ritual sculpture (*sewens*) of the Nanai people, the *Buchile* set.
a – male *Buchile*, "ancestor-tiger", the main assistant of the shaman (Museum of History and Culture of the Peoples of Siberia and the Far East SB RAS (MHCPSFE SB RAS), No. KP 761 osn.); *b* – *Mokhe* (*Mokha*), assistant to male *Buchile*, stylized image of tiger (MHCPSFE SB RAS, No. KP 2088 osn.); *c* – *Khapo*, assistant to male *Buchile*, stylized image of tigress (MHCPSFE SB RAS, No. KP 763 osn.); *d* – female *Buchile*, "ancestor-tigress", assistant to the shaman (MHCPSFE SB RAS, No. KP 760 osn.); *e* – *sangarav*, "children" of the female *Buchile*, in the form of tiger cubs (MHCPSFE SB RAS, No. KP 1891, 1892 osn.). *Sewens Mokhe* (*Mokha*) and *Khapo* form a separate group *indawla totkorpani* 'the dog that hits the target'.

the meaning of a dog and a tiger, we need to trace the development of its name, content, and form in the historical and cognitive context of the traditional culture of the Lower Amur region.

Dogs in the Amur Valley— from real to symbolic animals

The worldview of the Nanai shamans reflected the natural conditions in which the Amur fishermen and hunters lived. The host of their spirits included the images of wild and domesticated animals inhabiting Siberia and the Far East. These regions are located in the taiga zone, where economic models associated with hunting, fishing, and reindeer breeding evolved. Already in the early stages of human history, the inhabitants of this northern part of Asia could not live without dogs, which helped them in hunting, grazing and pasturing deer, and transporting belongings and people (Losey et al., 2018). In Northern Eurasia, two large areas can be distinguished where the use of dogs had its own specific features. In central Siberian taiga and tundra zones, where relationship between people and deer had a firm basis in economic and cultural areas, dogs were used as sheepdogs. On the Pacific coast, traditions of breeding sled dogs emerged,

which were reflected in the vocabulary of the Paleoasiatic peoples. The Nivkhs have a corpus of words denoting the functions of dogs and their position in the harness ('sled dog' – *if ɣan*, 'dog following the leader in sled harness' – *latrat*, 'first dog in sled harness' – nuɲis, etc.) (Savelieva, Taksami, 1970: 140, 157, 214).

The attitude to dogs among the Tungus-Manchu peoples of the Amur Valley was influenced by the Paleoasiatic and Tungus (Siberian) forms of economic activities and beliefs. The dog has become a multivalued figure in the life of the local community, and this role became reflected in folklore and the sacred domain. The dog's image absorbed many of its original features as transportation animal, sacrifice, assistant, and equivalent of man. The vocabulary of the Nanai people contains the name of sled dog – *khaliachiri inda*; but more words are associated with designation of dogs depending on their color, working qualities, and position in the pack (for example, 'gray dog' – *kurien*, 'black dog with a white stripe on the forehead' – *chokoan*, 'several months old puppy' – *keicheen*, 'leading dog' – *mioriamdi*, 'female dog' – *vechen*) (Onenko, 1980: 94, 234, 237, 262, 448). Folklore shows the attitude to the dog as a thinking and self-motivating being. In the Nanai fairytales *ningman*, one can distinguish the plots where the main character in the form of a dog becomes a relative of people and is endowed with human rights (Nanaiskiy folklor…, 1996: 174–183, 290–300; Sem, 2001). Such ideas have also found their place in ethical norms. Representatives of all Nanai families observed the ban on killing a dog. Taking care of dogs, their treatment, and, in the event of death, funeral with honors—all this formed the basis for the tradition of honoring dogs as human partners among the hunting peoples of the Amur Valley (Schrenck, 1899: 185–186; Sternberg, 1933: 500).

The perception of a four-legged helper as a sacrificial animal and contactee with spiritual beings has a more ancient subtext as compared to the one described above, which is confirmed by the Neolithic evidence found in Siberia (Losey et al., 2011). The Nivkhs, living next to the Ulchi and Nanai people, sacrificed dogs to appease the gods and make it easier for the deceased to travel to Mlyvo (the afterworld) (Sternberg, 1933: 299–328). Ritual killing of dogs in the name of supreme powers was practiced among a number of semi-sedentary peoples inhabiting the northern part of the Pacific coast (Sokolova, 1998: 261–262).

In Siberia and Pacific coast, the connection of dog with the hypostases of the mythical universe is most clearly manifested in burial complexes and funerary rites. In one of the mythological tales of the Yukaghirs, a dog acts as a guard of the road of the dead, judge and master of human destinies in the afterworld (Folklor…, 2005: 305). According to the Nanai beliefs about *buni* (afterlife), a dog was the carrier of the soul of the deceased: several harnessed dogs took the soul to another world (Shimkevich, 1896: 18).

A dog could be a counterpart of a wild animal. The dog-wolf relationship was perceived to be on the same conceptual plane among the peoples of Siberia with the nomadic type of economy. The following configuration of the animal autonomy emerged there in the form of a conventional triangle: deer was in one corner, elkhound in another corner, and wolf was in the third corner (Losey et al., 2011; Stepanoff et al., 2017). In the sacred realm, wolf and dog sometimes replaced each other; their essences were related to patronage of reindeer herd or to hunting (Ivanov, 1970: 34, 36, 88–90; Baldick, 2012: 147–148).

The worldview of the Tungus reindeer breeders has received a new content during their migration to the shores of the Pacific Ocean. The changes affected primarily the hierarchy of spirits that had their representations in the animal environment. The wolf has practically lost its sacred essence in the beliefs of the groups inhabiting the Amur Valley. There are several explanations for this. Pack-hunting is difficult in rough taiga terrain, which was sometimes flooded during the overflow of the rivers, and wolfs might face stronger competitors, such as bear and tiger (Cherenkov, Poyarkov, 2003: 7–33). In the past, there were isolated cases of capturing wolves in the lower reaches of the Amur River. The wolf was even a totem in some of the Nivkh clans; but in spiritual terms, the wild relative of the dog did not replace it (Priamurye…, 1909: 268; Sternberg, 1933: 304–305). The connection between the bear and dog as a sacrifice was expressed in the traditional consciousness of the population living in this part of the Amur region. Notably, the Gorin Nanai people had a tradition of leading a bear around the village, with harness *khala* put on it, essentially treating it like a riding animal. It can be assumed that in this case the bear performed the function of a dog (Samar E.D., 2003: 36). The Nanai people from the Lower Amur believed that the soul of the deceased was brought to the next world by a train of dogs headed by a bear (Lipsky, 1925: 47 (XLII); Smolyak, 1976: 131). Strengthening of the bond between the dog and bear in conservative rites serves as a proof that the Tungus-Manchu groups adopted the Paleoasiatic traditions.

In the shamanic iconography of the Nanai people, dog and bear were not paired. The image of a dog denoted the quality and property of connections between the objects of the spiritual world. From the host of shamanic spirits represented in sculptural form, one can distinguish the images of the mythical dog *Vanko*—a companion of an evil spirit or shaman and executor of his will, and the 'dog's head' *ingda delini*, guarding the souls of the dead, who have no opportunity to be reborn (Onenko, 1980: 90; Smolyak, 1991: 199–200). In the *Buchile* set, which included the *sewens Khapo* and *Mokhe*, the dog expressed the nature of their relationship; it united the

sewens into one group. To understand this pattern, one needs to proceed from the perception of dogs, which emerged among the peoples with a fishing and hunting lifestyle. The evidence relating to the Nivkhs and some peoples of Siberia makes it possible to identify several interrelated spiritual roles of the dog: "sacrifice", "receptacle of the soul of the deceased", and "guide to the afterworld" (Samar A.P., 2011: 125). Under these guises, dogs appeared also in the shamanic worldview. At the same time, we cannot rule out the overlapping of various symbolic functions of the dog, which emerged during the borrowings and transformations. Taking into account the essence of shamanic spirits, closely related to nature (terrain, flora and fauna, climatic conditions, etc.), and the second name of the *Mokhe-Khapo* group – 'the dog that hits the target', it can be assumed that reference to the dog is intended to emphasize the power of the spirits' influence. In this case, its initial function in human life as assistant and guard was taken as a basis (Sternberg, 1933: 495). The reflection of the utilitarian meaning of dogs in the sacred realm makes it possible to consider the sets of ritual sculptures as a kind of language. The double name, which includes the dog, serves as an emphatic construction, emphasizing strength and speed of the spirits "subordinate" to the shaman.

Adaptation of tiger image among taiga hunters and fishermen

The use of the image of a tiger among the Lower Amur peoples involves several semantic variations. Each of these reflects the evolution not only of concepts, but also of the shamanic complex as a whole. The conceptual model associated with the tiger image is based on the attitude towards the real animal. The indigenous population of the Amur Valley came into direct contact with tigers; therefore, many ideas about tigers resulted from observing them. For hunters, tigers were dangerous competitors; tigers often attacked unprotected camps or fishing groups, and forced them to look for new places to stay. The local population, which perceived tigers as carriers of mystical qualities, considered it to be one of the first ancestors. Such Nanai clans as the Samar, Beldy, Odzyal, and Aktanko traced their origin to the marriage of woman and tiger (Lopatin, 1922: 206–209; Nanaiskiy folklor…, 1996: 405–407; Samar E.D., 2003: 9–26). The tiger cult among the Tungus-speaking peoples, as was observed by Shirokogoroff, manifests the effect of various cultural systems (1935: 70–185). The most striking evidence of mixed heterogeneous layers in the worldview is the "tiger" terminology, applied mainly to the sacred realm. In this regard, it is interesting to compare the tiger and the bear as the main actors of ecological and social communication in the Amur Valley. In the peoples of the Lower Amur region, the conceptual framework associated with bears is more detailed than with tigers. In the Nanai language, the tiger has received the compound name *puren ambani*; panther and leopard have the names *amban edeni* or *yarga*. Previously, the image of a leopard was called *mari*, while that of tiger was called *yarga* or *ambani sewen* (Onenko, 1980: 36, 258, 543). The lexeme *amban* (*ambani*, *ambasani*), belonging to the group of names of feline predators, raises some questions regarding its etymology, and also its usage with several meanings. In the Nanai environment, it denoted an evil spirit, as well as tiger the animal. Modern Nanai informants still link together two sememes of the one word, which designates the properties of immaterial entity and material object in the guise of the animal. The tiger has become the embodiment of an evil spirit and a punishing, destructive, and irresistible force. In the late 1990s, in the Museum of Local History in Komsomolsk-on-Amur, the author of this article observed that some visitors from the indigenous population were afraid not only to pass by a stuffed tiger, but even to look at it. The visitors to the museum assured me that they were experiencing a superstitious fear from seeing the beast. Such a response testifies to preservation of the original attitude towards this predator in the depths of the Nanai consciousness. According to the information recorded in the Ulchsky District of the Khabarovsk Territory, the indigenous population of the Amur Valley does not always associate the beliefs about the tiger as the embodiment of deceit, wisdom, and clan power, with the real animal. Talking about receiving her gift in a dream, the Ulchi shaman Sofya Angi-Valdyu mentioned that for several nights her late father appeared to her in the guise of a tiger and each time offered her something item of shaman's equipment. On this occasion, she embroidered a picture of her ancestor-tiger, which looked most similar to a lion. As it turned out, the shaman submitted the screen image of the animal, which she associated with a tiger, since she had never seen a living tiger (FMA, village of Bulava, July 21, 1996).

Notably, transmission of animal imagery and interpretation of their qualities depend mostly on perception and knowledge of the world, fixed in the vocabulary. Since the 1930s, a pidgin derived from the literary Nanai and Russian languages played an important role in transmitting knowledge among the Nanai people, similarly to the majority of the peoples inhabiting the Amur Valley (Perekhvalskaya, 2008; Mamontova, 2015). The adopted literary vocabulary did not contain a set of the concepts related to the construction of the mental world, in particular, to the shamanic iconography. Using the introduced linguistic standards, new worldview complexes have emerged, in which the features of physical nature were combined with properties of the spiritual objects.

Viewing the problem through the lens of linguistic metamorphosis makes it possible to focus on the *amba*/*ambani* concept. While studying the rituals of the Nanai shamans, Bulgakova observed that their spirits (*sewens*) were not the embodiment of the subjects taken from the material world. *Sewens* were immaterial entities; to become stronger, they only adopted the features of animals (it could have been a combination of features from various species). They were opposed by *amba*—uncontrollable spirits who were not subordinate to the shaman (Bulgakova, 2016: 290–291). Shirokogoroff linked the appearance of the word *amban* in the Tungus-speaking environment with the Manchu and Chinese influence. This word was used to denote high officials, for whom the use of tiger skins was a sign of prestige (Shirokogoroff, 1935: 82). The indigenous inhabitants of the Amur Valley, who maintained close contacts with the Manchus, interpreted the use of tiger skins by the highest dignitaries of the Manchu court in their own way. The prohibition on hunting tigers has acquired totemic status among the dwellers of this region. The emerging tiger cult had similarities to, and some differences from, the bear cult. In both cases, some designations of the animals reflect a related use of names. For example, the Nanai people perceived the bear as an ancestor, and called it *mapa* (‘grandfather’, ‘old man’) (Onenko, 1980: 258). Their vocabulary also reflects the age of the bear: they call a bear-cub of 7–8 months of age *sirion*, one-year-old bear *chairo*, 2–3-year-old bear *khoer*, and 3–4-year-old bear *puer* (Ibid.: 340, 367, 463, 497). The relation to this carnivore as a blood relative is conveyed by the word *agdima*, meaning both the eldest of the brothers and a 5–6-year-old bear (Ibid.: 27).

