SIBERIAN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES
INSTITUTE OF ARCHAEOLOGY AND ETHNOGRAPHY

ARCHAEOLOGY, ETHNOLOGY & ANTHROPOLOGY OF EURASIA

Volume 50, No. 2, 2022

doi:10.17746/1563-0110.2022.50.2 *Published in Russian and English*

CONTENTS

ARCHAEOLOGY, ETHNOLOGY & ANTHROPOLOGY OF EURASIA

Volume 50, No. 2, 2022

Founded in January, 2000
A quarterly journal in Russian and English

Founders

Siberian Branch of the Russian Academy of Sciences

Institute of Archaeology and Ethnography of the Siberian Branch of the Russian Academy of Sciences

IAET SB RAS Editorial Office and Publishing House
Postal address:
Institute of Archaeology and Ethnography
Pr. Akademika Lavrentieva 17,
Novosibirsk, 630090, Russia
Tel.: (383) 330-83-66
E-mail: eurasia@archaeology.nsc.ru
http://journal.archaeology.nsc.ru

Editors of the original Russian texts
N.M. Andjievskaya
T.V. Romanenko

Issuing Editor
Y.A. Zhuravleva

Designer
I.P. Gemueva

Russian texts translated by
V.A. Baranov
A.A. Evteev
E.Y. Pankeyeva
E. Winslow

English texts revised by
L. Baranova
P. Magnussen

Mass media registration certificate
No. 018782 issued May 11, 1999

Passed for printing June 24, 2022
Appearance June 30, 2022
Format 60×84/8. Conv. print. sh. 18.83. Publ. sh. 20.5
Order No. 552. Circulation 100 copies
Open price

IAET SB RAS Printing House
Pr. Akademika Lavrentieva 17,
Novosibirsk, 630090, Russia
http://archaeology.nsc.ru

doi:10.17746/1563-0110.2022.50.2.003-012

V.A. Grishchenko[1], P.A. Pashentsev[2], and A.A. Vasilevski[1]
[1]Sakhalin State University,
Pr. Kommunistichesky 33, Yuzhno-Sakhalinsk, 693000, Russia
E-mail: v.grishchenko@mail.ru; vasilevski@bk.ru
[2]OOO "Izyskatel SakhGU",
Lenina 290, Yuzhno-Sakhalinsk, 693000, Russia
E-mail: pashentsev@inbox.ru

The Incipient Neolithic of the Kurile Islands: The Culture of Long Barrows

This study introduces a recently discovered Neolithic culture of insular Northeast Asia. The initial stage of the Kurile Neolithic is described using findings from the 2019–2020 excavations at Kitovyi-2 and -4 on Iturup Island, the Greater Kurile Chain, Sakhalin Region. Several types of Neolithic feature were first revealed on the Kuriles by excavating large areas. The site includes dwellings mostly of two types—terranean with wooden frames that are not dug into the ground, and semisubterranean. Artifacts include linear-relief pottery and retouched bifacial stone tools on flakes and entire singularities, processed by advanced polishing. For the first time on the Kuriles, long barrows encircled by basalt plates along the perimeter were detected. These structures with evidently non-utilitarian enclosures made of plates, tentatively identified as places for cremation burials and funerary rites, indicate symbolic behavior. On the basis of this key criterion, we propose to attribute Kitovyi-2 and -4 to the culture of long barrows. Stratigraphic evidence, supported by radiocarbon analysis, allows us to establish the initial stage of the Kurile Neolithic, dating to 13.0–8.5 cal ka BP.

Keywords: *Kurile Islands, incipient Neolithic, long barrows, ritual behavior, linear-relief pottery.*

Introduction

Archaeological studies on the Kurile Archipelago were carried out by researchers from Russia, Japan, America, and Europe, and have been going on for almost a century and a half (Milne, 1882; Kono, 1905; Torii, 1919; Schnell, 1932; Chubarova, 1960; Golubev, 1964, 1972). However, owing to the inaccessibility of the islands, the studies have had a sporadic character. The situation improved to some extent in the last quarter of the 20th century, with the participation of the USSR Geographical Society in organizing the study of Russian settlements of the Modern Age (Shubin, 1994). But the goals of the rest of the research projects still followed the patterns of the initial stage of the studies: survey of the coast, surface collection of artifacts, exploratory excavations, compilation of archaeological maps, and formation of collections (Steshenko, Gladyshev, 1977; Knorozov, Spevakovsky, Taksami, 1984; Prokofiev, 1986, 1995, 2001, 2003; Zaitseva et al., 1989).

The Kurile Archipelago still remained *terra incognita* as compared to achievements in world and domestic archaeology. The first decade of the 21st century was marked by a comprehensive international program of collaboration between Washington State University (USA) and a number of scientific institutions in Russia. The series of derived radiocarbon dates and arrays of scientific data provided the researchers

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 3–12 E-mail: Eurasia@archaeology.nsc.ru

with the possibility to carry out analyses based on an informational ecological-archaeological approach, which was conceptually new for the archipelago (Fitzhugh et al., 2002, 2004; Phillips, Speakman, 2009). In the 2000–2010s, regional studies in the country intensified, owing to the streamlining of rescue archaeology programs. New hypotheses and chronological classifications have been proposed, the approximate boundaries of the Stone Age, Late Bronze to Early Iron Ages, and Middle Ages have been determined, and a geographical atlas showing locations of archaeological objects has been compiled (Atlas…, 2009; Vasilevski, Grishchenko, Orlova, 2010; Shubina, 2012; Samarin, Shubina, 2013; Vasilevski, Potapova, 2017). On the basis of the surface collections and radiocarbon dates derived from the Yankito-1 samples, the hypothesis on the Early Neolithic on the Kurile Islands has been proposed (Yanshina, Andreeva, Pantyukhina, 2008; Yanshina, Kuzmin, 2010; Kuzmin et al., 2012). From the standpoint of modern knowledge, these works, which were not backed up by thorough field procedures (i.e. planigraphic, stratigraphic observations and typological series), are perceived as preliminary, which, however, corresponds to the pioneering nature of archaeological research on the archipelago in the 19th and 20th centuries.

A systemic progress occurred in 2016–2020, when seven multilayered sites of Rybaki-2, Kurilsk-6, and Kitovyi-2–6, with a total area of 11,364 m^2, dated to the Stone Age, Late Bronze to Early Iron Ages, and Middle Ages, were studied on Iturup Island during three seasons. The derived data make it possible to determine, reasonably and with sufficiently high accuracy, the content, chronological boundaries, and characteristics of the three above-mentioned epochs and their stages, as well as to introduce the concepts of the "Incipient Neolithic of the Kurile Islands" and the "culture of long barrows". This article is the first in a series scheduled for publication. The goal is to describe the stratified materials from the ongoing excavations in the Kurile Islands and to discuss a new concept of archipelago archaeology. This paper introduces a new Neolithic culture and substantiates the initial stage of the Neolithic of the Kurile Islands.

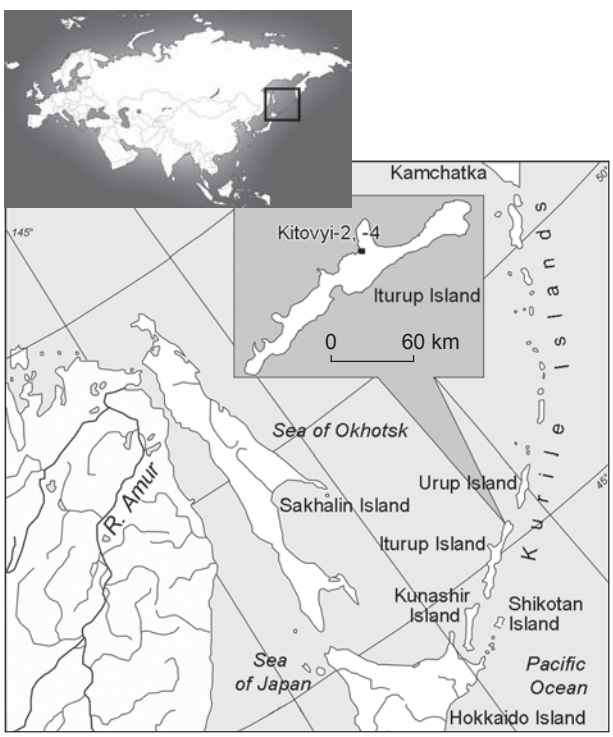


Fig. 1. Location of the archaeological sites of Kitovyi-2 and -4.

The objects of archaeological heritage—settlement sites of Kitovyi-2 and -4

The sites are located on the Sea of Okhotsk coast of Iturup Island (the Greater Kurile Chain), on the borderline between the village of Kitovyi and the city of Kurilsk. The sites are located in the nearest vicinity to each other on a volcanic plateau on the coast of Kitovyi Bay (Fig. 1, 2). The area is dominated by the Holocene stratovolcano Bogdan Khmelnitsky, 1585 m high; within a radius of 10–30 km, a group of other active volcanoes (Baransky, Ivan Grozny, Machekha, and others) is situated. The described plateau is a gently sloping plain, ending in a 20 m high abrasion ledge facing the bay. The areas containing the sites were previously known as the locations of surface collection of artifacts. In 2014–2019, during the historically and culturally expert works under the construction project, cultural layers were revealed at the both sites. In 2019 and 2020 rescue excavations of the settlements of Kitovyi-2 (1014 m^2) and -4 (4071 m^2) were carried out. As a result, in the lower layers of both the sites, dwellings and ritual objects from the Stone Age were found, with no parallels either on the neighboring islands, or on Hokkaido and Sakhalin. Since the settlements are adjacent to one another and the archaeological complexes from their lower horizons are stratigraphically, typologically, and chronologically (according to the results of radiocarbon dating) well correlated, in this article they are considered together.

Stratigraphy. The coastal part of the plateau containing both sites is characterized by the following features, revealed by excavations in 2019–2020. The sequence of loose deposits was formed during the transformation of parent volcanogenic rocks by subaerial processes, with the active participation of diluvium drift, and consists of a sequence of sandy-loamy sediments.

Fig. 2. Objects identified in excavation 1 of 2020 at Kitovyi-4 (south view).

Characteristic horizontal layering, granulometric composition, and the predominance of dark tones due to soot pigment in the color range of loose deposits are typical of both excavation areas. Dense sandy loams, abundantly saturated with small pyroclastic inclusions, alternately in light and dark colors, mark episodes of active volcanic activity in the Holocene.

In the upper horizons at the settlement of Kitovyi-2, medieval artifacts were found, which had been redeposited in a layered sequence of volcanogenic deposits. The underlying light loam layer, intensely colored with soot pigment of volcanic origin, does not contain signs of human presence. At Kitovyi-4, the stratigraphic situation is similar: solitary finds from recent periods in the upper layers of the sequence are separated from the Neolithic objects by an archaeologically sterile layer.

The dwelling-remains identified in horizon 4 at both sites were filled with dense sandy loam varying in color from black to light brown, interleaved with carbonized lenses. The underlying layers of dense sandy loam and still lower heavy yellow loam cover the bedrock and form the base of loose deposits. The loam layers are archaeologically sterile and have been taken as the bottom of the excavations. The objects of various ages in horizons 1 and 4 are mutually isolated, making it possible to consider the complexes of the Stone Age and the Middle Ages identified on the plateau as the objects *in situ* separated stratigraphically.

Dwellings. A dwelling designated as number 5 (Fig. 3) was identified in horizon 4, excavation area 1 of the Kitovyi-2 settlement (2019). After cleaning, at the bottom of the layer of dense sooty sandy loam, a rounded dwelling depression was revealed, 6.5 m in diameter and up to 0.4 m deep. The floor was even, without gradients, dense, composed of bright yellow loam. In the center, a hearth was noted—a rounded pit, 1.0 m in diameter and 0.2 m deep. Barrier stones (pebbles and boulders) serving as heat accumulators were found in its filling. The trampled floor and the smeared coals of the hearth indicate the northeast exit from the dwelling, in the direction opposite to the sea winds. Five concentric rows of pole holes were noted within the dwelling depression: three between the walls and the center; one in the center, remaining from powerful supporting poles surrounding the hearth; and one more row of shallow, elongated pits under the walls—these are traces of placement of inclined frame-rafters. The identified system suggests the tent-roof of a semi-dugout (Fig. 3). The task of the construction was to maintain the stability of the dwelling on the open seaside plateau, with the hurricane winds and extreme snow-load typical of the Kurile Islands.

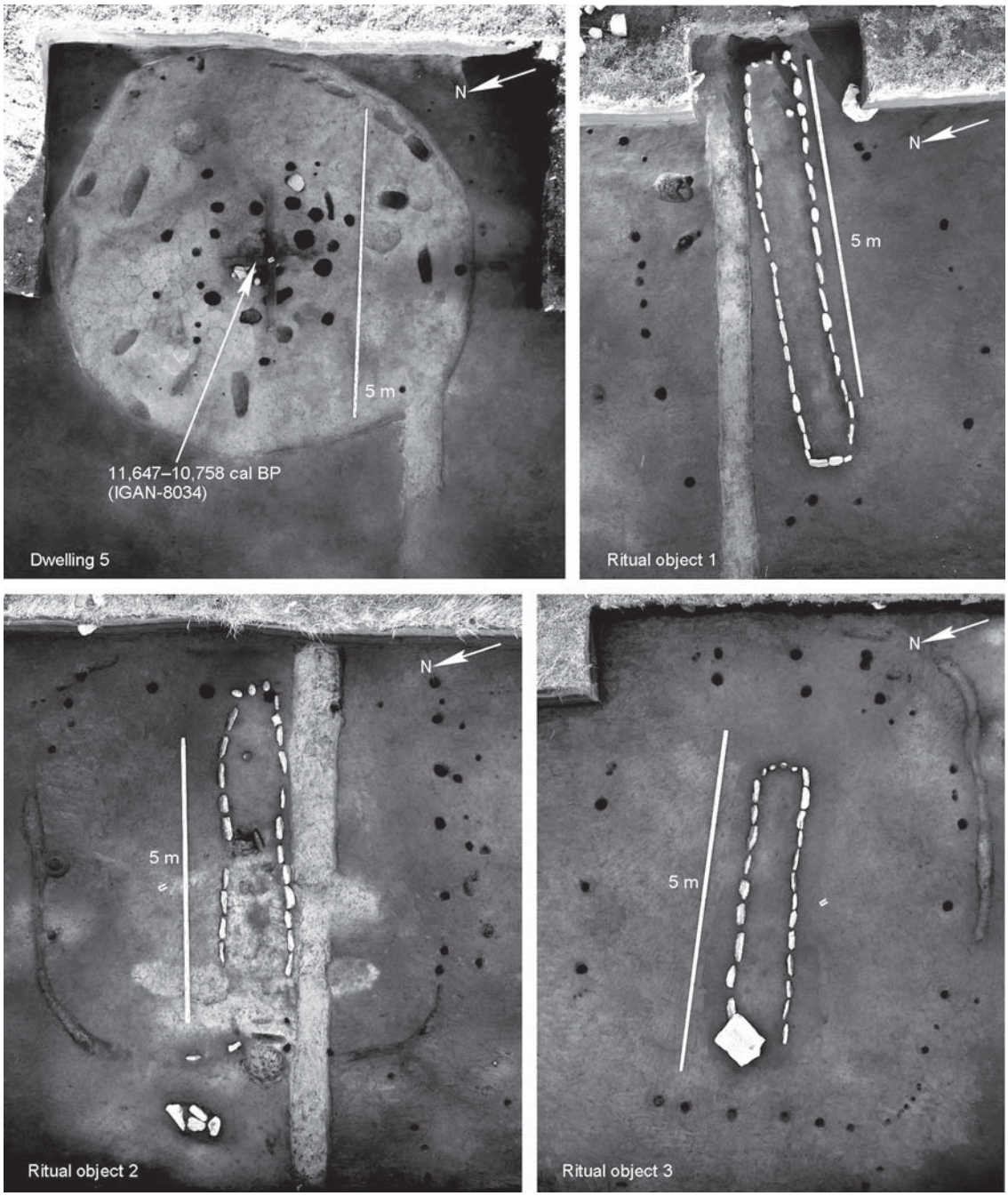


Fig. 3. Dwelling and ritual structures in excavation 1 of 2019 at Kitovyi-2.

In the lower layers of the excavation 1 at Kitovyi-4, three semisubterranean (1 and 2) and terranean (3) dwellings were cleared (see Fig. 2). The dwellings are similar in shape and size. Dwelling 1 rested on a rounded depression, 0.5 m deep and 6.3 m in diameter; dwelling 2 on an oval-shaped depression, 7.8 × 6.6 m in size, and 0.4–0.6 m deep. Both are dug into a layer of dense, dark gray sandy loam and go through the sooty layer of volcanic origin, reaching dense yellow loam. The ancient builders dispersed soil heaps along the edges of the dwelling depression, forming a banking. The floor in both dwellings is gently sloping from the walls to the center. Clusters of artifacts were found under the banking of dwelling 1. Hence, dwelling 1 was built later than dwelling 2.

In dwelling 1, 24 pits from vertical poles were noted on the floor. The pits' diameter is 0.2–0.3 m; the average depth is 0.25 m. Five grooves up to 0.25 m deep and up to 0.45 m wide were found along the walls. Additional six grooves up to 0.25 m deep were noted on the ledge-

shoulder along the margins of the dwelling depression. The configuration of pits and grooves suggests the tent-roof of the dwelling, which fits geometrically into a circle. The rafters rested against holes in the walls and were tied to a frame that united the poles around the hearth in the center. Thus, the lower hanging edges of the roof (eaves) rested against the grooves and pits on the ledge-shoulder. The walls of the frame fixing the wooden structure were supported by the rafters, which strengthened the structure's rigidity. Dwellings 2 and 5 at Kitovyi-2 and -4 respectively show similar construction. The profiles of hearth depressions contain several levels of carbonaceous lenses, which reflect not only the long-term, but also the discrete use of hearths.

The remains of a terranean dwelling were found in the western part of excavation 1 at Kitovyi-4 (see Fig. 2). Its outlines appeared in the course of cleaning the excavation's floor. The oval dwelling was 5.4 × 4.2 m in size, slightly dug into the underlying sterile layers. Within the dwelling, 34 pole holes and a series of grooves dug in antiquity along the floor's boundaries were found. In fact, this dwelling differs from the rest only in that it is not buried in the ground. This can only be explained by the absence of such a need.

Ritual objects. Three features at a distance of 7–8 m from one another were noted 12 m southwards of dwelling 5, at the base of excavation 1 at Kitovyi-2 (see Fig. 3). These are oval platforms contoured by pole holes. Feature 2 is additionally outlined along its semi-perimeter by narrow grooves. Each platform has a low (0.2–0.3 m) mound, up to 5.5 m long and 0.8 m wide, oriented along the E-W line, i.e. perpendicular to the surf-line. All of them are neatly fenced with basalt pebbles, selected by shape and size. In two cases, basalt plates are located at the mounds; such plates can be still found on the shore of the bay. The mounds are composed of sandy loams of brown and pale ocher color, with pieces of charcoal and inclusions of volcanic origin. Ceramic beads of cylindrical and biconical shape were the only finds in the mound's filling.

In excavation 1 at Kitovyi-4, a feature similar to those described above was found 9 m north of dwelling 1 (see Fig. 2). This is a subrectangular blockwork of flattened basalt plates and boulders, set along perimeter of the mound, which is 2.8 m long, 0.5 m wide, and 0.2 m high. A calcined spot was revealed at the base of the mound, and a pit filled with dark gray sandy loam to the east of the spot. The mound was surrounded by 33 pole holes forming a closed line measuring 4.7 × 3.8 m. Structurally and by elements, all four features were created according to the same technological pattern, which suggests the same goal that we understand as a ritual, and sustainable tradition, which will be discussed below.

Lithic industry. The lithic industry of Kitovyi-2 and -4 is typical of the Neolithic in the insular and coastal-continental parts of the south of the Russian Far East. The lithic industry is based on multiplatform core reduction; parallel flaking technique was not noted. The inexhaustible resource of raw material for this industry, the basalt plateau at the foot of the Bogdan Khmelnitsky volcano, is located not far from the sites, which largely explains the absence of blades. The analysis of the composition of the artifacts in clusters at the site of Kitovyi-2, located near the shore, leads to the conclusion that the primary reduction of solid basalt pieces, as well as of basalt pebbles and plates, and producing flakes for the subsequent manufacture of tools, took place not at the settlement, but at the rock deposit or on beach placers. In contrast, at Kitovyi-4, located far from the sea, several working zones were noted, where split flint pebbles, one preform, and multiplatform radial cores with negative scars of removals, as well as spalls, flakes, and chips, were found. The main blanks are unprepared rocks and large flakes.

The developed industry was focused on the manufacture of bifacial fishing/hunting and processing tools. The category of retouched tools includes knives—bifaces of foliate-rhomboid, laurel-leaf, and willow-leaf forms (Fig. 4, *1*). Arrowheads, possibly harpoon-heads, also show traditional triangular, rhomboid, or willow-leaf shapes (Fig. 4, *3–5*); these tools were made from yellow jasper, typical of the island, or of very poor-quality flint. Obsidian, in the form of solitary tools and flakes, is extremely rare.

A few completely polished biconvex adzes and chisels of medium and small sizes were made from pebbles. There are specimens with carefully sharpened edges, polished and leveled corners, and faceting (Fig. 4, *2*, *7*). At the present stage of the study, it is not clear whether the absence of large chopping tools is due to an undeveloped tradition, or these were used in other places—where boats were made, etc. Among the solitary finds, noteworthy is a concave basalt plate with a rectangular picked out cavity in the central part, interpreted as a fat lamp (Fig. 4, *6*).

A large number of blanks and fragmented tools in the space between dwellings at Kitovyi-4 attest to active economic activity, which apparently took place all year round. This is indicated by the features of the complete operation chain of tool-production. No such features were observed at Kitovyi-2.

Ceramics. The most striking feature of the site, and an indicator of its cultural and chronological affiliation, is the peculiar ceramic complex, which includes vessels and ornaments (beads) (Fig. 5). The vessels are thin-walled (5–7 mm), made of mineral-tempered clay; ceramic body is orange-brown. The bottoms of some vessels show a technical décor in the form of imprints of a wicker backing. The vessels were formed manually, through the bottom-wall coiling design technique. The pots do not bear cord impressions, which is a characteristic feature of this ceramic complex, distinguishing it from other

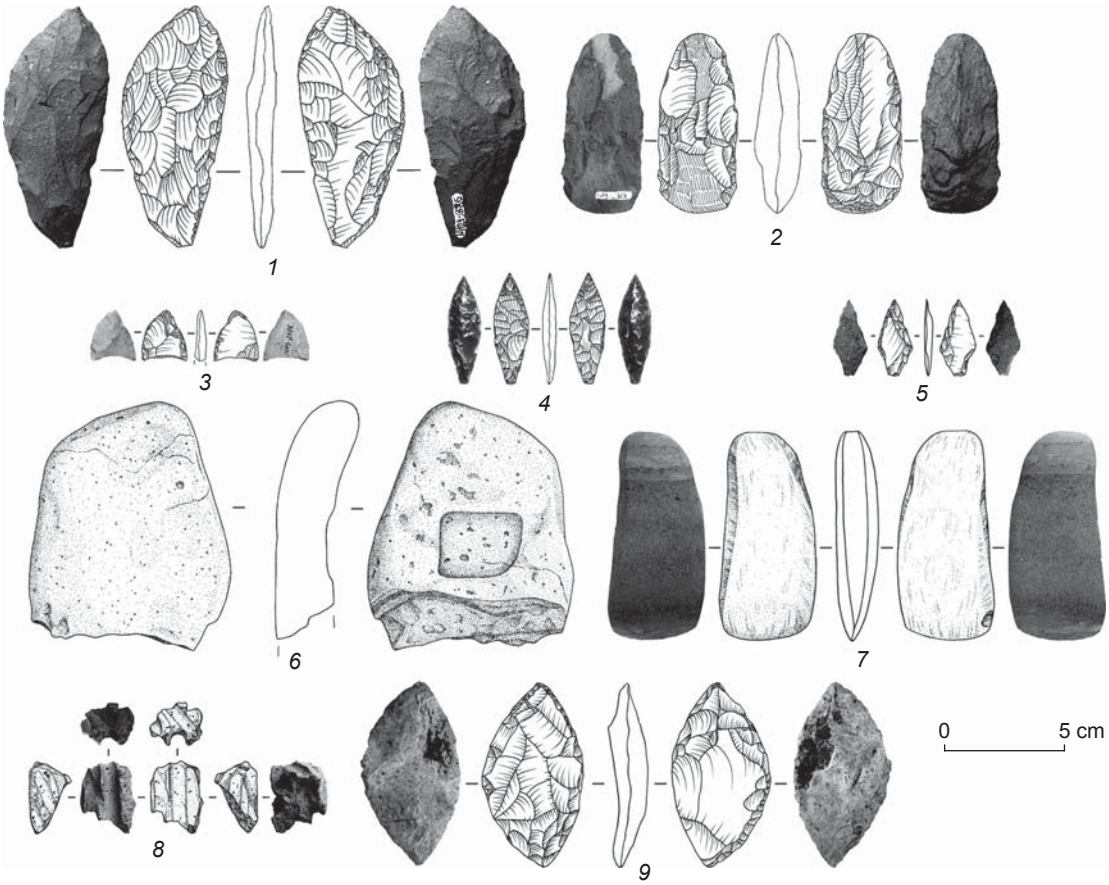


Fig. 4. Stone tools.
1–4 – Kitovyi-2, dwelling 5 and inter-dwelling area; *5–9* – Kitovyi-4, dwelling 1 and inter-dwelling area.

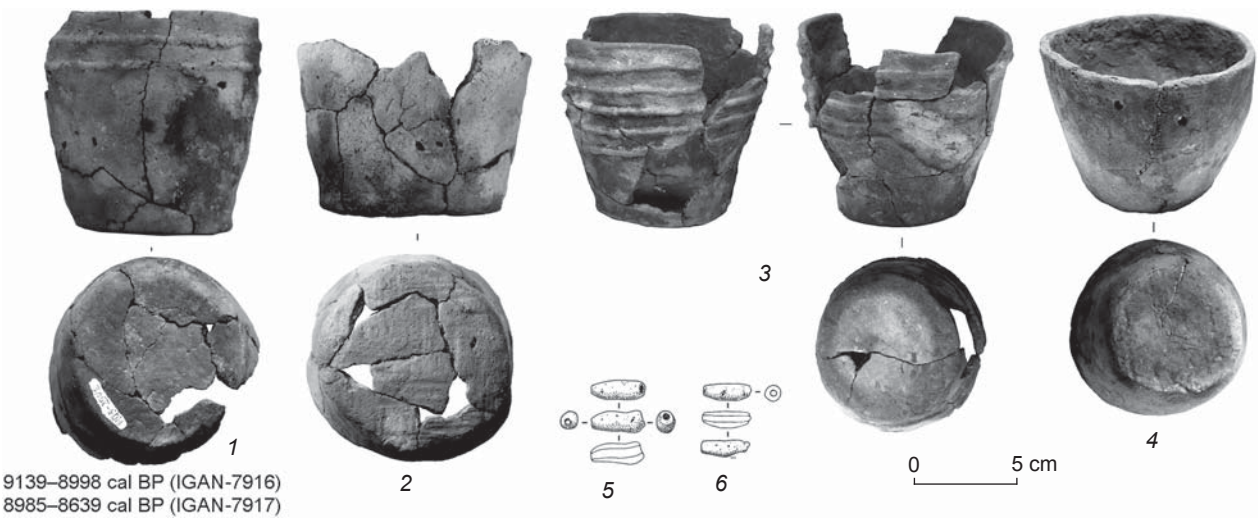


Fig. 5. Incipient Neolithic ceramics from Kitovyi-2 (*1*, *2*, *5*, *6*) and -4 (*3*, *4*).

ceramics of the Kurile Islands, Hokkaido, and Sakhalin. The closest parallels are the linear-relief pottery of the Ryukisenmon type in the northern part of Honshu Island. Thus, the above features suggest attribution of the ceramic complex from Iturup Island to the Incipient Neolithic, i.e. to the period before the appearance of the cultural phenomenon of Jomon pottery with cord imprints on the Kurile Islands.

Major results and interpretations

In the course of the excavations of the archaeological sites Kitovyi-2 and -4 on Iturup Island, several types of Neolithic objects were discovered, which were first recorded on the Kurile Islands as part of excavations over a large area. Two types of dwellings—terranean (without deepening of the wooden frame) and semisubterranean—were noted. The latter type is well-known from the Early and Middle Neolithic records of the islands of Sakhalin (Vasilevski, 2008: 191–192; Grishchenko, 2011: 80–81, 165–167; 2018: 22–24, 100) and Hokkaido (Obihiro…, 1988: 28, 31–32; 2006: 247–259). Terranean dwellings have not been previously studied on Sakhalin and the Kuriles.

Three original objects are platforms with long mounds and basalt plates laid out along the margins. The only acceptable interpretation of these structures is a ritual imitation of a terranean house with a burial bed in the center, where a double fence protects the "house of the deceased" and prevents the soul of the deceased from wandering in the world of the living, which corresponds to the more recent ideas of the Ainu about the souls of the dead as independent beings capable of coming back and harming people (Spevakovsky, 1988: 145–147).

We consider the mound to be a grave in which the remains of the cremated individuals were buried. The cremation ritual is indicated by the identified spots of calcined soil at the base of each object. Apparently, after burning, basalt plates brought from the coast were installed along the margins, and the space between them was filled with soil from a nearby pit. A fence was created around the lining; it is traced by a system of pits from poles around ritual mounds, similar to that of the terranean dwelling at Kitovyi-4, but without a gap marking the entrance/exit. Noteworthy is the conical profile of the pits, suggesting that the poles were not dug in, but that their ends were pointed and they were beaten into the ground. This indicates the symbolic nature of the structure surrounding the object. Since there are distances between the pits, we believe the poles were connected with wattle fence. The ceramic cylindrical beads found in mound 2 at Kitovyi-2 confirm indirectly the non-utilitarian nature of the structures.

Let us turn to the most general ethnographic parallels. The considered ritual mounds (let us call them long barrows) resemble stylistically the burials in boats described by L.Y. Sternberg, which are common among various peoples of the world. It was believed that such a burial allowed the deceased to return to the land of the ancestors in the same way that they once moved to a new place (Sternberg, 1936: 339). This parallel looks especially appropriate if we take into account the location of the described ritual complexes on the island, which clearly implies that the first generation of new Kurilians crossed the sea on their way from their place of origin. The absence of earlier cultural layers suggests the pioneering nature of the settlement on Iturup by the bearers of the culture of linear-relief pottery and long barrows. And this supports the hypothesis of the boat-burial tradition.

Apparently, there is an interrelation between the burials and specific dwellings at both settlements under study. The cemetery was built right next to the houses where the deceased lived. This can be interpreted both as the attachment of the living to their ancestors, and as a fear that animals or other people could harm the deceased relatives. In any interpretation, this fact speaks of the existence of the cult of ancestors, stable family-household and religious-mystical traditions and rules of conduct, taboos and moral values. This indicates fairly developed public relations and regulated social behavior, as well as the rich spiritual world of Iturup dwellers. The very existence of settlements on the island of the Greater Kurile Chain, isolated from the mainland, suggests a sufficiently high level of development of storm navigation in the Sea of Okhotsk and the coastal economy, thanks to which the people of this culture could live off marine fisheries. These assumptions, as well as the described complex of dwellings, lithic industry, and pottery, attest to interpretation of the settlements of Kitovyi-2 and -4 as the Neolithic sites. The excavations of 2019–2020 revealed several functional zones in the studied area. The first is semisubterranean dwellings of year-round habitation; the second is summer dwellings or terranean warehouses; the third is a zone of economic activity in the space between dwellings; the fourth is a zone of ritual actions—fenced areas of ancestor worship.

Chronology

In total, nine radiocarbon dates have been derived for the settlements of Kitovyi-2 and -4* (see *Table*): two dates were obtained from the samples of charred remains on the inside and outside of the walls of a ceramic vessel with a linear-relief ornament (see Fig. 5, *1*); the others from the charcoal pieces in the hearths of dwellings and one ritual object (see Fig. 2, *3*). Thus, at the present stage of the study, their age has been established in

*Dating of the samples and calibration of the dates with IGAN index were carried out at the Center for Collective Use "Laboratory of Radiocarbon Dating and Electron Microscopy" of the Institute of Geography of the Russian Academy of Sciences and the Center for Applied Isotope Studies of the University of Georgia (USA); the dates with SOAN index were calibrated at the Laboratory of Cenozoic Geology, Paleoclimatology and Mineralogical Indicators of Climate of the Sobolev Institute of Geology and Mineralogy SB RAS.

Data of radiocarbon analysis

Lab code	Sample description	Date, yrs BP	
		Noncalibrated 1σ (68 %)	Calibrated 2σ (95.4 %)
	Kitovyi-2		
IGAN-8034	Charcoal from hearth in dwelling 5	9 800 ± 130	11,647–10,758
IGAN-7916	Charred remains from ceramic vessel, scrape from the outside	8140 ± 35	9139–8998
IGAN-7917	Charred remains from ceramic vessel, scrape from the inside	7940 ± 40	8985–8639
	Kitovyi-4		
IGAN-8774	Charcoal from the filling of terranean dwelling 3	10,775 ± 30	12,757–12,720
IGAN-8775	Charcoal from the floor of terranean dwelling 3	11,115 ± 30	12,950–12,926
IGAN-8773	Charcoal from the hearth depression of dwelling 1	7375 ± 30	8142–8035
SOAN-9988	"	7990 ± 120	9264–8543
SOAN-9989	Charcoal from the hearth depression of dwelling 2	7005 ± 175	8182–7515
IGAN-8776	Charcoal from the filling of the pit at ritual object 1	7570 ± 30	8415–8343

the fairly wide range of 13,000–8000 years BP; which undoubtedly requires clarification, but indicates the extreme chronological boundaries of the identified period of the Stone Age of the Kurile Islands—namely, the Incipient Neolithic.

Stages of the Neolithic on the Kurile Islands

Summing up the data available for the Neolithic of the Kuriles, we propose the following periodization.

1. Incipient Neolithic (13.0–8.5 cal ka BP). The stage is illustrated by complexes with linear-relief pottery and is associated with the culture of long barrows. The lithic industry of this stage is characterized by the predominant bifacial technologies in the manufacture of retouched tools from flakes and entire singularities with advanced stone polishing, based on development of local basalt deposits. The occurrence of a few obsidian items suggests early exchange ties with the population of Hokkaido.

2. Early Neolithic (9.0–7.5 cal ka BP). This stage is identified hypothetically, because excavations of complexes of this period on the Kuriles have not yet been carried out. However, relying on the data of adjacent regions—primarily Sakhalin, Hokkaido, and Kamchatka—we assume that the early stage was associated with the blade arrowheads culture. The lithic industry is dominated by blade technology and the use of obsidian from Hokkaido and jasperoids and basalts from the island region. Pottery from this period is diverse and comprises several types—Akatsuki, Urahoro, and others. Separate traces of this stage were recognized during exploratory studies on the islands of Iturup (Rybaki-3), Shikotan (Malokurilskoye-1), and Kunashir (Lagunnoye-15).

3. Middle Neolithic (7.5–6.0 cal ka BP). Archaeological complexes of the Yankito-1 and -2 type on Iturup Island, with pottery bearing traces of wall-smoothing with a solid comb, and lithic industry based on the bifacial technique of tool-manufacturing from flakes and entire singularities, are associated with the Early Jomon in Japanese historiography and were considered by some authors as the Early Neolithic complexes of the Kurile Islands (Kuzmin et al., 2012). Given the recent research results, in terms of the generally accepted periodization, this stage should be identified as the Middle Neolithic.

Further studies of the archaeological sites of the Kurile Islands by excavating large areas are necessary to clarify the periodization of the Stone Age of the archipelago.