The representatives of the Nanai clans that believe they have originated from the tiger sometimes called it *daka* (‘father-in-law’) (Ibid.: 134). However, traces of the potestar organization have survived in the “tiger” terminology and the tradition of endowing the feline predator with the features of a taiga deity. Almost no peoples of the Amur region have practiced the ritual killing of this animal; and if it was killed for attacking a man, a symbolic trial was organized on this occasion, with participation of a *zangin* (tribal judge). This judge received a silk robe and a cauldron for his work, which served as a sign of reconciliation between the two parties—the “clan of the tiger” and that of the “man” (Smolyak, 1976: 151–152; Sternberg, 1933: 501–502). If a dead tiger was found in the forest, it was buried clothed in human outfit; depending on the season, it was dressed in winter or summer pants, khalat, footwear, and hat (Istoriya…, 2001: 92–93). The image of tiger entered the shamanic pantheon of spirits with a status of taiga deity. In the hierarchy of entities with zoomorphic features, the *sewens* with tiger qualities had the highest rank, as those close to the shaman. The problem is the interpretation of tiger images embodied in sculptures. Their origin points to borrowings from the religious and philosophical teaching of Buddhism and agricultural complexes. According to Shirokogoroff, the pantheon of spirits of the Tunguses emerged in the process of reworking the Manchu system of the spiritual world based on a number of Chinese cults (1935: 108–164). Among the spirits, the *mafa* group stands out, which had several interpretations. The spirits with the name *mafa*, which means ‘noble man’, ‘old man’, were considered the ancestors of the Manchus. According to Buddhist teachings, they descended from ancient animals and were neither benevolent nor harmful, but could cause illness and misfortune. In the Manchu complex, the word *mafa* also denoted various borrowed spirits with whom it was desirable to maintain good relations (Ibid.: 143, 145, 151, 158, 234–238). Among the Nanai and Tungus peoples, the word *mapa*/*mafa* with the meaning of “old man” referred to the patron spirits of places, and served as allegorical designation of bear (Lopatin, 1922: 206; Onenko, 1980: 258). It can be assumed that the name of *sewen Mokhe*/*Mokha* in the Nanai shamanic complex goes back to the word *mapa*/*mafa*. When this name entered shamanic ritual usage, it was phonetically changed and began to be used for denoting the status of a spiritual entity with punishing, destructive power, and the personification of a number of diseases. The etymology of the word *khapo*, meaning a *sewen* with protective function, which opposes *sewen Mokhe* with destructive, punishing power, causes many questions. The Nanai vocabulary does not contain words with the same root or a similar meaning, which suggests that it was borrowed from another language. In the works of P.P. Shimkevich, the *sewen* that symbolically expresses patronage and protection is called *khafani*. Its appearance may be associated with the dissimilation of consonants in the word *mafani*, and formation of words denoting the opposite hypostases in the configuration of the cultic realm (like *mukhani*/*khafani*; *mokhe*/*khapo*). It is also possible that the word *khapo*(*ni*) was formed as a result of adapting the name *Dzhafan mafa*—the patron spirit of house and estate among the Manchus—in the conglomerate of the Nanai shamanic spirits (Shimkevich, 1896: 52).

When considering the semantics of sculptures rendering the image of a feline predator, small discrepancies in conveying similar images in different parts of the Lower Amur region have been identified. The evidence gathered by several generations of scholars contains the following combinations of names: *yarga*, *khafu yarga*, *ambanso*, *ambanso mukhani*, *ambanso seoni*, *mocha*, and *khapo* (Kubanova, 1992: 37–43; Lopatin, 1922: 224–228; Shimkevich, 1896: App. 1; Baldick, 2012: 143–144). These should be interpreted not only in the light of shamanic “improvisation”, when the shaman himself personified the spirit and determined

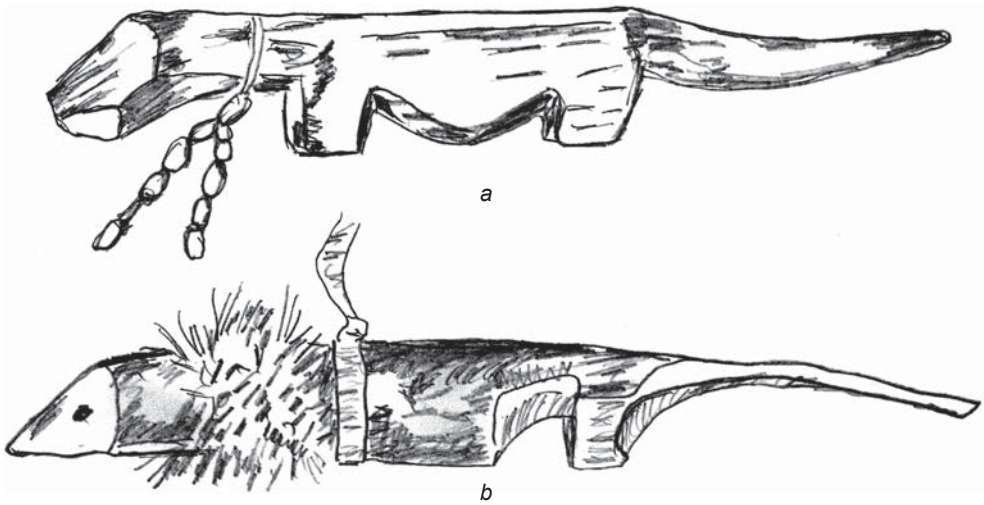

Fig. 2. Representations of a wolf and a dog.
a – wolf-*syadei*, Nenets people (Peter the Great Museum of Anthropology and Ethnography (Kunstkamera) of the RAS, coll. 2427-8); *b* – dog, Sakhalin Evenks (Russian Museum of Ethnography, coll. 6936-122).

its position in the hierarchy of invisible entities. It is also important to take into consideration the natural, social, and cultural contexts. In the southern part of the Nanai habitation area, which coincides with the ranges of the Amur tiger and the Far Eastern leopard, the attitude towards real predators was reflected in the shamanic worldview in the form of the supposed links between the tiger and leopard. The evidence discovered in these areas by the scholars in the late 19th to 20th centuries contains numerous representations of cultic images with feline features, which occupied various positions in the hierarchical system of spirits (Lopatin, 1922: 225–228; Shimkevich, 1896: 40–45). A.V. Smolyak gave an example of subordination, in which the assistants of the *amban sewen* (in the form of a tiger) were *sewens* of a lower rank—*yarga* (of a spotted leopard) (1991: 71). In the northern regions of the Nanai people (for example, the Gorin Nanai) territory, the "tiger-leopard" group of the shaman's set did not have such details. Notably, the worldview of the indigenous population inhabiting the Lower Amur region was enriched with new ideas under the influence of trade and family ties with the Manchus; up to the early 20th century, the posts of the Manchu officials could have been the centers for spreading state shamanism and Buddhist philosophy (Schrenck, 1883: Vol. 1, p. 53–74).

Outside the Lower Amur region, three-dimensional wooden representations, similar in style to the Amur sculptures, have been found in some parts of Siberia and Sakhalin. These are usually figurines with the horizontally elongated torsos and muzzles indicated by several cuts. Among the Nenets people, such small-scale sculpture serves as receptacle of the spirit of the wolf—*syadei*. Among the Sakhalin Evenks, a figurine with similar features conveys the image of a dog, and was used in the past as a toy (Fig. 2) (Ivanov, 1970: 89, 250). This is a widespread sculptural form, whose conventionality made it possible to fill it with different content in various regions of Siberia and the Far East. The meanings of this stylized image in various geographical locations reflect the distinctiveness of the natural environment of the nomadic community living in Northern Eurasia. In the culture of the reindeer breeders of Western and Eastern Siberia, spirits with wolf and dog features were the protagonists and masters of human destinies, while the fishermen and hunters of the Amur Valley had spirits in the guise of the taiga predator—a tiger.

Conclusions

Analysis of the shamanic sculpture of the Nanai people makes it possible to regard this as a phenomenon combining a number of semantic functions. For example, a set with the double meaning (of a dog and a tiger) indicates the cultural and mental fields, in which the figurines acquired their content. Shamanic sculptures were created as a means of communicating with the invisible world, in which the role of mediator was played by a shaman. This role determined the information content of a sculpted representation. In Nanai shamanism, wooden figures *sewens* performed a double function—as containers of spirits and neutralizers of their power. Representation semantics contains information about the category, character of the spirit, its position in the shamanic iconography, as well as personal participation of the shaman in its "processing". It can be assumed that the configuration and design of each figure were used by

the shaman as mnemonics, which helped him to orient himself in the spiritual realm. Accordingly, both individual images and their totality functioned as a sacred language. Conventionality in the transmission of images served as a basis for filling them with different ideological content.

The image of an animal with a horizontally elongated body and tail, embodied in wooden figurines, was spread over a vast territory. In different regions of Siberia and the Far East, it has his own semantic meaning: from wolf-dog to tiger. In the Amur Valley, a paired image (one of streamlined form with a narrowed end, the other angular with a thickening at the end of the tail or with a forked tail) combines the meanings of a dog, and each separately, a tiger and tigress. There is a deeper connotation in its interpretation. The semantic duality associated with dog and tiger indicates the cultural layers of different times, with the Tungus, Paleoasiatic, and Manchu (Chinese) roots. The ideas of domestic animal and wild predator, embodied in the ritual sculpture of the Nanai people, should also be perceived as actualization of social life, which was refracted in the sacred realm. Dogs played an important role in the life of almost all peoples of Siberia and the Far East; but in the shamanic iconography of the Nanai people, its symbolic function served as a basis for developing the profile of other spirits. The imported image of a tiger was a secondary link, expressing the aspect of social demarcation.

It can be concluded that Nanai ritual sculpture has lost its religious and practical content along with the decline of shamanism in the Amur region; its images have begun to be interpreted only in a historical, cultural, and symbolic context.

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References

Artemieva E.Y. 1999
Osnovy psikhologii subyektivnoi semantiki. Moscow: Nauka.

Baldick J. 2012
Animal and Shaman. Ancient Religions of Central Asia. London, New York: I.B. Tauris.

Bereznitsky S.V. 2003
Klassifikatsiya kultovoi atributiki korennykh narodov Dalnego Vostoka Rossii. In *Tipologiya kultury korennykh narodov Dalnego Vostoka Rossii (materialy k istoriko-etnograficheskomu atlasu)*. Vladivostok: Dalnauka, pp. 190–220.

Bulgakova T.D. 2016
Kamlaniya nanaiskikh shamanov. Norderstedt: Verlag der Kulturstiftung Sibirien SEC Publications.

Campbell J. 2002
Mificheskiy obraz. Moscow: Akt.

Cherenkov S.E., Poyarkov A.D. 2003
Volk, shakal. Moscow: Astrel, AST.

Flier A.Y. 2012
Proiskhozhdeniye kultury: Novaya kontseptsiya kulturogeneza. In *Informatsionnyi gumanitarnyi portal "Znaniye. Ponimaniye. Umeniye*", No. 4 (July–August). URL: http://www.zpu-journal.ru/e-zpu/2012/4/Flier_The-Origin-of-Culture/ (Accessed February 21, 2020).

Folklor yukagirov. 2005
Moscow, Novosibirsk: Nauka.

Geertz Cl. 1973
The Interpretation of Culture: Selected Essays. New York: Basic Books.

Istoriya i kultura orochei: Istoriko-etnograficheskiye ocherki. 2001
St. Petersburg: Nauka.

Ivanov S.V. 1937
Medved v religioznom i dekorativnom iskusstve narodnostei Priamurya. In *Pamyati V.G. Bogoraza (1865–1936)*. Moscow: Izd. AN SSSR, pp. 1–44.

Ivanov S.V. 1970
Skulptura narodov Severa Sibiri. Leningrad: Nauka.

Kubanova T.A. 1992
Ritualnaya skulptura nanaitsev. Komsomolsk-on-Amur: [Tip. APO im. Gagarina].

Lipsky A.N. 1925
Vvedeniye. In *Pervyi tuzemnyi syezd DVO*. Khabarovsk: pp. 5–52 (V–LII).

Lopatin I.A. 1922
Goldy amurskiye, ussuriyskiye i sungariyskiye. Vladivostok.

Losey R.J., Bazaliiskii V.I., Garvie-Lok S., Germonpré M., Leonard J.A., Allen A.L., Katzenberg M.A., Sablin M.V. 2011
Canids as persons: Early Neolithic dog and wolf burials, Cis-Baikal, Siberia. *Journal of Anthropological Archaeology*, vol. 30 (2): 174–189.

Losey R.J., Nomokonova T., Gusev A.V., Bachura O.P., Fedorova N.V., Kosintsev P.A., Sablin M.V. 2018
Dogs were domesticated in the Arctic: Culling practices and dog sledding at Ust'-Polui. *Journal of Anthropological Archaeology*, vol. 51: 113–126.

Maltseva O.V. 2008
Traditsionnye vozzreniya nanaitsev v kultovoi skulpture (po dnevnikovym materialam V.A. Timokhina, 1960–70-e gody). In *Zapiski Grodekovskogo muzeya*, iss. 20. Khabarovsk: Izd. Khabar. kraevogo kraeved. muzeya, pp. 164−169.

Mamontova N. 2015
Language as mechanism of systemic foundation: Tungus-speaking groups in the Far East. *Asian Ethnicity*, vol. 17 (1): 48–66.

Nanaiskiy folklor. Ningman, siokhor, telungu. 1996
N.B. Kile (comp.). Novosibirsk: Nauka.

Nanaitsy. 2019
Katalog kollektsii iz sobraniya Khabarovskogo kraevogo muzeya im. N.I. Grodekova. G.T. Titoreva et al. (comp.). Krasnoyarsk: Yuniset.

Onenko S.N. 1980
Nanaisko-russkiy slovar. Moscow: Rus. yaz.

Ostrovsky A.B. 2009
Ritualnaya skulptura narodov Amura i Sakhalina. Putevodnaya nit chisel. St. Petersburg: Nestor-Istoriya.

Ostrovsky A.B. 2019
Antropologiya myshleniya: Izbrannye statyi 1990–2016 gg. St. Petersburg: Nestor-Istoriya.

Ostrovsky A.B., Sem T.Y. 2019
Kody kommunikatsii s bogami: (Mifologiya i ritualnaya plastika ainov). St. Petersburg: Nestor-Istoriya.

Perekhvalskaya E.V. 2008
Russkiye pidzhiny. St. Petersburg: Aleteiya.

Priamurye. Fakty, tsifry, nablyudeniya. 1909
Moscow.

Samar A.P. 2011
Traditsionnoye sobakovodstvo nanaitsev. Vladivostok: Dalnauka.

Samar E.D. 2003
Pod senyu rodovogo dreva. Zapiski ob etnokulture i vozzreniyakh gerinskikh nanaitsev roda Samande-Mokha-Mongol/roda Samar. Khabarovsk: Kn. izd.

Savelieva V.N., Taksami C.M. 1970
Nivkhsko-russkiy slovar. Moscow: Sov. entsikl.

Schrenck L.I. 1883–1903
Ob inorodtsakh Amurskogo kraya. In 3 vol. St. Petersburg: Izd. AN.

Sem T.Y. 2001
Sobaka-mergen v folklore i ritualakh nanaitsev. In *Ritualnoye prostranstvo kultury: Materialy mezhdunar. foruma*. St. Petersburg: pp. 101–104.

Sem T.Y. 2002
Shamanizm tungusoyazychnykh narodov Sibiri i Dalnego Vostoka po materialam REM. In *Rasy i narody*, iss. 28. Moscow: Nauka, pp. 226–242.

Shimkevich P.P. 1896
Materialy dlya izucheniya shamanstva u goldov. In *Zapiski Priamurskogo otdeleniya IRGO*, vol. II, iss. 1. Khabarovsk: [Tip. kantselyarii Priamur. general-gubernatora].

Shirokogoroff S.M. 1919
Opyt issledovaniya shamanstva u tungusov. In *Uchenye zap. ist.-filol. fak. v g. Vladivostoke*, vol. 1. Vladivostok: [Tip. obl. zemsk. upravleniya], pp. 47–108.

Shirokogoroff S.M. 1935
Psychomental Complex of the Tungus. London: Kegan Paul, Trench, Trubner & Co.

Smolyak A.V. 1976
Predstavleniya nanaitsev o mire. In *Priroda i chelovek v religioznykh predstavleniyakh narodov Sibiri i Severa (vtoraya polovina XIX – nachalo XX v.)*. Leningrad: Nauka, pp. 129–160.

Smolyak A.V. 1991
Shaman: Lichnost, funktsii, mirovozzreniye. Moscow: Nauka.

Sokolova Z.P. 1998
Zhivotnye v religiyakh. St. Petersburg: Lan.

Stepanoff C., Marchina C., Fossier C., Bureau N. 2017
Animal autonomy and intermittent coexistences. North Asian modes of herding. *Current Anthropology*, vol. 58 (1): 57–81.

Sternberg L.Y. 1933
Gilyaki, orochi, goldy, negidaltsy, ainy. Khabarovsk: Dalgiz.

Titoreva G.T. 2012
Seveny: Katalog kultovoi skulptury iz sobraniya KhKM im. N.I. Grodekova. Khabarovsk: Khabarov. kraevoi muzei im. N.I. Grodekova.

Zelenin D.K. 1936
Kult ongonov v Sibiri. Perezhitki totemizma v ideologii narodov Sibiri. Moscow, Leningrad: AN SSSR.

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Population Affinities of the Ancient Northern Okhotsk People: Cranial Evidence from a Collective Burial in a Rock Niche on Cape Bratyev, the Northern Okhotsk Coast

This study reconstructs biological affinities in a cranial sample from a collective burial on Cape Bratyev in Babushkin Bay. The burial, found in a rock niche on the Okhotsk Coast, was excavated by S.P. Efimov in 1976 and tentatively attributed to the Old Koryak culture. The sample consists of 13 adult skulls of differing preservation—five male, five female, and three undeterminable. Genome-wide analysis was carried out at the Center for Geogenetics of the University of Copenhagen. Paleogenetic data support the archaeological hypothesis attributing the burial to the Old Koryak culture. The results of the craniometric analysis suggest that the Old Koryak population was heterogeneous. Cranial data indicate population contacts between ancient Koryaks and the Epi-Jōmon people of Hokkaido. Also, they reveal common episodes in the population history of the group from Cape Bratyev and the Okhotsk culture people. Two of the three Okhotsk samples used for comparative analysis demonstrate very close affinities with individuals studied. According to the previous studies and our current analysis, the Okhotsk people resulted from the admixture of ancient groups related to Chukchi and Eskimo, on the one hand, and Tungus-Manchu groups, on the other. A significant difference between the Old Koryak population and that of Okhotsk culture is that the former includes a component related to Nivkhs.

Keywords: *Northern Okhotsk Coast region, Cape Bratyev, craniometry, paleogenetics, population history, Old Koryak culture.*

Introduction

This study sets out to describe and compare a cranial sample from a collective burial in a rock niche on Cape Bratyev* in Babushkin Bay. The niche is one of very few archaeological sites in the Northern Okhotsk Coast region containing human skeletal remains. The burial belongs to a group of sites located at the coast of the Sea of Okhotsk, 150 km east of Magadan (59°5′22″ N, 153°20′12″ E). The group includes a settlement, a cave with manifestations of human occupation, and several burials. The archaeological and ethnic attribution of some of these sites remains a matter of debate.

The cave at Cape Bratyev was studied by K.A. Novikova in 1946, and later by B.E. Lipovsky, G.A. Pytlyakov, and R.S. Vasilyevsky in 1954, 1955, and 1965 (Pytlyakov, Belyaeva, 1957; Vasilyevsky, 1971: 92–98). These sites, as well as the settlements in neighboring Astronomicheskaya Bay, were assigned to the Old Koryak culture. But the association of the burials with this culture is less clear. The burial ground at Cape Bratyev and the interments in Astronomicheskaya Bay were studied by Vasilyevsky in 1964 and were determined by him to be Tungusian (1971: 28). The skeletal samples from those excavations, as well as the skulls from Astronomicheskaya Bay, excavated in 1955, were lost. The latter were studied by N.N. Mamonova from the Institute of Anthropology of Moscow State University (Pytlyakov, Belyaeva, 1957: 10). N.A. Belyaeva notes: "According to the conclusions of anthropologists (G.F. Debets, N.N. Mamonova), the skulls found in the burials likely belonged to the Yukaghirs or Lamuts. For a more precise determination of the ethnic affiliation of the burial grounds, the anthropological research should be continued" (1967: 84).

The specimens employed in the present study were excavated later. In 1976, fellows of a meteorological station reported the discovery of several skulls at Cape Bratyev. An archaeological survey carried out by S.P. Efimov detected a collective burial (Efimov, 1991) in a rock niche about 25 m from the coastal line, 8–10 m above the sea level. A small stone wall 50–60 cm wide surrounded the niche from the outside. Probably some stones of this enclosure eventually fell to the sea, and some inside the niche, resulting in the emergence of a gap, which made the burial visible.

According to Efimov, the artifacts excavated at the site support the determination of the collective burial in the niche at Cape Bratyev as Old Koryak. However, according to some other researchers, those artifacts are not numerous enough to accept or reject this hypothesis convincingly. On the other hand, any results from anthropological and paleogenetic studies of the remains can only be viewed as indirect evidence for the ethnic attribution of the deceased.

The archaeological data suggest that the Old Koryak culture was formed on the base of the Tokareva culture (Lebedintsev, 2008: 71) and is dated to the 5th–17th centuries AD. The question of the origin of the culture and its population has been a matter of debate, since the northeasternmost part of Asia at that time was an area of contact between a number of ethnocultural communities that later gave rise to the modern Koryak, Chukchi, Itelmen, and Eskimo.

In the present state of knowledge, it can be hypothesized that the bearers of the preceding Tokareva culture might have already had a complex anthropological composition. According to some archaeologists, several components have taken part in the formation of the culture, including populations from the Chukchi and Kamchatka peninsulas, Eskaleutians, continental groups from the Amur River basin, and probably the Late Neolithic population of Kolyma (Lebedintsev, 2019: 175). The formation of the Old Koryak culture per se is thought to be related to some additional influence of the Amur Basin people on the population of the Tokareva culture (Lebedintsev, 1999; Grebenyuk et al., 2019).

No systematic study of the skeletal collections of the Old Koryak culture has been carried out to date. Only one of the female skulls from the burial at Cape Bratyev was measured (Zubov, Lebedinskaya, 1985: 137–138), but no ethnogenetic conclusion was made from the metric data obtained.

The main aim of the present study was an analysis of the population affinity of the individuals from the Cape Bratyev burial on the basis of their craniometric features. The findings were compared with the molecular genetic data for the same sample obtained by C. de la Fuente at the Center for Geogenetics of the University of Copenhagen (2018: 55).

Materials and methods

The excavation of the burial at Cape Bratyev carried out in 1976 revealed 14 skulls and more than 100 various bones from several individuals. This skeletal collection was sent to the Shilo North-East Interdisciplinary Scientific Research Institute (NEISRI), Far East Branch, Russian Academy of Sciences (Magadan). We were only able to study 13 of the skulls. Unfortunately, the fate of one skull that was studied by G.V. Lebedinskaya is unknown, and her measurements do not match up to any of the individuals housed at the NEISRI today. Five of the skulls are male, five female, and the sex of

*Sometimes also referred to as Cape Trekh Bratyev (Vasilyevsky, 1971: 92–98).

three adult individuals was not determined owing to poor preservation. The mid-facials of all the skulls were destroyed, which made measurement of bizygomatic breadth impossible, while zygomaxillary dimensions were taken in only one individual. The mandibles were absent in all the skulls.

The sample was measured by M.S. Kishkurno following the protocol of R. Martin in the modification of V.P. Alekseev and G.F. Debets (1964) (Table 1). Craniometric data from the Far East were employed as a reference (Table 2). As individual measurements of female skulls are not available for many of the reference samples, only male skulls were analyzed.

The comparison of the individuals from the burial at Cape Bratyev and the reference samples was performed using canonical discriminant analysis in Statistica 7.0. Individual measurements of the following variables and indices were employed: 1, 8, 17, 9, 48, 51, 52, 54, 55, 77, zm, SS : SC (12 in total). Missing data were replaced via substitution of the mean of the respective sample. As was demonstrated by Kenyhercz and Passalacqua (2016: 193), if imputation of missing data is carried out using correct statistical methods, the outcome of an intergroup analysis remains qualitatively unchanged even if 50 % of the measurements are missing. Accordingly, the imputation could not bias the results of our analyses.

Results and discussion

Results of the statistical analysis. Our comparison of the cranial metrics of the individuals from the burial at Cape Bratyev and reference samples of the ancient and modern population of the Okhotsk Coast region has shown that the first canonical vector (CV1) accounts for 38 % of the total variation and differentiates two groups of populations (Fig. 1). Ancient and modern series from the Japanese archipelago (Jōmon, Epi-Jōmon, Satsumon culture, and the Ainu of Hokkaido) display positive values of CV1, while negative values are typical of the groups from the Amur River basin and northeasternmost Asia. The series of the Okhotsk culture from Hokkaido are similar to the last-named group, and the Eskimo and Nanai display the most distinctive position in respect to the Japanese samples.

The main features distinguishing the two groups of populations are facial, nasal, and orbital heights. Also, the samples from the Japanese archipelago, in contrast to those from the mainland, are characterized by smaller sizes of most cranial features and less horizontally-protruding faces (Table 3). Differences between CV1 scores of Japanese and continental groups are highly statistically significant (Student's t-test: $t = 14.37$, $p = 0.000$). Such a level of differentiation unequivocally suggests that those groups of populations originated from ancestral meta-populations differing in origin.

The sample from Cape Bratyev belongs to the "continental" block, but the individuals are widely scattered along CV1. Three of the skulls (7, 8, and 10) are clearly closer to the continental samples, while two others (6 and 2) display a similarity to the Epi-Jōmon ones (Fig. 1). This is not an occasional aberration and likely reflects the real history of the population from Cape Bratyev, because several genetic studies revealed similar results. The connections between the Epi-Jōmon population and the Koryaks were explored through the study of the genome of an individual from a burial at the Tankovoye-2 site (Iturup Island), which was archaeologically attributed to the Epi-Jōmon culture. The results of the analysis of nuclear SNPs confirmed the high degree of genetic similarity of this individual to modern Koryaks and Itelmen (Moiseyev et al., 2019: 141). The closer genetic affinity of the Ainu of Hokkaido (being the descendants of the Epi-Jōmon population) to the Koryaks, Itelmen, Chukchi, and Eskimo (rather than to other populations of East Asia) is also the evidence of the ancient genetic connections between the populations of the Northern Okhotsk Coast region with the indigenous groups of Japanese archipelago (Jeong, Nakagome, Di Rienzo, 2016: 267). The craniometric similarity between some individuals of the sample from Cape Bratyev and the skulls from Hokkaido points toward the considerable antiquity of these genetic affinities.

The issue of the presence of an esco-Aleutian influence that has been traced in the Old Koryak culture on the basis of archaeological data (Lebedintsev, 2019) is rather complicated. The Ekven series of the Old Bering Sea culture does not exhibit a close similarity to the skulls from Cape Bratyev. It is morphologically distinct from all the other populations, as is evident from the position of this series on the negative pole of CV2 (17 % of the total variation). The difference between the samples from Cape Bratyev and Ekven in CV2 scores is highly statistically significant ($t = –4.07$, $p < 0.005$). The most specific morphological feature of this group is a high and long cranial vault (Table 3).

The difference between the Cape Bratyev sample and modern Chukchi and Eskimo does not reach threshold for statistical significance. This means that during the period after the formation of the Old Bering Sea culture, but before or simultaneously with the dispersal of the Old Koryak culture in the Okhotsk Coast region, a population related to the ancestors of modern Chukchi and Eskimo might have migrated to the region. Unfortunately, the question of the origin of this population remains open so far. Two possible scenarios can be suggested: the first is that the population changes are resulted from gene flow from North Asia, while the second implies a back migration of some groups from the New World. It is impossible at the moment to give a

Table 1. **Cranial metrics of the skulls from the burial at Cape Bratyev**

Variable	Males						Females					
	Skull No.					Mean	Skull No.					Mean
	7	6	2	8	10		1	3	5	9	4	
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Cranial length	172	176	178	181	172	175.80	161	165	184	176	164	170
8. Maximum cranial breadth	136	136	140	148	150	142.00	–	135	148	143	132	139
17. Cranial height (from basion)	136	132	139	130	–	134.25	–	–	–	132	132	132
20. Cranial height (from porion)	111	116	119	–	–	115.33	–	–	–	–	–	–
5. Cranial base length	100	96	103	98.5	–	99.38	–	–	–	98	93	95.5
9. Minimal frontal breadth	88	102	96	95	96	95.40	88	94	97	92	88	91.8
Transverse frontal curvature subtense	16.1	22.3	19.9	18.2	13.1	17.92	13	18.6	15.8	12.8	17.9	15.62
10. Maximal frontal breadth	110	119	120	122	125	119.20	–	113	–	115	–	114
11. Cranial base breadth	127	122	131	–	–	126.67	–	–	–	–	119	119
29. Nasion-bregma chord	108	114	113	112	108	111.00	103.7	108	113	108	105	107.54
26. Sagittal frontal arch	123	135	135	133	126	130.40	119	128	130	122	120	123.8
SubNB. Longitudinal frontal curvature subtense	28.2	30.7	27.1	26.1	28.3	28.08	22.3	17.1	21.3	22.9	24	21.52
12. Occipital breadth	114	109	114	112	109	111.60	105	100	115	109	110	107.8
31. Lambda-opisthion chord	96	99	87	97	–	94.75	–	–	100	96	93	96.33
30. Bregma-lambda chord	102	–	112	107	105	106.50	105	104	110	–	103	105.5
27. Sagittal parietal arch	115	123	125	123	119	121.00	120	118	120	117	119	118.8
Occipital curvature height	29.5	26.5	24.6	30.2	–	27.70	–	–	25.2	25.4	26.2	25.6
40. Basion-prosthion length	–	–	96	–	–	96.00	–	–	–	96	–	96
48. Upper facial height	–	–	75	–	–	75.00	–	–	–	70	–	70
43. Upper facial breadth	104	107	106	100	104	104.20	106	100	108	105	99	103.6
51. Orbital breadth from mf.	42.3	43.3	44.8	–	40	42.60	43.2	42.8	–	43.2	42.6	42.95
51a. Orbital breadth from d.	–	–	42.2	–	–	42.20	40.7	39.2	–	–	–	39.95
52. Orbital height	37	33.1	36.8	–	34	35.23	34.7	34.6	–	35.2	–	34.83
54. Nasal breadth	–	–	25.2	–	–	25.20	–	–	31.3	26.8	–	29.05
55. Nasal height	–	–	50.1	–	–	50.10	–	–	–	55.4	–	55.4
60. Alveolar length	–	–	58	–	–	58.00	–	–	–	–	50	50
61. Alveolar breadth	61	–	66	–	–	63.50	–	–	–	62	67	64.5
62. Palate length	–	–	46.5	–	–	46.50	–	–	–	–	39.5	39.5
63. Palate breadth	38.2	–	39.9	–	–	39.05	–	–	–	34	34.8	34.4
43 (1). Biorbital breadth (fmo-fmo)	97.4	100	99.6	94.2	91.8 (?)	96.60	99.2	92.6	97.8	96.5	93	95.82
Subtense from nasion to fmo-fmo	12.1	17.2	14.4	10.5	8.3	12.50	12.4	15.5	13.7	10	16.9	13.7
77. Nasomalar angle	152.1	142	147.9	155	158.7	151.14	151.9	143.1	148.7	156.7	140.2	148.12
Zygomaxillary width	96.2 (?)	–	–	–	–	96.2 (?)	–	–	–	–	–	–