Conclusions

During excavations of the lower horizons of Kitovyi-2 and -4 in 2019–2020, an original archaeological complex was discovered that has no parallels on the Kurile Islands, as well as on Sakhalin and Hokkaido, to this day. It seems that in ancient times both sites belonged to a single large settlement on the coast and in the coastal zone of Kitovyi Bay. The most noteworthy elements of the complex are ritual structures in the form of mounds encircled by fencing of plates; these are presumably places for the

burial of the cremated remains of the deceased, and for the worship of ancestors. On the basis of this distinct and important feature, we propose to associate the studied Neolithic complexes with the Early Neolithic culture of long barrows.

The morphological similarity of the Iturup pottery with the linear-relief pottery of the Early Jomon culture dating back to 12–14 ka BP from the islands of Honshu and Kyushu (Special exhibition…, 2009: 35–38) is noteworthy. The northernmost point of occurrence of this pottery in Japan is the Hacchazawa-1 site in the far north of Honshu Island (Hacchazawa…, 1988: 36). Given the geographical gap between the north of Honshu and the Iturup, we assume a one-time migration of a well-organized group of fishermen on boats in the meridional direction from south to north.

References

Atlas Kurilskikh ostrovov. 2009
Moscow: Dizain. Informatsita. Kartografiya; Vladivostok: Feoriya.

Chubarova R.V. 1960
Neoliticheskiye stoyanki na o. Iturup. *Sovetskaya arkheologiya*, No. 2: 128–138.

Fitzhugh B., Moore S., Lockwood C., Boone C. 2004
Archaeological paleobiogeography in the Russian Far East: the Kuril Islands and Sakhalin in comparative perspective. *Asian Perspectives*, vol. 43 (1): 92–122.

Fitzhugh B., Shubin V.O., Tezuka K., Ishizuka Y., Mandryk C.A.S. 2002
Archaeology in the Kuril Islands: Advances in the study of human paleobiogeography and Northwest Pacific prehistory. *Arctic Anthropology*, vol. 39 (1/2): 69–94.

Golubev V.A. 1964
Po sledam drevnikh kostrov. *Dalniy Vostok*, No. 2: 149–151.

Golubev V.A. 1972
Arkheologiya Kurilskikh ostrovov: Cand. Sc. (History) Dissertation. Novosibirsk.

Grishchenko V.A. 2011
Ranniy neolit ostrova Sakhalin. Yuzhno-Sakhalinsk: Sakh. Gos. Univ.

Grishchenko V.A. 2018
Levoruchyinskiy kompleks ranney fazy srednego neolita ostrova Sakhalin: Raskopki poseleniya Leviy ruchey 2, punkt 2 v 2011 godu, raskop No. 2. Yuzhno-Sakhalinsk: Sakh. Gos. Univ. (Trudy Sakhalinskoy laboratorii arkheologii i etnografii; iss. 1).

Hacchazawa (1) iseki [Hacchazawa-1 Site]. 1988
Aomori: Aomori-ken Kyoiku Iinkai. (In Japanese).

Knorozov Y.V., Spevakovsky A.B., Taksami C.M. 1984
Piktograficheskiye nadpisi aynov. In *Poleviye issledovaniya Insituta etnografii: 1980–1981*. Moscow: Nauka, pp. 226–233.

Kono T. 1905
Chashi or fortresses of the Ainu. *Transactions of the Sapporo Natural History Society*, vol. 1: 73–90.

Kuzmin Y.V., Yanshina O.V., Fitzpatrick S.M., Shubina O.A. 2012
The Neolithic of the Kurile Islands (Russian Far East): Current state and future prospects. *Journal of Island and Coastal Archaeology*, vol. 7 (2): 234–254.

Milne J. 1882
Notes on the Koro-pok-guru or Pit-dwellers of Yezo and the Kuril Islands. *Transactions of the Asiatic Society of Japan*, vol. X (2): 187–198.

Obihiro Archaeological Records No. 7: Obihiro. 1988
Akatsuki site 3. Obihiro: Board of Education. (In Japanese, with English titles).

Obihiro Archaeological Records No. 27: Obihiro. 2006
Taisho sites 2. Obihiro: Board of Education. (In Japanese, with English titles).

Phillips S.C., Speakman R.J. 2009
Initial source evaluation of archaeological obsidian from the Kuril Islands of the Russian Far East using portable XRF. *Archaeological Sciences*, vol. 36: 1256–1263.

Prokofiev M.M. 1986
Arkheologicheskiye pamyatniki o. Iturup (po rezultatam razvedok 1983, 1985 gg.). In *XXVII syezd KPSS i zadachi muzeynogo stroitelstva v Sakhalinskoy oblasti*. Yuzhno-Sakhalinsk: Sakh. obl. krayeved. muzey, pp. 18–20.

Prokofiev M.M. 1995
Nakhodki keramicheskikh izdeliy kultury satsumon s kalendarnoy simvolikoy na o. Iturup. *Krayevedcheskiy byulleten: Problemy istorii Sakhalina, Kuril i sopredelnykh territoriy*, No. 3: 135–139.

Prokofiev M.M. 2001
Noviye materialy po arkheologii o. Iturup (iz polevogo dnevnika 1986 goda). *Krayevedcheskiy byulleten: Problemy istorii Sakhalina, Kuril i sopredelnykh territoriy*, No. 3: 21–35.

Prokofiev M.M. 2003
Keramika rannego dzyomona s Yuzhnykh Kuril. *Krayevedcheskiy byulleten: Problemy istorii Sakhalina*, No. 1: 89–94.

Samarin I.A., Shubina O.A. 2013
Pamyatniki istorii i kultury Yuzhno-Kurilskogo rayona. Yuzhno-Sakhalinsk: Sakh. obl. krayeved. muzey.

Schnell I. 1932
Prehistoric finds from the Island world of the Far East, now preserved in the Museum of the Far Eastern Antiquties, Stockholm. *Bulletin of Museum of Far Eastern Antiquities, Stockholm*, No. 4: 15–104.

Shubin V.O. 1994
Aleut in the Kuril Islands. In *Anthropology of the North Pacific Rim*, W.W. Fitzhugh, V. Chaussonet (eds.). Washington: Smithsonian Institution Press, pp. 337–345.

Shubina O.A. 2012
Obzor kollektsiy Rannego i Srednego Dzyomona Kurilskikh ostrovov iz fondov Sakhalinskogo oblastnogo krayevedcheskogo muzeya. *Vestnik Sakhalinskogo muzeya*, No. 19: 125–172.

Special Exhibition: Beginning of the Jomon Culture: What Took Place in 15,000 Years Ago? 2009
Sakura: National Museum of Japanese History. (In Japanese, with English titles).

Spevakovsky A.B. 1988

Dukhi, oborotni, demony i bozhestva aynov (religiozniye vozzreniya v traditsionnom aynskom obshchestve). Moscow: Nauka.

Sternberg L.Y. 1936

Pervobytnaya religiya v svete etnografii: Issledovaniya, statyi, lektsii. Leningrad: Izd. Inst. narodov Severa TsIK SSSR.

Steshenko T.V., Gladyshev S.A. 1977

Drevniye pamyatniki Kurilskikh ostrovov. In *Issledovaniya po arkheologii Sakhalinskoy oblasti*. Vladivostok: Dalnevost. nauch. tsentr AN SSSR, pp. 21–37.

Torii R. 1919

Les Ainou des Iles Kouriles. *Journal of the College of Science*. *Imperial University of Tokyo*, vol. XLII (1): 1–337.

Vasilevski A.A. 2008

Kamenniy vek ostrova Sakhalin. Yuzhno-Sakhalinsk: Izd. Sakh. Gos. Univ.

Vasilevski A.A., Grishchenko V.A., Orlova L.A. 2010

Periods, boundaries, and contact zones in the Far Eastern insular world of the Neolithic (based on the radiocarbon chronology of sites on the Sakhalin and Kuril Islands). *Archaeology, Ethnology and Anthropology of Eurasia*, No. 1: 10–25.

Vasilevski A.A., Potapova N.V. 2017

Ocherki istorii Kurilskikh ostrovov. Vol. 1: Istoriya Kurilskogo arkhipelaga s drevneishikh vremen do Sankt-Peterburgskogo dogovora 1875 goda. Yuzhno-Sakhalinsk: IAET SO RAN, Sakh. Gos. Univ.

Yanshina O.V., Andreeva M.A., Pantyukhina I.E. 2008

O rannem neolite Kurilskikh ostrovov: Stoyanka Yankito-1. *Rossiya i ATR*, No. 1: 75–87.

Yanshina O., Kuzmin Y. 2010

The earliest evidence of human settlement in the Kurile Islands (Russian Far East): The Yankito site cluster, Iturup Island. *Journal of Island and Coastal Archaeology*, vol. 5: 179–184.

Zaitseva G.I., Knorozov Y.V., Spevakovsky A.B., Prokofiev M.M. 1989

Absolyutnaya khronologiya drevnikh seleniy Kurilskikh ostrovov. In *Issledovaniya po arkheologii Sakhalina i Kurilskikh ostrovov: Tezisy vystupleniy na II arkheologicheskikh chteniyakh, posvyashchennykh pamyati R.V. Kozyrevoy*. Yuzhno-Sakhalinsk: pp. 24–28.

Received January 10, 2022.

doi:10.17746/1563-0110.2022.50.2.013-027

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

Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, Pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia
Novosibirsk State University, Pirogova 1, Novosibirsk, 630090, Russia
E-mail: molodin@archaeology.nsc.ru; l.mylnikova@yandex.ru; msnesterova@gmail.com; Lilyakobeleva@yandex.ru; selin@epage.ru

An Early Neolithic Sanctuary in the Eastern Irtysh Basin

We describe the findings of excavations at an unusual sanctuary in the Baraba forest-steppe. It is a structure consisting of a ditch encircling the presumed sacral space, and a system of pits containing non-utilitarian artifacts. Pits in the bottom of the ditch indicate wooden structures, which are not preserved. Descriptions of the features are provided. Artifacts are related to household, manufacturing, and ritual. On the basis of stratigraphy and radiocarbon analysis, relative and absolute chronology is assessed. The site dates to the 7th–6th millennia BC and is associated with the Barabinskaya culture. Parallels with Mesolithic and Neolithic sanctuaries and ritual sites in the Eurasian taiga zone are listed.

Keywords: *Western Siberia, Irtysh, Early Neolithic, Barabinskaya culture, ritual sites, primitive art.*

Introduction

On the basis of the discovery and research in 2015–2017 of a settlement complex with utility structures at the Tartas-1 site (Vengerovsky District, Novosibirsk Region) (Molodin et al., 2021), analysis of the recovered archaeological materials, obtaining a series of radiocarbon dates (Molodin, Nenakhov, Mylnikova et al., 2019; Molodin, Reinhold, Mylnikova et al., 2018), and the discovery of similar sites in the vicinity of the Tai floodplain meadow in the Vengerovsky District, Novosibirsk Region (Fig. 1), the Early Neolithic Barabinskaya culture has been identified (Molodin, Kobeleva, Mylnikova, 2017; Molodin, Mylnikova, Kobeleva et al., 2020). The discovery of similar archaeological materials in the same microdistrict, at the sites of Vengerovo-2 (Molodin et al., 2021; Myl'nikova, 2021), Avtodrom-2/2 (Bobrov, Marochkin, Yurakova, 2012), and Stary Moskovsky Trakt-5 (Bobrov et al., 2019)* supports the identification of this culture. All these settlement complexes are concentrated on the (both unflooded) high terraces of the Tai meadow**.

In addition to the Early and Late Neolithic settlements and burial grounds*** located on the left-

*Initially, the heads of the excavations attributed the sites of Avtodrom-2 and Stary Moskovsky Trakt-5 to the Boborykino culture. In the light of modern ideas, this definition appears implausible.

**The meadow occupies a vast floodplain area in the lower Tartas reaches, at its confluence with the Om, and was formed as early as the Ice Age; the meadow is inundated during floods.

***Burial grounds from the Early Neolithic period have not yet been discovered in Baraba.

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 13–27 E-mail: Eurasia@archaeology.nsc.ru

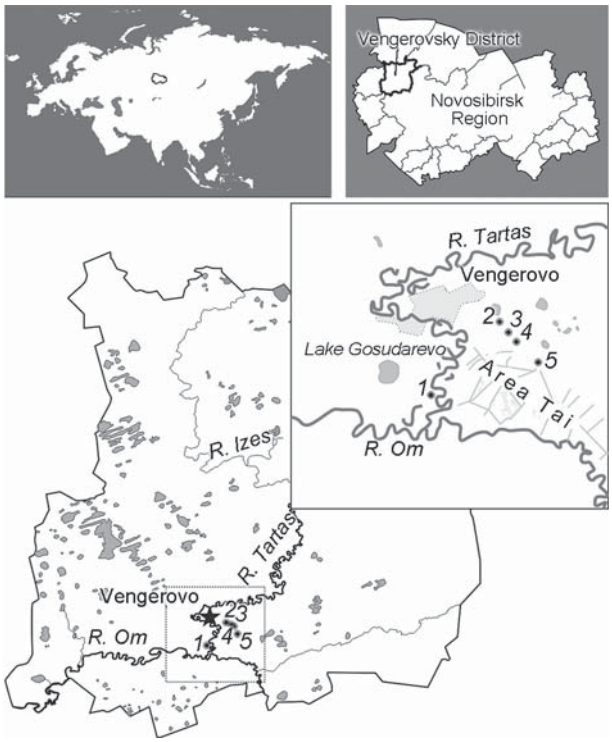


Fig. 1. The sites of the Early Neolithic Barabinskaya culture.
1 – Tartas-1; *2* – Avtodrom-2; *3* – Stary Moskovsky Trakt-5; *4* – Vengerovo-2; *5* – Ust-Tartas-1.

side terrace of the meadow, in the area of accumulation of archaeological complexes of various periods (mainly Early to Middle Bronze Age and the Early Iron Age), we have excavated and thoroughly studied an unusual archaeological site, which we interpret as an Early Neolithic sanctuary. This is a kind of architectural ensemble including a small ditch, enclosing the sacral space, and a system of pits containing various offerings—sacrifices. In this case, by a sanctuary we understand special structures or "fenced plots of land" where various constructions may be located. S.A. Tokarev argued that such complexes, intended for various irrational mysteries, are known among almost all ancient peoples (1969: 612). For instance, in the north of Europe, there are sanctuaries dating back to the Mesolithic and Early Neolithic periods, each with a special "shamanic" complex (Krainov, 1992a: 6), supporting the ideas of the mythological and sacred essence of this phenomenon.

The small ditch was recorded in the course of a magnetic survey of the terrace (Dyadkov et al., 2017; Parzinger et al., 2016), but the magnetic diagram showed the object only partially, and its spatial distribution was not clear. However, already at the initial stage of the study of this part of the Ust-Tartas-1 site (Fig. 2, 2018 excavation area), it had become clear that this was an uncommon construction. The site was completely excavated during three years (2018–2020). The excavations revealed salient relief features of the architectural ensemble. In antiquity, the construction may have been supplemented with wooden structures. During the Late Neolithic, Early and Middle Bronze Age, the sanctuary area was used for the construction of burial complexes (Artyn, Ust-Tartas, Odino, and Krotovo cultures). On the one hand, this overlapping made identification of the original Early Neolithic complex somewhat difficult; but on the other hand, stratigraphic observations provided the idea of the relative chronology of the structures, which made it possible to attribute the ensemble to the Early Neolithic. At present, there are radiocarbon dates of the features of the sanctuary itself available, confirming its chronological position.

The purpose of this work is to introduce new materials from the Early Neolithic Barabinskaya culture and to interpret these in the context of the sanctuary.

Description of the site and research results

The site is located on the edge of the above-floodplain terrace, which in this place reaches a height of about 8 m above the level of the flooded part of the Tai meadow. From here, a panorama of a wide floodplain opens, which is especially impressive during the period of maximum flooding.

The ditch was a U-shaped structure with a slightly curved long side and well-defined corners (Fig. 2, 3). Its length in the eastern part is 8.8 m, in the northern 36.3 m, in the western 6.6 m. In the eastern part, the ditch ended in a pit on the edge of the slope. In the western part, the end of the ditch curved sharply into the sacral area and ended in a small hollow separated from the modern edge of the terrace by a narrow passage. The area of the plot enclosed by the ditch was ca 320 m^2.

The ditch's width varied from 0.2 to 0.5 m. At the widest place, in sq. И-Л/39'-42', the ditch is 1.5 m. It was here that a rich set of offerings was discovered. The pits adjacent to the ditch in the western and eastern parts do not contain any artifacts*.

The walls of the ditch are mostly sheer, in some places inclined; at the top, there are low steps. In some areas, the opposite walls often differ in the angle of inclination to the base. On the bottom of the ditch, at a certain distance from one another (0.32–0.8 m), there are hollows of various sizes (Fig. 3).

Sections of the ditch vary from 0.16 to 0.54 m in depth. Taking into account the thickness of the buried soil,

*It should be noted that originally, the pits might have contained organic materials that did not survive: for example, animal meat or vegetable food.

Fig. 2. Photo of the excavation sites after removal of the filling. The location of pit 148–149 with the set of offerings is marked in red.

from the level of which the ditch was built, its real depth varies from 0.31 m to 0.89 m.

The ditch might have outlined the architectural structure where ritual actions took place: in particular, those related to the placement of sacrifice goods at the sanctuary.

The architectural ensemble includes numerous specially made pits. Their placement obviously depended on the orientation of the ditch. A series of pits was made along the ditch outside the enclosed sacral part (Fig. 3). The pits are arranged in a chain one after another. In plan view, they are most often oval or subrectangular, with rounded corners; rounded pits are much less common. The long axes of the pits correspond as a rule to the direction of the ditch. Some pits located outside the ditch revealed the finds associated with offerings. Notably, the number of pits in the western part of the ditch is many times less than in the central, and especially in the eastern, portions.

Eight pits were recorded along the eastern segment of the ditch (No. 19, 20, 35–37, 57–59)*; eleven pits were noted along the northern portion, coinciding in orientation with the direction of the ditch (No. 125, 127–129, 132, 133, 134A, 136, 150, 169, and 171). Some of the northern pits also contained offerings. Outside the western part of the ditch, there was only one pit, No. 174, oriented in the direction of this part of the ditch.

A significant number of the pits were located in the inner area enclosed by the ditch. Twelve pits were concentrated in the eastern part of the site. Pits 17, 27, 28, and 30 were made next to the ditch and oriented in the direction of the eastern and northern segments of the ditch. Pits 18, 24, 29, 32, 33, 34, 40, and 42 formed a dense group in the eastern part of the sacral space. Their orientation was variable.

Pits 130, 142, 156, and 179 were located along the northern wall of the ditch on its inner side, and pit 181 near the western segment of the ditch. Pit 85 was found in the eastern part of the sacral space. Pit 119, the largest in area, was located in the central part. Many pits contained artifacts, including fragments of Early Neolithic pottery, which made it possible to attribute the pits to this period.

Pit 148–149 with offerings (Fig. 3) is distinct among other pits. It is of considerable size (1.5 × 2.3 × 0.49 m), and is connected with a ditch, that is, located directly in the ditch. This pit yielded a set of 92 various items of obviously sacred purpose.

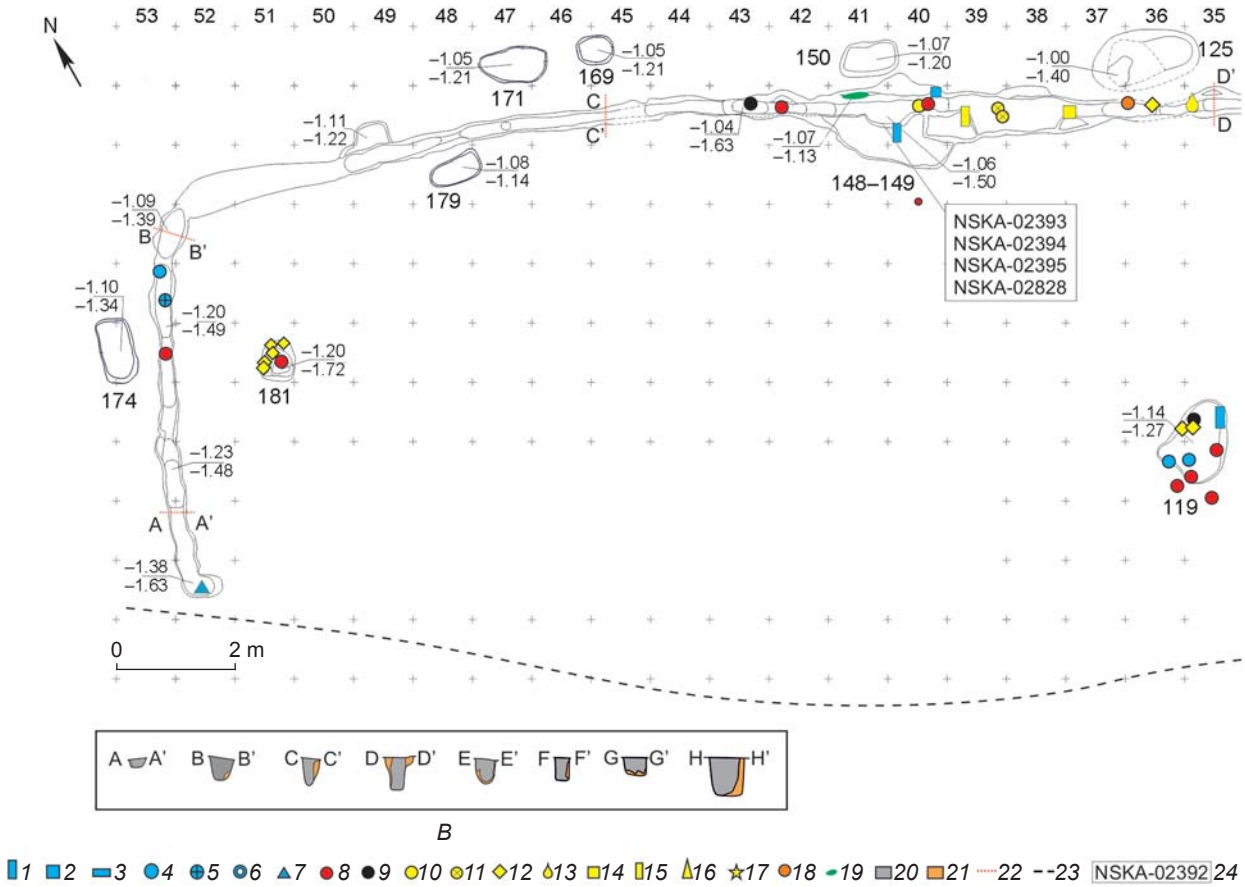
In addition to pits with offerings, separate items associated with the sanctuary were found in the cultural layer, mainly in the eastern part of the sanctuary, surrounded by the ditch.

Various artifacts were found in all three parts the ditch. They occurred at different depths individually or in clusters.

We begin with a description of the *ceramic collection,* consisting of 68 fragments (Fig. 4, *1–14*), which were found all over the site's area. These are mainly small fragments of vessel walls (56 spec.); rims (9 spec.), including ornamented ones (4 spec.); and fragments of bottoms with adjoining parts (3 spec.).

Red-burning loams (with a rather high content of sand) served as the basic raw material. The paste contains an admixture of grog and organic matter. The whitish-gray coating has been clearly noted in the paste (a sign of the use of an organic solution) through binocular examination; there are also small plant-remains in the form of carbonized depressions, extended canals, and small rounded formations made with phosphate materials as a natural impurity. The paste is poorly

*Unfortunately, the size of this publication does not allow us to provide detailed information about the parameters of the pits. These data will be presented in a special paper.



puddled, so it is difficult to determine the proportion of grog: in some samples there are single grains, in others its admixture is approximately 1:10. The size of the grog-grains varies from 0.02 to 0.8 cm. The vessels were manufactured through patch technique; it is evident on the surfaces of some potsherds where these patches have peeled off, as well as on transverse fractures. The upper parts of the vessels were molded with two-layer coils. A twisted cord was superimposed on the upper edge, which was then covered with a coil of patches folded inside the vessel. Fragments of bottoms showed that the bottoms in the form of flat tablets were also made through patch technique (Fig. 4, *3*). An appliquéd fillet was noted on one of the bottoms; the fillet was formed as a result of inserting a bottom into the finished vessel and sticking it to the body with small patches. The motifs on the fragments, in the form of multidirectional diagonal rows of lines, which form interpenetrating zones, were made by incision or by retreating scapula with a rounded working edge. The rim's edges are ornamented with oblique oval impressions made with a stick (Fig. 4, *1*, *4*, *8*, *12*).

Pottery with similar characteristics has been recorded at the neighboring sites of the Early Neolithic Barabinskaya culture: Tartas-1, Vengerovo-2, and Avtodrom-2/2. A fragmented vessel was recovered from the fish pit at Ust-Tartas-1 and reconstructed (Molodin, Kobeleva, Mylnikova, 2017; Molodin, Mylnikova, Kobeleva et al., 2020; Molodin et al., 2021; Myl'nikova, 2021; Yurakova, 2017). Thus, the ceramic collection from the ritual complex undoubtedly belongs to the Barabinskaya culture. Notably, ceramic vessels with flat bottoms in the Early Neolithic are typical not only of the Baraba forest-steppe. Similar artifacts from complexes dating back to the end of the 7th–6th millennium BC have been found at sites in the taiga zone of Western Siberia, the Trans-Urals, and the Tobol-Ishim interfluve (Dubovtseva et al., 2020; Enshin, 2020; Kardash et al., 2020; Klementyeva, Pogodin, 2020; Chemyakin, 2008, 2020).

The collection of lithics is represented by a set of tools, and production-waste. The collection consists of 49 items, of which 15 specimens were found in the filling of a ditch; 20 specimens were recovered from the pits or next to them; and the remaining 14 specimens were recovered from pit 148–149, together with other offerings (Fig. 4, *15–27*). In total, 21 tools were found; there are also 2 flakes, detached from polished items that show utilization retouch. The rest of the finds are production waste and technical spalls.

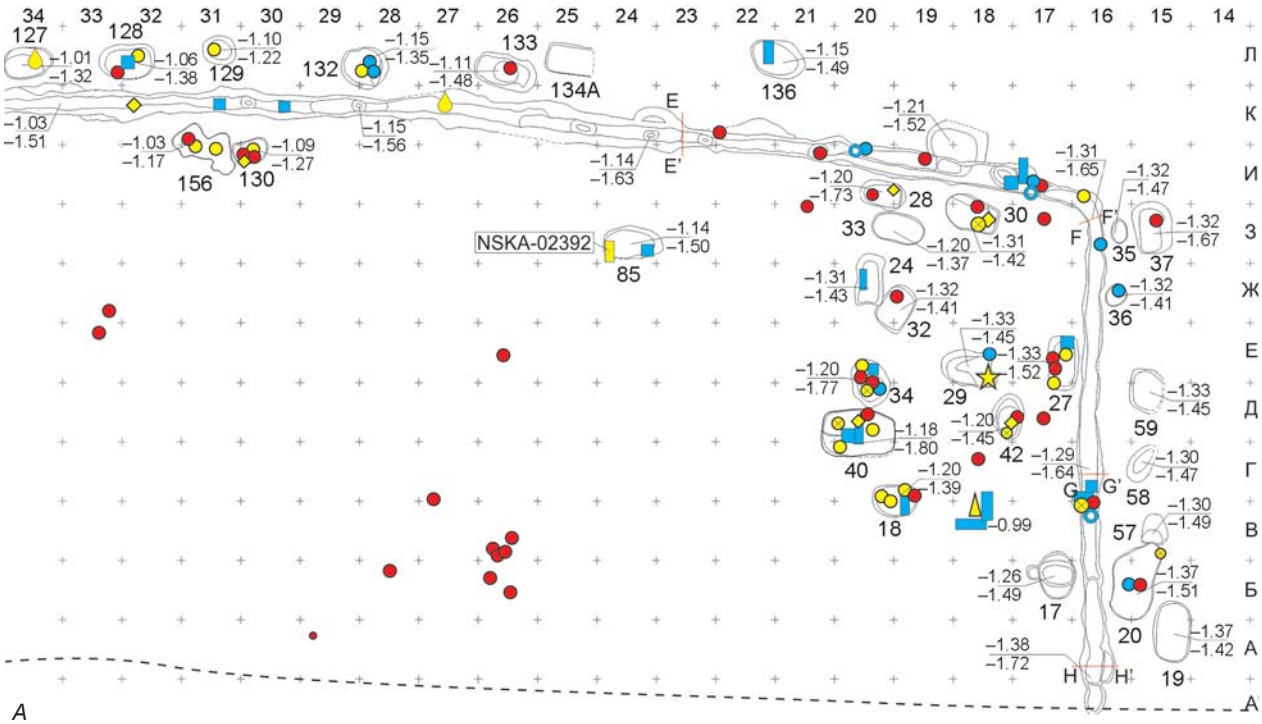


Fig. 3. Plan of the sanctuary (*A*), profiles of the ditches (*B*).
1 – blade; *2* – flake; *3* – end-scraper; *4* – spall; *5* – pebble; *6* – scale; *7* – abrader; *8* – ceramic fragment; *9* – charcoal; *10* – bone fragment; *11* – fragment of a calcined bone; *12* – fragment of bone/scale of a fish; *13* – animal tooth; *14* – antler artifact (striker); *15* – bone tool; *16* – bone dagger; *17* – dog's skull; *18* – coprolite; *19* – location of the set of offerings (pit 148–149); *20* – gray dense sandy loam; *21* – grayish-yellow sandy loam; *22* – location of the stratigraphic section; *23* – conditional edge of the terrace; *24* – code of samples for ^{14}C-analysis.
1–7 – stones.

The ditch's filling revealed the following: a miniature double side-scraper on a shortened flake (Fig. 4, *18*), two bladelets with utilization retouch, a rectangular abrader with traces of smoothing over its entire surface (Fig. 4, *15*), a flake (Fig. 4, *16*), nine shatters and chips, and a pebble (Fig. 4, *17*).

The collection of lithics from the filling of the pits includes a side-scraper on a shortened flake; five retouched blades (mainly medial segments, trapezoidal in cross-section), including a crested blade (Fig. 4, *21, 24, 25, 27*); two flakes (Fig. 4, *22, 23*); and ten scales and chips, including a chip from the surface of a polished tool (Fig. 4, *26*). A medial fragment of the blade with ventral sharpening retouch (Fig. 4, *19*) and a miniature end-scraper on blade (Fig. 4, *20*) were found next to the bone dagger (sq. B/18).

A series of lithic artifacts was recovered from pit 148–149, together with the main set of offerings.

Artifacts made of bone and antler beyond the main set of offerings in pit 148–149 were quite sparse. First, noteworthy is a side-bladed dagger made of antler, which was recovered from the cultural layer at the eastern part of the sanctuary (sq. B/18). One of the blade's sides clearly shows a groove for inserting blades (Fig. 5, *3*). This item is decorated with engraved pattern of angles. Next to it, a fragment of a knife-shaped blade-insert and a miniature end-scraper (see Fig. 4, *19*, *20*) were found. The dagger reveals a close similarity to the artifacts from the Neolithic sites of Oleniy Ostrov cemetery (Gurina, 1956: Fig. 122, *1*) and Shigir peat-bog (Savchenko, 2005: Fig. 38), and is also close in shape to the Late Paleolithic daggers from the Cis-Urals (Shcherbakova, 1994: 93, fig. 37) and particularly the settlement of Cherno-Ozerye II on the Irtysh (Gening, Petrin, 1985: 48, fig. XVII). The latter parallel suggests that the Barabinskaya Neolithic culture was formed on a local basis in the Late Pleistocene.

In the ditch, in the immediate vicinity of the pit with the main set of offerings, a pendant made of an elk's incisor (Fig. 5, *1*), a fragment of a bone dagger (Fig. 5, *4*), and a striker made from an elk's antler (Fig. 5, *2*) were found.

Pendants made of animal-teeth occupy a special place in burial complexes and sanctuaries (see, e.g., (Petersen, 2016)). This is clearly evidenced by the collection under consideration.

The striker found in the ditch is quite peculiar (Fig. 5, *2*). The product is made of an antler burr, was additionally worked along the margins, and was slightly polished. The antler adjacent to the burr was fashioned as a hilt. The tool could be used as a striking tool in combat or

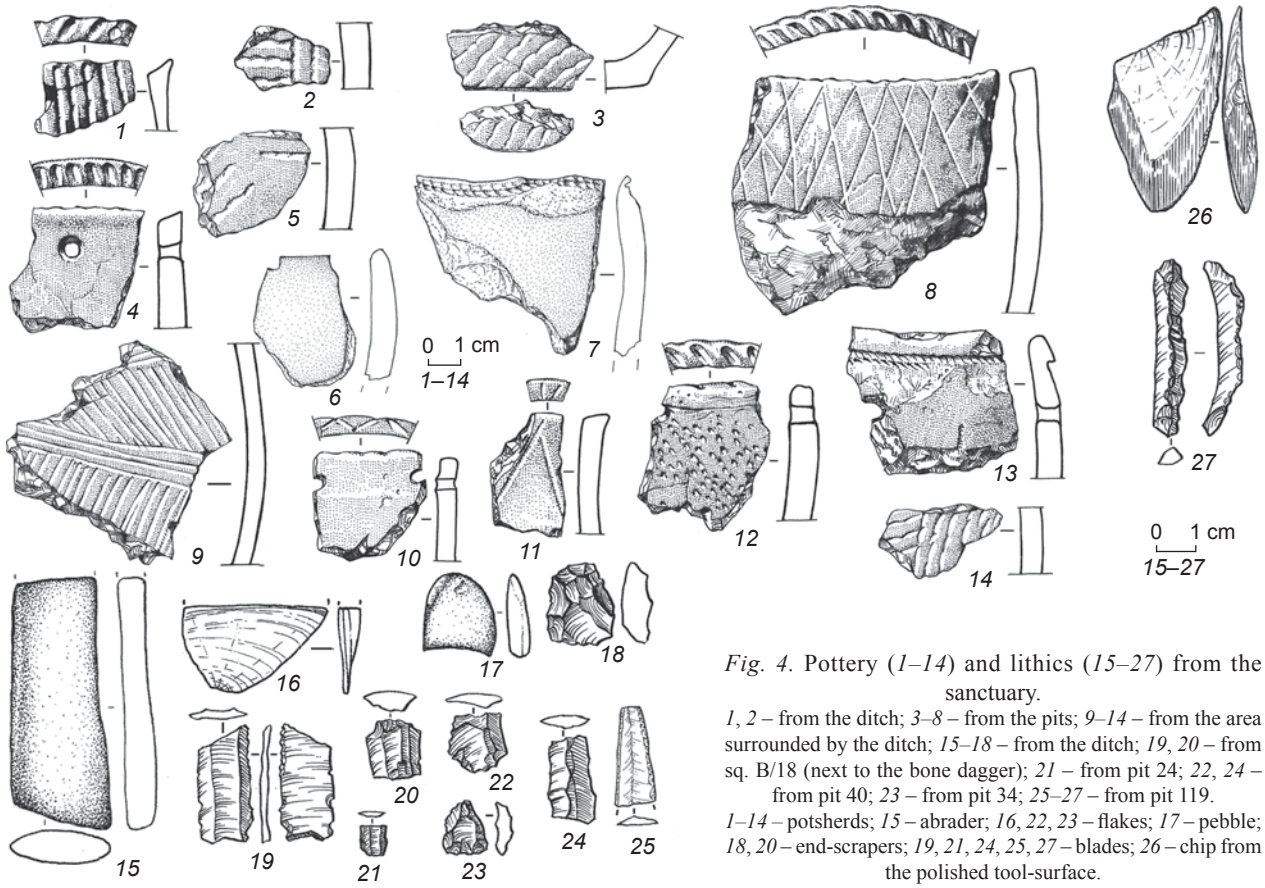


Fig. 4. Pottery (*1–14*) and lithics (*15–27*) from the sanctuary.
1, *2* – from the ditch; *3–8* – from the pits; *9–14* – from the area surrounded by the ditch; *15–18* – from the ditch; *19*, *20* – from sq. B/18 (next to the bone dagger); *21* – from pit 24; *22*, *24* – from pit 40; *23* – from pit 34; *25–27* – from pit 119.
1–14 – potsherds; *15* – abrader; *16*, *22*, *23* – flakes; *17* – pebble; *18*, *20* – end-scrapers; *19*, *21*, *24*, *25*, *27* – blades; *26* – chip from the polished tool-surface.

hunting practice, or as a beater for a tambourine. Perhaps the item had a different purpose. Notably, a series of similar items, referred to as "antler sleeves", was recorded at the Late Pleistocene site of Afontova Gora II (Pozdnepaleoliticheskaya stoyanka Afontova Gora II…, 2021: Fig. 29, 37, etc.).

A fragment of a dagger made from the bone of an elk (Fig. 5, *4*) is a typical item of Neolithic and Mesolithic sanctuaries and burials in the northern part of Eurasia. Thick bone points made of animals' metapodia were particularly significant in the settlements and sanctuaries of that period. At the site of Veretye I (northeastern Europe), a special pit with such items, interpreted as a cache, was found (Oshibkina, 1997: 177).

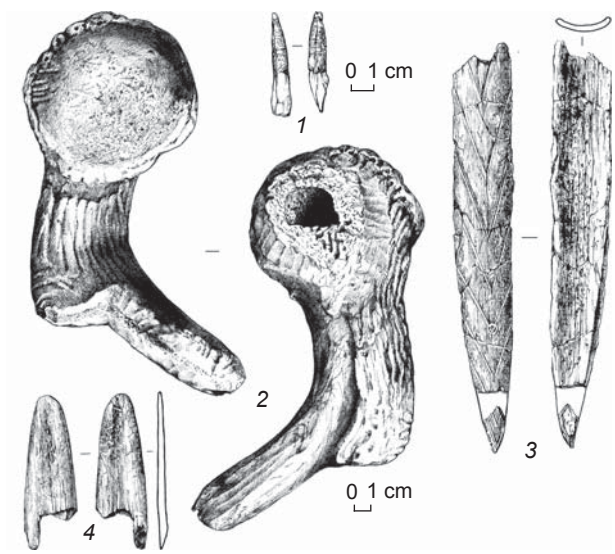


Fig. 5. Bone items of the ritual complex.
1 – pendant of elk tooth; *2* – antler striker; *3* – bone side-bladed dagger; *4* – fragment of a bone dagger.

Description of the main set of offerings from pit 148–149. The compact arrangement of the items suggests that they were placed in the pit in some kind of organic container. The dimensions of the pit made in the ditch are 1.5 × 2.3 m, the depth is 0.44–0.48 m. The offerings were placed in the upper part of the pit, on the northern step, slightly below the level of the modern surface.

It is expedient to describe the set of items from bottom to top, in accordance with the sequence of their deposition, which probably also had a sacred meaning.

The lowermost accumulation included five end-scrapers (Fig. 6, *8*, *9*, *11–13*), two knife-like blades (Fig. 6, *4, 7*), a chip from a polished item (Fig. 6, *6*), a polished adze (Fig. 6, *10*), and a core with three refittable flakes (Fig. 6, *1–3*, *5*). One of the end-scrapers was fashioned on an exhausted wedge-

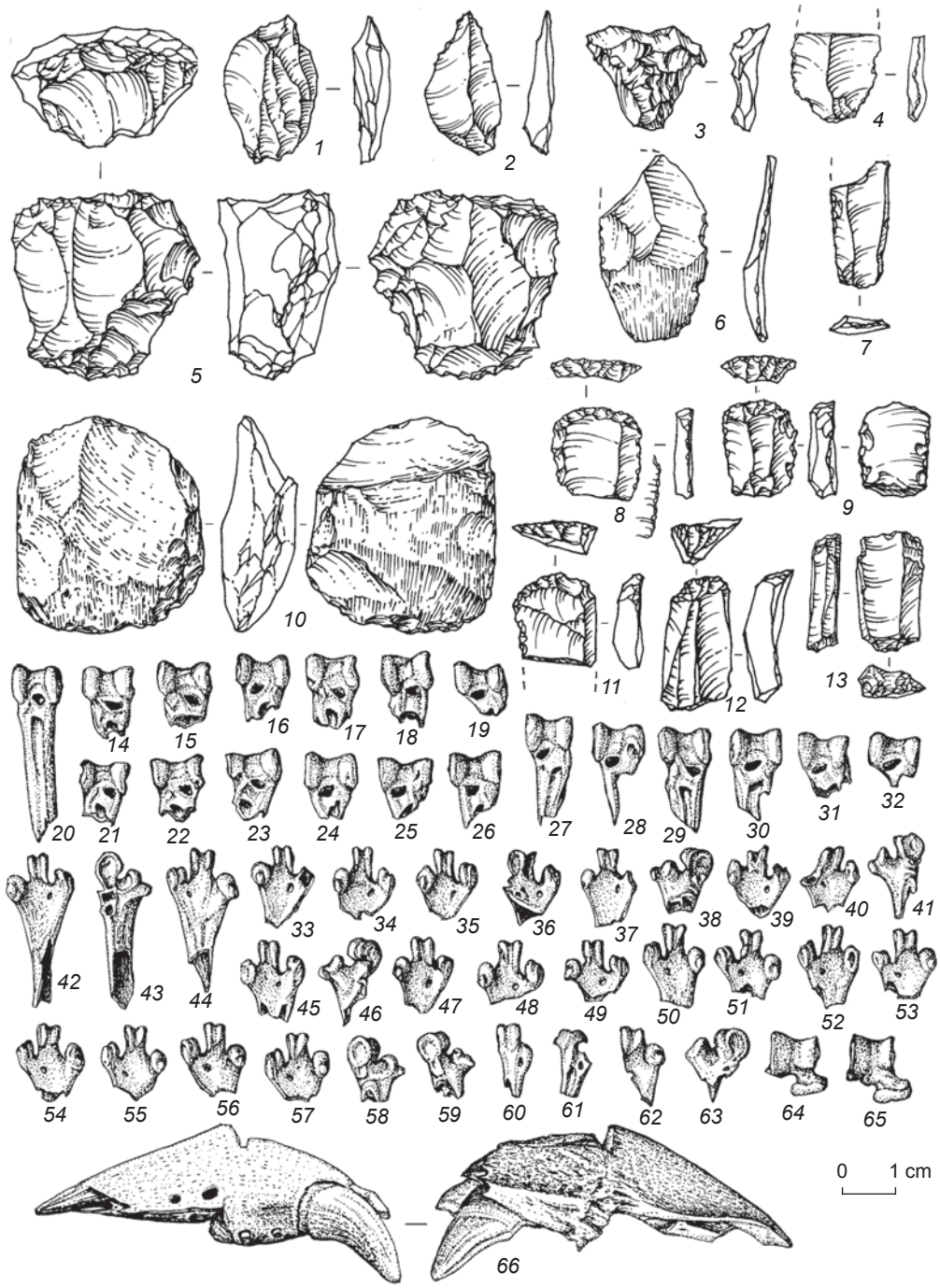


Fig. 6. Artifacts made of stone (*1–13*) and bone (*14–66*) in the set of offerings from pit 148–149.
1–3 – flakes; *4*, *7* – blades; *5* – core; *6* – chip from the polished tool surface; *8*, *9*, *11–13* – end-scrapers; *10* – polished adze-like tool; *14–63* – fragments of bird bones; *64*, *65* – tarsal bones of badger; *66* – mandible fragment of badger.

shaped core bearing negative scars of microblade removals (Fig. 6, *13*). One blade was found in the groove of a bone side-bladed dagger. Thus, in terms of technological characteristics, the lithic industry of the sanctuary (the predominance of blade technology, insert technology, ventral retouching, design of end-scrapers) generally corresponds to the lithic collections of the Barabinskaya Neolithic culture, and has parallels in the Early Neolithic complexes of the Trans-Urals and Western Siberia (see (Zhilin et al., 2007; Zhilin, Savchenko, 2010; Kosinskaya, 2015)), as well as in the Mesolithic and Upper Paleolithic complexes of the West Siberian Plain (Gening, Petrin, 1985; Gening, Petrin, Kosinskaya, 1973).

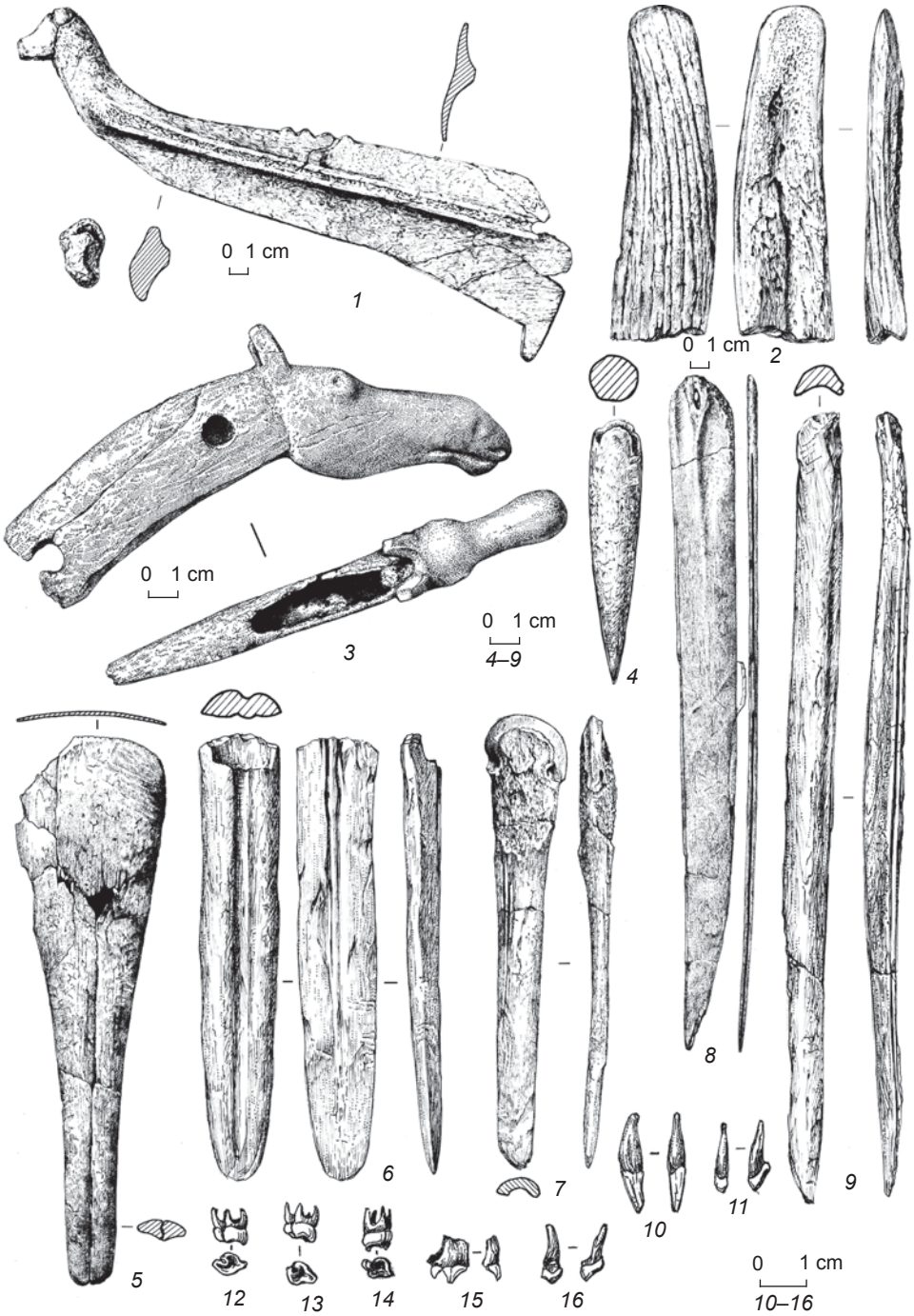


Fig. 7. Bone and antler items in the set of offerings from pit 148–149.
1 – bird figurine; *2* – antler burnisher; *3* – figurine of elk's head; *4* – cone-shaped artifact from antler; *5* – spatula with serrated working edge; *6*, *7* – bone burnishers; *8* – blade-sided dagger with insert; *9* – tool blank; *10–16* – teeth of small predator.

Over the stone offering items, there were 50 bone epiphyses of small birds' limbs (probably from partridges*) (Fig. 6, *20–63*), a fragment of a mandible (Fig. 6, *66*) and tarsal bones of a badger (Fig. 6, *64*, *65*), and also several fragments of tubular bones of birds

*Hereinafter, the identification of bones of mammals and birds was carried out by W. Rendu, the Head of the International Laboratory "Archaeozoology in Siberia and Central Asia" (IRL 2013, Centre National de la Recherche Scientifique, France – Institute of Archaeology and Ethnography of the Siberian Branch of the Russian Academy of Sciences), for which the authors express their gratitude.

Fig. 8. Antler finial shaped as an elk's head, with a handle.

and teeth of small predators (Fig. 7, *10–16*). Above this accumulation, a cone-shaped item made of antler was found (Fig. 7, *4*). It can be assumed that this is a "crane's beak" from a ritual mask. Similar masks have been known among Siberian natives up to ethnographically modern period (see (Maski…, 1975: 8)). Notably, the artifact has close parallels with the items of the ritual cache of the Neolithic sanctuary Sakhtysh II (Central Russia) of the Volosovo culture (Krainov, 1992b: Fig. 138). Above this find, there is a tool in the form of a massive spatula with a serrated working-edge, made from the central part of the skull of a large elk (Fig. 7, *5*). Its length is 28 cm. A bone burnisher was found next to the spatula (Fig. 7, *7*). A very close parallel to that tool has been reported from the Early Neolithic burial ground Kanaljorden, Motala, in southern Sweden (Hallgren, Fornander, 2016: Fig. 12, p. 170).

Still above, four humerus bones of swan, belonging to at least three individuals, and two massive bones of a large ungulate (elk?) were situated, which were the blanks for bone tools bearing signs of primary trimming (Fig. 7, *9*). There was also a side-bladed dagger, or rather its bone base (see Fig. 7, *8*), 29.4 cm long. Grooves were carved on its both sides. In the middle part of one of the grooves, a blade was inserted. Daggers of this kind, as well as relevant blanks, are most often found in the complexes of the Mesolithic and Early Neolithic sites of Northern Eurasia (see, e.g., (Krainov, 1992b: Fig. 109, *2*; Oshibkina, 1992a: Fig. 51, *1*; Gurina, Krainov, 1996: Fig. 56, *44*, *53*; Khlobystin, 1996: Fig. 89, *16*, *17*; 90, *20*, *26*; Zhilin et al., 2020: Fig. 65, 114, 118, 166, *2*; 167, *1*; Grünberg, 2016; Grünberg et al., 2016: Fig. 19, 20)).

A finial made of antler shaped as an elk's head, with a small curved handle (see Fig. 7, *3*; 8), was located over all the above mentioned items. The head's length is 9.1 cm, width along the cheekbone 4.2 cm, width in the frontal part 2.6 cm. The handle's dimensions are 11.2 × 4.0 × 2 cm. At the bottom and top, the handle has two fastening holes 1.4 cm in diameter. The figurine is amazingly realistic and skillfully made (Fig. 8). This is a three-dimensional sculpture of the animal's head with a characteristic pendulous lip, marked line of the mouth, nostrils, bulging expressive eyes, and alert ears. Parallels to the finial (some are almost identical to the one described) are known in materials from burials and sanctuaries predominantly in northwestern Europe of the Mesolithic-Chalcolithic period (see, e.g., (Gurina, 1956, 1996a, b; Oshibkina, 1978, 1992a, b; 1996; 2017; Tsvetkova, 1969, 1970; Loze, 1979; Krainov, 1988; Studzitskaya, 1997; Zhulnikov, Kashina, 2010a, b; Loze, 1970; Rimantiene, 2005)). A similar item on a long bone handle was recently discovered in the Orenburg steppe zone (Morgunova, 2020: Fig. 2, 3, pp. 16–17). Currently, the finial from the Ust-Tartas-1 marks the eastern border of the distribution area of such items.

In the uppermost layer of the set of offerings, there was a bone tool made from the shoulder blade of a large elk, 55 cm long (see Fig. 7, *1*; 9). This is a massive cutting tool of the scythe or reaping-hook type, shaped like a stylized image of a bird, with a massive head and neck and four dents cut on the back. Most likely, this is a stylized image of a swan. To enhance the resemblance to a bird, a tool made of antler, probably a scraper-knife, was specially placed over the item* (see Fig. 7, *2*; 9), which symbolized the wing—natural texture of its surface resembles folded feathers. It should be noted that a similar bird-shaped artifact was found in the cultural layer of the Early Neolithic site at Tartas-1; its sides, denoting the back and the right wing, were decorated with denticles.

*The traceological analysis was made by L.V. Zotkina, for which the authors are grateful.

Fig. 9. Bone figurine of a bird and an antler burnisher imitating a wing.

Results of the radiocarbon analysis of samples from the Ust-Tartas-1 sanctuary

Sample No.	Material	Place of discovery	Lab sample code	Radiocarbon age, BP	Calendar date, years cal BC	
					±δ	±2δ
1	Bone tool	Pit 85	GV02392	7610 ± 82	6569 (7.3 %) – 6546 6532 (60.9 %) – 6396	6640 (2.3 %) – 6616 6606 (86.9 %) – 6340 6313 (6.3 %) – 6258
2	Bird bone	Accumulation of artifacts (set of offerings, pit 148–149)	GV02393	6960 ± 68	5967 (5.1 %) – 5954 5900 (63.2 %) – 5760	5985 (95.4 %) – 5726
3	Animal tooth	"	GV02394	6389 ± 57	5471 (20.2 %) – 5433 5390 (48.1 %) – 5310	5476 (85.8 %) – 5296 5260 (9.6 %) – 5220
4	Bird bone	"	GV02395	6610 ± 59	5616 (21.3 %) – 5586 5566 (34.7 %) – 5516 5501 (12.4 %) – 5482	5635 (95.4 %) – 5474
5	Fragment of an elk-bird's shoulder blade	"	GV02828	6439 ± 72	5476 (63.2 %) – 5358 5346 (5.1 %) – 5333	5534 (91.1 %) – 5298 5259 (4.3 %) – 5220

This find is extremely important, since it is a link between the Early Neolithic Tartas-1 and the sanctuary described in this work. Fragments of similar items also occur in the Neolithic complexes of the Ural peat-bogs. In general, in the Mesolithic and Early Neolithic complexes of these sites, there are very numerous tools made from elks' shoulder blades, with long cutting-edges, which have been identified by the excavators as broad knives (Zhilin et al., 2020: Fig. 160, 162, 165). The Baraba finds show additional working, which was carried out in order to embody the ornithomorphic image. The presence of one such tool in the set of offerings at the sanctuary determines its sacred meaning.

Five dates were generated on a bone tool found in pit 85, two bird bones, an animal tooth, and an item made of an elk-bird's shoulder blade from the offerings set of the sanctuary under study—using the unique research installation "Accelerator Mass-Spectrometer of the INP SB RAS"*. These findings allowed the conclusion to be made that the sanctuary existed within the 7th–6th millennium BC (see *Table*).

Discussion of results

Features of irrational practice are well known at the Mesolithic and Early Neolithic sites in the northern part of Eurasia. They occur at burial grounds in the form of elements and in separate burials (see (Pesonen, 1977; Gurina, 1996a, b; Grünberg, 2016: 19–20; Grünberg et al., 2016)), as well as in the immediate vicinity of the settlements (special sanctuaries were often arranged next

*The authors express their gratitude to the Head of the Center for Collective Use "Geochronology of Cenozoic" E.V. Parkhomchuk for the promptly performed analyses.

to the settlements: for example, one of these was found on the outskirts of the settlement of Veretye I) (Oshibkina, 1992b: 28; 2017; etc.).

Stone Age sanctuaries have been reported from the sites of the Mesolithic to Early Neolithic periods in the north of Eastern and Western Europe. They differ from the North Eurasian ones in size and content of sacrificed goods (see (Oshibkina, 1992b: 28; etc.)). However, in this area, no complexes with evident architecture have been found, which allows us to consider the sanctuary in Baraba as something peculiar. In Central Europe, in the western part of modern Hungary, ca 30 rondels and other structures of the Lengyel culture were found. One of these structures, Gétye-Gyomgyáló-lejtős, is an oval-shaped earthen fence with four gaps (or gates) in the ditch (Barna et al., 2019). Here, as at the site under study, the ditch and the pits for offerings have been identified by geophysical methods. The dimensions of this site were 96 × 115 m. The entrances are oriented to the cardinal points, suggesting association of the semantics of the complex with the astronomical position of the sun. Fragments of ceramics, stone tools, and animal-bones were found in the structure. The sites in Western Hungary are similar to the sanctuary under study in their earthen architecture with pits for offerings and the irrational purpose.

The artifacts recovered at the Baraba site make it possible to formulate assumptions regarding some manifestations of ritual practice; although the authors admit that not all proposed interpretations will be supported by colleagues. First of all, we have solid ground to assume that food products were brought to the site as offerings—at least fish and meat. Fish bones and scales (moreover, with traces of burning) were found in pits 20, 28, 30, 40, 119, 156, 181 (see Fig. 3). As a rule, other finds were associated with them. Animal bones (elk, badger) were recorded in pits 18, 30, 40, 129, 130, 132, 148–149, 156. Bird bones were found in pits 18, 128. Most likely, the pits also contained meat (without bones), fish, and plant foods, which have not survived to our time.

Offering foodstuffs to representatives of the other world is a traditional practice at sanctuaries; it is also characteristic of human ritual activities up to the present. A great number of papers, mostly ethnologic, addressed this topic.

A special role in the ritual practice belonged to the dog, which was clearly manifested in the sanctuary under study. In pit 29, there was a dog's skull, which belonged, according to the paleozoological identifications, to an old individual that had anomalies in its lifetime. The remains of dogs—a scapula and bones of a limb in the articulation—were also found in pit 156. Skulls of dogs with traces of burning (41 individuals) and artificial damage were found at the settlement of Veretye I, the skulls of 6 individuals in Nizhny Veretye, 8 individuals in Sukhosh, etc. (Oshibkina, 1992b: 11). Burials of five dogs were found in the Mesolithic complex of the cemetery in Holland, in the northwestern Europe (Kooijmans, Hamburg, Smits, 2016: 599). The list of examples could go on.

The importance of animal teeth as offerings is undeniable. They were used to make pendants and sewed-on pieces for clothes. In the Late Paleolithic and Mesolithic, such rituals took place in almost all populations of Eurasia (Krainov, 1992b: 106). At the sanctuary under consideration, animal teeth (canines of a dog or fox) were found in the filling of the ditch, teeth of an elk were found in the filling of the ditch and pit 127. Teeth, like bones, could be substitutes for the animal itself (Oshibkina, 1992b: 24).

The swan was of particular importance in the ritual practice of the Early Neolithic Barabinskaya people. This is evidenced by the occurrence in the main set of offerings of the sanctuary not only of a bird-tool, but also of humerus bones of several individuals. Veneration of the swan is manifested by the sculptural images of swans' heads made of antler and wood at Veretye I (Ibid.: Fig. 36, 37). A massive cutting tool in the form of a stylized figurine of a swan from the main set of offerings (see Fig. 9) was apparently used both in household and ritual activities. Since ancient times, the population of Siberia has shown a special attitude towards the swan as a sacred bird. This was reflected in the Paleolithic site of Malta (Eastern Siberia): a remarkable sculptural image of a "grazing" swan has been found at the site (Gerasimov, 1931; Abramova, 1962).

In pit 148–149, an extraordinary artistic antler finial was found (see Fig. 7, *3*; 8). It was noted above that such tops could have crowned various items—shamans' staffs or wands, fronts of the boats, ski ends, and possibly other things (Stolyar, 1983; Studzitskaya, 1997), and their sacred meaning is indisputable.

First of all, it should be noted that today this find marks the eastern border of the area of distribution of carved items and rock art images. A.M. Zhulnikov and E.A. Kashina developed the map of distribution of such artifacts (2010b: 72, fig. 1), which shows that staffs, finials, and images of elk heads occur in the taiga zone of Europe from northern Scandinavia to the Urals. This confirms the anthropological data that the earliest Neolithic populations of Baraba are close to the Mesolithic-Neolithic populations of the northwestern part of the East European Plain, who migrated to Western Siberia in the 9th–8th millennium BC (Chikisheva, Pozdnyakov, 2021: 143). The area of their distribution generally coincides with the area of the northern Eurasian anthropological formation identified by T.A. Chikisheva (2012). This hypothesis was supported by paleogenetic data (Molodin, Pilipenko, Pozdnyakov, 2017: 153–154).

The topic of who could have owned the staff finials—shamans (Gurina, 1956: 242; Stolyar, 1983: 157) or "every man of the community" (Zhulnikov, Kashina, 2010b: 73)—requires discussion. The finial from the West Siberian sanctuary likely testifies in favor of the former assumption. First, it comes from the sacred complex. Second, in pit 148–149, containing offerings, and in the ditch, there were other sacred items: for example, a "crane's beak" from a mask or an antler striker. This assumption is also confirmed by the Scandinavian petroglyphs depicting sacred scenes. Represented on petroglyphs are elk-headed staffs (Helskog, 1988), anthropomorphic characters with elk-headed staffs (Ibid.; Kolpakov, 2007), sometimes together with animals (elks) (Hallström, 1960), fronts of the boats, in which individual members of the crew hold such symbols in their hands (Ibid.), and phallic characters with elk-headed staffs, apparently performing a ritual dance (Kolpakov, 2007); all these provide wide opportunities for all kinds of reconstructions of myth-making (Zhulnikov, Kashina, 2010b: 74–77). It is important for us that the above examples and the discovery of the finial in the form of an elk's head *in situ* at the sanctuary indicate that the Early Neolithic Barabinskaya people had developed sacred ideas, similar to those of the population living far to the west.

Finally, one cannot fail to note the use of stone and bone tools as offerings, which was also quite a common manifestation of sacrifices in the ritual practices of humans.

Another special topic for myth-making is represented by the attitude to a partridge, which is evidenced by the occurrence in the main pits at the sanctuary of its articular bones, possibly used as parts of a necklace or sewed-on pieces for clothes. A huge mass of myth-making is associated with birds, the manifestation of which has been survived among the aboriginal population up to the present time.

Conclusions

The described structure, with several various sets of offerings, is a unique sanctuary, a type of sacred-landscape place of the Early Neolithic population in Western Siberia.

The analysis showed that the ceramic complex of the sanctuary belonged to the Early Neolithic Barabinskaya culture. The derived radiocarbon dates make it possible to date the object reliably within the 7th–6th millennium BC. In addition to pottery and lithics of a clearly Neolithic morphology, the sanctuary also yielded such indicative tools as side-bladed daggers and sacral items, including the elk-headed finial and the stylized ornithomorphic tool.

The spiritual culture of Early Neolithic people in the Irtysh basin is characterized by the highly developed "symbolic behavior and symbolic representation" (Kornienko, 2015; Watkins, 2006, 2009, 2010). These are reflected: in the construction of an architectural structure in a specially selected place; the separation of this structure from residential and utility buildings; the standardization of the main images-symbols (elk, dog, bird); and the use of offerings.

The ritual complex of the sanctuary under study has no analogs; although such items as elk and bird figurines are not rare finds at the Neolithic sites in the northern regions. The studied complex is also remarkable for numerous manifestations of ritual practice testifying to the extremely complex mythology that had developed among West Siberian hunters and fishermen at the dawn of the New Stone Age.

Acknowledgements

The study was supported by the Russian Science Foundation (Project No. 20-18-00111). The work was carried out with the equal participation of the authors.

References

Abramova Z.A. 1962
Paleoliticheskoye iskusstvo na territorii SSSR. Moscow, Leningrad: Izd. SSSR. (SAI; iss. A4-3).

Barna J.P., Toth B., Pásztor E., Tokai Z.V., Biro K., Puszta S., Eke I., Puszta A., Busznyák J., Kocsis N., Száraz C., Tugya B. 2019
Non-invasive investigations of a Late Neolithic rondel at Gétye, western Hungary. In *"Trans Lacum Pelsonem": Prähistorische Forschungen in Südwestungarn (5500–500 v. Chr.)*. Rahden: Verl. Marie Leidorf GmbH, pp. 73–94.

Bobrov V.V., Marochkin A.G., Yurakova A.Y. 2012
Poseleniye boborykinskoy kultury Avtodrom-2/2 (severo-zapadniye raiony Barabinskoy lesostepi). *Vestnik arkheologii, antropologii i etnografii*, No. 3 (18): 4–13.

Bobrov V.V., Marochkin A.G., Yurakova A.Y., Veretennikov A.V. 2019
Yuzhnaya gruppa zhilishch poseleniya Stariy Moskovskiy Trakt-5 v Barabiskoy lesostepi (itogi rabot 2019 goda). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXV. Novosibirsk: Izd. IAET SO RAN, pp. 328–335.

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

Chemyakin Y.P. 2020
Neoliticheskiy kompleks poseleniya Barsova Gora II/9. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. No. 7: Arkheologiya, etnografiya: 191–202.

Chikisheva T.A. 2012
Dinamika antropologicheskoy differentsiatsii naseleniya yuga Zapadnoy Sibiri v epokhi neolita – rannego zheleza. Novosibirsk: Izd. IAET SO RAN.

Chikisheva T.A., Pozdnyakov D.V. 2021
The peopling of the Baraba forest-steppe in the Neolithic: Cranial evidence. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 49 (1): 133–145.

Dubovtseva E.N., Kosinskaya L.L., Piyetsonka K., Chairkina N.M. 2020
Poseleniya amninskogo kulturnogo tipa v kontekste rannego neolita severa Zapadnoy Sibiri. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. No. 7: Arkheologiya i etnografiya: 94–108.

Dyadkov P.G., Molodin V.I., Sumin V.A., Pozdnyakova O.A., Evmenov I.D., Tsibizov A.V. 2017
Rezultaty geofizicheskikh i geodezicheskikh rabot na territorii pamyatnika "Ust-Tartasskiye kurgany". In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIII. Novosibirsk: Izd. IAET SO RAN, pp. 307–310.

Enshin D.N. 2020
K voprosu o khronologicheskikh pozitsiyakh boborykinskikh i koshkinskikh kompleksov v Nizhnem Priishimye (po materialam poseleniya Mergen-6). *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. No. 7: Arkheologiya i etnografiya: 94–108.

Gening V.F., Petrin V.T. 1985
Pozdnepaleoliticheskaya epokha na yuge Zapadnoy Sibiri. Novosibirsk: Nauka.

Gening V.F., Petrin V.T., Kosinskaya L.L. 1973
Perviye poseleniya epokhi pozdnego paleolita i mezolita v Zapadnoy Sibiri. In *Iz istorii Sibiri*, iss. 5. Tomsk: Izd. Tom. Gos. Univ., pp. 24–47.

Gerasimov M.M. 1931
Malta. Paleoliticheskaya stoyanka (predvaritelniye danniye). Rezultat rabot 1928–1929 gg. Irkutsk: Irkut. krayevoy muzey.

Grünberg J.M. 2016
Mesolithic burials – Rites, symbols and social organisation of early postglacial communities. In *Mesolithic burials – Rites, symbols and social organisation of early postglacial communities: Intern. Conf. Halle (Saale), Germany, 18th–21st Sept. 2013*, Bd. 13/I. Halle: pp. 13–24. (Tagungen des Landesmuseums für Vorgeschichte Halle).

Grünberg J.M., Graetsch H.A., Heußner K.-U., Schneider K. 2016
Analyses of Mesolithic grave goods from upright seated individuals in Central Germany. In *Mesolithic burials – Rites, symbols and social organisation of early postglacial communities: Intern. Conf. Halle (Saale), Germany, 18th–21st Sept. 2013*, Bd. 13/I. Halle: pp. 291–328. (Tagungen des Landesmuseums für Vorgeschichte Halle).

Gurina N.N. 1956
Oleneostrovskiy mogilnik. Moscow, Leningrad: Izd. AN SSSR. (MIA; No. 47).

Gurina N.N. 1996a
Vostochnaya Pribaltika. In *Neolit Severnoy Yevrazii*. Moscow: Nauka, pp. 135–161.

Gurina N.N. 1996b
Neolit Kolskogo poluostrova. In *Neolit Severnoy Yevrazii*. Moscow: Nauka, pp. 230–236.

Gurina N.N., Krainov D.A. 1996
Lyalovskaya kultura. In *Neolit Severnoy Yevrazii*. Moscow: Nauka, pp. 173–179.

Hallgren F., Fornander E. 2016
Sculls on stakes and skulls in water. In *Mesolithic burials – Rites, symbols and social organisation of early postglacial communities: Intern. Conf. Halle (Saale), Germany, 18th–21st Sept. 2013*, Bd. 13/I. Halle: pp. 161–174. (Tagungen des Landesmuseums für Vorgeschichte Halle).

Hallström G. 1960
Monumental Art of Northern Sweden from the Stone Age: Nämforsen and Other Localities. Stockholm: Almqvis & Wiksell.

Helskog K. 1988
Helleristningene I Alta: spor etter ritualer og dagligliv i Finnmarks forhistorie. Alta: Alta Museum.

Kardash O.V., Chairkina N.M., Dubovtseva E.N., Piyetsonka K. 2020
Noviye issledovaniya gorodishcha rannego neolita Kayukovo-2 na severe Zapadnoy Sibiri. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. No. 7: Arkheologiya i etnografiya: 109–124.

Khlobystin L.P. 1996
Vostochnaya Sibir i Dalniy Vostok. Moscow: Nauka, pp. 270–328. (Arkheologiya. Neolit Severnoy Yevrazii).

Klementyeva T.Y., Pogodin A.A. 2020
Stratifikatsiya keramicheskikh kompleksov neolita reki Kondy. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. No. 7: Arkheologiya i etnografiya: 203–215.

Kolpakov E.M. 2007
Petroglify Kanozera: Tipologicheskiy analiz (po sostoyaniyu na 2005 g.). In *Kolskiy sbornik*. St. Petersburg: IIMK RAN, pp. 155–183.

Kooijmans L.L., Hamburg T., Smits L. 2016
Burial and non-burial at Late Mesolithic Hardinxveld (NL). In *Mesolithic burials – Rites, symbols and social organisation of early postglacial communities: Intern. Conf. Halle (Saale), Germany, 18th–21st Sept. 2013*, Bd.13/II. Halle: pp. 593–607. (Tagungen des Landesmuseums für Vorgeschichte Halle).

Kornienko T.V. 2015
O vozmozhnostyakh primeneniya psikhosotsialnogo podkhoda v izuchenii doistoricheskikh soobshchestv (na primere issledovaniy simvolicheskikh system Severnoy Mesopotamii epokhi rannego neolita). *Arkheologicheskiye vesti*, iss. 21: 291–303.

Kosinskaya L.L. 2015
Kamenniy inventar ranneneoliticheskikh torfyanikovykh stoyanok Varga-2 i Vtoraya Beregovaya v Zauralye. In *Neoliticheskiye kultury Vostochnoy Yevropy: Khronologiya, paleoekologiya, traditsii: Materialy Mezhdunar. nauch. konf., posvyashch. 75-letiyu V.P. Tretyakova (Sankt-Peterburg, 12–16 maya 2015 g.)*. St. Petersburg: pp. 203–207.

Krainov D.A. 1988
K voprosu o religioznykh predstavleniyakh plemen volosovskoy kultury. In *Drevnosti slavyan i Rusi*. Moscow: Nauka, pp. 38–44.

Krainov D.A. 1992a
Vvedeniye. In *Iskusstvo kamennogo veka (lesnaya zona vostochnoy Yevropy)*. Moscow: Nauka, pp. 5–6.

Krainov D.A. 1992b
Iskusstvo v neolite – eneolite. Russkaya ravnina, tsentr. In *Oshibkina S.V., Krainov D.A., Zimina M.P. Iskusstvo*

kamennogo veka (lesnaya zona Vostochnoy Yevropy). Moscow: Nauka, pp. 68–111.