Table 1 (end)

1	2	3	4	5	6	7	8	9	10	11	12	13
Subtense from subspinale to zygomaxillary width	14.6 (?)	–	–	–	–	14.6 (?)	–	–	–	–	–	–
Zygomaxillary angle	146.4 (?)	–	–	–	–	146.4 (?)	–	–	–	–	–	–
SS. Simotic subtense	–	2.9	1.9	2.6	4.5 (?)	2.98	1.3	2.2	3.1	2.3	2.7	2.32
SC. Simotic width	–	11.4	5.5	5.8	8.5	7.80	5.5	9.6	6.8	8.2	7.8	7.58
Maxillofrontal subtense	5.7	6.3	5.6	6.6	6.8	6.20	–	5.3	7.3	–	5.2	5.93
Maxillofrontal width	19.8	19.7	17.2	17.9	20.7	19.06	–	19.5	17.7	–	18.6	18.6
FC. Canine fossa depth	–	–	5.1	–	–	5.10	2.3	-	2.8	5.7	–	3.6
32. Frontal profile angle from nasion	83	–	86	–	–	84.50	–	–	–	–	–	–
Frontal profile angle from glabella	78	–	82	–	–	80.00	–	–	–	–	–	–
72. General facial angle	84	–	89	–	–	86.50	–	–	–	–	–	–
73. Mid-facial angle	87	–	90	–	–	88.50	–	–	–	–	–	–
74. Alveolar angle	65	–	81	–	–	73.00	–	–	–	–	–	–
75. Nasal bones inclination angle	–	–	75	–	–	75.00	–	–	–	–	–	–
75 (1). Nasal protrusion angle	–	–	14	–	–	14.00	–	–	–	–	–	–

Table 2. **Reference samples**

Sample	No.	Collection	Publication
Ainu of Hokkaido	15	Sapporo Medical University	Unpublished data of V.G. Moiseyev
Satsumon culture	2	"	"
Epi-Jōmon culture	9	Sapporo Medical University, Kioto University	Unpublished data of V.G. Moiseyev and T.A. Chikisheva
Okhotsk culture, Omisaki	8	Sapporo Medical University, Museum of the Hokkaido University	(Moiseyev, 2008)
Ditto, Moyoro	17	Museum of the Hokkaido University	(Ibid.)
Ditto, Hamanaka	10	Museum of the Hokkaido University, Sapporo Medical University	"
Jōmon era, Hokkaido	10	Sapporo Medical University, Kioto University, Museum of the Hokkaido University	Unpublished data of V.G. Moiseyev
Old Bering Sea culture (Ekven)	13	Research Institute and Museum of Anthropology of the Moscow State University	(Debets, 1975)
Ancient Aleuts (Chaluka)	9	Smithsonian Institution, USA	(Alekseev, Laughlin, 1983)
Mohe (Troitsky)	5	Institute of Archaeology and Ethnography of the Siberian Branch of the Russian Academy of Sciences	Unpublished data of V.G. Moiseyev and E.A. Krebs
Ainu of Sakhalin	10	Museum of Anthropology and Ethnography (the Kunstkamera)	Unpublished data of A.V. Zubova and V.G. Moiseyev
Chukchi	12	"	Unpublished data of V.G. Moiseyev
Eskimo	7	"	"
Ulchi	11	"	"
Nanai	7	"	"
Nivkhs	10	"	"

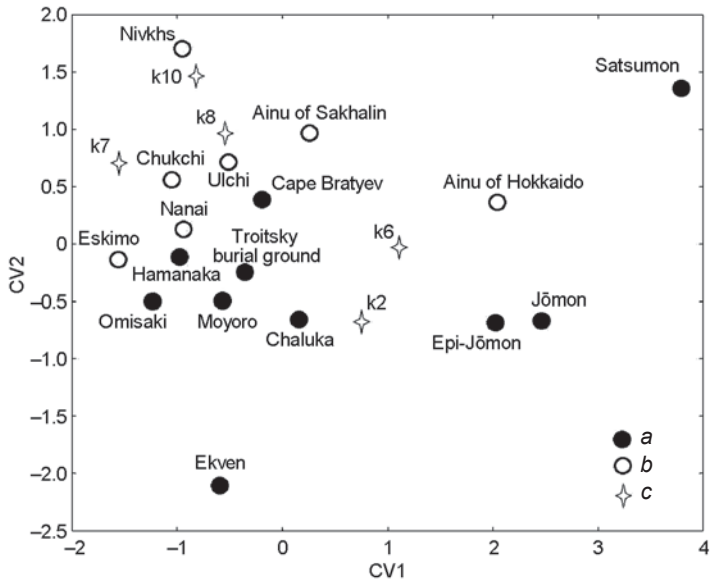

Fig. 1. Canonical discriminant analysis of 17 samples from the Far East. X-axis: CV1, Y-axis: CV2.
a – ancient samples; *b* – modern populations; *c* – single individuals from the burial at Cape Bratyev (labels k2, k6, k7, k8, k10 correspond to the numbers of the skulls in Table 1).

preference to one of these hypotheses, because of the absence (except for the skulls from Cape Bratyev) of materials from Northeast Asia or North America which would be chronologically intermediate between the Old Bering Sea culture and modern Chukchi and Eskimo. According to CV2 loadings (Table 3), this hypothetical ancestral population differed from the sample from Ekven by a relatively short and low cranial vault and a face flatter at the upper level.

It is also worth keeping in mind that CV1 of this analysis differentiates mainly the Japanese and continental series, and any similarity between continental groups cannot be interpreted as a close affinity but rather as a consequence of their equal separation from the Japanese samples. Thus, we carried out a canonical analysis, excluding the Japanese groups, in order to explore the differentiation of the continental populations in more detail. The positive pole of CV1 of this analysis (33 % of total variation) is occupied by the two ancient samples from Chaluka (pre-Aleuts) and Ekven, while the Nivkhs and the sample from Cape Bratyev are found at the negative pole of the axis (Fig. 2). The loadings on CV1 are similar to the loadings on CV2 of the previous analysis (Table 4). The modern groups of the Chukchi and Eskimo are again much more similar to the Old Koryaks than Ekven are. This observation confirms the idea about a later change of the anthropological composition of the Chukchi and Eskimo as compared to the bearers of the Old Bering Sea culture, and a relatedness of at least a part of the Old Koryak population with this particular substrate.

Table 3. **Correlation coefficients (loadings) between the raw craniometric variables and values of the first three canonical vectors of the analysis of 17 samples from the Far East**

Variable	CV1	CV2	CV3
1. Cranial length	0.121	**–0.441**	**0.352**
8. Maximum cranial breadth	**–0.214**	0.178	**–0.627**
17. Cranial height (from basion)	–0.069	**–0.524**	–0.068
9. Minimal frontal breadth	0.185	**–0.348**	–0.046
48. Upper facial height	**–0.836**	–0.044	–0.084
55. Nasal height	**–0.816**	–0.002	**–0.221**
54. Nasal breadth	0.082	**0.374**	**–0.236**
51. Orbital width	–0.040	–0.141	**–0.362**
52. Orbital height	**–0.502**	**–0.234**	–0.024
77. Nasomalar angle	**–0.446**	–0.136	**–0.275**
Zm. Zygomaxillary angle	**–0.333**	**0.344**	**0.269**
SS : SC. Simotic index	**0.237**	**0.281**	**0.399**
% of total variance	0.379	0.551	0.687

Note. Bold means correlations significant at p-level < 0.05.

CV2 (23 % of total variation) differentiates mainly the Amur River groups (positive values) from the Eskimo, Chukchi, and Cape Bratyev sample (negative values). The specific of the Amur population, i.e. a flattening of the nasal bridge and a widening of the nose (Table 4), is most clearly pronounced in the sample of Mohe from the Troitsky burial ground. The samples of the Okhotsk culture occupy an intermediate position between the Chukchi and Eskimo on the one hand, and both ancient and modern Tungus-Manchu groups on the other hand. These results match the conclusions of earlier studies that repeatedly pointed out the similarity of the morphological (Ishida, 1996; Komesu et al., 2008) and genetic (Sato et al., 2007; Gakuhari et al., 2020) features of the Ulchi and Okhotsk people, though the latter display a presence of an arctic component as well (Moiseyev, 2007, 2008).

The Nivkhs and Okhotsk people from Hamanaka are the closest series to Cape Bratyev in the morphospace of CV1 and CV2 (Fig. 2). Other samples of the Okhotsk culture display larger distances: Omisaki exhibits a slight shift towards Ekven, while Moyoro is the closest to the samples from the Amur region.

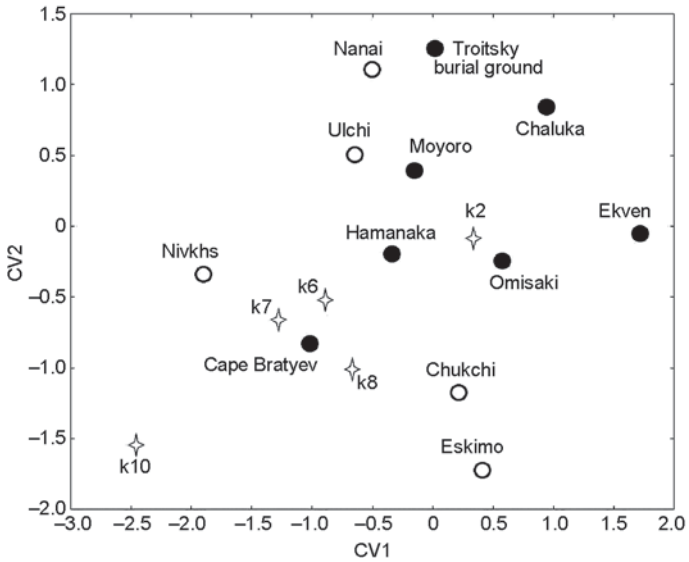

Fig. 2. Canonical discriminant analysis of 12 samples from the Far East. X-axis: CV1, Y-axis: CV2. (Legend same as on Fig. 1).

Table 4. **Correlation coefficients (loadings) between the raw craniometric variables and values of the first three canonical vectors of the analysis of 17 samples from the Far East***

Variable	CV1	CV2	CV3
1. Cranial length	**0.623**	**0.278**	–0.084
8. Maximum cranial breadth	**–0.534**	–0.074	**0.362**
17. Cranial height (from basion)	**0.411**	**0.216**	–0.164
9. Minimal frontal breadth	0.224	–0.418	**–0.417**
48. Upper facial height	–0.095	**–0.449**	–0.028
55. Nasal height	–0.121	–0.054	–0.244
54. Nasal breadth	**–0.598**	**0.439**	–0.169
51. Orbital width	0.063	–0.135	0.010
52. Orbital height	**0.360**	–0.171	**0.246**
77. Nasomalar angle	0.022	–0.018	0.191
Zm. Zygomaxillary angle	**–0.368**	–0.304	**–0.238**
SS : SC. Simotic index	–0.052	**–0.487**	**0.364**
% of total variance	33.1	23.1	17.1

*See note to Table 3.

On the basis of the results of both versions of canonical analysis we have arrived at the following conclusions. The outcomes of the first analysis were affected by high level of cranial specificity of series from Japanese archipelago. Thus, the distribution of the continental groups in the morphospace of CV1 and CV2 (see Fig. 1) reflects the degree of their dissimilarity to the autochthonous population of Japan, rather than their real biological affinities. Consequently, the apparent similarity of the scores between the series from Cape Bratyev and the Amur groups does not mean relatedness. The second version of the analysis, which differentiates the continental samples much more precisely, has clearly confirmed the closer affinity between the Old Koryak people and arctic populations but not with Tungus-Manchu.

Notably, vector statistical techniques, including CVA, are aimed at exploring the most significant patterns of morphological variation in the array of groups under analysis. However, the history of any population and, accordingly, the history of the formation of its morphological specificity is often fairly complex and cannot be reduced to the dynamic of just two or three complexes of variables, which are typically analyzed when employing a vector approach. Another problem is the built-in algorithm of orthogonality of vectors common to multidimensional statistical techniques; therefore, the morphological combinations described by the vectors are mathematically independent. This can obstruct a complete description of complex population relationships, whereas the episodic emergence of similar morphological features can be due to contacts with various neighboring groups, but also can be a result of admixture from a single but very heterogeneous population. Local population contacts, while important for a particular group, can be only described by minor vectors highly susceptible to statistical noise.

In order to obtain the most complete picture of the population relationships between the studied groups, we calculated a Mahalanobis distance matrix for a cumulative assessment of similarity between the groups by the full set of craniometric variables. This analysis has shown that the series from Cape Bratyev displays the closest similarity (in descending order) to two samples of the Okhotsk culture—Hamanaka and Moyoro, followed by the Eskimo and Chukchi (Fig. 3). Despite the morphological affinity to the Nivkhs demonstrated by the canonical analysis, according to the cumulative statistic, this group is only the fifth most similar to Cape Bratyev.

This result does not contradict the presence of a component common between the Nivkhs and Cape Bratyev population detected via the canonical analysis, but just emphasizes that this component is minor. The Ekven series, unlike the modern Chukchi and Eskimo, again displays a clear dissimilarity with Cape Bratyev.

The analysis of Mahalanobis distances between single individuals of the Cape Bratyev burial and the 16 series from the Far East (Fig. 4) generally confirms the

heterogeneity of the Old Koryak sample and its similarity to the people of the Okhotsk culture. Almost all the Old Koryak skulls display some affinity to the Moyoro and Hamanaka samples. The only exception is individual 6, which is more similar to the Hokkaido Ainu. The Epi-Jōmon series is one of the closest to individuals 2 and 6, but not to others. Three skulls (6, 8, and 10) display an affinity to the Nivkhs. The similarity of the Cape Bratyev skulls to the Chukchi at the individual level is not pronounced, while some affinity to the Ulchi and Eskimo is sporadic and minor as compared to the similarity to the Okhotsk culture samples. Thus, it seems possible that the arctic component has influenced the people of the Old Koryak culture indirectly, through the population of the Okhotsk culture.