Loze I. 1970

Seno ticejumu un tradiciju atspogulojums akmens laikmeta maksla Austrumbaltija. *Archeologija un etnografija*, No. 9: 9–30.

Loze I.A. 1979

Pozdniy neolit i rannyaya bronza Lubanskoy ravniny. Riga: Zinatne.

Maski narodov Sibiri. 1975

S.V. Ivanov (text and ill.), V.A. Stukalov (photo). Leningrad: Avrora.

Molodin V.I., Hansen S., Myl'nikova L.N., Reinhold S., Nenachov D.A., Nesterova M.S., Durakov I.A., Kobeleva L.S., Nenachova J.N. 2017 (2021)

Der frühneolithische Siedlungskomplex am Unterlauf des Tartas (Südwestsibirisches Tiefland). *Eurasia Antiqua*, No. 23: 27–88.

Molodin V.I., Kobeleva L.S., Mylnikova L.N. 2017

Ranneneoliticheskaya stoyanka Ust-Tartas-1 i ee kulturno-khronologicheskaya interpretatsiya. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIII. Novosibirsk: Izd. IAET SO RAN, pp. 172–177.

Molodin V.I., Mylnikova L.N., Kobeleva L.S., Nesterova M.S., Nenakhov D.A. 2020

Barabinskaya kultura rannego neolita. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. No. 7: Arkheologiya i etnografiya: 69–93.

Molodin V.I., Nenakhov D.A., Mylnikova L.N., Reinhold S., Parkhomchuk E.V., Kalinkin P.N., Parkhomchuk V.V., Rastigeev S.D. 2019

The Early Neolithic complex on the Tartas-1 site: Results of the AMS radiocarbon dating. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 47 (1): 15–22.

Molodin V.I., Pilipenko A.S., Pozdnyakov D.V. 2017

Etnogeneticheskiye rekonstruktsii populyatsiy yuga Zapadnoy Sibiri v golotsene (neolit–pozdneye Srednevekovye). Kompleksniy podkhod. In *Multidistsiplinarniye metody v arkheologii: Noveishiye itogi i perspektivy: Materialy Mezhdunar. simp*. Novosibirsk: Izd. IAET SO RAN, pp. 148–158.

Molodin V.I., Reinhold S., Mylnikova L.N., Nenakhov D.A., Hansen S. 2018

Radiouglerodniye daty neoliticheskogo kompleksa pamyatnika Tartas-1 (ranniy neolit v Barabe). *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 17. No. 3: Arkheologiya i etnografiya: 39–56.

Morgunova N.L. 2020

A zoomorphic antler staff from an Early Neolithic Burial at Pushkinsky, the Orenburg Region. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 48 (2): 14–21.

Myl'nikova L.N. 2017 (2021)

Technologie der neolithischen Keramikherstellung in Baraba (Westsibirien). *Eurasia Antiqua*, No. 23: 89–106.

Oshibkina S.V. 1978

Neolit Vostochnogo Prionezhya. Moscow: Nauka.

Oshibkina S.V. 1992a

Sever Vostochnoy Yevropy. In *Iskusstvo kamennogo veka (lesnaya zona Vostochnoy Yevropy)*. Moscow: Nauka, pp. 44–67.

Oshibkina S.V. 1992b

Iskusstvo epokhi mezolita. In *Iskusstvo kamennogo veka (lesnaya zona Vostochnoy Yevropy)*. Moscow: Nauka, pp. 7–40.

Oshibkina S.V. 1996

Sever Vostochnoy Yevropy. In *Neolit Severnoy Yevrazii*. Moscow: Nauka, pp. 210–229.

Oshibkina S.V. 1997

Veretye I. Poseleniye epokhi mezolita na Severe Vostochoy Yevropy. Moscow: Nauka.

Oshibkina S.V. 2017

Iskusstvo epokhi mezolita (po materialam kultury veretye). Moscow: IA RAN.

Parzinger G., Molodin V.I., Fassbinder J., Kobeleva L.S., Gass A., Hofmann I., Nenakhov D.A. 2016

Predvaritelniye rezultaty issledovaniy periferii bolshykh kurganov sargatskoy kultury v Tsentralnoy Barabe. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXII. Novosibirsk: Izd. IAET SO RAN, pp. 401–404.

Pesonen P.E. 1977

O dvukh drevnikh poseleniyakh v nizovye r. Niva. *Sovetskaya arkheologiya*, No. 1: 126–138.

Petersen P.V. 2016

Papooses in the Mesolithic? A reinterpretation of tooth and snail shell ornaments found in grave 8 at Bøgebakken and other Mesolithic burials. In *Mesolithic burials – Rites, symbols and social organisation of early postglacial communities: Intern. Conf. Halle (Saale), Germany, 18th–21st Sept. 2013*, Bd.13/II. Halle: pp. 109–124. (Tagungen des Landesmuseums für Vorgeschichte Halle).

Pozdnepaleoliticheskaya stoyanka Afontova Gora II: Itogi multidistsiplinarnykh issledovaniy 2014 goda. 2021

E.V. Akimova, A.A. Anoikin, S.K. Vasiliev et al. Novosibirsk: Izd. IAET SO RAN.

Rimantiene R. 2005

Die Steinzeit-fischer an der Ostseelagune in Litauen. Vilnius: Litauisches Nationalmuseum.

Savchenko S.N. 2005

Kinzhaly i nozhi iz kosti i roga v shigirskoy kollektsii Sverdlovskogo oblastnogo krayevedcheskogo muzeya. In *Kamenniy vek lesnoy zony vostochnoy Yevropy i Zauralya: Sbornik statey k 70-letiyu L.V. Koltsova*. Moscow: Academia, pp. 213–237.

Shcherbakova T.I. 1994

Materialy verkhnepaleoliticheskoy stoyanki Talitskogo (Ostrovskoy). Yekaterinburg: Izd. UrO RAN.

Stolyar A.D. 1983

"Zhezly" onezhskikh petroglifov i ikh materialniye prototipy. In *Izyskaniya po mezolitu i neolitu SSSR*. Leningrad: Nauka, pp. 145–158.

Studzitskaya S.V. 1997

Ritualniye "zhezly-posokhi" neolita lesnoy polosy Yevrazii. In *Aktualniye problemy drevney i srednevekovoy Yevrazii*. Tomsk: Tom. Gos. Univ., pp. 95–103.

Tokarev S.A. 1969

Svyatilishche. In *Sovetskaya istor. entsikl*., vol. 12. Moscow: Sov. entsikl., pp. 611–612.

Tsvetkova I.K. 1969

Ukrasheniya i skulptura iz neoliticheskogo poseleniya Chernaya Gora. In *Ekspeditsii Gosudarstvennogo istoricheskogo muzeya*. Moscow: GIM, pp. 25–38.

Tsvetkova I.K. 1970

Plemena ryazanskoy kultury. In *Okskiy bassein v epokhu kamnya i bronzy*. Moscow: Sov. Rossiya, pp. 94–153. (Trudy GIM; iss. 44).

Watkins T. 2006

Architecture and the symbolic construction of new worlds. In *Domesticating Space: Construction, Community, and Cosmology in the Late Prehistoric Near East*. Berlin: Ex Oriente, pp. 15–24.

Watkins T. 2009

Ordering time and space: Creating a cultural world. In *Proceedings of the 5th Intern. Congr. on the Archaeology of the Ancient Near East*. Madrid: pp. 647–659.

Watkins T. 2010

New light on Neolithic revolution in south-west Asia. *Antiquity*, vol. 84 (325): 621–634.

Yurakova A.Y. 2017

Neolit Barabinskoy lesostepi i yuzhno-tayezhnogo Priirtyshya. Cand. Sc. (History) Dissertation. Kemerovo.

Yurakova A.Y., Marochkin A.G. 2020

Sravnitelniy analiz kamennykh industry poseleniy "ploskodonnogo neolita" Baraby. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 19. No. 7: Arkheologiya i etnografiya: 176–190.

Zhilin M.G., Antipina T.G., Zaretskaya N.E., Kosinskaya L.L., Kosintsev P.A., Panova N.K., Savchenko S.N., Uspenskaya O.N., Chairkina N.M. 2007

Varga-2. Ranneneoliticheskaya stoyanka v Srednem Zauralye (opyt kompleksnogo issledovaniya). Yekaterinburg: Rezhevskiy pechatniy dom.

Zhilin M.G., Savchenko S.N. 2010

Torfyannikoviye pamyatniki mezolita i rannego neolita Zauralya: Opyt i perspektivy kompleksnogo issledovaniya. In *Tagilskiy vestnik: Istoriko-krayevedcheskiy almanakh*, iss. 6. Nizhniy Tagil: Nizhnetagil. Gos. Sots.-Ped. Akad., pp. 30–42.

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.

Zhulnikov A.M., Kashina E.A. 2010a

Obraz ptitsy v iskusstve neolita–eneolita lesnoy zony Vostochnoy Yevropy. *Rossiyskaya arkheologiya*, No. 2: 5–17.

Zhulnikov A.M., Kashina E.A. 2010b

"Staffs with elk heads" in the culture of prehistoric populations of Urals, Northern and Eastern Europe. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 38 (2): 71–78.

Received March 14, 2022.

doi:10.17746/1563-0110.2022.50.2.028-040

Y.E. Berezkin
Peter the Great Museum of Anthropology and Ethnography (Kunstkamera), Russian Academy of Sciences, Universitetskaya nab. 3, St. Petersburg, 199034, Russia
E-mail: berezkin1@gmail.com

The Cultural Continuum of the Eurasian Boreal Zone and the Eastern Siberian Wedge (Based on Comparative Mythology and Paleogenetics)

Over the recent decade, abstracts of many thousands of folktales recorded in Europe and Asia have been added to our Electronic Catalogue of World Mythology and Folklore. Their analysis reveals systematic parallels between the traditions of Western Eurasia and America, those of the Plains Indians in particular. Such motifs are especially apparent in Ancient Greek mythology (Phaethon's fall, Pasiphae and the bull, cranes attacking dwarfs, etc.). Although they have been known since the 19th century, no explanation for them could be proposed for a long time. The situation changed thanks to recent advances in Siberian paleogenetics. Before the peak of the Last Glacial Maximum, Eastern Siberian populations (Yana RHS and Malta) exhibited European affinities. By the mid-Holocene, population replacement occurred. It was not abrupt, but eventually resulted in a breakup of the initial cultural continuum spanning the Eurasian boreal zone and later extending to the New World. Many of the Western Eurasian–American motifs are episodes from stories of adventures. On the other hand, parallels between traditions of the Indo-Pacific rim of Asia and America mostly relate to motifs that are mythological in the narrow sense (etiological and cosmological), including early ones, evidently stemming from Africa. From the Hunno-Sarmatian, if not Scythian age onward, Southern Siberian and Central Asian motifs had been transferred to Western Eurasia on a large scale. Classical sources mirror an earlier stage of European mythology, hence the difference between the Ancient Greek set of motifs and that peculiar to later European traditions.

Keywords: *Peopling of America, prehistory of Siberia, comparative mythology, Eurasian folklore, Ancient Greek mythology, statistical methods in humanities.*

Introduction

Millions of folklore and mythological texts have been published in various languages. Undoubtedly, these sources contain important information. But which exactly? For two centuries, scholars have expressed different opinions on what can be learned from systematizing traditional narratives. A dozen hypotheses that have been proposed can be easily reduced to two main paradigms. Folklore and mythology are either a historical source that helps scholars to reconstruct the past, or they reflect the universal features of the human psyche. There is no third option. As a rule, folklorists did not deal with either one or the other, but systematized plots and genres. There is only one objection to this: typology cannot be the goal of research, but is only its preliminary, albeit necessary stage.

Regardless of some disputable suggestions, T. Kuhn was right when he insisted that followers of various paradigms were unable to convince each other (2003).

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 28–40 E-mail: Eurasia@archaeology.nsc.ru

Scholarly fields originate and disappear only together with their representatives. People may argue about specific issues, but not about general approaches. For a historian, it is clear that everything that exists emerged in a certain place and at certain time. We agree that culture embodies something intrinsic to humans as a species, but in this case we are not interested in universal elements—psychologists and ethologists should address them. As far as folklore and mythology are concerned, mapping irrefutably proves that plots, motifs, and genres of folklore are not universal. Their specific forms and variants are typical of some regions and are unknown in others, and these differences rarely, if ever, correlate with natural, social, and economic features (trivial cases, such as absence of myths explaining the ebb and flow of tides among the inhabitants of areas remote from the sea should not be even mentioned). The area distribution of the elements of folklore and mythology reflects contacts between people and outlines the ancient spheres of interaction.

There are many reasons why cultural anthropology and folklore ceased to be the fields of history in the 1920s. Yet, it is important that ethnographic and folklore evidence, which had been collected, has not lost its value because of this. As the remote past of mankind takes on a concrete shape thanks to successes of archaeology and genetics, the body of folklore and ethnographic data turns into unique information resource shedding some light on the aspects of the past that are inaccessible to other fields of history.

The scholarly field that we represent does not yet have a stable name. It can be called "the corpus folklore", although admittedly, this term is obscure. In essence, the idea is that historical information is contained not in individual mythological texts, not in the plots of narratives, but in the distribution areas of the elements extracted from the texts, which coincide with areas of specific cultural and historical communities. The time when such communities existed is known thanks to archaeologists and geneticists. This makes it possible (in the first approximation) to give the *terminus ante quem* to the emergence of mythological images and narrative episodes.

American connections with Ancient Greek mythology

In the late 19th century, F. Boas, the founder of professional American anthropology, recorded the myths of the Native Americans who lived on the coast of British Columbia, and discovered an episode similar to the Ancient Greek myth about cranes and pygmies (2002: 213–215). Somewhere far away, there lived dwarfs endowed with remarkable strength, but suffering harm from migratory birds that regularly attacked them, such as geese, swans, ducks, and cranes (Shtal, 1982). The story usually unfolded about how a man who found himself among the dwarfs easily defeated the birds.

Boas did not attempt to comment upon this parallel and did not even include this motif into the list of traditions he studied (2002: 672–674), but what could he do at that time? Scholars have identified texts on this subject among a large number of the peoples of Eurasia and especially America (Toivonen, 1937). We indicated most of the cases in an overview published a decade and a half ago* (Berezkin, 2007). Since then, similar episodes have also been found in France (Charente Department) and Germany (Rügen Island) (Karlin, 1991: 247–248; Haas, 1903: 157–159). These fairy tales incorporated ancient ideas that had lost their relevance. In a brief form, "Cranes and pygmies" have been found among the Evenks of China (Bäcker, 1988: 198–201). In the 20th century, such narratives almost disappeared from the folklore traditions of the Old World, and are known mainly from early records.

The plot of "Cranes and pygmies" contains several motifs-episodes with partially intersecting definitions**. In the Electronic Catalogue of World Mythology and Folklore***, these are numbers k22, k22a, k22aa, k22b, k22c, and k23 (Berezkin, Duvakin, (s.a.)). "Cranes and pygmies" appeared in three regions (Fig. 1). In the west of Eurasia, the plot has been found in Europe, Transcaucasus, and Western Asia (Arabic written tradition). In the Far East, relatively rich data are available in ancient and medieval Chinese sources. The same story among the Nanai people has survived in a unique record of the late 19th century (Shimkevich, 1897: 137). Most of the evidence collected pertain to the traditions of the New World. In North America, the corresponding narratives are spread over the territory between the extreme south of Alaska (the Tlingit people), northern Plains, Great Lakes (Fox), southeastern United States, and northern Mexico. One text was recorded among the Eskimos of Northwestern Alaska, but does not appear in most of the American

*Among some peoples, for example, the Georgians, the creatures with whom the man happens to be are also birds, but of different species. In some Native American traditions, wasps, grass tussocks, or even pots of porridge, and not migratory birds, attack the inhabitants of a distant country. These variations do not affect the structure and general content of the texts.

**"Motif" is an episode or image found in two or more traditions. "Tradition" is a set of texts recorded within a specific ethnic and linguistic community or territory.

***The catalogue is available on the Internet; it contains definitions of motifs, summaries of texts, and their publication data. This eliminates the need to provide hundreds of references to publications in an article.

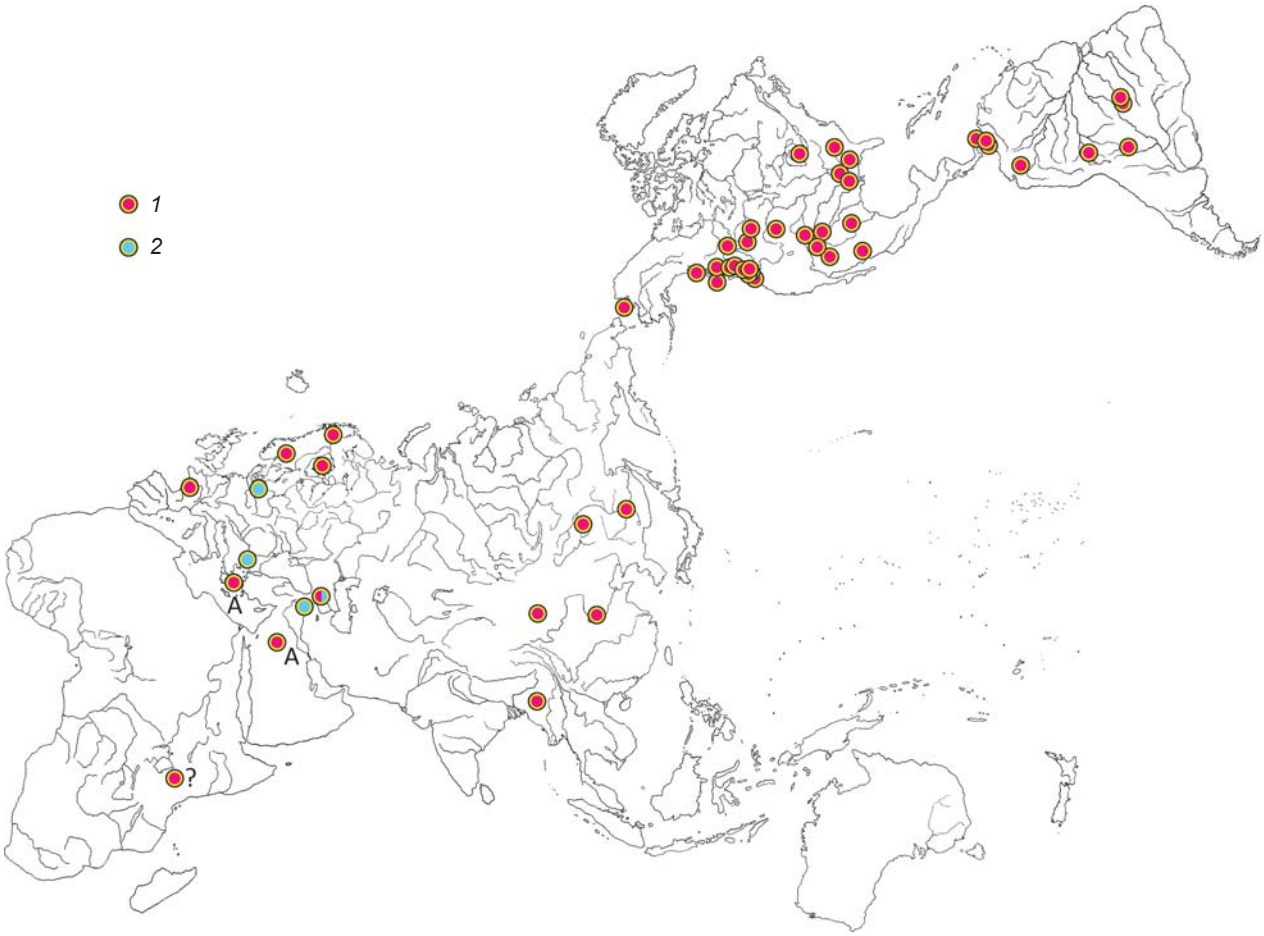


Fig. 1. Distribution of motifs "Cranes and pygmies" (k22 in the Electronic Catalogue) (*1*) and "Birds in the north – people in the south" (k22aa) (*2*).
Hereafter, letter "A" marks early written traditions; in this case, Ancient Greek and Arabic.

Arctic and Subarctic. In South America, this plot is less common than in North America, but also occurs in a large area: from the Isthmus of Panama to the upper Xingu River in Brazil.

This distribution suggests that the plot came to the New World in the early period of migration. Its independent emergence in America is unlikely. Episodes recorded in different traditions of the Old and New Worlds are not trivial and not common throughout the world. They have not been found either in Southeast Asia and Oceania, or in Africa. Among the Chagga people of East Africa, a myth was recorded about the birds that attack the rising sun every morning, mistaking it for grain, and people protect it (Millroth, 1965: 25–26). However, the connection of this variant with the rest variants is not obvious; in any case, it is the only one in the region. The plot of "Cranes and pygmies" is based on the concept of migratory birds, and should have originated somewhere in the north. It was most likely brought to South America along with peopling of the continent.

Motif k22aa "Birds in the north – people in the south" occurs in Europe (Germans, Bulgarians) and Transcaucasus (Georgians, Armenians): a person comes to a country whose inhabitants are birds that live with people in the summer and turn into people flying away to their own lands (Fig. 1). Although the fight between birds and dwarfs is not mentioned there, the motif of traveling to a country where migratory birds arrive may be relevant to the plot in question. In the Georgian version, motifs k22 and k22aa are combined in a single narrative.

The story about cranes and pygmies is not the only plot connecting Ancient Greek mythology with the Far East and especially with the New World. There are other plots, such as narratives about the Cretan King Minos and his wife Pasiphae. During copulation, Minos ejaculated poisonous creatures (what it was in particular is unknown), killing women, and Pasiphae had intercourse with the bull from whom she begot Minotaur. "Strange marriage" with a large quadruped (motif f34) and "Dangerous genitals" (f9a, f9b–f9e, f10, f11) in a mythological rather than

anecdotal context are common motifs in the oral traditions of the Native Americans, but they are absent in the west of Eurasia and Africa (Berezkin, 2018a). The Greek example is one of a kind.

Another motif is Heracles' extermination of the Stymphalian birds, which threw their feathers like arrows (in the Electronic Catalogue, this motif is k23a). It is unique for Western Eurasia, but is known to the Chukchi and Native Americans who inhabit the northwestern coast of North America, from British Columbia to the border of Oregon.

The presence of identical imagery and motifs in the Far East and America is not surprising—the Native Americans came to the New World from Asia. But what does this have to do with Greece or France?

The Greek written tradition is the only ancient Western Eurasian tradition for which we have extensive and varied data. In the number of motifs that we have identified in the sources of Greek Antiquity (260 among almost 3000 for the whole world) it is comparable to late folklore traditions of Europe. Half of these motifs are mythological in the narrow sense, and reflect ideas about the world. The other half consists of adventure and trickster-related motifs.

As opposed to the Ancient Greek tradition, early written traditions of India and China are similar to those in the folklore records of the 19th–20th centuries. They also contain sufficient evidence: 196 motifs for Ancient India and 150 for Ancient China, while 265 motifs are registered for the Hindi-speaking population of North India, 185 motifs for the Punjabis, 180 motifs for the Miao people, as well as 150 motifs for the Lisu people and the similar Tibetan-Burmese groups of Yunnan. In Mesoamerica, sets of motifs in the sources from the time of the Spanish conquest and in the Native American traditions of the 20th century are almost identical. And only the Ancient Greek mythology, after processing data on the occurrence of motifs, turns out to be closer not to the later traditions of its own region, but to the sets of mythological motifs in another part of the globe—America and Indo-Pacific Rim of Asia. This shift is statistically small, but noticeable (Fig. 2).

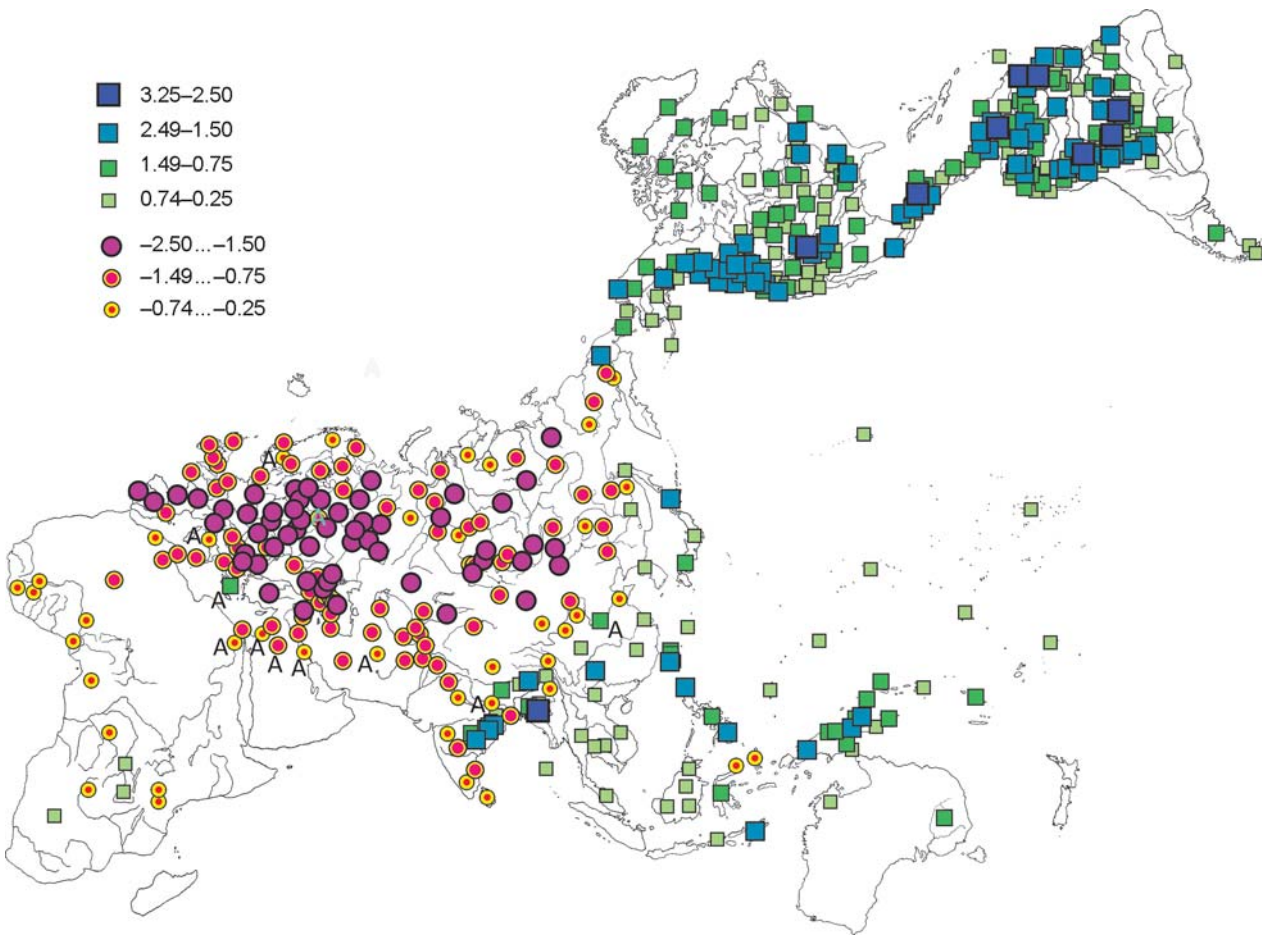


Fig. 2. Results of statistical processing of data on the distribution of 490 cosmological and etiological motifs in 987 traditions of the world. Only the motifs that were found in both the Old and New Worlds have been taken into consideration. PC 2. Dispersion is 4.1 %. Traditions with the number of motifs <16 and absolute value of indices <0.25 are not shown.

Using factor analysis applied to statistical data processing, principal components (PC) were identified in a tremendous array of various parallels between traditions. The higher the correlation of a certain group of motifs with specific group of traditions, the higher the absolute values of conventional mathematical indices for the corresponding traditions. The first PC-s are significant; the rest are informational noise reflecting many multidirectional connections between the pairs and small groups of traditions. If traditions differ dramatically in the number of motifs, the software perceives the understudied traditions as objectively different from the well-studied traditions, opposing one to the other. However, such opposition only points to differences in availability of sources. Usually it is reflected by the first PC, while the second PC is the most significant. The data we provide are from the second PC.

Each PC is associated with two sets of traditions that are the least similar in their composition of motifs. The software gives them indexes with "+" or "–" signs. The more vividly the trend is expressed, the higher the absolute value of the index is. Each group with indices of the same sign corresponds to some community. Such communities, according to the terminology by R.N. Adams, are fragmentary and aggregated. Not only are they incapable of coordinating the actions of their members, but they also lack or almost lack self-identification (Adams, 1975: Fig. 2). Their members are connected with each other only by a network of contacts a little more dense than contacts with other communities. But even a slight increase in information exchange within the boundaries of a certain area contributes to selection of regional cultural features.

Western European-American parallels and the Siberian gap

The map in Fig. 2 reflects only the motifs that were present both in America and Eurasia. This certainly means that correspondences to American traditions appear not only in Ancient Greek mythology, but also in the later traditions of Europe. Ancient Greek tradition has a special position not because it is the only one with American parallels, but because in later traditions, there occur more commonly motifs known in America but typical mostly of Western Eurasia. In Ancient Greek tradition, there are relatively few motifs typical of the European folklore, and therefore the American and Indo-Pacific parallels are more noticeable (in this regard, see also Fig. 6). In addition, in later traditions, there are many motifs that are equally common in Europe and America.

It has been long observed that there are many parallels between the traditions of the New World in the Western and Central Eurasian folklore. However, for a long time, this observation was largely ignored, since such facts did not fit into any acceptable theory explaining the peopling of the New World. Too many thousands of kilometers separate America from Europe. Only after collecting and analyzing Western Eurasian folklore for several years, as a part of a project supported by the Russian Science Foundation, was it established that these were not isolated coincidences, but regularity reflected in a large body of evidence. There are dozens of coincidences, and Western Eurasian and American areas of the corresponding motifs are always separated by the huge Siberian gap (Fig. 3).

This gap does not have clear boundaries. Some European parallels have been found not only in America, but also in the Chukchi Peninsula; others are absent not only from Siberia, but also from Alaska, and first appear only on the northwestern coast of North America or even further south (in California or on the Plains). However, the area where the corresponding motifs are encountered least of all is invariably Eastern Siberia.

We selected 42 motifs with similar distribution, belonging to different thematic groups. The list also includes the already mentioned motifs*. Sporadic matches with Western Asian motifs can be found everywhere, while the systematically repeated matches (from 6 to 12) are typical precisely for the Native Americans. Moreover, among the Eskimo traditions, more than five motifs from this list have been found only among the Inupiat of Northwestern Alaska, whose narratives are often similar to those of the Chukchi. In most of Siberia, except for

*Motifs a14 (Cause of eclipses: relationship of the Sun to the Moon), a16 (Dangers in the path of the sun), a42a (Phaeton – an imitator of the sun), b75a (Sounds in the time of creation: human voice), f9d (Scorpions in the genitals), f11 (Biting penis), f34 (Communication with the ground quadruped), f39 (Time of women), f65a (Pretended dead: meeting with the lover), f70 (Potiphar's wife), h24 (Vessel opened too early), h33 (Children walk since birth), i4b (Man helps thunder to defeat the enemy), i20 (Underground dwarfs), i25 (Bribed guards), i45b (Not pointing a finger at the rainbow), i85c (Vessels with weather), i86a (Fluff turns into snow), i115a (Orion as man, Pleiades as women), j7 (Replaced signs), K18 (Recognition of father or mother), k22 (Cranes and pygmies), k23a (Feathers as weapons of birds), k33 (The living drowned woman), k35 (Replaced man), k36 (Turned into an animal), k41 (Thunder against the snake), K49 (Dead mother nurses the baby), k75 (Younger daughter is willing), k130a (Girl in the house of her brothers), L15a (Vulnerable place on the body), L4 (Killer exposed), L39 (Protagonist is forced to descend from a tree), L40 (Reflection and shadow), L48 (Demons eat their own), L49 (Body parts fall down), L50 (Man-eater by the path), m23 (Pretended fear of imaginary danger), m30 (Trickster falls down), m57a (Beads as body secretions), m84 (Person or animal revived from his/its bones), m120 (Man-eating nanny).

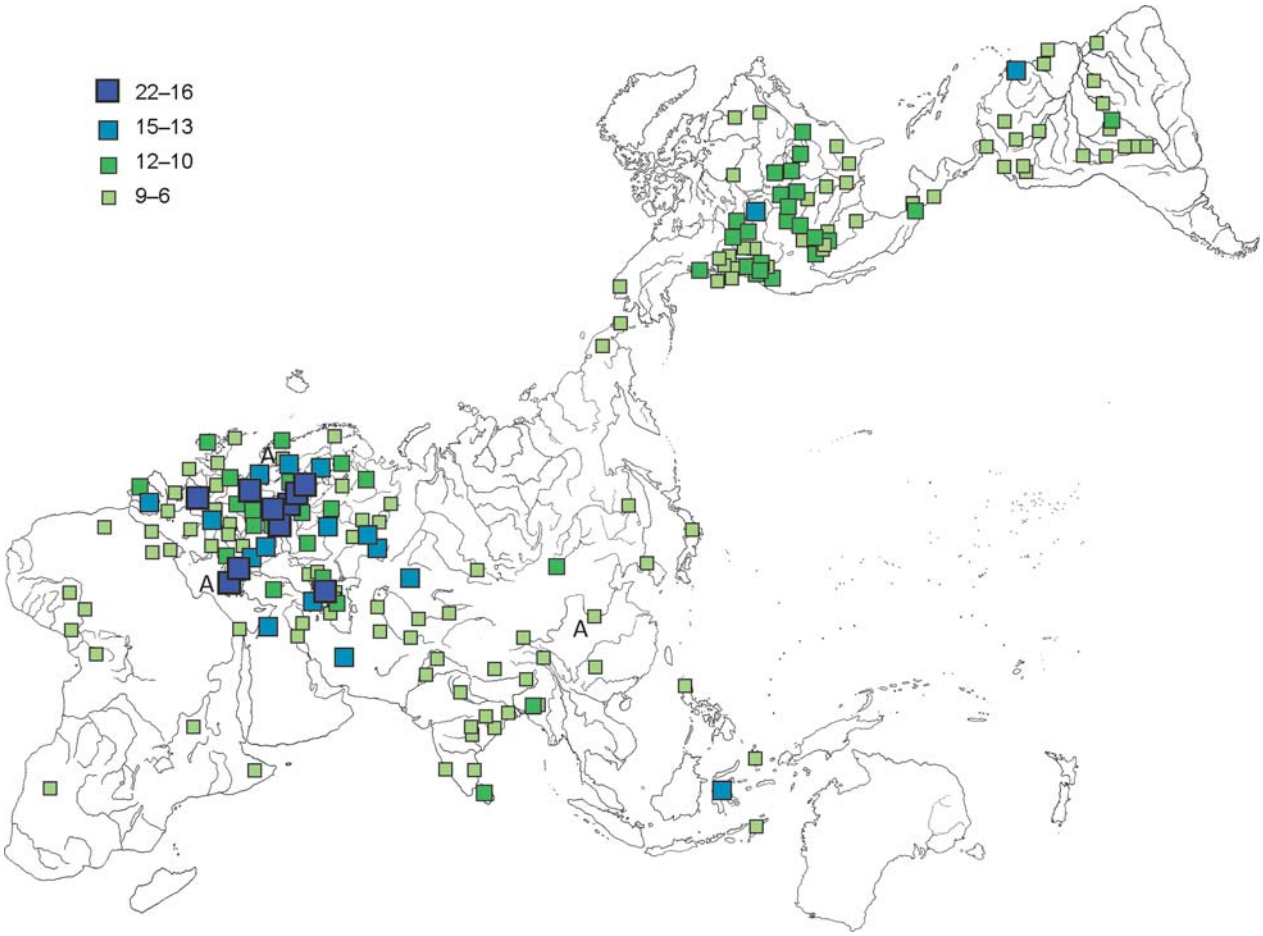


Fig. 3. Distribution of the selected motifs typical of Western Eurasia and America, but unknown in most of Siberia. Size and color of the signs correspond to the number of motifs (from 22 to 6) found in each tradition.

the Lower Amur basin (Nanai people), Far Northeast (Chukchi and Asian Eskimos), and Altai (Altai-Kizhi), the number of these motifs does not exceed 3 or 4, and more often is between 0 and 2. More Western Eurasian parallels have been discovered in Asia to the south of Siberia. At the same time, only the Khalkha Mongols, Sinhalese people, Chin people, and Torajans have more than nine of them.

The exclusive parallels between the traditions of the populations of Western and Central Eurasia, and Plains Indians (Fig. 4) are of particular interest. We did not take these data into account while compiling map 3, since they have some specific features. In the New World, the area of occurrence of the corresponding motifs* is sharply bounded by the Rocky Mountains in the west, and stretches across the entire Plains from north to south. In Eurasia, the maximum number of parallels has been found not only in the mythologies of Europe, but also in the Turkic-Mongolian traditions of the south of Siberia and Turkestan. These parallels were noticed twenty years ago and were regarded as resulting from migration of the ancestors of the Native Americans from the Altai-Sayan to the New World (Berezkin, 2003). After reaching Alaska and moving along the Yukon and Mackenzie valleys, people entered the expanses of the Plains. They must have gradually dispersed further, although in the Mackenzie Corridor migration could have been more rapid. In the intermediate territories of Siberia and American Northwest, the corresponding motifs should have been known at one time, but were erased during migrations.

American regional traditions do not constitute a unity, but find parallels in different regional traditions of Eurasia. This conclusion has later found more and more proofs (Berezkin, 2016a, 2018c, 2019, 2020a). There are almost no doubts that we are dealing here with isolated events in peopling of the New World. The

*Motifs b46 (Seven stellar brothers), b48b (Piece of human flesh), j27 (The lodge-boy and the thrown-away), k27z (Gambling for life and death), K37a (Recognize the man), k38b (The serpent threatens the nestlings), k64 (Escape from the herdmaster's cave), k66 (Mighty warriors with different abilities).

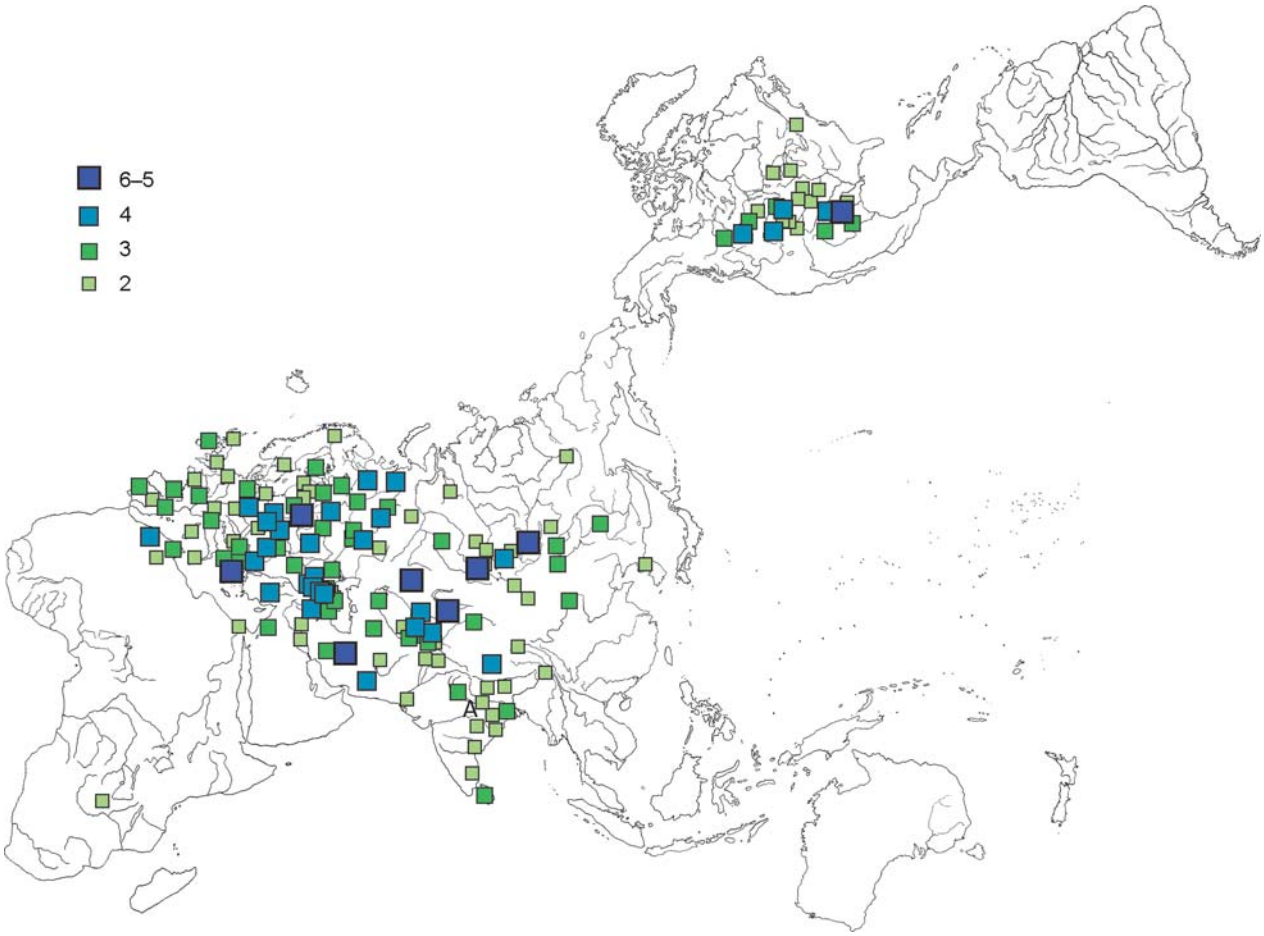


Fig. 4. Distribution of the selected motifs typical of Western Eurasia and the Great Plains. Size and color of the signs correspond to the number of motifs (from 6 to 2) found in each tradition.

movement of people from Southern Siberia to North America is possible, since genetic data also point to this area of the Old World as the main source of the Y-chromosomal lineages in the New World (Wei et al., 2018). However, this scenario is vulnerable. First, there is no archaeological evidence for early migration along the Mackenzie Corridor. Fluted points found in Alaska were brought there not from Asia, but relatively late from the mainland of the future United States (Vasiliev et al., 2015: 171–177). Second, as our catalogue becomes enriched with many thousands of European, West Asian, and North African texts, it is clear that in the realm of folklore and mythology, American connections are not specific to Southern Siberia, but are typical of the entire area west of the Altai.

Noteworthy is a small group of motifs connecting the north of North America and Chukchi Peninsula with Northern Europe, especially with the Sami people and the Baltic Finns*. The concentration of parallels in the Bering Strait region suggests the later penetration of motifs from Asia into America than those concentrated in the Plains. However, in this case too, the contacts between the Chukchi Peninsula and Fennoscandia could hardly have taken place given the ethno-linguistic situation in Siberia known to us, since in the past it should have been significantly different (Fig. 5).

While working on Project 21-18-00232 supported by the Russian Science Foundation, we tried to identify any parallels connecting the ancient mythologies of Western Asia with both Ancient Greek and late folklore traditions of Eurasia and America. This work is not finished yet. However, even if the number of identified motifs increases (now it is in the range of 35–55 for each of the ancient traditions), it is unlikely that many parallels will be found.

*Motifs b57a (Red sunset as indication of what happened), b71 (Dancing flashes of light), b75b (Sounds in the time of creation: creaking of trees), b75b1 (Sounds in the time of creation: voice of the wife or mother-in-law), b91a (Eyes: taken and not returned), k25a2 (Downcast feathers), L101 (Downcast clothes), L41c (Those sliding down the hill were taken away by a demon), M42b (Eyes of tar), m97 (The blind man asks the trees).

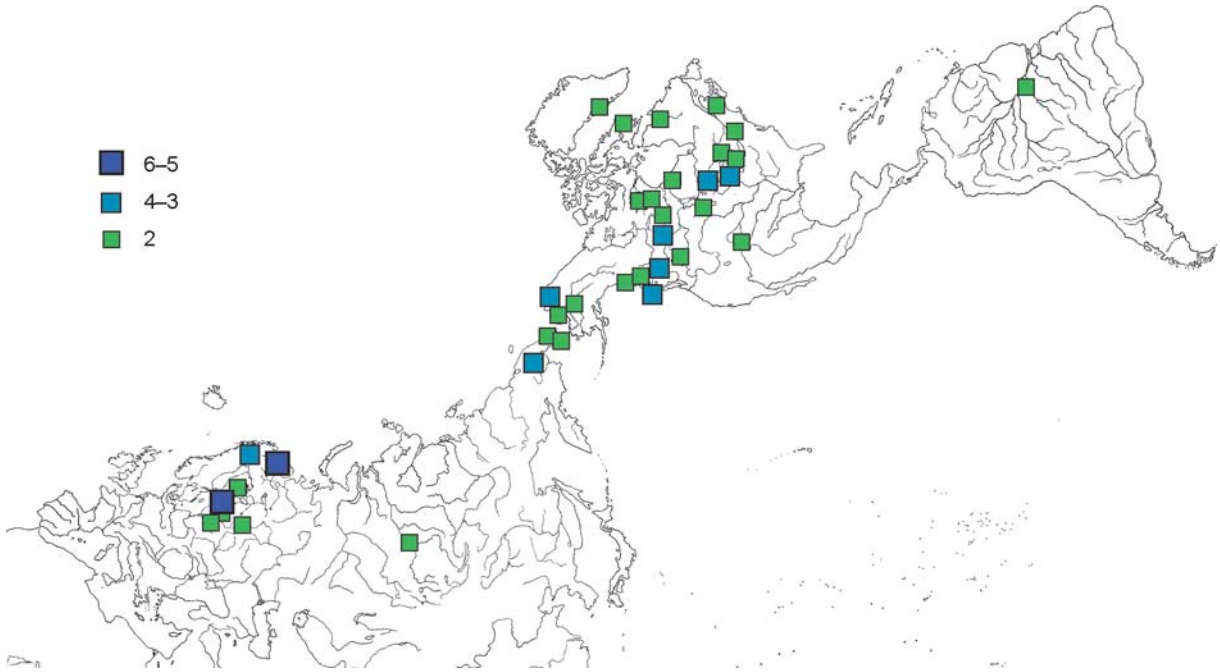


Fig. 5. Distribution of the selected motifs typical of Northern Europe, the Bering Sea, and north of North America. Size and color of the signs correspond to the number of motifs (from 6 to 2) found in each tradition.

As far as the parallels between Europe and America are concerned, we are apparently dealing with the northern zone with which the traditions of Western Asia had nothing to do. This is a separate topic, which deserves special research.

Population history of Eastern Siberia

The data of folklore and mythology do not have their own dating. If antiquity of plots and genres is assessed only from the content of the texts, it is very dependent on the intuition of the researcher and cannot have objective confirmation. We may get on a relatively firm ground only when we discover the areas of large groups of motifs. These data can be correlated with the boundaries of the distribution zones of human communities, which archaeologists and geneticists identify for specific chronological periods. The coincidence of the boundaries in the areas suggests the possibility that certain sets of motives emerged within the communities (spheres of interaction) that existed only in certain periods. Notably, this concerns epochal periodization, and not calendar dates.

Samples of fossil DNA that were analyzed in recent years have made it possible to establish the population history of Eastern Siberia in general terms (Kozintsev, 2021: 142; Sikora, Pitulko, Willerslev, 2019). Before the peak of the glacial maximum, in the north of the region (Yana site), there lived people genetically close to European populations, particularly to the inhabitants of the Sungir site (Massilani et al., 2020). There is similar data for the Malta site in the Baikal region; some genes of its inhabitants later came to America (Balter, 2013). The relationship between the population of the Malta site (Baikal region) and the Upper Paleolithic population of Europe is also indicated by odontological evidence (Shpakova, 2001). The gene pool of the ancient Northern Siberians living on the lower Yana River also had East Asian component, although it was not predominant. By the beginning of the Holocene, the situation had changed significantly. As the deciphered genomes have shown, the man from the lower Kolyma River (Duvanny Yar site) partially retained the gene pool of the ancient Northern Siberians, and was close to the Eskimos and Native Americans (Sikora, Pitulko, Willerslev, 2019). The population with links to American people also remained in the Cis-Baikal region in the Final Paleolithic (Yu et al., 2020). However, 6000–4000 years ago, the genetic ancestors of the people who were encountered by the Russian pioneers already lived both in the north of Eastern Siberia and in the Cis-Baikal region.

Time-related changes in the gene pool of Eastern Siberia suggest a gradual shift of the region's population to the north. As the Ice Age passed away, biocenoses typical of a very cold climate were replaced by more thermophilic biocenoses. Natural zones moved to the north, and populations adapted to them moved up along (Pavlova, Pitulko, 2020; Pitulko, Pavlova, 2020). However, there is no exact evidence that archaeological

complexes discovered in the north of Eastern Siberia originate from the southern part of the region. It can be argued that archaeological evidence does not contradict the data of genetics, but it also does not contain additional justification for the reconstructed process, only testifying to the increased demographic density.

It is still difficult to establish where the population that spread to the north of Eastern Siberia originally emerged; possibly, in Manchuria, in the east of Mongolia, and in Transbaikal region. There are no arguments in favor of migration from the areas south of Manchuria. The populations with the pebble tool industry lived in South China; throughout the entire Upper Paleolithic, they were pushed from the north by the people of blade industry (Bar-Yosef, Belfer-Cohen, 2013: 37–38). The earliest genome of an anatomically modern human in China (the sample was extracted from a femur found in the Tianyuan cave in Zhoukoudian, near Beijing) dates back to ca 40 ka BP (all dates are calibrated), and is located almost at the base of the lines leading to various populations of East Asia and America (Gakuhari et al., 2020: Fig. 4; Kaifu, Fuhita, 2011; Shang et al., 2007; Wang, Yeh, Reich, 2021).

The origin of the population of Eastern Siberia is an issue not directly related to the topic of this article and is beyond the competence of the author. If paleogenetic data are obtained for the population of Transbaikalia and Amur region, the situation will most likely become clearer. It is important that in the period between about 20 and 5 ka BP, there was a radical change in the composition of the population in that region, at least in its northern part, and in the Cis-Baikal region. People who lived there in the Pleistocene shared more genes with both inhabitants of Western Eurasia and Native Americans, than the Yukagirs, Yakuts, Tunguses, or Buryats do.

The data of genetics, archaeology, linguistics, and comparative mythology rarely coincides in detail, since different features of culture, just as genes, are transmitted in different ways (see (Berezkin, 2018b)). The coincidence is more noticeable at the highest, transcontinental level, when specific tendencies balance each other. Changes in the gene pool of the Eastern Siberia population in the Late Pleistocene and Early Holocene well correlate with data of comparative mythology. These changes make it possible to explain how it could happen that significant sets of elements of oral tradition, common to Western Eurasia and the New World, are almost absent from Siberia. Our working scenario is as follows.

Anatomically modern humans peopled continental Eurasia 45–40 ka BP (Bae, Douka, Petraglia, 2017; Fewlass et al., 2020; Pitulko, Pavlova, 2020); that is, around the same time when the populations from Africa reached the Indo-Pacific Rim of Asia (Massilani et al., 2020; O'Connell, Allen, 2015). This dating is consistent with disappearance of the "Hobbits" from the Island of Flores ca 50 ka BP (Sutikna et al., 2016). The penetration of *Homo sapiens* into Australia and New Guinea earlier than 50 ka BP cannot yet be ruled out (Bradshaw et al., 2021), but it is not supported by indisputable evidence. There is no information on penetration of *Homo sapiens* in the territory of China north of the Yellow River earlier than 40 ka BP, and in the areas located to the south earlier than 50–45 ka BP (Sun et al., 2021).

The set of mythological motifs brought from Africa must have been small (Berezkin, 2021). After peopling of Eurasia by the *Homo sapiens*, contacts between the northern (continental Eurasian) and southern (Indo-Pacific) populations could not have been intense, since Central Asian deserts and mountains separating them were rarely inhabited, especially during the glacial maximum (Morgan et al., 2011). As a result, different sets of folklore and mythological motifs emerged in the north and southeast of Eurasia.

People began to enter the New World after the peak of the glacial maximum had been over. The most ancient reliably dated sites in America date back to 16.5–15 ka BP (Prates, Politis, Perez, 2020; Williams et al., 2018). The earliest groups might have been not continental Eurasian but Indo-Pacific (Australasian) populations. This is indicated both by our data on the distribution of mythological motifs (Fig. 6)*, and by exclusive correspondences in the gene pool of some Amazonian Native Americans, Papua people, and Andamanese people (Skoglund et al., 2015). At the same time, such conclusion cannot be drawn based on craniological traits of modern populations (Turbon, Arenas, Cuadras, 2017). There is also no Australasian trace in the DNA

*Motifs a32b (Moon toad), a36 (Moon and immortality), c1 (Falling sky), c4 (Flood: falling fruits), c34 (Flood: wounded creature), d12 (Food was baked under the sun), e5e (The two-headed one is not allowed to go out to the ground), e6 (Connection between the worlds is broken by the fault of a woman), f1 (First woman is a transmuted man), f9a (Vagina dentata), f9c (Snake in vagina), f10 (Vaginal teeth knocked out), f11 (Biting penis), f18d (Long clitoris), f23 (Cause of menstruation is sexual intercourse), f26 (Cause of menstruation is loss of sacred objects), f30 (Snake paramour), f33 (Intercourse with a water creature), f34 (Intercourse with a terrestrial quadruped), f35 (Cut off genitals), f38 (Women and secret knowledge), f43a (Women kill men), f43 (Disappearance of women), f47 (People from pieces of flesh), f49 (Caesarean section), f55 (What do you want?), f79 (Wives-animals), g5 (Tree of abundance), g13 (People ate rotten wood), g13a (People ate earth), g23a (Plants from body parts), g28 (Tree with fish), h4 (Change of skin as a condition of immortality), h11 (Call of God), i16 (Bodily anomalies of the first people), j59 (Up to the sky following the arrow), L22 (Deep sleep), L28+L28a+L29+L30 (group of motifs that are usually linked into one plot in America: Snake meat, He who ate a snake causes the flood, Fish from a puddle, He who ate a snake is thirsty), L31 (Sticky monster).

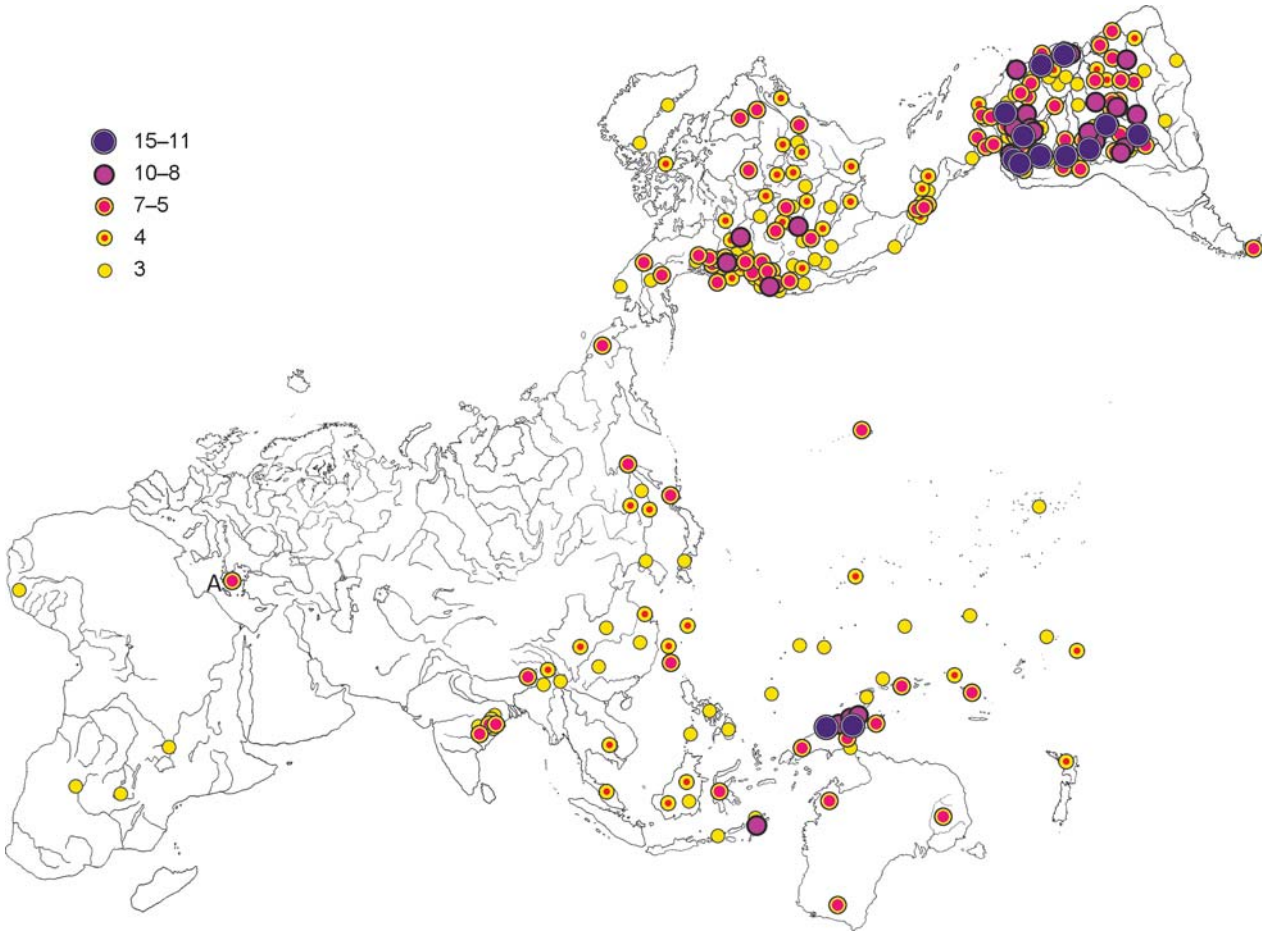


Fig. 6. Distribution of the selected motifs typical of America and Indo-Pacific Rim of Asia. Size and color of the signs correspond to the number of motifs (from 15 to 3) found in each tradition.

samples taken from human fossils in North America, including Anzick and Spirit Cave, associated with two major Paleo-Indian cultural complexes—the Clovis and Western Stemmed Points Tradition. This trace is noticeable, albeit weakly, only in South America, while all the studied samples there belong to the Holocene (Moreno-Mayar et al., 2018).

Importantly, the topics of the circum-Pacific motifs used in creating the map in Fig. 6 and motifs linking Eurasia and America (see Figs. 2–5) are systematically different. The former include the episodes of ancient African origin, explaining the origin of death (a36, h4, h11) (Berezkin, 2021). The rest are mainly associated with etiology, especially human anatomy and gender relations. Over a half of the Western Eurasian-American parallels are the episodes of adventure and trickster-related narratives. Since adventure motifs of African origin could not be identified at all, these are apparently later than the mythological motifs *sensu stricto* (related to cosmology and etiology).

Not later than the Final Pleistocene, the descendants of the early inhabitants of Eastern Siberia (non-Mongoloid groups and those not associated with the Indo-Pacific world) entered the New World. The systematic parallels between Western Eurasia and America can be best explained by the presence of a once-existing boreal cultural continuum from the Atlantic to the Bering Sea region, which was continued in America. The change in the population of Eastern Siberia during the Holocene led to disruption in this continuum.

However, the question remains: why is the set of mythological motifs of the 1st millennium BC, known from Ancient Greek sources, is statistically closer to the traditions of the Native Americans than the late European folklore?

In the earlier published articles, we tried to show the role of Siberian and Central Asian narrative traditions in formation of European folklore known from the records of the 19th century (Berezkin, 2016b, 2018b, 2020b). Late folklore of Europe emerged not only on the basis of borrowings from Western Asia (largely from those available in written form) and the local substratum, which is difficult to reconstruct (for an attempt at such reconstruction, see (Berezkin, in press)). No less

important, if not a decisive, role was probably played by the transfer of motifs from east to west during migrations across the Great Steppe from the Hunno-Sarmatian period and up to the 17th century (the Kalmyks). Taking into account the anthropological similarity between the Royal Scythians and the Tuvan Okunev population (Kozintsev, 2007), it can be assumed that this process had begun even several centuries earlier. The motifs brought from Siberia and Central Asia had a particularly strong influence on the traditions of Eastern Europe (Berezkin, 2016b), but this influence affected the entire Western Eurasia. And if the Mongol conquests of the 13th century are well described in the written sources, the processes that took place in the mid 1st millennium AD are known only in general terms, and it is almost impossible to evaluate the dynamics of changes in the sets of motifs in Western Eurasia after Antiquity, since there are no data. One thing is clear: there is a huge gap between the Hellenistic-Roman period and the 17th–18th centuries, when European folklore started to be reflected in publications.

Conclusions

None of the conclusions drawn from behind the desk work may on their own serve as a basis for large-scale reconstructions. This is the privilege of sciences based either on experiment or on direct observation. Remaining within the boundaries of comparative folklore, we would have never taken the liberty of proposing a historical scenario explaining the similarity of motifs in Western Eurasia and America. This became possible only thanks to successes of genetic and archaeological research whose results are in good agreement with analysis of tens of thousands of folklore and mythological texts. It may be the case that this interpretation is incorrect and another one will be proposed instead. Yet the facts on which it rests seem reliable; they have been accumulated over several decades and were not collected for any specific hypothesis.

The list of Western Eurasian-American parallels is open and is updated with accumulation of new data. The motifs widespread in the Old and New Worlds, but unknown in Africa (except for North Africa), such as Clashing rocks (i22) or Eyelids of Viy (h54) are of particular interest. There is little doubt that such motifs appeared after leaving Africa, but it is still difficult to establish exactly where and in which ways they spread. It would be interesting to find it out also because the chains of motifs identified in the texts make it possible to detect ancient cultural connections between human communities. Such connections and exchange of ideas largely determined the course of history, and the more ancient period they belonged to, the greater their consequences might have been.

Acknowledgments

This study was a part of the Project 21-18-00232 of the Russian Science Foundation. The author thanks E.N. Duvakin, A.G. Kozintsev, and O.V. Yanshina for their corrections, ideas, and information.

References

Adams R.N. 1975
Energy and Structure. A Theory of Social Power. Austin and London: Univ. of Texas Press.

Bäcker J. 1988
Märchen aus der Mandschurei. München: Diederichs.

Bae C.J., Douka K., Petraglia M.D. 2017
On the origin of modern humans: Asian perspectives. *Science*, vol. 358 (6368). doi: 10.1126/science.aai9067.

Balter M. 2013
Ancient DNA links Native Americans with Europe. *Science*, No. 342: 408–409.

Bar-Yosef O., Belfer-Cohen A. 2013
Following Pleistocene road signs of human dispersals across Eurasia. *Quaternary International*, vol. 285: 30–43.

Berezkin Y.E. 2003
Southern Siberian – North American links in mythology. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 2: 94–105.

Berezkin Y. 2007
Dwarfs and cranes. Baltic Finnish mythologies in Eurasian and American perspective (70 years after Yriö Toivonen). *Folklore (Tartu)*, No. 36: 75–96.

Berezkin Y.E. 2016a
Rezultaty obrabotki dannykh o raspredelenii folklorno-mifologicheskikh motivov v Severnoy Azii (yuzhnoaziatskiye i amerikanskiye svyazi). *Yazyki i folklor korennykh narodov Sibiri*, No. 2 (31): 5–14.

Berezkin Y.E. 2016b
Vostochnoslavyanskiy folklor v yevropeiskom i yevraziyskom kontekste (rezultaty statisticheskoy obrabotki dannykh). *Antropologicheskiy Forum*, No. 31: 9–24.

Berezkin Y.E. 2018a
Manifestation of worldviews in traditional narratives: Reconstruction of global tendencies in the spread and the chronology of emergence of mythological motifs. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 46 (2): 149–157.

Berezkin Y.E. 2018b
Samodiyskaya kosmologiya v sibirsko-severoamerikanskom kontekste. *Uralo-altayskiye issledovaniya*, No. 2 (29): 18–29.

Berezkin Y.E. 2018c
Sibir i Tsentralnaya Aziya kak innovatsionniy region (materialy folklora). *Antropologicheskiy Forum*, No. 39: 33–51.

Berezkin Y. 2019
Athabaskan–Siberian folklore links: In search of Na-Dene origins. *Folklore (London)*, vol. 130 (1): 31–47.

Berezkin E.Y. 2020a
Sibirskiy folklor i yego sosedi. *Vestnik Tomskogo gosudarstvennogo univeriteta. Istoriya*, No. 68: 89–97.

Berezkin Y.E. 2020b
Vostochnoslavyanskiy folklor v yevraziyskom kontekste. *Slavyanovedeniye*, No. 6: 41–55.

Berezkin Y.E. 2021
Afrikanskoye naslediye v mifologii. *Antropologicheskiy Forum*, No. 48: 91–114.

Berezkin Y.E. (In press)
Nekotoriye ranniye motivy v folklore Yevropy. (In press).

Berezkin Y.E., Duvakin E.N. (s.a.)
Tematicheskaya klassifikatsiya i raspredeleniye folklorno-mifologicheskikh motivov po arealam. *Elektronniy analiticheskiy katalog*. Last update January 2022. URL: http://www.ruthenia.ru/folklore/berezkin

Boas F. 2002
Indian Myths and Legends from the North Pacific Coast of America. Vancouver: Talonbooks.

Bradshaw C., Norman K., Ulm S., Williams A.N., Clarkson C., Chadœuf J., Lin S.C., Jacobs Z., Roberts R.G., Bird M.I., Weyrich L.S., Haberle S.G., O'Connor S., Llamas B., Cohen T.J., Friedrich T., Veth P., Leavesley M., Saltré F. 2021
Stochastic models support rapid peopling of Late Pleistocene Sahul. *Nature Communications*, vol. 12 (2440). doi: 10.1038/S41467-021-21551-3.

Fewlass H., Talamo S., Wacker L., Hublin J.-J. 2020
A ^{14}C chronology for the Upper Palaeolithic transition at Bacho Kiro Cave, Bulgaria. *Nature Ecology & Evolution*, vol. 4: 794–801.

Gakuhari T., Nakagome S., Rasmussen S., Allentoft M., Sato T., Korneliussen T., Chuinneagáin B.N. 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.

Haas A. 1903
Rügensche Sagen und Märchen. Stettin: Johs. Burmeister's Buchhandlung.

Kaifu Y., Fuhita M. 2011
Fossil record of early modern humans in East Asia. *Quaternary International*, vol. 248: 2–11.

Karlin A.S. 1991
Frantsuzskiye narodniye skazki. Moscow: Sov. pisatel: Olimp.

Kozintsev A.G. 2007
Scythians of the North Pontic Region: Between-group cranial variation, affinities, and origins. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4: 143–158.

Kozintsev A.G. 2021
Patterns in the population history of Northern Eurasia from the Mesolithic to the Early Bronze Age, based on craniometry and genetics. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 49 (4): 140–151.

Kuhn T. 2003
Struktura nauchnykh revolyutsiy. Moscow: Yermak.

Massilani D., Skov L., Hajdinjak M., Gunchinsuren B., Paabo S. 2020
Denisovan ancestry and population history of early East Asians. *Science*, vol. 370 (6516): 579–583.

Millroth B. 1965
Lyuba. Traditional Religion of the Sukuma. Uppsala: Univ. of Uppsala.

Moreno-Mayar V.J., Vinner L., Barros Damgaad P., de, Fuente C., de la, Willersleb E. 2018
Early human dispersals within the Americas. *Science*, vol. 362 (6419). doi:10.1126/science.aav2621.

Morgan C., Barton L., Bettinger R., Chen F., Dongju Z. 2011
Glacial cycles and Paleolithic adaptive variability on China's Western Loess Plateau. *Antiquity*, vol. 85 (328): 365–379.

O'Connell J.F., Allen J. 2015
The process, biotic impact, and global implications of the human colonization of Sahul about 47,000 years ago. *Journal of Archaeological Science*, vol. 56: 73–84.

Pavlova E.Y., Pitulko V.V. 2020
Late Pleistocene and Early Holocene climate changes and human habitation in the arctic Western Beringia based on revision of palaeobotanical data. *Quaternary International*, vol. 549: 5–25.

Pitulko V.V., Pavlova E.Y. 2020
Colonization of the Eurasian Arctic. In *Encyclopedia of the World's Biomes*, vol. 2. Amsterdam: Elsevier, pp. 374–391.

Prates L., Politis G.F., Perez S.I. 2020
Rapid radiation of humans in South America after the last glacial maximum: A radiocarbon-based study. *PlosOne*. 22 July. doi:10.1371/journal.pone.0236023.

Shang H., Tong H., Zhang S., Chen F., Trinkaus F. 2007
An early modern human from Tianyuan Cave, Zhoukoudian, China. *Proceedings of the National Academy of Sciences USA*, vol. 104 (16): 6573–6578.

Shimkevich P.P. 1897
Obychai, poverya i predaniya goldov. *Etnograficheskoye obozreniye*, vol. 34 (3): 135–147.

Shpakova E.G. 2001
Paleolithic human dental remains from Siberia. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4: 64–76.

Shtal I.V. 1982
Epicheskiye predaniya Drevney Gretsii. Geranomakhiya. Moscow: Nauka.

Sikora M., Pitulko V., Willerslev E. 2019
The population history of northeastern Siberian since the Pleistocene. *Nature*, vol. 570: 182–188.

Skoglund P., Mallick S., Bortolini M., Chennagiri N., Hünemeier T., Petzl-Erler M.L., Salzano F.M., Patterson N., Reich D. 2015
Genetic evidence for two founding populations of the Americas. *Nature*, vol. 525: 104–108. doi:10.1038/nature14895.

Sun X., Wen S., Lu C., Zhou B., Curnoe D., Lu H., Li H., Wang W., Cheng H., Yi S., Jia X., Du P., Xu X., Lu Y., Lu Y., Zheng H., Zhang H., Sun C., Wei L., Han F., Huang J., Edwards R.L., Jin L., Li H. 2021
Ancient DNA and multimethod dating confirm the late arrival of anatomically modern humans in southern China. *Proceedings of the National Academy of Sciences*, vol. 118 (8). doi:10.1073/pnas.2019158118.

Sutikna T., Tocheri M., Morwood M., Saptomo E.W., Jatmiko, Awe R.D., Wasisto S., Westaway K.E., Aubert M., Li B., Zhao J., Storey M., Alloway B.W., Morley M.W., Meijer H., Bergh G., van den, Grün R., Dosseto A., Brumm A., Jungers W.L., Roberts R.G. 2016

Revised stratigraphy and chronology for *Homo floresiensis* at Liang Bua in Indonesia. *Nature*, vol. 532: 366–369. doi:10.1038/nature17179.

Toivonen Y.H. 1937

Pygmäen und Zugvögel. Alte kosmologische Vorstellungen. *Finnisch-Ugrische Forschungen*, Bd. 24 (1/3): 87–126.

Turbon D., Arenas C., Cuadras C.M. 2017

Fueguian crania and the circum-Pacific rim variation. *American Journal of Physical Anthropology*, vol. 163 (2): 295–316.

Vasiliev S.A., Berezkin Y.E., Kozintsev A.G., Peiros I.I., Slobodin S.B., Tabarev A.V. 2015

Zaseleniye chelovekom Novogo Sveta: Opyt kompleksnogo issledovaniya. St. Petersburg: Nestor-Istoriya.

Wang C., Yeh H., Reich D. 2021

Genomic insights into the formation of human populations in East Asia. *Nature*, vol. 591: 413–419. doi:10.1038/s41586-021-03336-2.