Population status of the Cape Bratyev sample from the point of view of paleogenetics. Whole-genome analysis of the skeletal sample from the burial at Cape Bratyev in the context of variation of the modern and recent population of Northeast Asia has demonstrated a similarity between the individuals of the sample and the population of the Tokareva culture, as well as the modern Koryak and Itelmen (Fuente, 2018: 55). All these samples belong to the same genetic cluster that goes back to the ancient individual from Duvanny Yar (9.8 cal ka BP). According to the result of a principal components analysis (PCA), this cluster occupies an intermediate position between two others. The first includes people of the Old Bering Sea culture, as well as the modern and historic Eskimo and Chukchi; the second comprises continental Tungus-Manchu and some Turkic groups.

An analysis of the mitochondrial genomes of the individuals from Cape Bratyev revealed the following haplogroups: G1b, C4b2, and Z1a2a (Ibid.: Fig. A, tab. S1). All of these are present in the gene-pool of the modern Koryak and Itelmen (Derenko, Malyarchuk, 2010: 120–122; Gubina et al., 2013: 865–869). Haplogroup G1b is the key for the ancient Paleosiberian population known from the genome of the individual from Duvanny Yar. This population gave rise to the Tokareva culture (Sikora et al., 2019), which, in turn, is thought to be the base for the formation of the Old Koryak culture. Thus, the results of the paleogenetic analysis have demonstrated that the individuals from the collective burial in the rock niche at Cape Bratyev could be the ancestors of the modern Koryak.

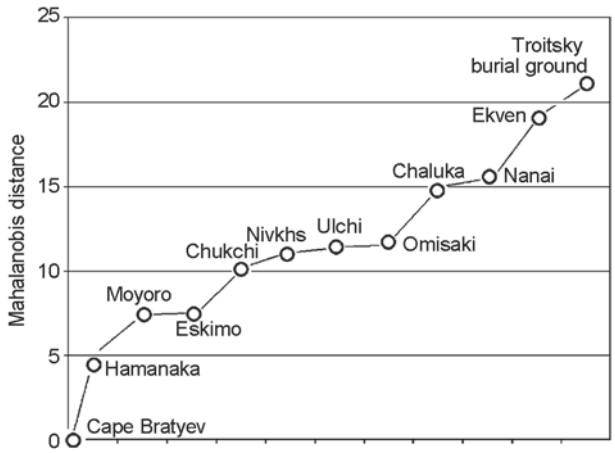

Fig. 3. Mahalanobis distances between the Cape Bratyev sample and 11 ancient and modern groups.

	Cape Bratyev	Satsumon	Epi-Jōmon	Jōmon	Ainu of Sakhalin	Ainu of Hokkaido	Moyoro	Omisaki	Hamanaka	Chukchi	Eskimo	Ulchi	Nanai	Troitsky burial ground	Nivkhs	Ekven	Chaluka
k2			■				■		■								
k8							■		■						■		
k10									■		■				■		
k7							■		■			■					
k6			■			■									■		

Fig. 4. Distribution of squared Mahalanobis distances between single individuals from the burial at Cape Bratyev and the ancient and modern populations.
Labels k2, k6, k7, k8, k10 correspond to the numbers of the skulls in Table 1. Three groups with the smallest distances are marked for each individual.

Conclusions

The paleogenetic data have demonstrated a high affinity between the individuals from the burial at Cape Bratyev and the modern Koryaks on the one hand, and the population of the Tokareva culture on the other hand. Thus, the hypothesis that the burial belonged to the Old Koryaks, formulated on the basis of archaeological evidence, can be considered confirmed. The craniometric features of the studied sample suggest some genetic contacts between the Old Koryak and Hokkaido populations (which was not represented in the genetic analysis). These contacts resulted in the presence of well-pronounced Epi-Jōmon specificity in two individuals from Cape Bratyev.

Also, the findings reveal some common episodes in the population history of the group from Cape Bratyev and the Okhotsk culture people. Two of the three series of this culture demonstrate the closest cumulative similarity to the Cape Bratyev individuals. However, the affinity to populations from the Amur River basin is only typical

for the Okhotsk people but not for the Old Koryaks. The group from Cape Bratyev is also distinct from the Okhotsk culture in terms of the much higher degree of similarity with the Nivkhs and Epi-Jōmon population. The craniometric differences between the Cape Bartyev and Ekven samples exclude direct continuity between these populations. But these differences do not preclude some influence of the component related to the recent Eskaleuts, since the Cape Bratyev series exhibits a similarity to the modern Chukchi and Eskimo. It can be suggested that this morphological similarity emerged, not as a result of a direct Old Bering Sea culture influence, but owing to later contact with the population that gave rise to present Chukchi and Eskimo craniofacial morphology. That population was likely associated with the bearers of the Okhotsk culture.

Taken together, the results of our analysis have demonstrated the complexity of the anthropological composition of the Old Koryak population, which might have resulted in the extreme heterogeneity of the modern Koryak as compared to other Paleoasian groups, described by G.F. Debets basing on somatological data (1951: 114).

Acknowledgements

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References

Alekseev V.P., Debets G.F. 1964
Kraniometriya: Metodika antropologicheskikh issledovaniy. Moscow: Nauka.

Alekseev V.P., Laflin U. 1983
Materialy k antropologii drevnego naseleniya Alyaski i Aleutskikh ostrovov. II. Cherepa iz prealeutskikh pogrebeniy na stoyanke Chaluka (o. Umnak). *Sovetskaya etnographiya*, No. 1: 114–127.

Belyaeva N.A. 1967
Drevneishiye pogrebeniya na Okhotskom poberezhye. In *Istoriya i kultura narodov Severa Dalnego Vostoka*. Moscow: Nauka, pp. 80–84.

Debets G.F. 1951
Antropologicheskiye issledovaniya v Kamchatskoy oblasti. Moscow: Izd. AN SSSR. (TIE. Nov. ser.; vol. 17). (Trudy Severo-Vostochnoy ekspeditsii; vol. 1).

Debets G.F. 1975
Paleoantropologicheskiye materialy iz drevne-beringomorskikh mogilnikov Uelen i Ekven. In *Problemy etnicheskoy istorii Beringomorya*. Moscow: Nauka, pp. 198–237.

Derenko M.V., Malyarchuk B.A. 2010
Molekulyarnaya filogeografiya naseleniya Severnoy Yevrazii po dannym ob izmenchivosti mitokhondrialnoy DNK, I.A. Zakharov-Gezekhus (ed.). Magadan: SVNC DVO RAN.

Efimov S.P. 1991
Ostatki kollektivnogo pogrebeniya na myse Trekh Bratyev – Noviy pamyatnik drevnekoryakskoy kultury. In *Drevniye pamyatniki Severa Dalnego Vostoka*. Magadan: SVKNII DVO AN SSSR, pp. 136–141.

Fuente C., de la. 2018
Recent population history of Siberia: PhD Dissertation. Copenhagen: Univ. of Copenhagen.

Gakuhari T., Nakagome S., Rasmussen S., Morten E., Allentoft M.E., Sato T., Korneliussen T., Chuinneagáin B.N., Matsumae H., Koganebuchi K., Schmidt R., Mizushima S., Kondo O., Shigehara N., Yoneda M., Kimura R., Ishida H., Masuyama T., Yamada Y., Tajima A., Shibata H., Toyoda A., Tsurumoto T., Wakebe T., Shitara H., Willerslev E., Sikora M., Oota H. 2020
Ancient Jomon genome sequence analysis sheds light on migration patterns of early East Asian populations. *Communications Biology*, vol. 3 (437). doi:10.1038/s42003-020-01162-2.

Grebenyuk P.S., Fedorchenko A.Y., Lebedintsev A.I., Malyarchuk B.A. 2019
Drevniye kultury krainego Severo-Vostoka Azii i etnogeneticheskiye rekonstruktsii. *Tomskiy zhurnal lingvisticheskikh i antropologicheskikh issledovaniy*, No. 2: 110–136.

Gubina M.A., Gyrgolkau L.A., Babenko V.N., Damba L.D., Maksimov V.N., Voyevoda M.I. 2013
Polimorfizm mitokhondrialnoy DNK v populyatsiyakh korennykh zhiteley Dalnego Vostoka. *Genetika*, vol. 49 (7): 862–876.

Ishida H. 1996
Metric and nonmetric cranial variation of the Prehistoric Okhotsk people. *Anthropological Science*, vol. 104: 233–258.

Jeong C., Nakagome S., Di Rienzo A. 2016
Deep history of East Asian populations revealed through genetic analysis of the Ainu. *Genetics*, vol. 202 (1): 261–272.

Kenyhercz M.W., Passalacqua N.V. 2016
Chapter 9 – Missing data imputation methods and their performance with biodistance analysis. In *Biological Distance Analysis: Forensic and Bioarchaeological Perspectives*, M.A. Pilloud, J.T. Hefner (eds.). London: Academic Press, pp. 181–194.

Komesu A., Hanihara T., Amano T., Ono H., Yoneda M., Dodo Y., Fukumine T., Ishida H. 2008
Nonmetric cranial variation in human skeletal remains associated with Okhotsk culture. *Anthropological Science*, vol. 116: 33–47.

Lebedintsev A.I. 1999
Stanovleniye i razvitiye primorskogo khozyaistva v Severnom Priokhotye i na Kamchatke. In *Istoriya, arkheologiya i etnografiya Severo-Vostoka Rossii*. Magadan: SVKNII DVO RAN, pp. 42–69.

Lebedintsev A.I. 2008
Problema proiskhozhdeniya severo-vostochnykh paleoaziatov. *Vestnik SVNC DVO RAN*, No. 3: 67–80.

Lebedintsev A.I. 2019
Primorskiye kultury Okhotomorya: Eskimossko-aleutskoye vliyaniye. In *Severniy arkheologicheskiy congress*, N.M. Chairkina (ed.). Yekaterinburg: Alfa-Print, pp. 175–177.

Moiseyev V.G. 2007
K voprosu o proiskhozhdenii naseleniya okhotskoy kultury Severnogo i Vostochnogo Khokkaido. In *Radlovskiy sbornik: Nauchniye issledovaniya i muzeyniye proyekty MAE RAN v 2006 g*. St. Petersburg: MAE RAN, pp. 194–197.

Moiseyev V.G. 2008
On the origin of Okhotsk populations of Northern and Eastern Hokkaido: Cranial evidence. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 33 (1): 134–141.

Moiseyev V.G., Zubova A.V., Fuente K., de la, Yanshina O.V., Kishkurno M.S., Chikisheva T.A. 2019
Noviye kraniologicheskiye i paleogeneticheskiye danniye k probleme proiskhozhdeniya korennogo naseleniya Khokkaido i Sakhalina. *Camera praehistorica*, No. 2: 137–146.

Pytlyakov G.A., Belyaeva A.V. 1957
Arkheologicheskiye raboty na Okhotskom poberezhye. In *Krayevedcheskiye zapiski*, iss. I. Magadan: Kn. izd., pp. 5–11.

Sato T., Amano T., Ono H., Ishida H., Kodera H., Matsumura H., Yoneda M., Masuda R. 2007
Origins and genetic features of the Okhotsk people, revealed by ancient mitochondrial DNA analysis. *Journal of Human Genetics*, vol. 52: 618–627.

Sikora M., Pitulko V.V., Sousa V.C., Allentoft M.E., Vinner L., Rasmussen S., Margaryan A., Barros Damgaard P., de, Fuente C., de la, Renaud G., Yang M.A., Fu Q., Dupanloup I., Giampoudakis K., Nogués-Bravo D., Rahbek C., Kroonen G., Peyro M., McColl H., Vasilyev S.V., Veselovskaya E., Gerasimova M., Pavlova E.Y., Chasnyk V.G., Nikolskiy P.A., Gromov A.V., Khartanovich V.I., Moiseyev V., Grebenyuk P.S., Fedorchenko A.Y., Lebedintsev A.I., Slobodin S.B., Malyarchuk B.A., Martiniano R., Meldgaard M., Arppe L., Palo J.U., Sundell T., Mannermaa K., Putkonen M., Alexandersen V., Primeau C., Baimukhanov N., Malhi R.S., Sjögren K.-G., Kristiansen K., Wessman A., Sajantila A., Lahr M.M., Durbin R., Nielsen R., Meltzer D.J., Laurent Excoffier L., Willerslev E. 2019
The population history of northeastern Siberia since the Pleistocene. *Nature*, vol. 570: 182–188.

Vasilyevsky R.S. 1971
Proiskhozhdeniye i drevnyaya kultura koryakov. Novosibirsk: Nauka.

Zubov A.A., Lebedinskaya G.V. 1985
Rekonstruktsiya vneshnego oblika lyudey po cherepam, naidennym vo vremya arkheologicheskikh rabot na Kamchatke i Chukotke. In *Novoye v arkheologii severa Dalnego Vostoka*. Magadan: SVKNII DVNC AN SSSR, pp. 126–142.

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The First Settlers of Novosibirsk: The Demographic Structure of Krivoshchekovo, Western Siberia, in the 18th and Early 19th Centuries

Sex and age were determined in a skeletal sample from an 18th to early 19th century cemetery at Krivoshchekovo, a rural center since the mid-1790s. Historical records mention the area as the Krivoshchekovo Ob region. The village was founded by immigrants from European Russia. Archival sources concerning the demography of Krivoshchekovo were analyzed, mortality tables were constructed, proportions of various age groups were calculated, and average age of death was estimated for adults. Limitations of the study stem from the fact that the population of Krivoshchekovo was not stationary. The results of the paleodemographic analysis are compared with information from two archival sources: confessional lists and parish registers of St. Nicholas Church, where births, marriages, and deaths were recorded over the period from 1763–1841. Comparative material relates to Russian old residents and the local Tatar population of the Omsk Irtysh region in the 1600s–1800s. Sex and age were estimated in a skeletal sample of 462 individuals—one third of the number of deaths during 1763–1841, when people were buried at the graveyard. Child mortality was lower than among old residents, immigrants, or natives of the Middle Irtysh. The most vulnerable group in the Krivoshchekovo population were young women and children aged 1–4. The findings of the skeletal study agree with those derived from archival sources, and likely mirror the real situation.

Keywords: *Paleodemography, mortality tables, parish registers, immigration, Russian first settlers, Krivoshchekovo population.*

Introduction

In September and October 2018, the Department of Conservation and Rescue Archaeology at the Institute of Archaeology and Ethnography (IAET) SB RAS carried out a rescue excavation at the site named "A sector of the cultural layer of Krivoshchekovo village". The site was located in the building area of a bridge crossing the Ob River at the entrance to Ippodromskaya Street in Novosibirsk. According to written sources, Krivoshchekovo was the first settlement of subjects of the Russian Empire in the area. By the middle of the 18th century, after the construction of St. Nicholas Church, Krivoshchekovo had become a village and the center of the volost (district) of the same name.