Wei L.-H., Wang L.-X., Wen S.Q., Yan S., Canada R., Gurianov V., Huang Y., Mallick S., Biondo A., O'Leary A., Wang C., Lu Y., Zhang C., Jin L., Xu S., Li H. 2018

Paternal origin of Paleo-Indians in Siberia: Insights from Y-chromosome sequences. *European Journal of Human Genetics*, vol. 26: 1687–1696. doi:10.1038/s41431-018-0211-6.

Williams T.J., Collins M.B., Rodrigues K., Rink W.J., Prewitt E.R. 2018

Evidence of an early projectile point technology in North America at the Gault Site, Texas, USA. *Science Advances*, vol. 4 (7): 1–7. doi:10.1126/sciadv.aar5954.

Yu H., Spyrou M.A., Karapetian M., Krause J. 2020

Paleolithic to Bronze Age Siberians reveal connections with first Americans and across Eurasia. *Cell*, vol. 181: 1–14.

Received February 7, 2022.

doi:10.17746/1563-0110.2022.50.2.041-048

A.P. Borodovsky
Institute of Archaeology and Ethnography,
Siberian Branch, Russian Academy of Sciences,
Pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia
Tomsk State University,
Pr. Lenina 36, Tomsk, 630400, Russia
E-mail: altaicenter2011@gmail.com

A Bronze Age Shaft-Hole Axe from the Northwestern Baraba Forest-Steppe

This study introduces a crested shaft-hole axe found on the southern shore of Lake Maidan, Vengerovsky District, Novosibirsk Region. Such random finds are regarded as markers of Bronze Age landscape zones and transportation routes in southwestern Siberia. Shaft-hole axes with slight crests occurred on this territory from the mid to late 2nd millennium BC. In addition to such axes, several casting molds made of clay, stone or metal have been found, possibly suggesting that axes were not only imported but also manufactured locally. These random finds of shaft-hole axes can be considered markers of the complex, mirroring not only Middle and Late Bronze Age distribution areas, but also a considerable northward shift of landscape borders during an episode of climatic change, as well as indicating key routes for the migration of people associated with various traditions and objects. The mapping of various subtypes of shaft-hole axes from the Baraba forest-steppe revealed one such route, leading northward from southwestern Siberia to the Vasyugan Swamp. Apart from the series of axes from Baraba, certain cemeteries, such as Stary Tartas-4, yielded miniature replicas used as personal adornments. This feature links the north of the western part of the axes' distribution area (the forest-steppe zone of the Ob-Irtysh watershed) with its eastern part—the Minusinsk Basin.

Keywords: *Bronze Age, Southwestern Siberia, shaft-hole axes, forest-steppe, Ob-Irtysh interfluve, boundaries, migration routes.*

Introduction

Shaft-hole axes of the Bronze Age have been known from the Baraba forest-steppe since the late 19th century. The first find came from the village of Lyalino (now the village of Lyanino in Zdvinsky District of Novosibirsk Region) (Pribavleniye…, 1890; Frolov, Tishkin, 2021). In the late 20th and early 21st century, several more shaft-hole axes have been found in Baraba (Molodin, Ermakova, 2009; Molodin, Novikov, Sofeikov, 2000: 162; Molodin, Shatov, Sofeikov, 1999). Detailed analysis of the spatial distribution of such random finds makes it possible to establish the boundaries of the area where these tools occurred in the Bronze Age (Avanesova, 1991: 15).

In the summer of 2021, a crested shaft-hole axe (Fig. 1, 2) was accidentally discovered north of the village of Pavlovo on the southern shore of Lake Maidan, in the northwest of Vengerovsky District of Novosibirsk Region (Fig. 1). In geomorphological terms, this area is a poorly broken watershed surface of the Baraba low-ridge lake plain (Kuzmin et al., 2013: 88,

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 41–48 E-mail: Eurasia@archaeology.nsc.ru

Fig. 1. Place of discovery of the shaft-hole metal axe on Lake Maidan in the village of Pavlovo (Vengerovsky District, Novosibirsk Region).

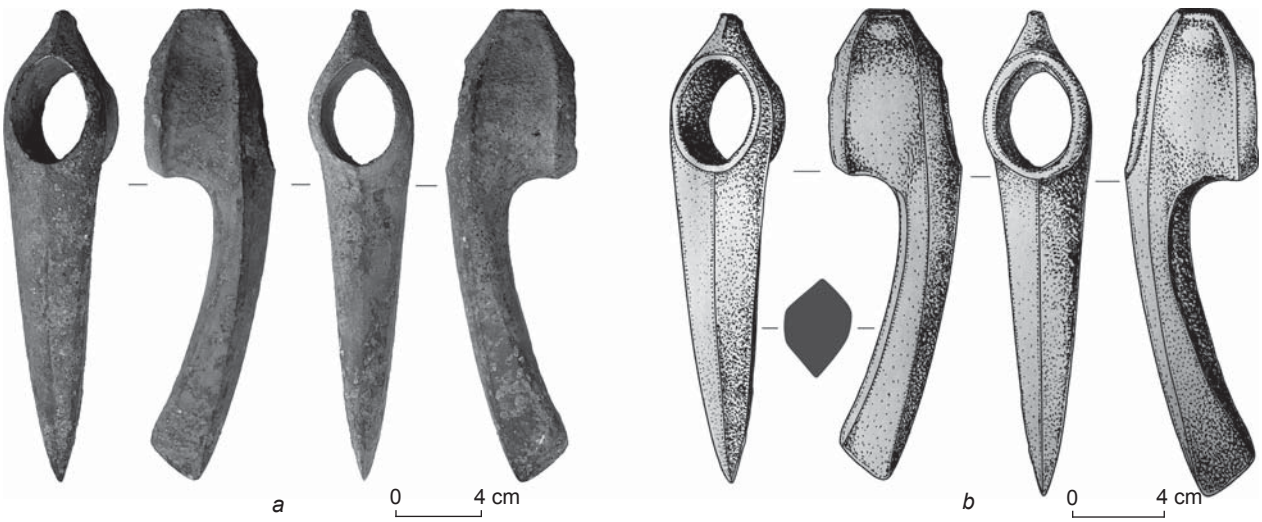


Fig. 2. Shaft-hole axe from Lake Maidan (*a*) and its drawing (*b*).

89, fig. 1). The place where the discovery was made is a potential area for searching for a settlement complex or ritual burial of items associated with foundry production. This is confirmed by another random find of a clay mold from the Middle Bronze Age, discovered on the edge of a terrace slope of the Uyen River in the vicinity of the village of Umna, in Kolyvansky District of Novosibirsk Region (Borodovsky, 2002). Currently, the shaft-hole axe is kept in the Museum of Local History "Redut Solyanoy Povorot" in the village of Solyanoye in Cherlaksky District of Omsk Region.

Research results

Recently, a number of studies (Molodin, Ermakova, 2009; Tishkin, Frolov, 2015, 2016, 2017; Frolov, Tishkin, 2021; Kovtun, 2021) have been published on random finds of shaft-hole axes in the southern part of the West Siberian Plain. The available standardized model for their description includes detailed assessment of external technological features of the items, quality of casting, as well as morphology, typology, and weight of the axes.

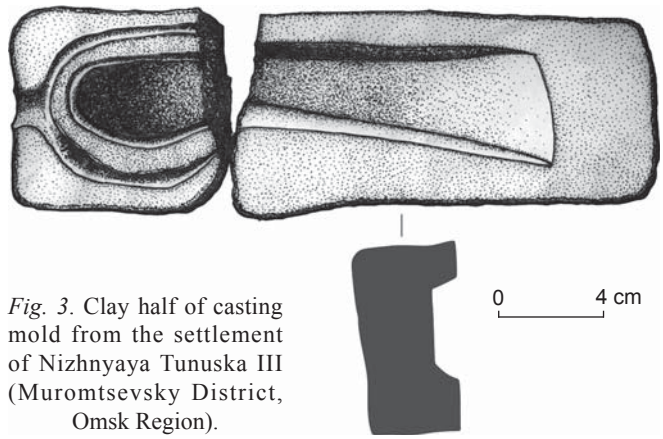


Fig. 3. Clay half of casting mold from the settlement of Nizhnyaya Tunuska III (Muromtsevsky District, Omsk Region).

The shaft-hole axe from Lake Maidan was covered with a layer of patina, manifested by areas of bluish-green oxides covering the main planes of the dark brown item. The axe was cast in a bivalve mold. Casting seams in the form of thin ridges in the center of the blade and butt are clearly visible. These areas reveal the displacement of two opposite parts of the mold relative to one other due to flawed joining of the mold halves during the casting process. A small casting cavity was visible on the left outer side of the socket. This cavity might have been caused by a minimal thickness of cast metal in this section of the item; by a fragment of the wall of the clay mold ending up in the metal as it was poured; or by a low temperature of the smelted metal and insufficient heating of the mold. An even larger cavity was located on the axe blade on the same side. On the inside of the socket, no casting defects were found. In general, the casting was performed at a fairly high level. In this regard, it should be mentioned that the manufacturing quality of shaft-hole axes can suggest their territorial affiliation. For example, in the forest-steppe Altai, a number of such tools have been found showing numerous casting defects (Tishkin, Frolov, 2017: 95); whereas similar tools from the Baraba forest-steppe do not have such defects. These facts still require analysis, since not only the end products, but also various types of foundry equipment for their production have been discovered in the area of distribution of the Bronze Age shaft-hole axes in the Ob-Irtysh interfluve (Borodovsky, 2018). The examples from the Upper Ob region include a casting mold from the settlement of Samusskoye IV (Kosarev, 1984: 112) and half of a bronze mold from the collection of the Museum of Archaeology and Ethnography of Siberia at Tomsk State University (MAES TSU) (Grishin, 1980: 116, fig. 29, *1*; Avanesova, 1991: 14, 133, fig. 14, *69*). In the Middle Irtysh region, halves of casting molds for crested shaft-hole axes are known from the settlement of Nizhnyaya Tunuska III (Fig. 3) (Marchenko, 2009) in Muromtsevsky District of Omsk Region. The exposition of the Omsk Museum of Local History presents two halves of a stone casting mold (OMX-4533) for manufacturing such a tool (Avanesova, 1991: 17, 133, fig. 14, *70*).

The weight of the shaft-hole axe from Lake Maidan was 924 g, which makes it possible to classify it as a small axe (Ibid.: 16). The item had a long massive hexagonal blade, large socket, and slightly curved cutting edge (see Fig. 2). The cutting edge sloped downward at an angle of 70°. Notably, the Bronze Age shaft-hole axes had various types of cutting edges: straight, sloped downward, and semicircular. Judging by the discovered foundry equipment, these features appeared already at the level of the molds used for casting such products.

The cutting edge of the axe from Lake Maidan showed no traces of sharpening. The total length of the tool was 22.3 cm; the length of the blade starting at the socket was 14 cm; the width at the junction of the socket and blade was 3 cm, and the thickness was 4.5 cm. The blade gradually flattened and expanded towards the cutting edge. A slight ridge on the top of the blade marked the casting seam (see Fig. 2). The hole of the axe socket was oval, measuring 4.7 × 3.2 cm at the top and 4.4 × 3.1 cm at the bottom. The outer size of the socket at the bottom was 8 × 5 cm; the height (in the center) was 5.2 cm. The upper and lower edges of the socket sloped towards the butt (see Fig. 2). The bevel of the upper edge relative to the cutting edge was 175°, which corresponds to the maximum values of this parameter for shaft-hole axes (Ibid.: 12). The lower edge of the socket was even. The thickness of its side walls, which were the thinnest parts of the casting, reached 0.8 cm. There was no decoration on the socket. Two thick bands with sharp ridges ran below and above along the edges of its lateral sides (cheeks). The upper band smoothly passed into the upper part of the blade. The butt of the axe had a distinctive crested protrusion that formed a continuation of the band-like thickenings on the cheeks of the socket. There were no holes on it. A thin protrusion looking like a narrowed hammering surface (see Fig. 2) was in the center of the butt. Its size was 2.0 × 2.0 × 0.5 cm. According to different available casting molds, the sprue was located at this part of the item (Ibid.: 133, fig. 14, *69*, *70*) (Fig. 4). After removal of the sprue, this area was not worn down during the use of the axe, as was the case with individual shaft-hole axes (the village of Severnyi) from the Altai Territory (Tishkin, Frolov, 2017: 92, fig. 8).

The material from which the axe was made is quite durable and resistant to mechanical stress. Metal analysis was carried out by M.M. Ignatov from the Institute of Archaeology and Ethnography of the SB RAS, in the Laboratory of Isotope Studies, using elemental analysis based on energy dispersive spectrometry. A Hitachi TM 3000 electron microscope (Japan) with a Bruker Quantax 70 energy dispersive unit (Germany) was used. The sample for the analysis was taken from the outer edge

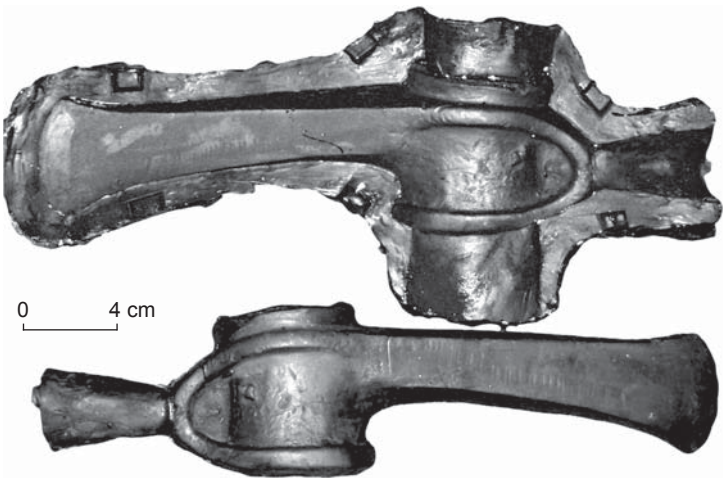


Fig. 4. Reconstruction of casting mold and sprue for the crested shaft-hole axe from Lake Uryum (village of Mikhailovka).

of the bottom part of the socket. In this section of the axe, the alloy consisted of copper (82.7 %), tin (12.9 %), lead (2.6 %), and arsenic (1.7 %). According to the content of copper and tin, the item was similar to the axes from Bor-Forpost (Kulunda) and Karpovo (the Chumysh-Charysh interfluve) (Ibid.: 93). However, it differed in the admixture of lead, which might have resulted from a different source of raw material.

Shaft-hole axes of relatively light weight have been usually interpreted as weapons (Avanesova, 1991: 16). A light axe is more convenient for making movements, for example a sweeping motion. Nevertheless, a similar tool of larger weight from Lake Uryum (Zdvinsky District, Novosibirsk Region) has also been interpreted as a weapon (Molodin, Novikov, Sofeikov, 2000: 162, 163, fig. 155). Therefore, it is problematic to unambiguously establish the functional purpose of the shaft-hole axe from Lake Maidan. However, one should note the difference in size of the upper and lower edges of the socket (4.7 × 3.4 cm and 4.5 × 3.4 cm, respectively). This suggests that the axe handle was set in the same way as was typical for a mining pick (from top to bottom) and then wedged in the socket with a locking wedge. The bend of the massive blade also marks the similarity of the shaft-hole axe under discussion to a pickaxe or similar tool. Such interpretations of shaft-hole axes have been discussed (Avanesova, 1991: 16), together with indicating pickaxes found in the Altai (Zmeinogorsk and Zolotukhino mines) (Ibid.: 38; Tishkin, Frolov, 2017: 93, fig. 10, *9*, *10*). Double-sided mountain picks without sockets were also widespread in Central Asia in the Bronze Age (Avanesova, 1991: 36).

A similar axe from the village of Lyalino, close to the axe under consideration, has upper and lower edges of the socket measuring 4.7 × 3.3 and 5.0 × 3.6 cm, respectively (Frolov, Tishkin, 2021: 189). This difference is also typical of several shaft-hole axes discovered in the Altai Territory (Bor-Forpost, Karpovo, Severnyi) (Tishkin, Frolov, 2017: 89, pl. 1). These features imply two methods of attaching the axe handle: one method was typical of the pickaxe, while the other method was typical of the axe. In the first method (from top to bottom), the metal blade did not fit tightly with the wooden handle (Fig. 5). Considering this feature of the sockets in the axes from Lyalino and Lake Maidan, it is quite possible to assume their use as a pickaxe. This assumption is also confirmed by the orientation of the cutting edge in these items. In the first case, the cutting edge had a predominantly oval shape, and in the second case, it sloped downward. The latter feature is also typical of several shaft-hole axes (Tyumentsevo, Klyuchi, Urlapovo) from the forest-steppe Altai (Ibid.: 93, fig. 10, *1*, *3*, *5*). The combination of features of the socket and cutting edge obviously reflects a different functional purpose of similar items. Such a conclusion is quite consistent with basic principles of the typological approach to shaft-hole axes (Avanesova, 1991: 12).

In general, according to the typology elaborated by N.A. Avanesova, the axe from Lake Maidan can be attributed to subtypes B_3, B_4, which prevailed after the earlier type A ("smooth shaft-hole" axes) (Ibid.: 13–14). A whole series of such items has been found in the Ob-Irtysh interfluve (Tishkin, Frolov, 2017: 93, fig. 10). However, shaft-hole axes show a fairly large number of

Fig. 5. Gaps at the edges of the metal part of the axe from Lake Maidan, formed when it was set on a wooden handle.

forms differing from the "classical" varieties (Avanesova, 1991: 11), which is fully applicable to the forest-steppe Ob-Irtysh interfluve.

Bronze Age shaft-hole axes have been most often found accidentally, as part of hoards, and occasionally in burials. Accidental discovery of such items is most typical of the forest-steppe Ob-Irtysh region (Fig. 6). In a number of cases, these items were moved from their original location during economic activities, as occurred with the axes from the villages of Lyalino (Frolov, Tishkin, 2021: 189), Karpovo (Altai Territory) (Tishkin, Frolov, 2017: 91, fig. 6, 7), and Polomoshnoye (Yashkinsky District of Kemerovo Region) (Kovtun, 2021: 159, fig. 1). In southwestern Siberia and Central Asia, some shaft-hole axes were found in several hoards of the Late Bronze Age (Avanesova, 1991: 10), including the Khonnykh hoard (Abakansky District of the Republic of Khakassia) in the Middle Yenisei region, and Zaysan hoard in East Kazakhstan (Kushch et al., 2016: 203, fig. 3, *1*, *2*). Cartographic information on the distribution of Bronze Age shaft-hole axes in this region has been published several times (Avanesova, 1991: 11, fig. 1; Tishkin, Frolov, 2015: 136, fig. 1; 2016: 126; 2017: 88, fig. 1; Frolov, Tishkin, 2021: 192, fig. 3).

Close grouping of accidentally found shaft-hole axes was established taking into account territorial, landscape, and hydrological aspects. According to the first aspect, two regions are usually distinguished in Siberia: the western region in the south of the Ob-Irtysh interfluve (the steppe Irtysh region), and the eastern region in the Minusinsk Basin (Tishkin, Frolov, 2016: 126). However, this corresponds to a predominantly latitudinal distribution of shaft-hole axes. At the present, the Baraba forest-steppe, which is located in the center of the western region, can well be subject to a "meridional" approach in mapping the distribution of shaft-hole axes in southwestern Siberia. This location has long included the northernmost find of the shaft-hole axe near the former village of Zolotye Yurty (Bakcharsky District of Tomsk Region), on the Kenga River in the subtaiga zone of the Vasyugan Swamp (Matyushchenko, 1973: Fig. 6, *1*; Kosarev, 1984: 18, fig. 7, *4*; Avanesova, 1991: 132, fig. 13, *56*; Frolov, Tishkin, 2021: 192, Fig. 3; Kovtun, 2021: 161, fig. 3). This area should also include the items found in the Novosibirsk Region on Lake Maidan (Vengerovsky District), near the village of Sedovo (Staro-Borodino, Kuibyshevsky District), and near Lake Uryum (village of Mikhailovka, Zdvinsky District). Identification of this territory in the context of western and eastern areas of Bronze Age shaft-hole axes makes it possible not only to mark the boundary of the forest-steppe zone in the Bronze Age (Frolov, Tishkin, 2021: 192, fig. 2), but also to detect the northern direction for the distribution of such items. At the same time, the main vector of their "advance" corresponds to their meridional localization (Kosarev, 1984: 169). Previously, a similar localization of shaft-hole axes was also observed in the southern direction, including axes found in the Kulunda steppe and the Charysh-Chumysh interfluve (Tishkin, Frolov, 2017: 88, fig. 1). Therefore, the shaft-hole axe from Zolotye Yurty can hardly be considered a "single find" (Frolov, Tishkin, 2021: 193). In southwestern Siberia (in the Irtysh region), meridional trade routes from Central Asia still existed in the 16th century (Matveev, Tataurov, 2014: 96; Matveev, 2017: 23).

The emergence of such main lines of communication in Western Siberia was closely associated with natural passageways (Matveev, 2014: 67). Therefore, the landscape context of distribution of shaft-hole axes in southwestern Siberia is also quite indicative. The largest number of such finds from the forest-steppe region of the Altai comes from areas near the ribbon-like pine forests and the northwestern foothills (Tishkin, Frolov, 2017: 88, fig. 1). Since ancient times, these distinctive forest ecosystems emerged in the places of ancient drainage and the valley of the Ob River—one of the main rivers

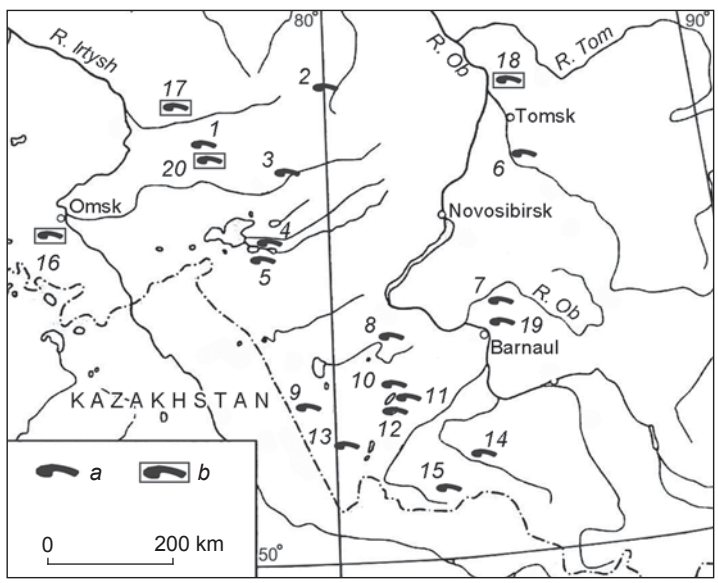


Fig. 6. Location of places of random finds of Bronze Age shaft-hole axes in southwestern Siberia.
1 – Lake Maidan; *2* – village of Zolotye Yurty; *3* – village of Sedovo (Staro-Borodino); *4* – Lake Uryum (village of Mikhailovka); *5* – village of Lyalino; *6* – village of Polomoshnoye; *7* – village of Severnyi; *8* – village of Tyumentsevo; *9* – village of Klyuchi; *10* – village of Mamontovo; *11* – village of Urlapovo; *12* – settlement of Krestyanskoye IVa; *13* – Bor-Forpost; *14* – village of Karpovo; *15* – Zmeinogorsk mine; *16* – Upper Irtysh region (Omsk State Museum of Local History); *17* – settlement of Nizhnyaya Tunuska III; *18* – Upper Irtysh region (MAES TSU); *19* – village of Kislukha; *20* – cemetery of Sopka-2/5.
a – shaft-hole axe; *b* – casting mold.

of Western Siberia, and were natural routes from south to north and from north to south. Products made of non-ferrous metal were distributed along these routes. Therefore, it is probably not worth associating the places where shaft-hole axes were accidentally found north of their main distribution area with displacement of landscape boundaries in southwestern Siberia during the Bronze Age (Frolov, Tishkin, 2021: 193).

The hydrological context of the location of finds is no less important. The distribution of shaft-hole axes showed significant differences in various regions of the forest-steppe Ob-Irtysh interfluve. In the east, in the Upper Ob region, the locations of such items were often associated with river systems, whereas in the west, in Baraba, they were found no less often near lakes, such as the shaft-hole axes from Lake Maidan at the village of Pavlovo (Vengerovsky District) and Lake Uryum near the village of Mikhailovka (Zdvinsky District) in Novosibirsk Region. Such facts still require detailed analysis, possibly taking into account the ritual context.

One criteria for objectively locating individual distribution areas of shaft-hole axes in southwestern Siberia is not only the close grouping of their locations in a specific area, but also presence of votive replicas of these tools in burial complexes of the Bronze Age. Examples include finds both from the eastern region (Minusinsk Basin) and central part of the western region (Ob-Irtysh interfluve). Pendants were found in the form of miniature shaft-hole axes in the cemeteries of Lanin Log in the Sydo-Erbinsk Basin (Vadetskaya, 1986: 48; Avanesova, 1991: 132, fig. 13, *63*) and Stary Tartas-4 in Baraba (Molodin, Novikov, Grishin, 1998: 297, fig. 2, *b*; Molodin, Novikov, Zhemerikin, 2002: 60–61, fig. 10; Molodin et al., 2012: Pl. 1). According to the radiocarbon dates, the latter item belongs to the 18th–15th centuries BC (Molodin et al., 2012: Pl. 1, p. 740). It is noteworthy that in these two cases, we may speak about the geographical proximity of votive items and their real prototypes, and about possible chronology of randomly found shaft-hole axes. According to some scholars, the protrusion on the butt of the axe from the village of Lyalino (Tishkin, Frolov, 2016: 126) is similar to the protrusion on the axe-shaped pendant from Stary Tartas-4 (Molodin, Novikov, Grishin, 1998: 297, fig. 2, *b*). This similarity may indirectly indicate that axes of this type belonged to the Andronovo cultural tradition (Avanesova, 1991: 14; Tishkin, Frolov, 2016: 126). This feature was also typical of the Minusinsk Basin, where shaft-hole axes with slight crests, also probably associated with the Andronovo complexes, mainly occur (Tishkin, Frolov, 2016: 126). Nevertheless, it should be mentioned that the protrusion on the axe socket from Lake Maidan (village of Pavlovo) somewhat differed from that of the pendant from Stary Tartas-4. The rear protruding part of the socket on the axe was flattened, whereas it was pointed on the pendant. However, it must be kept in mind that the exact similarity of axe-shaped personal adornments with their real prototypes is likely to be provisional, since it was highly unlikely that the technique of scaling the original models was used in their manufacturing, and only the common features of several varieties of such items were rendered. The same can be said about the pendant in the form of an axe from Lanin Log.

Conclusions

The cultural and historical attribution of shaft-hole axes is considerably varied (Avanesova, 1991: 12–15; Molodin, Shatov, Sofeikov, 1999: 465; Molodin, Novikov, Sofeikov, 2000: 162; Tishkin, Frolov, 2015: 142), but they are generally correlated with a number of archaeological cultures of the Middle and Late Bronze Age, chronologically corresponding to the period from the mid to late 2nd millennium BC (Tishkin, Frolov, 2015: 142). According to some scholars, discovery of shaft-hole axes and their votive counterparts at the archaeological sites of Baraba and forest-steppe Altai indicates that the relative chronology of types of these tools proposed by N.A. Avanesova (1991: 15) is not so clear-cut (Tishkin, Frolov, 2015: 142). For example, morphological features of shaft-hole axes from the villages of Lyalino and Tyumentsevo demonstrate transitional features typical for items of both the Andronovo historical and cultural community and Late Bronze Age cultures (Ibid.). On the contrary, on the shaft-hole axe from Lake Maidan, the "bands" with ridges along the socket and butt were more pronounced. This makes it possible to attribute it to belonging to earlier specimens (Tishkin, Frolov, 2017: 94), since the items from Lyalino and Tyumentsevo show a combination of two types of "bands"—rounded and with ridges (Ibid.). This feature is also present in another random find—a shaft-hole axe from the village of Kislukha (Pervomaisky District of the Altai Territory) (Golovchenko, Shevchenko, 2022). The wide geographical presence of this morphological feature in the mentioned axes makes it possible to synchronize such items. Notably, the reliability of establishing cultural affiliation (Andronovo, Sargara-Alekseevka, or Begazy culture) for shaft-hole axes from the forest-steppe zone of Western Siberia (Avanesova, 1991: 14; Molodin, Novikov, Grishin, 1998: 297, fig. 2, *b*; Tishkin, Frolov, 2016: 126; 2017: 94), which were accidentally discovered outside specific archaeological sites, remains quite hypothetical (Tishkin, Frolov, 2017: 94). As for the location of the shaft-hole axe from the southern shore of Lake Maidan, the Bronze Age (Andronovo) sites in this area were usually located on watersheds, while complexes of the Late Bronze Age (Irmen) were located on the edge of the watershed bordering on lake-like depressions

(Kuzmin et al., 2013: 93). Thus, the topographic feature of the place of discovery of that find is not quite typical, especially if we take into account relatively narrow dating and cultural affiliation of the item.

Nevertheless, we should agree that localization of the shaft-hole axes that were discovered accidentally may be a sign of yet unidentified sites of archaeological heritage, including not only Bronze Age settlements (Tishkin, Frolov, 2015: 143), but also hoards, caches, as well as items that were lost. The place where the shaft-hole axe was discovered near Lake Maidan is located far to the north of the main area of Bronze Age sites in Vengerovsky District of Novosibirsk Region (Kuzmin et al., 2013: 90, fig. 1). Obviously, this may indicate another promising area for the search for archaeological sites of the Bronze Age on the southern periphery of the Vasyugan Plain. Close spatial localization of such finds in latitudinal and meridional terms makes it possible to identify not only cultural and landscape boundaries of the Bronze Age, but also main directions of movements of the ancient population who used natural corridors as communication routes.

Generally, the Baraba forest-steppe typically manifests both shaft-hole axes and their casting equipment, including various forms of these tools corresponding to their different functions and the chronology of their existence (Avanesova, 1991: 12). The main directions of distribution of such items through Baraba to the Vasyugan Plain can be seen. In the Bronze Age, this region was less swampy than today; therefore, natural transportation corridors that are marked by random finds of shaft-hole axes of the Bronze Age could have been present in some of its areas.

Acknowledgments

This study was supported by the Program of Development of the Tomsk State University (Priority 2030).

The author is grateful to A.V. Polevodov for the drawing of the unpublished artifact from the excavations of I.G. Glushkov at the settlement of Nizhnyaya Tunuska III, and for information on the origin of the shaft-hole axe discovered in the Southern Irtysh region in 1988, and also of the stone mold for casting such a tool from the collection of the Omsk Museum of Local History.

References

Avanesova N.A. 1991

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

Borodovsky A.P. 2002

Liteinaya forma kelta-lopatki samusko-seiminskogo vremeni iz Novosibirskogo Priobya. In *Severnaya Yevraziya v epokhu bronzy: Prostranstvo, vremya, kultura*. Barnaul: Izd. Alt. Gos. Univ., pp. 163–166.

Borodovsky A.P. 2018

A half of a metal bipartite mold of the Seima-Turbino period from the Upper Irtysh Region. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 46 (3): 59–65.

Frolov Y.V., Tishkin A.A. 2021

Grebenchatiy visloobushniy topor iz Barnaulskogo okruga. In *Arkheologiya Severnoy i Tsentralnoy Azii: Noviye otkrytiya i rezultaty mezhdistsiplinarnykh issledovaniy*. Barnaul: Izd. Alt. Gos. Univ., pp. 188–193.

Golovchenko N.N., Shevchenko Y.V. 2022

K voprosu rassledovaniya ugolovnykh del o prestupleniyakh, predusmotrennykh statyey 243.2 Ugolovnogo kodeksa Rossiyskoy Federatsii ("Nezakonniy poisk i (ili) izyatiye arkheologicheskikh predmetov iz mest zaleganiya"). *Informatsionniy byulleten Sledstvennogo departamenta MVD Rossii*, No. 1. (In press).

Grishin Y.S. 1980

Drevnyaya dobycha medi i olova. Moscow: Nauka.

Kosarev M.F. 1984

Zapadnaya Sibir v drevnosti. Moscow: Nauka.

Kovtun I.V. 2021

Visloobushniy topor s grebnem v Nizhnetomskom ochage naskalnogo iskusstva. In *Arkheologiya Severnoy i Tsentralnoy Azii: Noviye otkrytiya i rezultaty mezhdistsiplinarnykh issledovaniy*. Barnaul: Izd. Alt. Gos. Univ., pp. 157–164.

Kushch G., Dzhumabekova G., Demidenko S., Bazarbaeva G. 2016

Klad epokhi pozdney bronzy s klepanym sosudom iz Vostochnogo Kazakhstana. *Tyragetia: Arheologie Istorie Antică*. Ser. Nouă, vol. X [XXV], No. 1: 201–210.

Kuzmin Y.V., Zolnikov I.D., Novikova O.I., Glushkova N.V., Chuprina D.A., Sofeikov O.V., Anufriev D.E., Dementiev V.N. 2013

Analiz prostranstvennogo raspredeleniya arkheologicheskikh pamyatnikov tsentralnoychasti Barabinskoy lesostepi (Vengerovskiy rayon Novosibirskoy oblasti) na osnove GIS-tekhnologiy. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya. Filologiya, vol. 12. Iss. 7: Arkheologiya i etnografiya: 87–96.

Marchenko Z.V. 2009

Kulturnaya prinadlezhnost, khronologiya i periodizatsiya arkheologicheskikh pamyatnikov srednego techeniya r. Tary (epokha neolita i bronzy): Cand. Sc. (History) Dissertation. Novosibirsk.

Matveev A.V. 2014

Istoriya sukhoputnykh putey soobshcheniya Omskogo Priirtyshya (Srednevekovye – Novoye vremya). Omsk: Nauka.

Matveev A.V. 2017

Gipoteza o sushchestvovanii karavannogo puti XVII–XVIII vv. v mezhdurechye rek Irtysh i Osha. *Vestnik Omskogo gosudarstvennogo universiteta*. Ser.: Istoricheskiye nauki, No. 4: 22–26.

Matveev A.V., Tataurov S.F. 2014

Puti soobshcheniya Sibirskikh khanstv. *Vestnik Omskogo gosudarstvennogo universiteta*. Ser.: Istoricheskiye nauki, No. 3: 95–101.

Matyushchenko V.I. 1973

Drevnyaya istoriya naseleniya lesnogo i lesostepnogo Priobya (neolit i bronzoviy vek). Pt. III: Andronovskaya

kultura na Verkhney Obi. Tomsk: Izd. Tom. Gos. Univ. (Iz istorii Sibiri; iss. 11).

Molodin V.I., Ermakova N.V. 2009

Bronzoviy visloobushniy topor iz Tsentralnoy Baraby. In *Problemy arkheologii, etnografii i antropologii Sibiri i sopredelnykh territoriy*, vol. XV. Novosibirsk: Izd. IAET SO RAN, pp. 334–336.

Molodin V.I., Marchenko Z.V., Kuzmin Y.V., Grishin A.E., Van Strydonck M., Orlova L.A. 2012

Radiocarbon chronology of burial grounds of the Andronovo period (Middle Bronze Age) in Baraba forest steppe, Western Siberia. *Radiocarbon*, vol. 54 (3/4): 737–747.

Molodin V.I., Novikov A.V., Grishin A.E. 1998

Rezultaty poslednego goda polevykh issledovaniy mogilnika andronovskoy kultury Stariy Tartas-4. In *Problemy arkheologii, etnografii i antropologii Sibiri i sopredelnykh territoriy*, vol. IV. Novosibirsk: Izd. IAET SO RAN, pp. 294–299.

Molodin V.I., Novikov A.V., Sofeikov O.V. 2000

Arkheologicheskiye pamyatniki Zdvinskogo rayona Novosibirskoy oblasti. Novosibirsk: Nauch.-proizv. tsentr po sokhraneniyu istor.-kultur. naslediya Novosib. obl. (Svod pamyatnikov istorii i kultury narodov Rossii: Materialy; iss. 4).

Molodin V.I., Novikov A.V., Zhemerikin R.V. 2002

Staryi Tartas-4 burial ground: New data on the Andronovo culture. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 3: 48–62.

Molodin V.I., Shatov A.G., Sofeikov O.V. 1999

Proushnoy topor s "grebnem" iz Yuzhnoy Baraby. In *Problemy arkheologii, etnografii i antropologii Sibiri i sopredelnykh territoriy*, vol. V. Novosibirsk: Izd. IAET SO RAN, pp. 462–466.

Pribavleniye k katalogu Arkheologicheskogo muzeya Tomskogo universiteta. 1890

V.M. Florinskiy (comp.). Tomsk: (Tipo-lit. Mikhailova i Makushina), pp. 156–337.

Tishkin A.A., Frolov Y.V. 2015

Novaya nakhodka bronzovogo topora s territorii Lesostepnogo Altaya. *Teoriya i praktika arkheologicheskikh issledovaniy*, No. 1: 135–144.

Tishkin A.A., Frolov Y.V. 2016

Proushniye metallicheskiye topory Ob-Irtyshskogo mezhdurechya: Tendentsii izmeneniy form v kontse epokhi bronzy i nachale rannego zheleznogo veka. *Vestnik Tomskogo gosudarstvennogo universiteta*: Istoriya, No. 4: 124–128.

Tishkin A.A., Frolov Y.V. 2017

Bronze Age axes from the forest-steppe Altai. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 45 (2): 87–96.

Vadetskaya E.B. 1986

Arkheologicheskiye pamyatniki v stepyakh Srednego Yeniseya. Leningrad: Nauka.

Received October 22, 2021.
Received in revised form December 15, 2021.

doi:10.17746/1563-0110.2022.50.2.049-059

N.L. Morgunova[1], A.A. Faizullin[1], O.Y. Chechyotkina[2], and M.B. Mednikova[2]

[1]Orenburg State Pedagogical University, Sovetskaya 19, Orenburg, 460014, Russia
E-mail: nina-morgunova@yandex.ru; faizullin.airat@yandex.ru
[2]Institute of Archaeology, Russian Academy of Sciences, Dm. Ulyanova 19, Moscow, 117292, Russia
E-mail: chechyotkina91@bk.ru; medma_pa@mail.ru

Bioarchaeology of Childhood in the Yamnaya Culture, Based on Kurgan 1 at Boldyrevo-4, the Southern Urals

Archaeological and anthropological data concerning two children's burials representing the early horizon at Boldyrevo-4 kurgan 1, Orenburg Region, excavated in 2019–2020, are presented. Early mounds were covered by a huge kurgan above another, later burial of adults. The entire complex was built by the Yamnaya people at the turn of the early and middle stages of this culture, about 3300–3100 cal BC. Remains of three children, aged about 6, from two graves, were examined. Severe pathological conditions were discovered. The child from burial 3 died of metastatic cancer. Child 1 from burial 4, represented only by a cranium, possibly suffered from scurvy. The oncological condition may have been triggered by a long stay at a smoky hearth or proximity to a metalworking site, since the Yamnaya population of the Southern Urals was engaged in an intense exploitation of copper deposits. In both children's burials, common elements of the Yamnaya funerary rite were accompanied by certain unusual features. Vessels were similar in form and decoration, but different in manufacturing technique. The organic substances of which the mats under the skeletons were made display certain differences. These features suggest that children belonged to related but separate groups. Children buried under early mounds apparently had a special inherited social status that had an effect on the further construction of the kurgan for members of the elite.

Keywords: *Yamnaya culture, elite kurgan, children's burials, Southern Urals, paleopathology, pediatric oncology.*

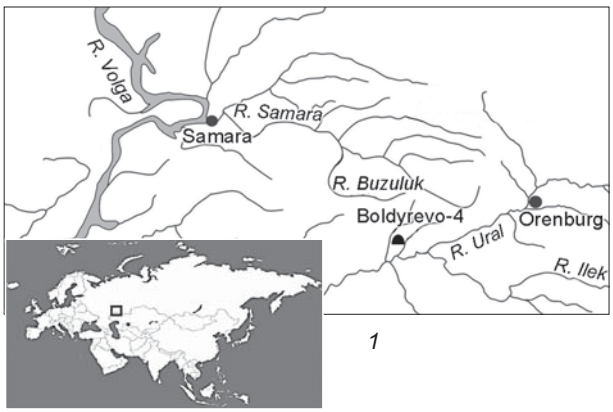
Introduction

Bioarchaeology is a rapidly developing area of interdisciplinary research based on the contextual study of anthropological materials (Bioarchaeology…, 2006; Mednikova, 2017). A separate branch of knowledge, the bioarchaeology of children, studies children's burials (Lewis, 2007; Mays et al., 2017).

Diverse studies have already been devoted to the children of agriculturalists of the Neolithic and the Early Iron Age. But the status and social role of children among the contemporaneous pastoralists of the Eurasian steppe corridor has not been studied in detail. We are going to partly fill this gap through the data from kurgan 1 at the Boldyrevo-4 burial ground excavated by N.L. Morgunova in 2019–2020. This is one of the elite and largest burial mounds of the Yamnaya (Pit Grave) culture in the northern part of the Volga-Urals. The cemetery is located on the first high fluvial terrace on the left bank of the Irtek River,

a tributary of the Ural, 4 km to the south-southwest from the Boldyrevo village, Tashlinsky District, Orenburg Region (Fig. 1). Excavations at Boldyrevo-4 began in 1984–1986, along with the works at the well-known Boldyrevo-1 cemetery (Kravtsov, Morgunova, 1991; Morgunova, 2000; 2014: 85–86; Morgunova, Kulkova, Kulkov, 2021).

Originally, the kurgan had a diameter of 62 m and a height of 4.2 m. However, its center was leveled by a looting pit in the early 20th century. In ancient times, the height of the kurgan could have reached 8 m. Noteworthy is its internal structure, and the design elements of the area under the kurgan and of grave structures that have not been seen before. The kurgan was surrounded by a circular ditch up to 10 m wide. Multidisciplinary studies of the derived data have not yet been completed. This article addresses the early horizon of kurgan 1, associated with children's burials. For obvious reasons, the conclusions will be preliminary.



1

Archaeological data

Planigraphy and stratigraphy of the kurgan. According to archaeological and paleosol studies, kurgan 1 consisted of three structures. The early horizon is represented by mounds 1 (Fig. 2, *1*, *2*) and 2 (Fig. 2, *3*). Their dimensions are identical: height is ca 1.0–1.2 m, diameter is 10–11 m. The ancient kurgans were completely covered by the largest mound 3, constructed later for a huge burial 5, where five adults were buried. The soil for its construction was taken from the outer circular ditch.

Mounds 1 and 2 contained one burial each (burials 3 and 4, respectively) located in the centers of the areas under the kurgans. These areas were surrounded by ditches that, in contrast to the outer circular ditch, consisted of separate oval-subsquare pits of various depths (Fig. 2, *4*). Thus, according to the stratigraphic data and location of the burials, these burials seem to have been constructed according to a plan, over a relatively short period of time. Evidently, the area for the construction of huge

2

Fig. 1. Location of the Boldyrevo-4 cemetery (*1*), and view on kurgan 1 prior to excavations (*2*).

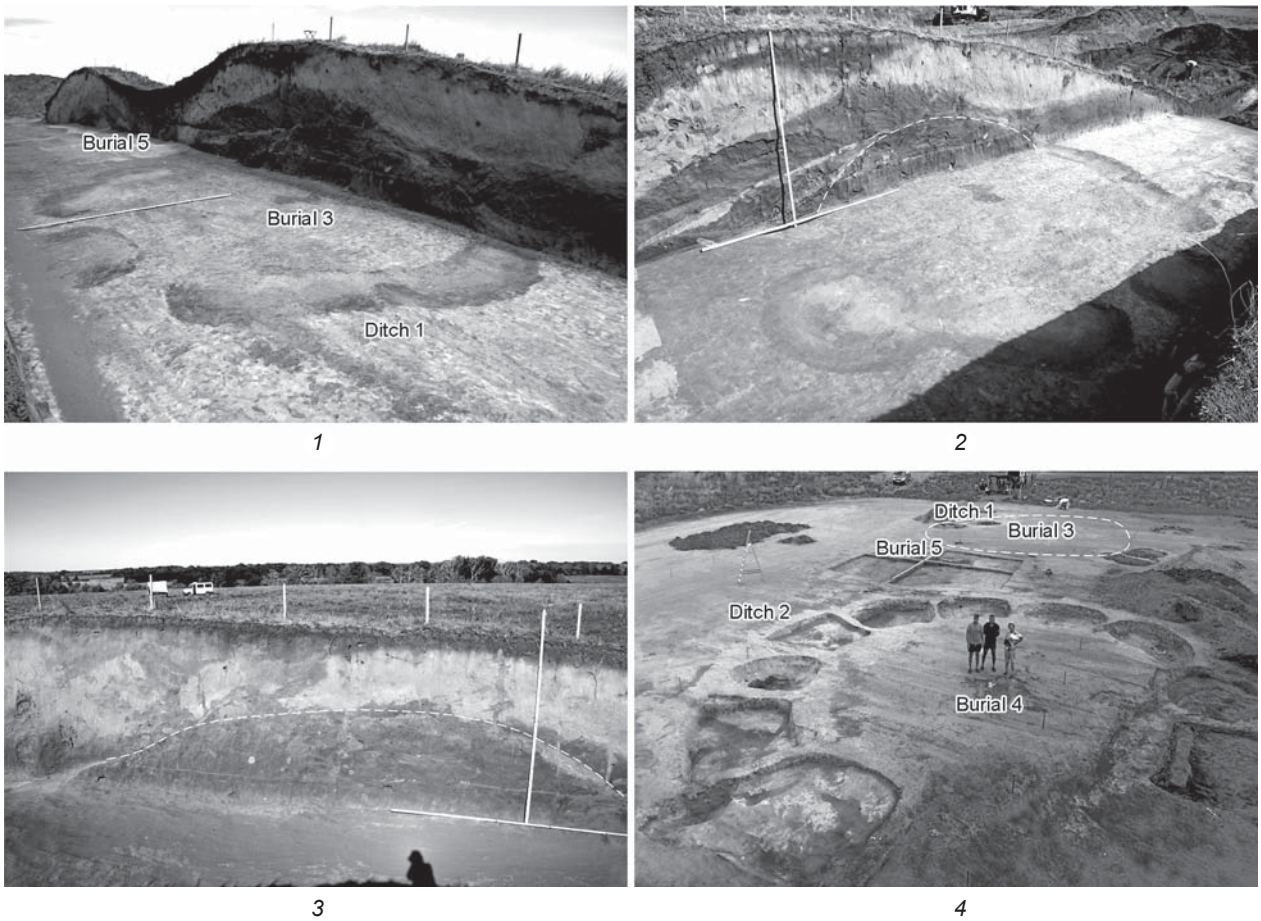


Fig. 2. Excavations at kurgan 1.
1 – central baulk profile, mound 1 and ditch 1, mound 3; *2* – profile of mound 1; *3* – mound 2 in the profile of the western baulk, and filling-up of the northern slope of the kurgan; *4* – top view on ditches 1 and 2 and burial 5.

burial 5, accurately fitted in between the earlier kurgans, was not chosen by chance. In this regard, the question arises: what was the role of the children buried under mounds 1 and 2 in this choice?

Description of the children's burials. Burial 3 (Fig. 3, *1*) was made in a rectangular pit, 70 × × 100 cm, 70–72 cm deep from the virgin land's level (–482 cm from 0). At the bottom of the grave, on top of the organic mat, there was a skeleton of a child. The deceased was buried in a flexed supine position, with his arms extended along the body, legs bent, the head to the east-north-east. The bones of the skeleton were weakly stained with ocher; bright ocher spots were also noted on the mat. An intact clay vessel of a semi-ovoid shape with a closed mouth, convex body, and rounded bottom was found behind the skull (Fig. 3, *2*). The vessel's height is 13 cm, the diameter of the neck is 9.5 cm. Technological analysis (N.P. Salugina) showed that the paste contained clay, grog, and organic solution. The entire interior and exterior surfaces of the vessel bear imprints of comb stamps dragged in various directions. The upper part of the body is ornamented with two rows of imprints of a large twisted rope, below with two rows of oval impressions.

Burial 4 (Fig. 3, *3*) was made in a rectangular pit, 87 × 144 cm, 75–80 cm deep from the virgin land's level (–488 cm from 0). The child's skeleton was placed on an organic mat in the center of the pit. The child was buried in a flexed supine position, with his arms extended along the body, and the head to the northeast. The skeleton was faintly painted with ocher. The bright ocher spots were noted around the skull and on the facial bones. Fragments of another skull were noted on the parietal bones. Between the skulls and the northern wall of the pit, there was a clay vessel; under this vessel, a point made of a splint bone 11.5 cm long (Fig. 3, *5*) was found.

The vessel (Fig. 3, *6*), semi-ovoid in shape, with a closed mouth, a convex body, and a rounded bottom,

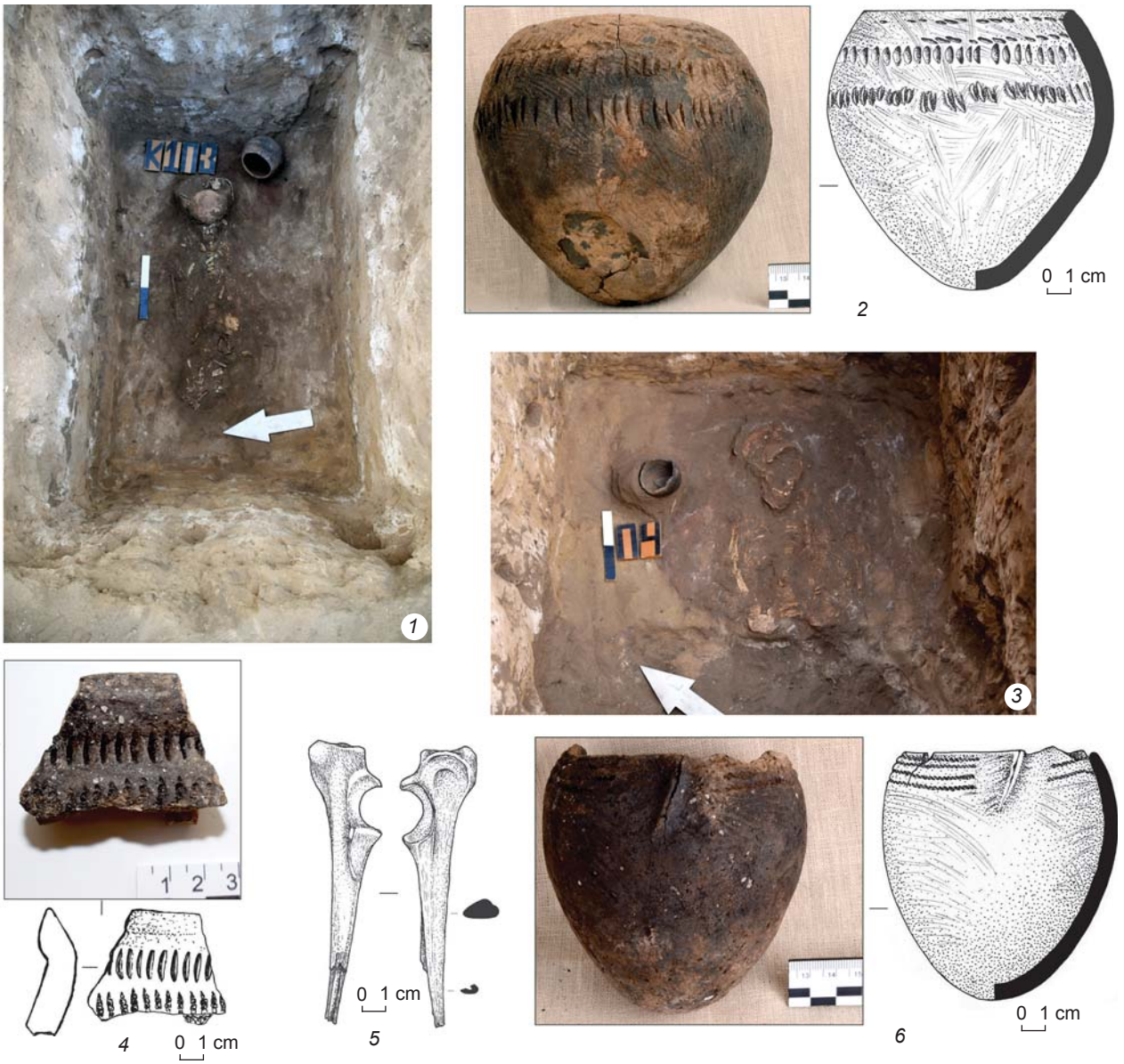


Fig. 3. Children's burials at kurgan 1 and grave goods.
1 – burial 3; *2* – vessel from burial 3; *3* – burial 4; *4* – pottery fragment from pit 10 of ditch 2; *5*, *6* – bone borer and vessel from burial 4.

is 10 cm high; its neck is 8 cm in diameter. The paste contained silty clay, grog, and crushed preheated shell. The exterior surface of the vessel was partly smoothed with a comb stamp. The upper part of the body was ornamented with four rows of imprints of a twisted rope. In one place, the ornament is interrupted by a pinch. Ceramic fragments similar in morphology were found in the pits of the ditch surrounding the mound above this grave (Fig. 3, *4*).

Children's burials 3 and 4 are similar in many features of the funerary rite. However, certain differences that might go unnoticed by visual analysis should be mentioned. First, the preliminary results of microbiomorphic analysis (A.A. Golyeva) showed that the composition of mats and "pillows" differs both in volume and composition. In burial 4, a thick mat composed of meadow-grasses, organic animal material (felt or wool), and wood/bark was used. The mat in burial 3 contained dry steppe-grasses and very little organic material of animal origin.

Second, distinctions were revealed in the vessels' manufacturing technology. Both vessels are close in shape and ornamentation; they are typical of the

sites of the middle stage of the Yamnaya culture of the Volga-Urals. On the other hand, they were manufactured in different pottery traditions, as evidenced by the composition of the paste and the methods of surface treatment. Notably, numerous fragments of pottery found in the pits of the ditch around burial 4 were also made of two different pastes. The available data suggest that these burials were constructed by related groups of people, but probably belonging to separate tribal or family groups (Salugina, 2019).

Relative and absolute chronology

According to the features of the funerary rite, the children's burials in kurgan 1 at Boldyrevo-4 cemetery can be attributed to any stage of the Yamnaya culture (Merpert, 1974: 54–73; Morgunova, 2014: 152–216). The posture of the deceased (in a flexed supine position) is more typical of the early (Repino) and the first half of the middle stage. Discontinuous ditches consisting of several pits are reported from the sites of the early, Repino (Krasikovo-1 cemetery), and late, Poltavka (Skvortsovka cemetery), periods. The middle stage is characterized by exclusively circular ditches similar to the third ditch around the kurgan intended for central burial 5.

Radiocarbon analysis of the Boldyrevo-4 archaeological materials has not yet provided the desired results. Although the dates have been derived for all the three burials, these show a significant time spread. Taking into account the pottery technology, stratigraphic and paleosol data, the AMS date obtained on a human bone from burial 4 (4690 ± ± 25 BP (IGAN-8682), 3439–3378 cal BC) seems the most acceptable. This date suggests the attribution of the burial to the period from the late Repino to the early middle stage of the Yamnaya culture. Another ^{14}C-date (4300 ± 70 BP (SPb-3386), 3025–2873 cal BC), derived from a fragment of the organic mat of burial 5, apparently correctly refers this burial to the middle stage of the Yamnaya culture*. Both dates are well correlated with the succession of the burials, established on the basis of the kurgan's stratigraphy and the data of paleosol studies.

Analyses of the available ceramics provide for more accurate age-estimation of the burials. Neckless, semi-ovoid vessels were common at the middle stage of the Yamnaya culture (Merpert, 1974: 61, fig. 6, 7; Morgunova, 2014: 197–199). In the materials of the Repino stage, they are less common. The late, Poltavka, period is characterized mainly by flat-bottomed pottery. Ornamentation with a cord and application of deep scratching by comb stamps over the vessels' surfaces are typical of the Repino ceramic complexes. In addition, fragments of pottery from ditch 2 and a vessel from burial 4 are close to the Repino tradition of manufacturing technology (the use of silty clays with the addition of shell). The technological characteristics of the vessel from burial 3 (the raw material was clay with the addition of grog without shell) are most typical of the pottery of the middle stage of the Yamnaya culture in the Volga-Urals (Salugina, 2019).

The data from paleosol studies (O.S. Khokhlova, A.E. Sverchkova) are of particular importance for the age estimation of the kurgan. They can be correlated with the results of our studies at other sites in the Orenburg region in the last two decades, which provided the reconstruction of paleoclimatic conditions at four chronological intervals of the Yamnaya development in the Southern Urals (Khokhlova, Morgunova, Golyeva, 2019; Morgunova, Khokhlova, 2020). The available characteristics of the soils in kurgan 1 at Boldyrevo-4 suggest that the paleoenvironment at the start of its construction was the closest to the conditions during the construction of kurgans 1 and 2 at Krasikovo-1. In both cases, the arid episode was reconstructed. The chronological closeness of these sites is also suggested by the identical morphological and technological features of the ceramics found in the fillings of their ditches. According to the archaeological data and radiocarbon dates, the Krasikovo kurgans are dated to the range from 3600 to 3300–3200 cal BC (Morgunova, Kulkova, 2019). The paleosols buried in the interval of 3200–2600 cal BC under the kurgans of the middle stage of the Yamnaya culture (Shumaevo and Mustaevo V cemeteries) were formed under different climatic conditions. They attest to a significantly more humid climate as compared to the paleosols of the early Repino period (Khokhlova, Morgunova, Golyeva, 2019).

*According to our data, which are still being refined, a representative series of ^{14}C-dates of the settlements and burials of the Repino period in the Southern Urals provides the range of 3900–3200 cal BC, with the early middle stage falling to 3300–3200 cal BC, and the late middle stage to ca 2600 cal BC (Morgunova, 2014: 181, 193–213; Khokhlova, Morgunova, Golyeva, 2019).

Thus, chronological estimations of the stages of construction of kurgan 1 at Boldyrevo-4 cemetery should be based mainly on the results of archaeological and paleosol studies. The available radiocarbon dates need to be supported by new data, which will be done in the near future.

Methods of the study of the skeletal remains

The identification and description of the degree of preservation of the remains of the buried were carried out following existing standards for juvenile osteology (Schaefer, Black, Scheuer, 2009). The biological age-at-death of the children was determined based on the stage of dental development, assessed using X-ray images of both maxillary and mandibular teeth. Both the cranial and postcranial fragments were studied via digital microfocus radiography employing a stationary PRDU-02 device. The images were initially obtained as phosphor plates and digitized using a CR-35 SEC X-ray scanner (No. X000241).

The protocol of macroscopic examination of the specimens included bone- and teeth markers of physiological stress and pathological conditions. The differential diagnostics were based on both radiographic and microCT data. The chemical composition of the dyes utilized in the burials was studied via radiographic fluorescence analysis, using a Bruker AXS device (analytic L.A. Pelgunova, Severtsov Institute of Ecology and Evolution RAS).

Results of the study of the skeletal remains

Burial 3. The following skeletal elements were present: parietal and temporal bones (including the auditory tube); mandible; vertebrae; fragment of a skull base with some parts of the occipital foramen; separate teeth buds; fragments of the wall of the metaphysis of a femur; diaphysis of a radius and a tibia; a small fragment of a rib; scapula; fragments of sternum; and an innominate bone.

The biological age of this individual was determined to be 6 years ± 24 months, based on microfocus radiography data. The shape of the angle of the mandible suggests that it belonged to a female, but the final decision must be based on the results of the genetic analysis, which is currently being carried out.

The deciduous upper incisor and the permanent molar display signs of linear enamel hypoplasia (LEH). The linear defects emerged between 1.5 and 4 years of age and point to four episodes of stress. Dental calculus in the cervical area was detected in the deciduous molar.

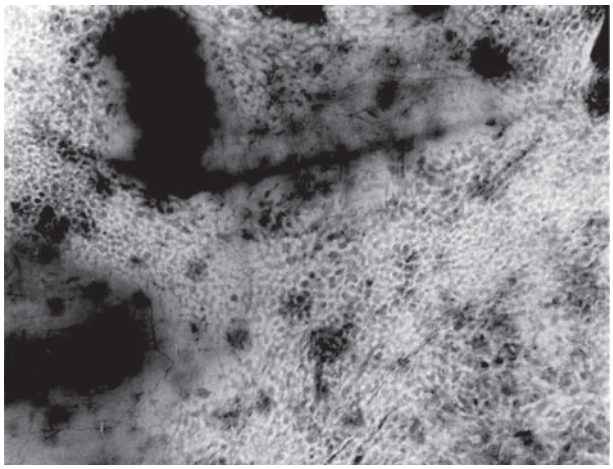
Large periosteal lesions (ossified hematomas) are observed on the palatal surface. The alveoli of upper and lower deciduous teeth are widened. The diameter of the *foramen mentale* is enlarged. Observable surfaces of the sockets of mandibular teeth display substantial porotic changes; their margins are sharp and widened. Both external and internal surfaces of the skull's base exhibit vast periosteal lesions.

Pits of sub-circular shape and perforations up to 1 mm in diameter were detected in the parietal bone (its maximal thickness – 3 mm), which suggested performing microfocus and microCT scanning of the bone. Radiography has shown the presence of numerous destructive foci of various shapes and sizes. The largest of those lesions have irregular margins, while bone tissue displays a "moth-eaten" pattern (Fig. 4, *1*). Radiographic images of the other skeletal fragments demonstrate the presence of a regular structure of a vertebra, pneumatization, and sparsity in the sternum, thinning of the cortical layer of the mandible (particularly evident in comparison to the mandible of the child from burial 4), large localized thinning in the palate, and, finally, a locus of bone sparsity of the ilium, of unknown etiology.

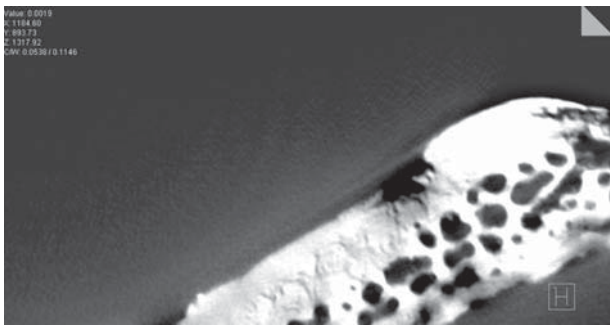
A 3D reconstruction of the microCT images of the parietal fragment shows that the defects of the cortical layer are of a subcircular shape and reminiscent of "craters" (Fig. 4, *5*). In the vertical plane, their bottoms appear irregular, and in the horizontal plane star-shaped (Fig. 4, *2–4*). Large destructive loci were also detected in the diploe of the skull's vault. The largest of those lesions are penetrating and have irregular margins. The diameter of such a defect in a transverse section of the diploe can reach 3 mm.

A visual inspection of the internal surface of the wall of the lower metaphysis of the femur and the diaphysis of the tibia revealed the presence of lytic lesions similar to those of the inner and outer compact layers of the parietals. Porotic changes in the upper margin of the scapula were also observed.

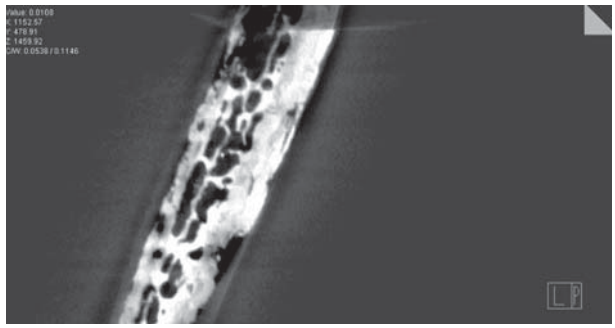
Despite the overall fragility of these infantile remains, the use of the radiological techniques provides evidence for declining the hypothesis of a post-mortem origin of the observed bone lesions, and for considering these as manifestations of



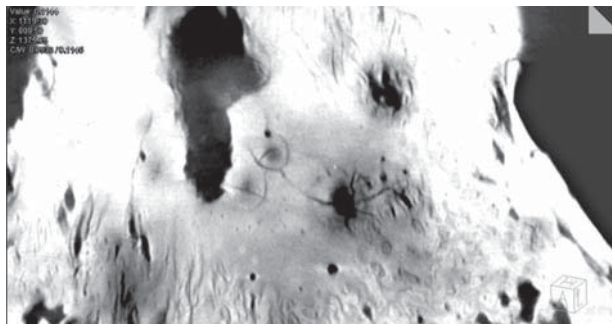
1



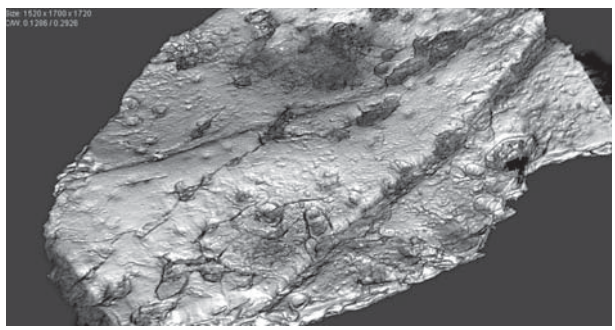
2



3



4



5

Fig. 4. Microfocus radiograph of a fragment of the parietal bone of a child from burial 3 with ×10 magnification (*1*), MicroCT: vertical and transverse sections (*2–4*), 3D reconstruction (*5*).

a chronic pathology that led to the death of the individual.

The faint red coloration observed in the cranial vault's fragments, on the basis of the radiographic fluorescence analysis, was made with ocher.

Burial 4. The archaeological report about the excavation of the kurgan describes this interment as a single burial, but the laboratory study of the remains has established that these belonged to two individuals. A temporal bone with an auditory tube, a fragment of the occipital bone, small fragments of the parietals, a sphenoid bone, and a fragment of a skull base belong to the first individual, probably buried only partially. The wing of the sphenoid exhibits porosity (a manifestation of vitamin C deficiency). Some slight intentional coloring of the remains cannot be excluded. Judging by the size of the bones, they belonged to a 5- to 6-year-old child.

The second individual was represented by parietal bones, an unidentified fragment of the skull vault, paired fragments of temporal bones with the area of the auditory tube preserved, a mandible, fragments of a second cervical vertebra, a radius, a sacrum, destructed innominates, and separate teeth buds. The age at death of this individual, judging by the dental development, is the same as for the child from burial 3: 6 years ± ± 24 months. The upper central incisor displays LEH (episodic stress indicator), which suggests at least five negative episodes suffered by the individual between 1.5 and 4.5 years of age. The radiographic fluorescence analysis confirmed that the mandible and the upper part of the skull vault were colored with ocher.

Discussion of the results of the study of the children's remains

Our laboratory study of the skeletal remains from the children's burials from kurgan 1 at Boldyrevo-4 identified three individuals. All these infants died at about the age of 6, which can be attributed to the period of "true childhood" (3 to 7 years, according to Bogin (1997)), when children in ancient societies were still fed and protected by adults. The end of this stage of ontogeny is marked by the eruption of the first permanent molars and incisors. In many traditional societies, it was the time for initiation rituals (Mednikova, 2017: 65–68). It seems plausible that the similarity in the age at death of the infants buried in the kurgan was not just a coincidence. Another feature common to both individuals is the presence of skeletal pathological manifestations indicative of dangerous diseases.

The most notable lesions in the skeleton from burial 3 are the numerous ante-mortem bone defects in the skull vault and in metaphyses of the long bones. These defects emerged as a result of a pathological process leading to a high level of osteolytic activity. The differential diagnosis of the lesions must consider infections, and also fungal and oncological diseases, as possible causes.

Skeletal signs of chronic infections in children are commonly associated with tuberculosis, which can be detected using a vast set of markers (Lewis, 2007: 146–151). Despite the incomplete preservation of the skeleton, the absence of such markers can be confidently confirmed.

Another cause of lytic lesions of the cranial vault and skeleton can be metastatic cancer, which should necessarily be taken into account in any attempt at differential diagnosis. In adults, extensive destruction of the vault is most often a manifestation of multiple myeloma or metastatic carcinoma (Ortner, 2003: 534).

The "moth-eaten" pattern of the margins of the defects detected by radiography suggests intense degradation of bone tissue and an increased rate of the metastatic growth, which is commonly associated with vast or local periosteal reactions and the possibility of the spread of the pathological process into soft tissues (Ragsdale, Campbell, Kirkpatrick, 2018). Type II margins of lytic lesions ("moth-eaten") appear as a result of multiple resorptive loci along the endosteal surface of the cortical bone layer, or in the cancellous bone. In a review of the literature on the diagnosis of multiple myeloma in paleopathology (Riccomi, Fornaciari, Giuffra, 2019), the authors conclude that this disease is highly prevalent in adults (91.7 %), particularly in older age cohorts and in males. Nevertheless, modern clinical cases of multiple myeloma in children have been published as well: in a twelve-year-old Chinese girl (Bernstein, Perez-Atayde, Weinstein, 1985), or, complicated with HIV infection, in an eight-year-old boy (Radhakrishnan et al., 2017).

Multiple myeloma is a malignant proliferation of plasma cells in the bone-marrow, of a poorly known etiology (Riccomi, Fornaciari, Giuffra, 2019). Chemical reagents, dyes, and waste from metallurgical production are among the possible causes. The disease rarely develops before the age of 40, and affects the vertebrae, ribs, skull, shoulder girdle, pelvis, and long bones. The radiographic picture includes sharply defined "embossed" lesions, or lytic defects of the "moth-eaten" type, without a surrounding periosteal reaction. The manifestations observed in the skeleton from burial 3 match this description in general; but there are serious arguments against such a diagnosis based on the young age and the sex of the individual.

Metastatic carcinoma, which affects the vertebrae, ribs, skull, and long bones in the form of multiple elliptical or irregular defects, can be dismissed in this case, since the disease is only observed in adults above 40 years of age. The same applies to sarcoidosis, which only manifests after 30.

Taking into account the biological age of the child from burial 3, leukemia seems to be the most plausible diagnosis. The prevalence of this pathology peaks at 3–5 years, it affects the skull, shoulder girdle, upper and lower limbs, ribs, vertebrae, and pelvis (Ibid.: 202). It is of note, however, that some modern clinical cases of multiple myeloma in children were, in fact, B-cell neoplasms, i.e. acute lymphocytic leukemia (Rossi et al., 1987). Thus, even in modern clinical practice, there are difficulties in making a diagnosis in children with leukemia when the destructive loci display an atypical localization, or if there is a possibility of mimicry of signs of multiple myeloma. This means that making such a diagnosis in paleopathological cases must be particularly complicated.

Importantly, paleopathology relies on its own suite of diagnostic features, almost never employed in modern medicine. Also, paleooncologists are potentially able to identify some previously unrecognized forms of cancer that disappeared in the course of human evolution, or to find alternative

manifestations of common diseases that existed in the past (Halperin, 2004).

Unfortunately, skulls were absent in the burials of the children affected by acute lymphocytic leukemia; thus, those individuals cannot be compared with the skeletons from Boldyrevo. The first case is represented by a 3- to 5-year-old child burial dated to 1100–680 BC, from the excavation at the Dakhleh Oasis in Egypt (Moltoa, Sheldrick, 2018). In this individual, the bone defects can be described as diffuse pits surrounding dilated tubules, followed by involvement of the periosteal layer. The hematogenous location of lesions points toward acute lymphocytic leukemia or neuroblastoma. The authors of that study tended to the former diagnosis according to the age of the individual. Lytic and proliferative manifestations of acute lymphocytic leukemia in a 5–6-year-old child were described in a Colonial period sample from Peru (Klaus, 2014).