The excavation unearthed the basement of stone St. Nicholas Church*, built in 1881. This basement

*In historical literature, the church is referred to as Nikolskaya, while in archive documents it is called Nikolaevskaya, e.g.: "Three-part metrics of Nikolaevskaya Church of the Krivoshchekovo village of the Tobolsk Eparchy of the Kolyvan Governorate of the Barnaul District (State Archive of the Novosibirsk Region (GANO). F. 156, Inv. 1, D. 2817, fol. 1).

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overlapped a flat-grave burial ground, which suggests that the church was built on the territory of a graveyard of the 18th to early 19th centuries. The first mention of a church at Krivoshchekovo is found in the eighth section of the historical-geographical description by G.F. Miller (Elert, 1988: 79). The territory was probably occupied earlier by a wooden church built in 1746, surrounded by a graveyard. According to K.A. Golodyaev, in 1824, "the village community, "on shares" with the residents of neighboring villages, built a new wooden church in the name of Saint and Wonderworker Nicholas of Myra, a rural municipality, and a police station in Krivoshchekovo" (2016: 90). As was traditional, the new cathedral was erected in the place of an older church. The excavation revealed human skeletal remains from 384 burials, which became the object of the present paleodemographic study.

Paleodemography emerged as the section of demography that employs mortality tables based on skeletal determinations of the sex and age of the deceased for building models of the natural movement of the population. The latter is defined as the changes in the size, sex, or age structure of the population in terms of sociobiological, socioeconomical, and sociocultural factors (Borisov, 2001: 6–7).

Modern methods make it possible to assess such demographic parameters of populations as size, mortality in various age cohorts, the lifespan of adults of both sexes, sex ratio of adults, fertility, and child mortality (Acsadi, Nemeshkeri, 1970; Weiss, 1973; Chamberlain, 2001; Paleodemography…, 2002; Alekseyev, 1972; Alekseyeva, Bogatenkov, Lebedinskaya, 2003). On the basis of these parameters, researchers are able to reconstruct crisis consequences of epidemics, interpopulation and intrapopulation conflicts, patterns of family life, and specific physical activity. However, in practice, paleodemographic research is typically restricted to an analysis of mortality tables. More sophisticated reconstructions are rare because of the limited employment of archaeological and ethnographic data for the interpretation of observed demographic events by anthropologists. And *vice versa*: archaeologists do not pay proper attention to anthropological data. In this study, we set out to expand the subject field by placing paleodemographic data into the context of the data related to a particular population for which a bulk of historical information is available.

One of the issues obstructing the creation of reliable models of paleodemographic events is the breaking of such an important rule of data collecting as the fullest possible preservation of information on the age composition of skeletal samples. The most typical pitfall is the distortion of the proportion of subadult individuals, infants in particular. Weakly calcified subadult remains are more prone to degradation (owing to the physical and chemical agents in the soil) than adult skeletons. The child remains often get lost in museum collections, as they are barely used for analyses by classical anthropological methods, and thus receive less attention from curators. This latter issue does not apply to the sample from Krivoshchekovo, because all the remains found at the site were carefully collected, and the sex and age determination was carried out immediately in the field. Not only complete or almost complete skeletons were studied, but also single bones and bone fragments. The subadult remains were the object of particularly careful scrutiny.

One of the most hotly debated topics in paleodemography is the question of whether the actual demographic structure of past populations can be modeled on the basis of the mortality rates of osteological samples (Hoppa, 2002). But for Krivoshchekovo and several neighboring villages, the parish registers were available; thus, we were able to cross-check the results of the osteological analyses using the information from two archive sources: confessional lists and parish registers, recording acts of civil status (birth, marriage, death). As a result, we have demonstrated that the studied osteological sample well represents the actual population of Krivoshchekovo, and that some critical demographic features of the sample (e.g. increased mortality in some age cohorts) can be related to the traditions of family life and social events.

Material and methods

Sex and age were determined for 462 individuals, which is 93.1 % of the total number of the buried (496 skeletons). The paleodemographic characteristics calculated for such a representative sample provide a robust approximation of the demographic structure of the parish of St. Nicholas Church. All the settlements belonging to the parish were using the same graveyard. Taking into account regular administrative and territorial transformations due to the growing population and the emergence of new settlements, T.S. Mamsik, who studied the history of the Upper Ob region in the 18th to 19th centuries, sometimes referred it to as the Krivoshchekovo Ob region (2012: 65). We will also use this term further on.

The demographic data for the actual population of Krivoshchekovo were obtained from the parish documentation (GANO. F. 156, Inv. 1, D. 2814–2818; State Archive of the Tomsk Region (GATO). F. 264, Inv. 1, D. 22). This information covers the period from 1764 to 1841. The calculation of the main parameters of the natural movement of the population (coefficients of fertility, mortality, and natural increase) was carried out for 1781, 1797, 1813, 1825, and 1835, i.e. at approximately equal intervals, spanning 54 years. These calculations clearly suggest that the fertility coefficient steadily

and significantly exceeded the mortality rates (Table 1, Fig. 1). This does not fit a stable or a stationary demographic situation for which the modeling equations employed in paleodemography are calculated (Angel, 1969; Weiss, 1973: 8–10). Thus, the most important parameters of population structure (the probability of death and life expectancy for different age cohorts, population size, family size, etc.) cannot be reliably estimated in this case. Achieving stability can take some 50–100 years in pre-industrial populations closed to immigration (Chamberlain, 2001). But the size of the population of the Krivoshchekovo Ob region was progressively increasing, owing not only to natural reproduction but also to immigration (Mamsik, 2012: 67). Settling of the

Table 1. **Indicators of the natural movement of the population**

Year	Group	Total number	Number of births	Number of deaths	Total coefficient of fertility, %	Total coefficient of mortality, %	Coefficient of natural growth, %
1781	Males	702	30	3	4.27	0.43	3.84
	Females	689	20	5	2.9	0.73	2.17
	Total	1391	50	8	3.39	0.57	2.82
1797	Males	1051	28	4	2.66	0.38	2.28
	Females	1032	27	6	2.61	0.58	2.03
	Total	2083	56	10	2.68	0.48	2.2
1813	Males	1280	80	18	6.25	1.41	4.84
	Females	1318	81	14	6.14	1.01	5.13
	Total	2661	161	32	6.05	1.2	4.85
1825	Males	1609	83	13	5.16	0.81	4.35
	Females	1756	94	13	5.35	0.74	4.61
	Total	3365	177	26	5.26	0.77	4.49
1835	Males	1979	111	25	5.61	1.26	4.35
	Females	2169	98	30	4.52	1.38	3.14
	Total	4148	209	55	5.04	1.33	3.71

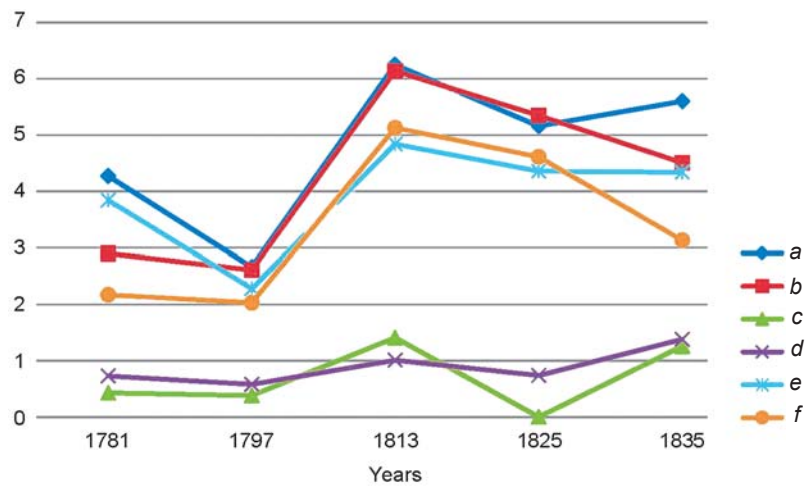

Fig. 1. Distribution of the indicators of the natural movement of the studied population in 1781–1835.
a, b – fertility coefficient: *a* – males, *b* – females; *c, d* – mortality coefficient: *c* – males, *d* – females; *e, f* – natural growth: *e* – males, *f* – females.

area by the Russians began from the establishment of a "market-village" called Krivoshchekovo by some 20 families of settlers from various Tobolsk slobodas in 1707 (Ibid.: 50–51). The village was located at the boundary of the so-called Teleut land around the Siberian Tract—the territory occupied by the "White Kalmyks", subjects of Dzungaria. By the 1790s, the Krivoshchekovo Volost was established, which included 35 small settlements, and by 1823, 38 settlements (Ibid.: 68).

Assuming that the factor of migration had some effect on the formation of the demographic structure of the Krivoshchekovo population, and that this effect cannot be assessed quantitatively, we calculated only the main paleodemographic parameters using the mortality tables. Their commonly accepted symbolic designations and formulae (Weiss, 1973: 1–10; Alekseyeva, Bogatenkov, Lebedinskaya, 2003: 21) are given in Table 2. We obtained the distribution of the individuals between age and sex cohorts, calculated the mean life expectancy (disregarding the subadult mortality), and analyzed the percent ratios of subadults, males, and females in different age classes.

The standard grouping for the description of the age structure of the population, accepted in all demographic documents and calculations of the UN, includes one-year intervals from 0 to 4 years and five-year intervals from 5 to 85 years. The last interval is open: 85 and older (Borisov, 2001: 57–58). Such a classification is also employed for compiling mortality (life) tables and respective calculations in paleodemography, where subadults from 0 to 4 years of age are typically combined into a single cohort. In our tables, subadults that died during birth or immediately after birth were treated as a separate age cohort. This group is of particular interest, as it is numerous at the Krivoshchekovo cemetery, and the remains of these subadults are typically found in female burials. Thus, the age interval from 0 to 4 years was composed of two different groups: 0–1 and 1–4 years. The final age cohort employed in this study included individuals 55 years old and older.

Some of the existing approaches to the grouping of paleodemographic raw data into cohorts are based on the gradations of the main stages of ontogeny (Alekseyev, 1972; Pezhemsky, 2003, 2010). Such an approach can be successfully applied to our study sample, as the bulk of reference data on the Russian old residents and local Tatar populations of the Omsk Irtysh region of the 17th to 19th centuries AD was tabulated according to the stages of ontogeny (Yuzhakova, 2016, 2018).

Taking into account the large proportion of subadult remains in the Krivoshchekovo sample (201 individuals out of the total 462, or 43.5 %), we paid special attention to the natural movement of the subadult part of the historic population. The analysis of the movement was based on

Table 2. **Paleodemographic indicators and the formulae used for their calculation (five year intervals)**

Indicator	Formula
x. Age cohort	–
X. Median of the age cohort x	X = [i + (i + 5)]/2, where i means the beginning of an age cohort
Dx. Number of individuals in the age cohort x	–
Nr. Sample size	–
Na (x). Number of adult individuals in the age cohort x	–
Nf (x). Number of adult females in the age cohort x	–
Nm (x). Number of adult males in the age cohort x	–
Nc (x). Number of children in the age cohort x	–
Cx. Proportion of the age cohort x in the total sample	(Dx/Nr) × 100
PSR (m or f). Total sex ratio in the sample	[N(m or f)/Na] × 100
PSR (x). Sex ratio in the age cohort x	The same for the age cohort x
PSR (c–a). Proportion of children and adults in the sample (%)	(Nc/Na) × 100
PCD. Child mortality (%)	[∑ (0, 14) Dx/Nr] × 100
PCNB. Child mortality in the zero age cohort (%)	[∑ (0) Dx/Nr] × 100
PCB. Child mortality during the first year of life (%)	[∑ (0–1) Dx/Nr] × 100
AA. Mean age-at-death of adults	[∑ (15, 50+) XDx/Na] × 100

Table 3. **Total mortality table for the sample from the Krivoshchekovo cemetery**

Age cohort (x)	Total sample		Males		Females	
	Number of individuals (Dx)	Proportion of the sample (Cx)	Number of individuals (Dx)	Proportion of the sample (Cx)	Number of individuals (Dx)	Proportion of the sample (Cx)
0	38	8.23	–	–	–	–
0–1	27	5.84	–	–	–	–
1–4	90	19.48	–	–	–	–
5–9	35	7.58	–	–	–	–
10–14	11	2.38	–	–	–	–
15–19	20*	4.33	2	1.59	17	12.69
20–24	24	5.19	8	6.35	16	11.94
25–29	39	8.44	15	11.90	24	17.91
30–34	22	4.76	9	7.14	13	9.70
35–39	51	11.04	30	23.81	21	15.67
40–44	39	8.44	23	18.25	16	11.94
45–49	32	6.93	21	16.67	11	8.21
50–54	15	3.25	7	5.56	8	5.97
55+	19	4.11	11	8.73	8	5.97
Total	462	100	126	100	134	100

*Including one individual of undetermined sex.

the data on fertility and child mortality extracted from the parish registers ranging from 1763 to 1841 (GANO. F. 156, Inv. 1, D. 2814–2818; GATO. F. 264, Inv. 1, D. 22). Those books contain information regarding the cause of death as well.

Results and discussion

According to the principles described above, a mortality table for the population represented by the burials at the cemetery of the 18th to early 19th church in the Krivoshchekovo village was calculated. The distribution of age cohorts in the sample displays an increase in mortality in three intervals: 0–4; 25–29, and 35–39 years (Fig. 2). A notable feature of the graph is an elevated position of the female mortality curve with respect to the male curve in the interval from 15–19 to 25–29 years, though the general shape of both curves is similar. After the 30–34 years cohort, the position of the female and male curves changes. While female mortality is much higher from 15 to 30 years of age, an opposite picture is observed in older cohorts, from 25–39 to 55+ years. We do not mean to explain this trend by more favorable live conditions for mature females. Rather, the observed inversion of the mortality curves can be associated with a notable decrease in the number of individuals from the *Maturus* age cohort owing to frequent deaths of young females. The analysis of the factors that led to such a pattern was beyond the aims of the present study. It is of note, however, that such a cause of death as "fever" is often found in the parish registers for females. This can probably be interpreted as death from general sepsis accompanied by a very high temperature. Frequent parturitions, in the absence of qualified obstetrics and necessary hygiene, might determine the selective mortality of females from the *Juvenilis* and *Adultus* age cohorts.

The association between female mortality and labor is evidenced by the presence of numerous double burials of women and newborn or prenatal children at the Krivoshchekovo cemetery. Nine such cases were detected. The age composition of the deceased from those burials is quite wide: 16–18 (1), 18–20 (1), 25–29 (1), 35–39 (5), and even 55–60 (1). In two cases, the burials contained the remains of twins. Multiple pregnancies were probably frequent in the Krivoshchekovo population and can be considered a typical feature of this group. In general, six cases of the interment of two subadults of approximately the same age were observed: four pairs of newborns, and two pairs of older children (2.5–3

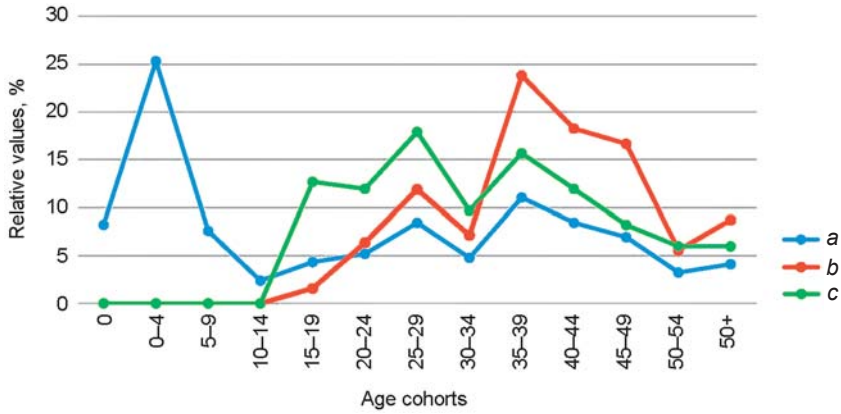

Fig. 2. Age distribution of adult individuals of the studied sample.
a – all individuals; *b* – males; *c* – females.

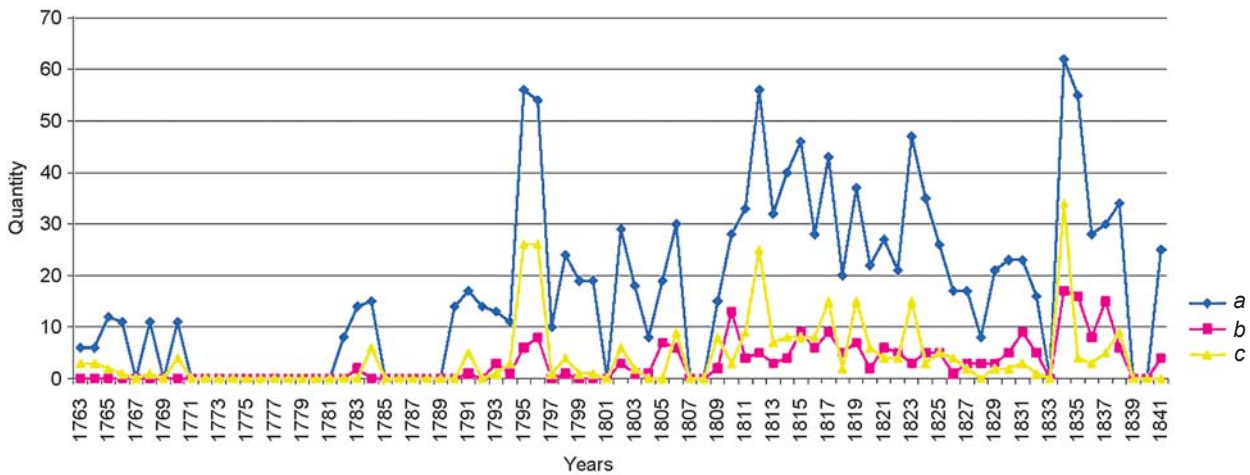

Fig. 3. Age distribution of the subadult individuals died in the Krivoshchekovo Volost in 1763–1841.
a – all subadults; *b* – first year of life; *c* – 1–5 years.

and 3.5–4 years old). Our observations comply with the records in the parish registers, which also report births of twins.

The peak subadult mortality falls in the first year of life, and this result is similar between the osteological observations and the demographic data for the period from 1763 to 1841 (Fig. 3). In this graph, the mortality curve for 1–5 years is substantially higher than that for infants (0–1 years). Notably, in Krivoshchekovo Volost, children's deaths were not being registered in the parish registers during quite long periods, i.e. from 1771 to 1781, and from 1785 to 1789. This is probably due to the absence of information for the respective years rather than to the real demographic situation in the population. The top four peaks of subadult mortality (1795–1796; 1810–1812; 1823, and 1834–1835) are associated with the smallpox epidemics in the region, which is also evident from the records in the metric books. The lower vulnerability of infants can be explained by a higher level of immunity due to breastfeeding. Weaning and the adoption of an adult diet, accompanied by an increase in physical and cognitive activity, in older children may explain their higher vulnerability to infectious agents. Adult mortality was rising in the epidemic years as well, which was accompanied by an increase in fertility: the highest number of births falls on the very same years as the highest mortality rates (Fig. 4). Clearly, the prevention of depopulation was achieved not only through immigration but also by increased fertility.

The plots of the distribution of the main parameters of natural movement of the population (see Fig. 1) display a lower amplitude of fluctuation of mortality coefficient in females than in males for five years during a 54-year-long period (at roughly equal intervals from 1781 to 1835). The coefficients of fertility and natural population growth show similar trends in both sexes till the terminal

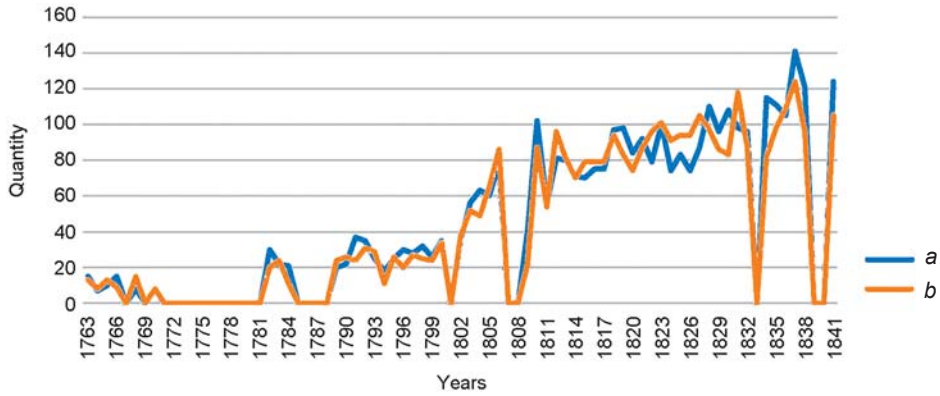

Fig. 4. Sex distribution of children born in Krivoshchekovo Volost in 1763–1841.
a – males; *b* – females.

year of our analysis (1835), when the fertility coefficient substantially decreased in females but increased in males. A similar trend is observed for natural growth as well. The tendencies for the indicators of the natural movement display some similar characteristic features of the subadult fertility and mortality plots for 1763–1841. The highest, and almost equal for both sexes, fertility and natural growth coefficients are detected simultaneously with the maximal values of the mortality coefficient—in 1813. But in 1835, the increase of mortality rate as compared to 1825 common for both sexes has led to an increase in the coefficients of fertility and natural growth in males only, while the same indicators in females have substantially decreased. This observation may suggest that the formation of a balanced demographic structure in populations depends on many factors, the most salient of which for the Krivoshchekovo population was mortality. The response to its growth, especially in subadults, was an increase in the fertility rate.

The sex and age structure of the Krivoshchekovo population can be compared with the data on the old residents and migrants from the Izyuk village nearby Tara. The village was established by servicemen from Tara in 1701, almost simultaneously with Krivoshchekovo. An excavation of the local cemetery, referred to in archaeological literature as Izyuk I, revealed the remains of 264 individuals from 261 burials (Yuzhakova, 2018). The data on the Ayalyn Tatars from the Cheplyarevo village, taken from the 1625 census (Tomilov, 1981: 137), were available for comparative analysis as well. These data were represented by an osteological sample from the Cheplyarevo-27 burial ground, which was probably the cemetery belonging to the village (Yuzhakova, 2016). In the late 18th to early 19th centuries, the Ayalyn Tatars were a well-defined ethnic group of the Tara Tatars, displaying an endogamy coefficient as high as 65 % in 1795 (Tomilov, 1981: 138). Such a comparison of the paleodemographic indicators between a population open to immigration and a demographically isolated group is of particular interest (Table 4).

The first difference is the prevalence of females in the Krivoshchekovo sample, while for Cheplyarevo-27 and Izyuk I an opposite sex ratio is observed. The relatively higher mortality of females in the settlements of the Krivoshchekovo Ob region than in the Middle Irtysh region villages might be a result of the differences in social, living, and even environmental conditions, which determine the main pattern of occupational activity, and the ways of biological adaptation to these conditions.

The population of Krivoshchekovo had been formed by the servicemen who migrated mainly from the Russian North (Mamsik, 2012: 89). But the waves of immigrants from European Russia might have included the Belarusians, Malorussians (Ukrainians), Poles, and Lithuanians (Ibid.: 105). The migrants were initially trading with the Teleuts in the early 18th century, but later they began to specialize in driving livestock and transporting goods to the right bank of the Ob River, along with fishing and domestic crafts (Ibid.: 49). As a historically established crossing for cattle, this place was convenient, because the Ob is shallow and has several islands there. The new settlers were arriving in the Krivoshchekovo Ob region with their own families, though the possibility of marriages of the migrant men with the Teleut women cannot be ruled out.

The first eleven families at Krivoshchekovo were registered by the 1710 census (Russian State Archive of Ancient Acts (RGADA), F. 214, Inv. 5, D. 434). These included 19 males, 18 females, and 50 children from 0 to 19 years of age: the first generation of the Krivoshchekovo population. According to confessional records and historical sources, many of those families belonged to the class of commoners (Mamsik, 2012: 108; Minenko, 1990: 42), i.e. both husbands and wives were quite far from peasant labor. As trade was carried out by men only, peasant life fell mainly on the shoulders

Table 4. **Main paleodemographic indicators of the population from the Krivoshchekovo necropolis and some cemeteries of the Omsk Irtysh region**

Indicator	Krivoshchekovo	Izyuk I (Yuzhakova, 2018)	Cheplyarovo-27 (Ayalyn Tatars) (Yuzhakova, 2016)
PSR (m–f)	48.5–51.5	39.3–60.7	58.5–41.5
PSR (m–f) Juvenilis (15–24)	23.3–76.7	20.0–80.0	50.0–50.0
PSR (m–f) Adultus (25–34)	39.3–60.7	33.3–66.7	55.6–44.4
PSR (m–f) Maturus I (35–44)	58.9–41.1	41.2–58.8	58.8–41.2
PSR (m–f) Maturus II (45–54)	59.6–40.4	42.1–57.9	55.6–44.4
PSR (m–f) Senilis (55+)	57.9–42.1	50.0–50.0	100.0–0
C (55+)	4.11	1.53	1.9
Cm (55+)	2.38	0.77	1.9
Cf (55+)	1.73	0.77	0
PCD	43.72	69.1	60.2
PSR (c–a)*	43.7–56.3	69.1–30.7	60.2–39.8
PCNB. Newborn mortality in the children age cohort (%)	18.81	44.2	12.9
PCB. Mortality during the first year of life in the children age cohort (%)	13.37	21.0	21.0
AA. Mean age-at-death of adults of the sample**	35.4	35.1	41.3
AA (m). Mean age-at-death of males**	39.4	38.3	42.0
AA (f). Mean age-at-death of females**	33.9	33.4	39.7

*Adolescent individuals (Juvenilis) were included in the adult age cohort (a).
**The mean age-at-death for the final age cohort (55+) was set to 57.5 years.

of women. Since 1759, the male part of the population was assigned the manufactures of the Altai District and had to carry out additional duties (Minenko, 1990: 65) that tore men away from their families for a long time. This increased the already heavy physical load of their wives. Taking this into account, it can be assumed that at least the first two generations of Krivoshchekovo women could not be well adapted to the local environmental conditions and occupation.

The population of Izyuk, according to ethnographic data, was formed not only from the Russian migrants but also from baptized representatives of the local Finno-Ugric groups, and the population was well integrated with neighboring communities (Berezhnova, Korusenko, Novoselova, 2001). Girls from Izyuk married mostly men from the old-residents' villages close by. These males might have been of a non-Russian ethnic origin, and their fathers belonged to the peasant and service classes (Ibid.). The Ayalyn Tatars buried at Cheplyarovo-27, in turn, had at least four centuries of adaptation to the local environment and the formation of an adequate structure of social relations. This is reflected by such a paleodemographic indicator as the mean age-at-death of adults, which is substantially higher at Cheplyarovo than in the Izyuk and Krivoshchekovo groups.

The reconstructed demographic profile of the paleopopulation of Krivoshchekovo is basically similar to that observed in migrants and old residents of the Izyuk village. The mean age-at-death is low and almost identical in both groups, females are prevalent and most vulnerable at adolescence. Nevertheless, unlike those of Cheplyarovo-27, both the Izyuk and Krivoshchekovo samples included elderly females. The archives of the Krivoshchekovo Volost provide information about people who lived up to 90 years old.

The mean age-at-death of the adults buried at Cheplyarovo-27 is substantially higher than in the Izyuk and Krivoshchekovo samples. The sex ratio is biased towards males, owing to their higher survival to mature and elderly ages. An almost equal sex ratio in the adolescent and young adult cohorts is peculiar to the Cheplyarovo paleopopulation.

The proportion of subadult individuals in all three groups can be considered typical of the rural population. Despite the high total number of subadults (200 individuals), the percentage of this cohort at Krivoshchekovo was the lowest among the three paleopopulations: 43.7 % as compared to 69.1 % at Izyuk and 60.2 % at Cheplyarovo-27. The mortality of newborns and infants (first year of life) was accordingly lower in the Krivoshchekovo population. Thus, the level of subadult mortality in the population of the Krivoshchekovo Ob region in the 18th to early 19th centuries was typical for migrant and old resident Siberian groups, and even lower as compared to the aborigines of the Middle Irtysh area.

Conclusions

The osteological sample obtained during the excavation of the cemetery at Krivoshchekovo represents five generations of the inhabitants of this and neighboring villages. The territory of the cemetery was uncovered almost completely, and the age and sex determinations were made immediately after the end of the excavations, in stationary conditions at the IAET SB RAS. Our analysis of paleodemographic indicators is based on a representative sample of the inhabitants of the Krivoshchekovo Volost. According to the parish registers of St. Nicholas Church, 1374 people died from 1763 to 1841, during the period of the frequent use of the cemetery. Age and sex determinations were made for 462 individuals, i.e. for approximately 1/3 of the total number of the deceased. Nevertheless, we did not find it justified to apply the formulae of paleodemographic analysis to the mortality tables of the Krivoshchekovo sample, as the written sources suggest that the real population of this village was open to immigration.

The basic indicators of the demographic structure of the sample are in good agreement with the sociocultural characteristics reconstructed using archival data. The Krivoshchekovo population was formed mainly by migrants from European Russia; thus, its first two generations had to adapt to new environmental and living conditions, as well as to changes in occupational activity. This was complicated by periodical outbreaks of natural smallpox, which had been striking Siberia since the early 17th century. Young females and children from 1 to 4 years of age were the cohorts most vulnerable in this population.

While general trends in the level and pattern of mortality at Krivoshchekovo were similar to other large settlements of the Middle Irtysh region, subadult mortality was lower in the studied sample. This observation can be explained by the specifics of the social stratum that gave rise to the Krivoshchekovo population. The representatives of the commoner class among the Krivoshchekovo first settlers had some level of education, the experience of living in cities, and could use their knowledge to create relatively safe sanitary and hygienic conditions in their homes. Some of them might even have some medical knowledge, as evidenced by the records of the causes of death in the parish registers (smallpox, tumors, consumption, etc.).

Summing up the results of the analysis of the demographic structure of the Krivoshchekovo population, reconstructed on the basis of anthropological and archival data, it can be concluded that, taken together, these data reliably reflect the features of the paleodemographic processes in the Novosibirsk Ob region in the 18th to early 19th centuries.

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References

Acsadi G., Nemeshkeri J. 1970
History of Human Life Span and Mortality. Budapest: Akademiai Kiado.

Alekseyev V.P. 1972
Paleodemografiya SSSR. *Sovetskaya arkheologiya*, No. 1: 3–21.

Alekseyeva T.A., Bogatenkov D.V., Lebedinskaya G.V. 2003
Vlakhi: Antropo-ekologicheskoye issledovaniye (po materialam srednevekovogo nekropolya Mistikhali). Moscow: Nauch. mir.

Angel J.L. 1969
The bases of paleodemography. *American Journal of Physical Anthropology*, vol. 30: 427–438.

Berezhnova M.L., Korusenko S.N., Novoselova A.A. 2001
Logisticheskiy analiz odnogo postroyeniya: Kak istoriki sozdayut mify. In *Integratsiya arkheologicheskikh i etnograficheskikh issledovaniy.* Nalchik, Omsk: Om. Gos. Ped. Univ., pp. 48–56.

Borisov V.A. 2001
Demografiya. Moscow: Nota Bene.

Chamberlain A.T. 2001
Palaeodemography. In *Handbook of Archaeological Sciences*, D.R. Brothwell, A.M. Pollard (eds.). New York, London: John Wiley and Sons, pp. 259–267.

Elert A.K. 1988
Istoriko-geograficheskoye opisaniye Tomskogo uezda G.F. Millera (1734 g.). In *Istochniki po istorii Sibiri dosovetskogo perioda*. Novosibirsk: Nauka, pp. 59–101.

Golodyaev K.A. 2016
Nikolskaya tserkov s. Krivoshchekovo Tomskoi gubernii. In *Balandinskiye chteniya*, vol. XI. Novosibirsk: Novosib. Gos. Univ. arkhitektury, dizaina i iskusstv, pp. 91–96.

Hoppa J.W. 2002
Paleodemography: looking back and thinking ahead. In *Paleodemography: Age Distributions from Skeletal Samples*, R.D. Hoppa, J.W. Vaupel (eds.). New York: Cambridge Univ. Press, pp. 9–28.

Mamsik T.S. 2012
Pervoposelentsy Novosibirskogo Priobya: Po materialam XVIII – serediny XIX v. Novosibirsk: Izd. SO RAN.

Minenko N.A. 1990
Po staromu Moskovskomu traktu. Novosibirsk: Kn. izd.

Paleodemography: Age Distributions from Skeletal Samples. 2002
R.D. Hoppa, J.W. Vaupel (eds.). New York: Cambridge Univ. Press.

Pezhemsky D.V. 2003
Opredeleniye biologicheskogo vozrasta v paleoantropologii i problema vozrastnykh intervalov. In *V Kongress etnografov i antropologov Rossii. Omsk. 9–12 iyunya 2003 g.: Tezisy dokl*. Moscow: IEA RAN, p. 255.

Pezhemsky D.V. 2010
Polovozrastnaya struktura naseleniya Petrovskogo kontsa srednevekovogo Pskova. In *Arkheologiya i istoriya Pskova i Pskovskoi zemli*. Pskov: Izd. IA RAN, pp. 47–54.

Tomilov N.A. 1981
Tyurkoyazychnoye naseleniye Zapadno-Sibirskoi ravniny v kontse XVI – pervoi chetverti XIX v. Tomsk: Izd. Tom. Gos. Univ.

Weiss K.M. 1973
Demographic Models for Anthropology. Washington: Society for American Archeology.

Yuzhakova A.V. 2016
Paleodemografiya naseleniya lesostepnogo Priirtyshya XVII–XVIII vv. (mogilnik Cheplyarovo 27). *Vestnik Tomskogo gosudarstvennogo universiteta*. Istoriya, No. 5: 169–174.

Yuzhakova A.V. 2018
Paleodemograficheskaya kharakteristika starozhilcheskogo naseleniya Omskogo Priirtyshya XVII–XVIII vv. (po materialam pamyatnika Izyuk I). *Izvestiya Irkutskogo gosudarstvennogo universiteta*. Ser.: Geoarkheologiya. Etnologiya. Antropologiya, vol. 25: 162–175.

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Archaeologist, Ethnographer, Art Historian— 60 Years of Scientific Research: To the Anniversary of Professor D.G. Savinov

March 20, 2021 marks the 80th anniversary of Dmitry Glebovich Savinov, an outstanding scientist, teacher, and remarkable person, Professor of the Department of Archaeology at Saint Petersburg State University.

Dmitry G. Savinov has made a significant contribution to Russian science. He has devoted his life to studying and reconstructing the primordial and medieval history of the peoples inhabiting the Eurasian steppes.

The range of D.G. Savinov's scientific research is great. His field of interest covers the period from the Bronze to New Age; his expeditionary routes embraced the vast territory stretching from Northern China to the taiga zone of Western Siberia, and from the Caucasus and Black Sea region to Transbaikalia. The scope of his studies is large-scale indeed.

The study of medieval archaeology is among the main directions of the scientific activity of Dmitry G. Savinov. The topic of his candidate dissertation was "Culture of the Population of Southern Siberia in the pre-Mongol Period (10th–12th Centuries)" (1974); his doctoral dissertation was dedicated to the topic of "Formation and Development of Early Medieval Archaeological Cultures of Southern Siberia" (1987). History and archaeology of the medieval period, as well as the preceding Xiongnu-Sarmatian age, were the main topics of many monographs of the scholar, including "The Peoples of South Siberia in the Early Turkic Period" (Leningrad, 1984), "Steppe Empires of Ancient Eurasia" (St. Petersburg, 2005, co-authored with S.G. Klyashtorny), "Upper Ob Region at the Turn of the Eras. Basandai Culture" (Novosibirsk, 2008, co-authored with A.V. Novikov and S.G. Roslyakov), "Minusinsk Province of the Xiongnu" (St. Petersburg, 2009). Many specialists still regard these books as the reference ones.

Dmitry Savinov, a first-year student at the Department of Theory and History of Art at the Repin Institute of Painting, Sculpture and Architecture of the USSR Academy of Arts became interested in archaeology when he participated in the Baikal expedition headed by M.P. Gryaznov in 1959. Thereafter, the young man made important changes in his life plans; he transferred to the Leningrad State University. He was attracted by the romance of the expeditionary life, the search and study of the amazing archaeological monuments of

Southern Siberia, which were literally underfoot. Dmitry participated in the Tuva and Krasnoyarsk archaeological expeditions, during which, on his own initiative, he looked for and traced the images on the mounds' stone fences. A.D. Grach, a prominent specialist in the archaeology of Southern Siberia and the head of the Tuva archaeological expedition, played a special role in the professional education of the young field researcher.

The diploma thesis of D. Savinov, a student of the Archaeology Department of the Leningrad State University, was devoted to the rock art of Southern Siberia and Central Asia. The independent choice of the thesis topic by the senior student surprised to some extent his scientific advisor Professor M.I. Artamonov, who headed the Department of Archaeology in those years. The young researcher's fascination with the issues of primitive art was probably formed under the influence of family traditions; his parents and grandfather were professional artists.

After the brilliant defense, the main contents of D.G. Savinov's thesis was published in the "Bulletin of the Leningrad University" (1964). The case is undoubtedly significant, since only a real scientific work could be published in a serious journal. The topics of ancient and medieval art are still among the basic fields of Dmitry Savinov's scientific studies. He has published almost 70 scientific papers addressing this theme. He was the first to set the task of studying deer stones in the Eurasian steppes, identify pictorial styles, describe their local characteristics, and study the carvings on the mound stones. Dmitry Savinov was one of the first to identify the links between the Okunev art and the art of southwestern Asia in his book "The Primitive Periphery of Class Societies before the Great Geographical Discoveries (Problems of Historical Contacts)" (1978). He identified the Arzhan-Mayemir style in the Early Scythian Art in Central Asia and Southern Siberia. D.G. Savinov's works devoted to the theoretical issues of the study of primitive art are widely known. In his papers, Dmitry G. Savinov has always expressed his original vision of the subject of fine art or proposed a new meaningful exciting idea about ancient art. He proposed reconstructions of the diversity of the world embodied in realistic and irrational forms of human perception. His reconstructions of rituals were based on many years of work at the Department of Ethnography of the Leningrad University.

In 1968, Professor R.F. Its reconstituted the Department of Ethnography at the Leningrad State University and proposed a position to D.G. Savinov, when he finished his military service after graduating from the university. Dmitry Savinov accepted this offer and soon became one of the most respected teachers of the students, future ethnologists. While working at this department, he developed his own scientific method of research at the intersection of archaeology and ethnography; this approach served as the basis for studying the problems of ethnocultural genesis and ethnopolitical history of the nomadic peoples of Central Asia and Southern Siberia. In fact, his career can be considered as a good example of the multidisciplinary approach to research.

The academic stage of the scientific activity of our hero is comparably short, but quite fruitful, especially in expeditionary works. In 1984, D.G. Savinov occupied a position at the Department of Central Asian and Caucasian Studies of the Leningrad Branch of the Institute of Archaeology (LOIA) of the USSR Academy of Sciences. He leaded a large-scale Middle Yenisei expedition; later, he headed all rescue archaeology works of the LOIA at new construction sites. He believed that his task was not only to save archaeological monuments from destruction, but also to preserve and musealise the objects of cultural heritage. Many multi-ton carved slabs and sentry-stones from the mounds in the Askyz steppe were threatened with destruction. On the initiative of Dmitry Savinov, these were transported to the village of Poltakov in Khakassia and became the basis for a unique museum. At present, this village has an open-air museum, probably the only one in the Russian Federation, in which all the exhibits are stone slabs from mounds, with carved images of the Bronze to Middle Ages.

During these years, Dmitry G. Savinov investigated the unique Late Bronze Age settlement of Torgozhak in the Minusinsk Basin; the recovered materials provided a new insight into the Middle Yenisei antiquities. The results of these works were presented in a monograph (1996) and a series of articles. The materials of this site have always attracted attention of specialists.

In 1991, Dmitry Savinov resumed his work at the Saint Petersburg University, but at the Department of Archaeology. His skills of an organizer of the educational and research processes were especially evident during the period of his heading the department (1996–2002). It should be remembered that these years were the most difficult in our country; however, during the crisis, the department expanded research supported by grants and projects, arranged scientific conferences at various levels, and published volumes of collected papers on various topics. The scientific community appreciated the conferences, including international ones, focusing on specific types of archaeological sites. Among them are "Kurgan: Historical and Cultural Research and Reconstruction" (1996), "Sanctuaries: Archaeology of Ritual and Issues of Semantics" (2000), "Figurative Monuments: Style, Era, Compositions" (2004). Dmitry G. Savinov initiated these scientific conferences, dealt with organizational issues, and edited materials for publication.

The activities of an interdisciplinary seminar entitled "Theory and Methodology of the Archaic" are also associated with his name. In the course of the long-term work of the seminar under his direction, the scholars shared the accumulated experience of scientific research and knowledge with other researchers attending the meetings. The wide range of topics discussed at the meetings is evidenced by the released collections of reports edited with the participation of D.G. Savinov.

Profound knowledge of history, ethnography, and archaeology allows Dmitry Savinov to conduct successful research related to the historical interpretation of archaeological sources. These research results are presented in articles devoted to the sociogenesis of the populations of Southern Siberia in the Bronze and Early Iron Age, as well as to the separate topics of the worldview of ethnocultural associations of the antiquity and medieval period. The historical approach manifests itself in almost all the works of Professor D.G. Savinov.

Over the years of his work at the Saint Petersburg University, Dmitry G. Savinov has shown himself as

a brilliant teacher and mentor of the young people. He trained dozens of first-class specialists; his most talented disciples defended their candidate dissertations in archaeology and ethnography.

In a short essay, it is hardly possible to highlight all the aspects of the multifaceted activity of our celebrant, an outstanding scientist—archaeologist, historian, ethnographer, researcher of ancient and medieval monuments of Siberia and Central Asia, who dedicated almost 60 years to the humanities and 45 years to the training of highly qualified specialists. Scientific heritage of Dmitry G. Savinov as an author and co-author includes about 500 articles and 20 monographs. And it is constantly being replenished. Dmitry Glebovich Savinov is widely known in the international scientific community. In 2013, he was elected a Corresponding Member of the German Archaeological Institute (Berlin), one of the oldest and most respected scientific organizations in the world.

His wife Natalya is the faithful life partner of Dmitry Savinov. His achievements are her merit too: Natalya participated in expeditions together with Dmitry every year; her presence provided inspiration for fruitful work. Together they raised a wonderful son, Fedor, and help raising their grandchildren.

On behalf of the archaeologists of Siberia, we congratulate the "True Siberian man from St. Petersburg" Dmitry G. Savinov—an outstanding scientist, excellent teacher, brilliant lecturer, and polemicist—on his anniversary. We wish him good health, new discoveries, and implementation of his creative plans, talented and grateful students, and many joyful years of life.

A.P. Derevianko, V.V. Bobrov, V.I. Molodin, N.V. Polosmak, V.P. Mylnikov, L.N. Mylnikova, and Y.N. Nenakhova

AN SSSR – USSR Academy of Sciences

BNC SO RAN – Buryat Science Center, Siberian Branch, Russian Academy of Sciences (Ulan-Ude)

CNRS – Centre national de la recherché scientifique

CVRK IMBT SO RAN – Center of Oriental Manuscripts and Xylographs of the Institute of Mongolian, Buddhist and Tibetan Studies, Siberian Branch, Russian Academy of Sciences (Ulan-Ude)

GAIMK – State Academy for the History of Material Culture (Moscow)

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)

IRGO – Imperial Russian Geographical Society

KKKR v ChSR – Commission of Kalmyk Cultural Workers in Czechoslovak Socialist Republic

KNIIYaLI – Kalmyk Research Institute of Language, Literature and History (Elista)

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)

MIA – Materials and Investigations on Archaeology in the USSR

SVKNII DVO RAN (AN SSSR) – Shilo North-East Interdisciplinary Scientific Research Institute, Far Eastern Branch, Russian (USSR) Academy of Sciences (Magadan)

SVNC DVO RAN – North-East Scientific Center, Far Eastern Branch, Russian Academy of Sciences (Magadan)

TIE – Transactions of the Institute of Ethnography

UrO RAN – Ural Branch, Russian Academy of Sciences

VSEGEI – Karpinsky Russian Geological Research Institute (St. Petersburg)

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