Another disease to consider is histiocytosis, which is quite widespread in children and displays a similar location: flat parts of the skull, ribs, and pelvis are affected in more than 50 % of cases (Khung et al., 2013). It has been noted that those bone lesions are strongly reminiscent of the pattern typical of multiple myeloma in adults. A differential diagnosis of histiocytosis must include a consideration of metastatic neuroblastoma with a peak incidence at the age of 1 to 1.5 years. Histiocytosis is accompanied by a subperiosteal reaction, and in some cases by thickening of the walls of long bones—the pattern not observed in the bone fragments of the studied individuals. Growth retardation and stomatitis can also manifest in this disease, besides the cranial and pelvic defects mentioned above (Riccomi, Fornaciari, Giuffra, 2019). Modern clinical panoramic radiographic images demonstrate strong destruction of the alveolar bone, accompanied by the so-called "floating teeth" pattern (Khung et al., 2013). The vast periosteal reaction in the palatal surface and alveoli in the child from burial 3 suggests the presence of inflammation and bleeding of soft tissues of the oral cavity, as well as the loosening of the teeth. But such manifestations could be just a consequence of vitamin C deficiency (infantile scurvy). Unfortunately, the poor preservation of this cranial specimen hinders a definitive diagnosis.

Summing up, it can be reliably concluded that the individual from burial 3 died from metastatic cancer of hematogenous diffusion, which affected the bone marrow (differential diagnosis: lymphocytic leukemia, multiple myeloma, histiocytosis). The disease at its final stage was likely complicated by scurvy. What negative factors could contribute to this?

According to P. Ewald (2018), the emergence of cancer in ancient historical and prehistorical populations could be predominantly induced by pathogens, i.e. T-lymphotropic virus type 1 (HTLV-1), which was infecting children with mother's milk. Oncogenic papillomaviruses, Epstein-Barr viruses and other pathogens have had a long history of circulation in ancient societies as well. Besides this, in our opinion, a long stay at the smoky hearth or in proximity to the place of metalworking could be additional adverse factors, since the Yamnaya groups of the Urals were actively developing copper deposits.

The infantile remains from burial 4 do not exhibit manifestations of such a rare pathology as does the individual from burial 3. The periosteal reaction on the surface of the sphenoid bone of one of them suggests the presence of infantile scurvy, or Möller-Barlow disease, which could be fatal (Brickley, Ives, 2006). The second individual from burial 4 displays numerous linear defects of the permanent dentition (LEH), which means that he had regularly suffered serious episodes of physiological stress, probably seasonal. Notably, the number of such episodes (5) is similar to the number of stress events (4) experienced by the child from burial 3 before the development of his cancer.

We can conclude that the hypothesis regarding the selectivity and thoroughness of the burials of those six-year-old severely ill children is confirmed by the paleopathological data, and by the results of the X-ray fluorescence analysis.

Conclusions

Archaeological and paleoanthropological data testify to the significant role of children and their burial places in the construction of kurgan 1 at Boldyrevo-4. This kurgan is unusual in terms of the amount of labor and the complexity of architecture as compared to other known sites of the Yamnaya culture, both in the Volga-Ural region and in other areas of this culture's distribution. By the features of funerary rite, the children's burials correspond to the traditions characteristic of burials of adults of all age groups of the population. At the same time, children's burials of the Yamnaya culture are extremely rare.

Taking this fact into account, the burials under consideration stand out primarily by the presence of the specially designed kurgans, which confirms the specific, probably hereditary, social status of the deceased (Morgunova, Faizullin, 2018: 49). Despite the serious pathologies, the children were honored with such a rite by their birth in a social group significant for society, and subsequently with a special attitude to the place of their burial. It is possible that the entire space under the kurgan was a platform where closely related people (or even people from different tribal communities) gathered to perform not only burials, but also some other sacred and public ceremonies. And it was here that over time a huge kurgan was erected over a no less grandiose collective burial of five adults.

Acknowledgements

The authors thank O.S. Khokhlova and A.E. Sverchkova (Institute of Physicochemical and Biological Problems of Soil Science RAS), A.A. Golyeva (Institute of Geography RAS), and N.P. Salugina (Samara State Institute of Culture) for the opportunity to use some preliminary research data.

Paleoanthropological analysis was carried out under R&D Project No. 122011200264-9.

References

Bernstein S.C., Perez-Atayde A.R., Weinstein H.J. 1985
Multiple myeloma in a child. *Cancer*, vol. 56 (8): 2143–2147.

Bioarchaeology: The Contextual Analysis of Human Remains. 2006
J.E. Buikstra, L.A. Beck (eds.). Amsterdam: Academic Press is an imprint of Elsevier.

Bogin B. 1997
Evolutionary hypothesis for human childhood. *Yearbook of Physical Anthropology*, vol. 40: 63–89.

Brickley M., Ives R. 2006
Skeletal manifestations of infantile scurvy. *American Journal of Physical Anthropology*, vol. 129: 163–172.

Ewald P. 2018
Ancient cancers and infection-induced oncogenesis. *International Journal of Paleopathology*, vol. 21: 178–185.

Halperin E.C. 2004
Paleo-oncology: The role of ancient remains in the study of cancer. *Perspectives in Biology and Medicine*, vol. 47 (1): 1–14.

Khokhlova O.S., Morgunova N.L., Golyeva A.A. 2019
Prirodno-klimaticheskiye usloviya v V–III tys. do n.e. v Orenburzhye po dannym mezhdisciplinarnykh geoarkheologicheskikh issledovaniy. In *Fenomeny kultur rannego bronzovogo veka stepnoy i lesostepnoy polosy Yevrazii: Puti kulturnogo vzaimodeistviya v V–III tys. do n.e*. Orenburg: Izd. Orenburg. Gos. Ped. Univ., pp. 102–112.

Khung S., Budzik J.-F., Amzallag-Bellenger E., Lambilliote A., Soto Ares G., Cotten A., Boutry N. 2013
Skeletal involvement in Langerhans cell histiocytosis. *Insights Imaging*, vol. 4 (5): 569–579.

Klaus H.D. 2014
A probable case of acute childhood leukemia: Skeletal involvement, differential diagnosis, and the bioarchaeology of cancer in South America. *International Journal of Osteoarchaeology*, vol. 26 (2): 348–358.

Kravtsov A.Y., Morgunova N.L. 1991
Pogrebeniya drevneyamnoy kultury na r. Irtek v yugo-zapadnom Orenburzhye. In *Drevnosti Vostochno-Yevropeiskoy lesostepi*. Samara: Samar. Gos. Ped. Inst., pp. 120–137.

Lewis M. 2007
The Bioarchaeology of Children: Perspectives from Biological and Forensic Anthropology. Cambridge: Cambridge Univ. Press.

Mays S., Gowland R., Halcrow S., Murphy E. 2017
Child bioarchaeology: Perspectives on the past 10 years. *Childhood in the Past*: *An International Journal*, vol. 10 (1): 38–56.

Mednikova M.B. 2017
Bioarkheologiya detstva v kontekste rannezemledelcheskikh kultur Balkan, Kavkaza i Blizhnego Vostoka. Moscow: Club Print.

Merpert N.Y. 1974
Drevneishiye skotovody Volzhsko-Uralskogo mezhdurechya. Moscow: Nauka.

Moltoa E., Sheldrick P. 2018
Paleo-oncology in the Dakhleh Oasis, Egypt: Case studies and a paleoepidemiological perspective. *International Journal of Paleopathology*, vol. 21: 96–110.

Morgunova N.L. 2000
Bolshoy Boldyrevskiy kurgan. In *Arkheologicheskiye pamyatniki Orenburzhya*, iss. 4. Orenburg: Izd. Orenburg. Gos. Ped. Univ., pp. 55–62.

Morgunova N.L. 2014
Priuralskaya gruppa pamyatnikov v sisteme volzhsko-uralskogo varianta yamnoy kulturno-istoricheskoy oblasti. Orenburg: Izd. Orenburg. Gos. Ped. Univ.

Morgunova N.L., Faizullin A.A. 2018
Sotsialnaya struktura yamnoy kultury Volzhsko-Uralskogo mezhdurechya. *Stratum Plus*, No. 2: 35–60.

Morgunova N.L., Khokhlova O.S. 2020
Development of ancient cultures during the Eneolithic period and the Early Bronze Age in the Southern Cis-Urals steppe (Russia). *Archaeological and Anthropological Sciences*, vol. 12: 241–256.

Morgunova N.L., Kulkova M.A. 2019
Rezultaty radiouglerodnogo datirovaniya kurgannogo mogilnika Krasikovo I. In *Arkheologicheskiye pamyatniki Orenburzhya*, iss. 14. Orenburg: Izd. Orenburg. Gos. Ped. Univ., pp. 39–45.

Morgunova N.L., Kulkova M.A., Kulkov A.M. 2021
Meteoritnoye zhelezo v proizvodstvennoy i ritualnoy praktike yamnoy kultury Priuralya. *KSIA*, iss. 262: 190–206.

Ortner D.J. 2003

Chapter 20: Tumors and tumor-like lesions of bone. In *Identification of Pathological Conditions in Human Skeletal Remains*. [2nd edition]. London: London Academic Press, pp. 503–544.

Radhakrishnan V., Reddy P., Totadri S., Sundersingh S., Sagar T. 2017

Multiple myeloma in an 8-year-old child with HIV infection. *Journal of Pediatric Hematology/Oncology*, vol. 39 (1): 77.

Ragsdale B.D., Campbell R.A., Kirkpatrick C.L. 2018

Neoplasm or not? General principles of morphologic analysis of dry bone specimens. *International Journal of Paleopathology*, vol. 21: 27–40.

Riccomi G., Fornaciari G., Giuffra V. 2019

Multiple myeloma in paleopathology: A critical review. *International Journal of Paleopathology*, vol. 24: 201–212.

Rossi J.-F., Bataille R., Chappard D., Alexandre C., Janbon C. 1987

B cell malignancies presenting with unusual bone involvement and mimicking multiple myeloma: Study of nine cases. *American Journal of Medicine*, vol. 83 (1): 10–16.

Salugina N.P. 2019

Naseleniye Volgo-Uralya v epokhu rannego bronzovogo veka v svete dannykh tekhnologicheskogo analiza keramiki. In *Fenomeny kultur rannego bronzovogo veka stepnoy i lesostepnoy polosy Yevrazii: Puti kulturnogo vzaimodeistviya v V–III tys. do n.e.* Orenburg: Izd. Orenburg. Gos. Ped. Univ., pp. 113–122.

Schaefer M., Black S., Scheuer L. 2009

Juvenile Osteology: A Laboratory and Field Manual. Amsterdam: Academic Press is an imprint of Elsevier.

Received January 31, 2022.

doi:10.17746/1563-0110.2022.50.2.060-070

A.N. Popov[1], Kanomata Yoshitaka[2], M.K. Rudenko[1], and B.V. Lazin[1]

[1]Far Eastern Federal University,
Ayaks 10, Russky Island, Vladivostok, 690922, Russia
E-mail: popov.an@dvfu.ru; rudenko.mko@dvfu.ru; lazin.bv@dvfu.ru
[2]Tohoku University,
Kawauchi 27-1, Aoba ward, Sendai, 980-8576, Japan
E-mail: yoshitaka.kanomata.d8@tohoku.ac.jp

A Functional Analysis of Lithics of the Early Iron Age Yankovsky Culture: New Findings

We present the results of a functional analysis of lithics of the Yankovsky culture (800 BC to the turn of the millennium) from two sites—Cherepakha-7 and Solontsovaya-2, excavated over large areas during salvage works in 2015 and 2017, respectively. Such tools are traditionally described as axes, adzes, chisels, knives, spearheads, and projectile points. Certain findings of the functional analysis disagree with this classification. The question arises of the correspondence between formal typological and traceological criteria. For functional analysis, the so-called Keeley method, or High Power Approach, was used, along with the classification of polishing types, elaborated at Tohoku University (Japan). Functions of 28 of the 62 tools selected for high-precision functional analysis were assessed. The existing nomenclature of woodworking tool types is clarified, information on the technique of harvesting herbaceous plants and on leatherworking tools is significantly specified. More details are provided on tools involved in bone carving, as well as those used to open shells of bivalve mollusks. The High Power Approach has enhanced our understanding of the functions of stone tools, which, despite the use of metals, were basic in Yankovsky technologies. Further directions of traceological studies are suggested.

Keywords: *Primorye Territory, Early Iron Age, Yankovsky culture, functional analysis, lithics.*

Introduction

From 800 BC to the turn of the millennium, the Yankovsky archaeological culture was widespread over the southern part of Meritime Region (Primorye Territory). Over the almost 140-year history of studies (the first site was discovered in the last quarter of the 19th century), local historians and archaeologists have identified more than 200 settlements and other sites; determined the chronological period of this culture; recorded the characteristic features of settlements, technological and typological characteristics of artifacts; reconstructed the main components of the subsistence system; and identified cultural and economic characteristics of the Yankovsky population (Okladnikov, Derevianko, 1973; Andreeva, Zhushchikhovskaya, Kononenko, 1986; Brodyansky, 1987). Research is currently ongoing. Today, the main task is to supplement information about certain aspects of the culture

(Rowley-Conwy, Vostretsov, 2009; Lutaenko, Artemyeva, 2017; Zhushchikovskaya, Nikitin, 2019; Popov et al., 2021). A significant advantage of modern research is based on an integrated approach, involving a wide range of natural science methods in the study of archaeological materials (Zhushchikhovskaya, 2014, 2017; Popov et al., 2021), and the recent excavations over large areas of Yankovsky settlements (Lazin, Popov, 2019). The results of these studies provide more detailed information concerning controversial or problematic issues.

The functional analysis of lithics is one of the key topics in the study of the Yankovsky culture. Ancient sites produced abundant collections of typologically diverse stone tools. This means that stone products were regularly used and, accordingly, the activities with stone tools were significant. Hence, an accurate functional determination of lithic artifacts makes it possible to establish most reliably the nature and structure of the economy and productive activities of the Yankovsky population. Over the long history of study, researchers have published a whole series of works with undeniable significance and informational potential (Okladnikov, 1963; Okladnikov, Derevianko, 1973; Andreeva, Zhushchikhovskaya, Kononenko, 1986; Brodyansky, 2013).

The functional definitions of Yankovsky tools provided in various publications are based mainly on the method of direct parallels; on interpretations of morphological features based on the professional experience of the researcher; and on the context of artifacts' discovery (Andreeva, Zhushchikhovskaya, Kononenko, 1986; Popov, Rudenko, Nikitin, 2020). These methods have some disadvantages. There is no guaranteed coincidence of ancient and modern ideas about the rationality and usability of individual tools. The shapes of tools do not always help to understand their function, especially when it comes to knapping-products. In addition, products can be multifunctional. The use of the constantly developing experimental traceological method seems to be more effective (Semenov, 1957: 15–43; Keeley, 1980: 1–10; Korobkova, Shchelinsky, 1996: 3–25; Volkov, 2013: 94–149). The effectiveness of its application to Yankovsky artifacts, produced mainly from soft rocks easily subjected to polishing, is well illustrated in the publications of N.A. Kononenko (1978, 1982, 1986). Functional analysis of a series of tools made of chert and sandstone allowed the author to reveal "the functions of a number of items about which, until recently, there was no consensus among researchers (reaper knives and grinders)" (Kononenko, 1986: 130). In addition, the results of traceological studies shed light on the economic and productive activities of the Yankovsky people, namely, "to determine the economic variability of settlements… the share and level of development of domestic crafts and branches of producing and foraging economies" (Ibid.: 130–131). To date, these are the only published materials describing the experience of applying the use-wear method to Yankovsky artifacts.

The purpose of this study is to establish the functions of the Yankovsky polished stone tools by traceological analysis, and to correlate the findings with typological definitions.

Materials and methods

Functional analysis was carried out in the Laboratory for Integrated Archaeological Research and Examination of Cultural Heritage Objects of the Far Eastern Federal University (Vladivostok) in May 2019. It included the microanalysis of surfaces and the identification of reflective characteristics of polished areas on the tools' edges at high magnification, using the Keeley method, or High Power Approach (Keeley, 1980: 10–15). An Olympus BHM metallographic microscope was used to detect use-wear traces. The observation was carried out at magnifications from ×100 to ×400. The identified traces were determined according to classification of types of wear polishing (Fig. 1) developed by specialists of Tohoku University (Japan) (Akoshima, 1989; Kanomata, 2012; Serizawa, Kajiwara, Akoshima, 1982).

A series of lithic artifacts from the two sites excavated over large areas during archaeological salvage works was selected as material for research. The Cherepakha-7 settlement is located on the western coast of Muravyinaya Bay, in the northern part of Ussuri Bay (Fig. 2). Available radiocarbon dates in the range of 2830 ± 90 to 2150 ± 80 BP determine the period of existence of the Yankovsky culture in this region. The site also yielded redeposited artifacts from the Late Neolithic

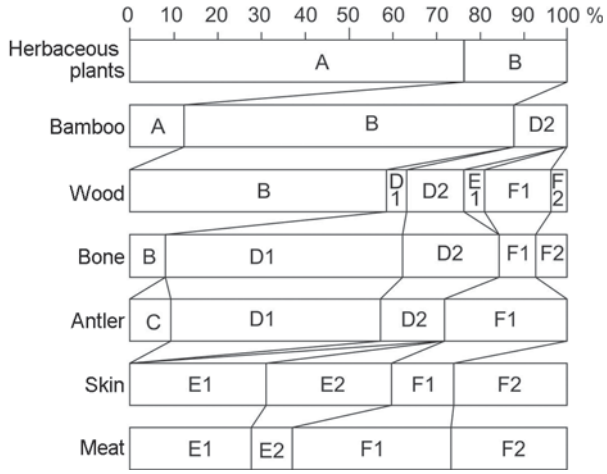


Fig. 1. Classification of polishing types (after (Akoshima, 1989)).

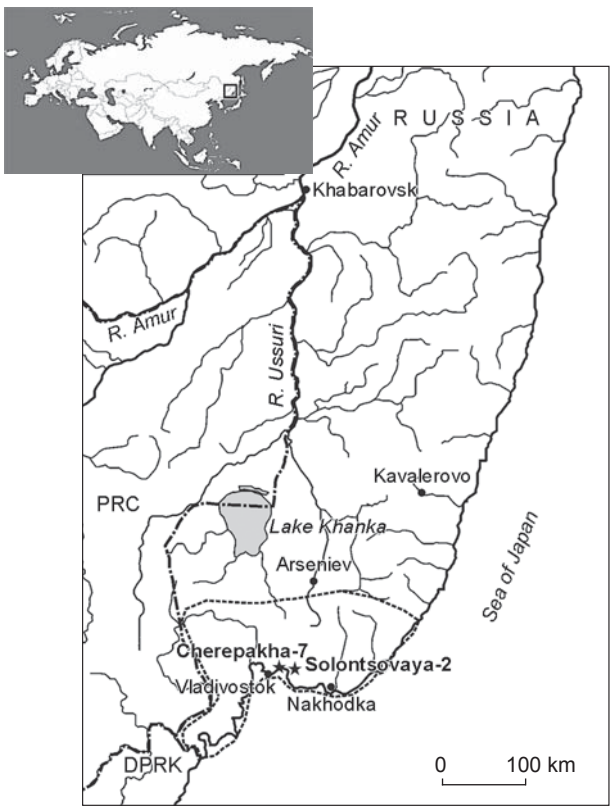


Fig. 2. Yankovsky distribution area (designated with dotted line) and locations of Cherepakha-7 and Solontsovaya-2.

Zaisanovka culture (Zhushchikhovskaya, Nikitin, 2019). The Solontsovaya-2 settlement is located on the right bank of the Solontsovaya River, in the Shkotovsky District (Fig. 2). Excavations at the site revealed layers bearing remains of the Early Iron Age Yankovsky and Krounovka cultures; solitary artifacts attributable to the Late Neolithic, Early Iron Age, and Medieval periods were also found. Radiocarbon dates in the range from 2670 ± 70 to 2510 ± 90 BP were obtained for the Yankovsky layer (Lazin, Popov, 2019).

The collections of Yankovsky lithics from the settlements under consideration are quite numerous: Cherepakha-7 yielded 853 artifacts (Popov, Rudenko, Nikitin, 2020), Solontsovaya-2 produced 2471 artifacts. A representative series of 120 specimens was selected for functional analysis, of which 62 tools suitable for microanalysis were taken through primary microscopic examination. According to morphological features, the sample included the following types: axes, adzes, chisels (37 spec., including fragments); reaping knives (10 spec., including fragments); knives (10 spec.); and spearheads and projectile points (5 spec., including fragments).

The raw material types have been conventionally determined through visual analysis, without the use of special geological methods.

Analysis results

As a result of microanalysis, various polishing types were recognized on 11 tools from Cherepakha-7 and on 17 tools from Solontsovaya-2 (see *Table*). We designate individual artifacts by their numbers in the field records, which simplifies the identification of tools.

Axes, adzes, and chisels. This set includes 37 items (27 intact and 10 fragments) made of andesite, chert, sandstone, and green tuff. These tools show rectangular or trapezoidal shape, rectangular or similar cross section, and symmetrical or asymmetrical blade. Traditionally, artifacts with the above characteristics are classified as woodworking tools.

Despite the fact that macro- and micro-facets of retouch were noted on the edges of 24 tools (Fig. 3, *6*, *7*), traces of use polishing subject to functional diagnostics were recorded only on eleven artifacts. These traces are of two types. The polishing type B (vertical striations), attesting to woodworking, was observed on the blade edges of four tools (No. 6704, 8346, 10208, and 10234; Fig. 3, *1–4*). On the back surface of axe No. 10208, there were

Functional definitions of lithics

No. in field records*	Artifact type	Raw material	Dimensions, cm	Blade sharpening angle, degree	Polishing type	Processed material	Striations	Function
S-10524	Adze (fragment)	Green tuff	4.5 × 4.7 × 1.2	50	E2/X	Skin	Vertical	Scraping
S-10183	Adze	"	9.3 × 4.4 × 1.1	41	E2/X	"	"	"
S-10267	"	"	8.0 × 4.7 × 1.3	32	E2/X	"	"	"
S-6051	Adze (fragment)	"	5.4 × 4.0 × 1.1	41	E2/X	"	"	"
S-10140	"	"	6.3 × 5.3 × 1.8	50	E2/X	"	"	"
S-10072	"	"	10.2 × 5.1 × 1.3	40	E2/X	"	"	"
S-10208	Chisel	Chert	5.8 × 2.6 × 1.6	48	B	Wood	"	Woodworking
S-10234	Axe (fragment)	Sandstone	10.4 × 6.0 × 5.1	70	B	"	"	Chopping
C-6704	Adze	Green tuff	8.1 × 4.0 × 1.2	52	B	"	"	Woodworking
C-8346	"	"	10.6 × 4.4 × 1.4	43	B	"	"	"
C-14505	Chisel	"	9.5 × 2.0 × 1.3	34	E2/X	Skin	"	Scraping
S-10493	Reaping knife	Chert	18.1 × 6.4 × 0.7	48	B	Herbaceous plants	"	Stem breaking
S-10356	Reaping knife (fragment)	"	4.7 × 5.4 × 0.9	45	B	"	"	"
S-9231	"	"	11.6 × 4.5 × 0.9	60	B	"	"	"
S-9831	"	"	3.4 × 2.0 × 0.3	32	B	"	"	"
S-10438	"	"	4.6 × 4.7 × 0.9	52	B	"	"	"
C-6708	Reaping knife	"	13.6 × 5.3 × 0.6	24	B	"	"	"
C-8344	"	Sandstone	12.3 × 5.5 × 1.0	48	B. A	"	"	"
C-8918	Reaping knife (fragment)	"	9.8 × 4.5 × 0.7	32	B	"	"	"
C-14731	"	Chert	7.4 × 4.4 × 0.7	74	B	"	"	"
C-6787	Reaping knife	"	3.7 × 5.6 × 0.4	26	B	"	"	"
S-10370	Knife	"	11.2 × 5.3 × 1.0	33	D2	Bone, horn	Parallel	Sawing, cutting
S-10474	"	"	9.4 × 6.9 × 1.2	43	B	Herbaceous plants	Vertical	Stem breaking
S-24194	"	Green tuff	7.5 × 4.5 × 1.1	32	?	?	Parallel	Cutting
C-14736	"	Chert	10.1 × 4.6 × 0.7	36	B	Herbaceous plants	"	"
C-15946	"	"	5.2 × 7.7 × 0.7	27	D2	Bone, horn	Vertical	Sawing, cutting
C-4509	"	Green tuff	7.2 × 3.0 × 1.6	37	D2	Mollusk shell	"	Opening
S-10104	Spearhead (fragment)	Chert	10.7 × 4.9 × 1.2	25	B	Herbaceous plants	?	?

*S – Solontsovaya-2, C – Cherepakha-7.

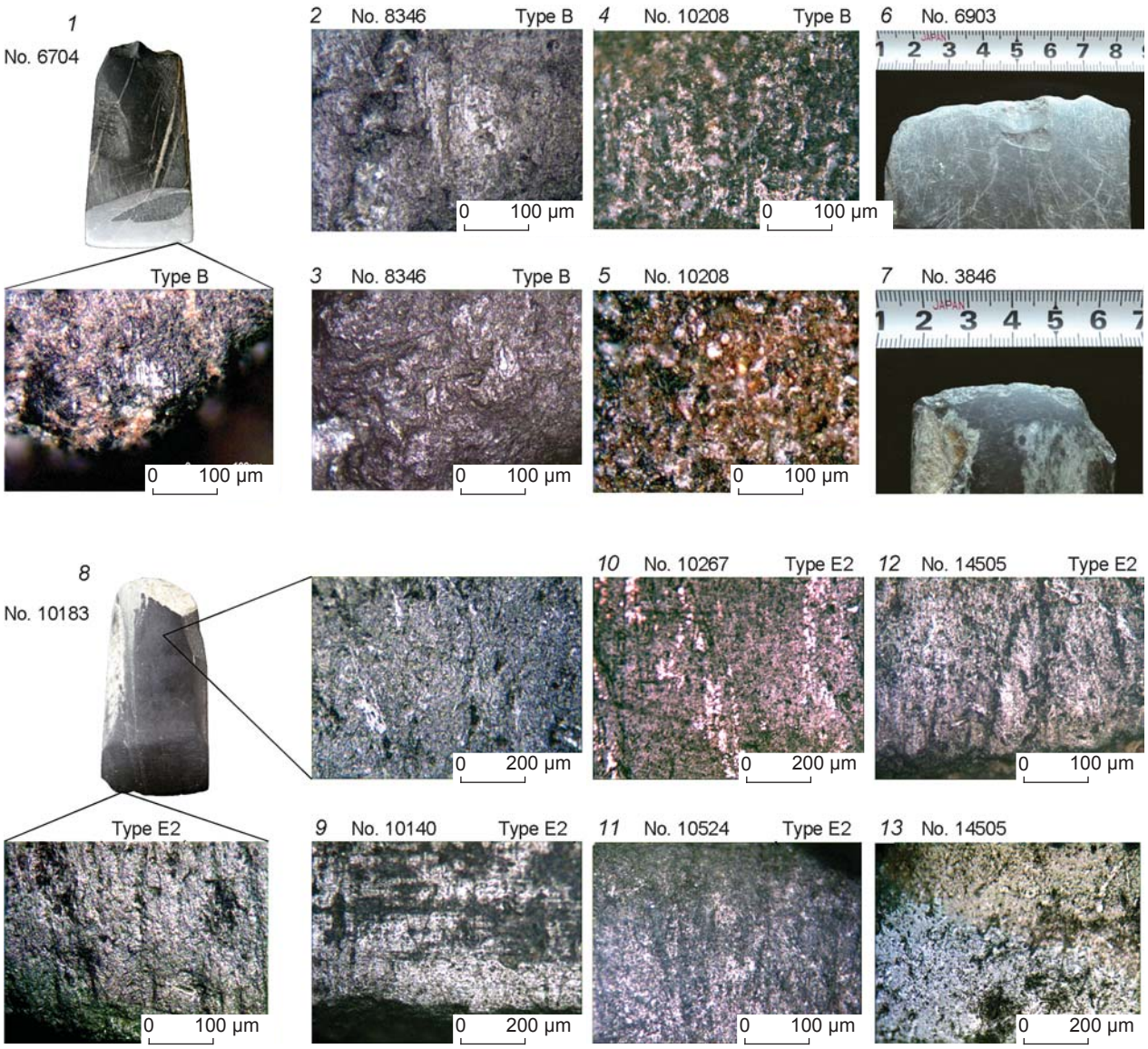


Fig. 3. Identified use-wear traces on the working elements of axes, adzes, and chisels.

typical polishing traces produced by the handle during the use of the tool (Fig. 3, *5*). The identified traces confirm the typological definitions—axes, adzes, chisels.

The polishing type E2 (vertical striations) was recognized on the blades of six adze-like artifacts (No. 6051, 10072, 10140, 10183, 10267, and 10524) and on the working surface of chisel-like tool No. 14505. The roundness and roughness of the traces suggest that the tools were used for scraping dry skin/leather (Fig. 3, *8–12*). Sometimes, soil tillage leads to a similar polishing (type X) on the edges of tools. However, the fact that the identified traces were spread over one side of the tool-edge indicates scraping. We assume that skins could have been scraped with the addition of sand, but this assumption requires further research. No other diagnostic traces of wear were noted on these artifacts. In some cases, hafting traces were recorded on three tools. The backs of artifacts No. 10267 and 10183 show polishing marks whose depth of penetration indicates the hardness of the contact material (Fig. 3, *8*). The widespread and bright polishing without linear traces noted at the base of tool No. 14505 (Fig. 3, *13*) also testifies to the handle-fastening. The obtained results allow the conclusion to be made that these tools were used as end-scrapers with handles for leatherworking.

The functional purpose of the tools whose working surfaces have no polishing traces can be determined by the edge damage and the macro- and micro-facets of retouch (Fig. 3, *6*, *7*). Such marks are the results of heavy blows over hard material. Taking account of the typological definition of artifacts, these implements can be identified as chopping tools. The analyzed set also contained two blanks of axes with typical dimensions of 16.6 × 5.7 × 3.8 and 16.3 × 5.7 × 3.4 cm (No. 12674 and 9500).

Reaping knives. The set includes 10 items (three intact and seven fragments) mostly of elongated rectangular shape with rounded edges, a slightly convex blade, and a drilled hole in the center. The microanalysis of the artifacts has shown polishing of type B, indicating work with herbaceous plants or wood-processing. Because these tools were made of chert and sandstone, use wear traces were found only in limited areas of the working surfaces containing harder minerals.

The clear traces of polishing of type B (vertical striations) have been observed at the edges of the blades of tools No. 10493 (on one side) and 8344 (on both sides) (Fig. 4, *1*, *2*). Less obvious smooth and rounded traces of this type (vertical striations) were noted on limited areas near the edges of blades on one side of artifacts No. 8918, 6708, 6787, 9231, 10438, 9831, and on both sides of tools No. 14731 and 10356 (Fig. 4, *3*–*5*). In addition, item No. 14731 showed the uneven density and distribution of polishing on its sides, one of which was in stronger contact with the processed material.

In the centers of artifacts No. 8918 and 14731, close to the holes, ground grooves were identified intended for the thinning of surface before drilling. In addition, these items and tools No. 10356, 6708 showed traces of rope fastening—areas of linear polishing directed from the hole to the back (Fig. 4, *6*).

Notably, in the middle part of the blade edge of tool No. 8344, along with the above polishing marks, clear traces of polishing of type A (vertical striations) were noted (Fig. 4, *2*), which are the result of overlapping of the polishing traces of type B. Another distinctive feature of this specimen is the

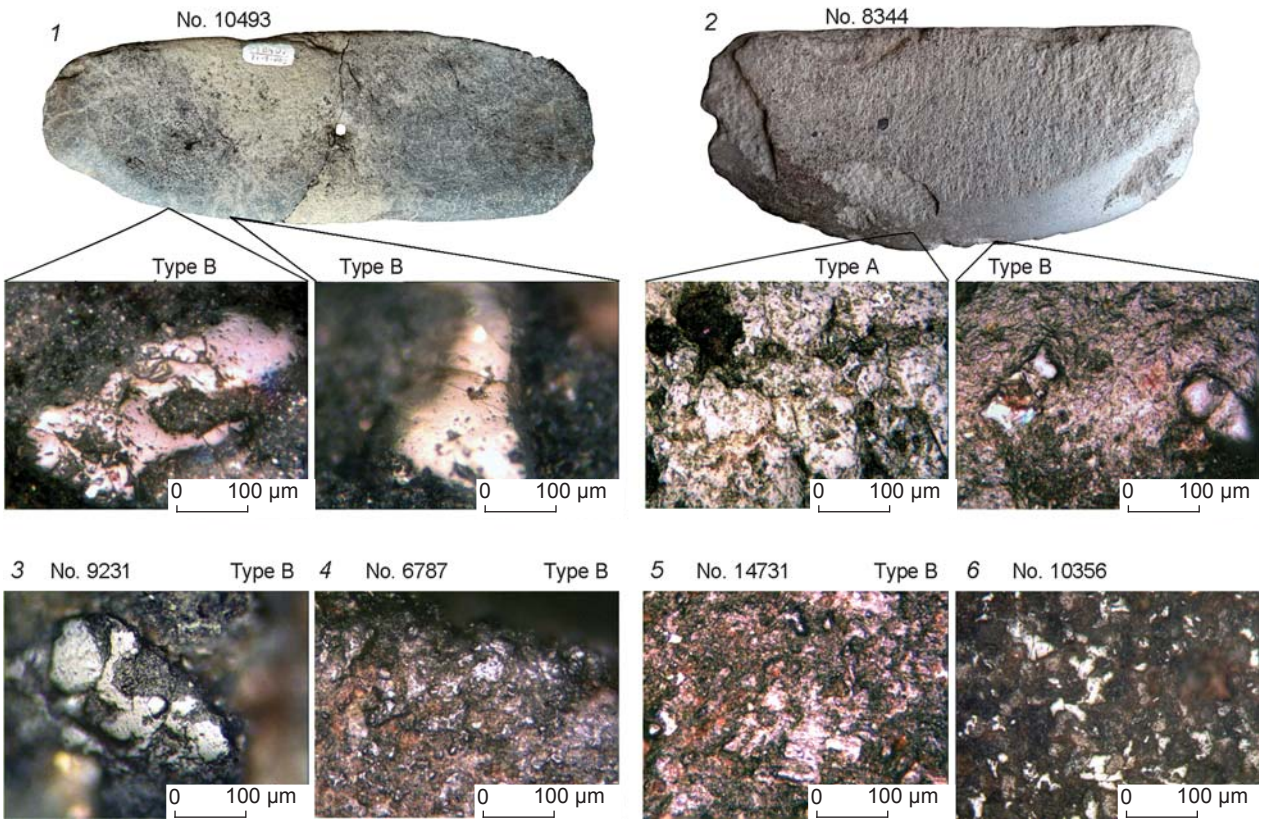


Fig. 4. Identified use-wear traces on the working elements of reaping knives.

method of rope attachment. Instead of hole, two notches were made on its lateral faces.

The distribution, shape, and direction of the recorded traces suggest that these tools were indeed used as reaping knives, which were attached to the hand with a rope. The plant harvesting was carried out by vertical movements, with rotation of the wrist towards the body while holding the stem with the thumb.

Knives. The sample includes 10 intact artifacts with sharpened and ground edges. The artifacts have been classified into two groups by design: with an arcuate blade and the presence of a deliberately distinguished handle (3 spec.); and with a blade prepared on fragments of tools or production waste (7 spec.). In the first group, two artifacts showed diagnostic use wear traces. Uneven double-sided polishing of type B (vertical striations) were traced on the edge of knife No. 10474 (Fig. 5, *1–3*). The blade was fashioned perpendicular to the long straight handle. The features of the revealed traces suggest that this tool was used for the same operation as the reaping knives described above.

Double-sided polishing of type D2 (parallel striations) was observed on the working edge of specimen No. 10370, with a beveled blade and a short straight handle (Fig. 5, *4–6*). The recognized traces indicate that the knife was used for cutting or sawing bones or horns. A distinctive morphological feature of this tool is a drilled hole in the center of the handle.

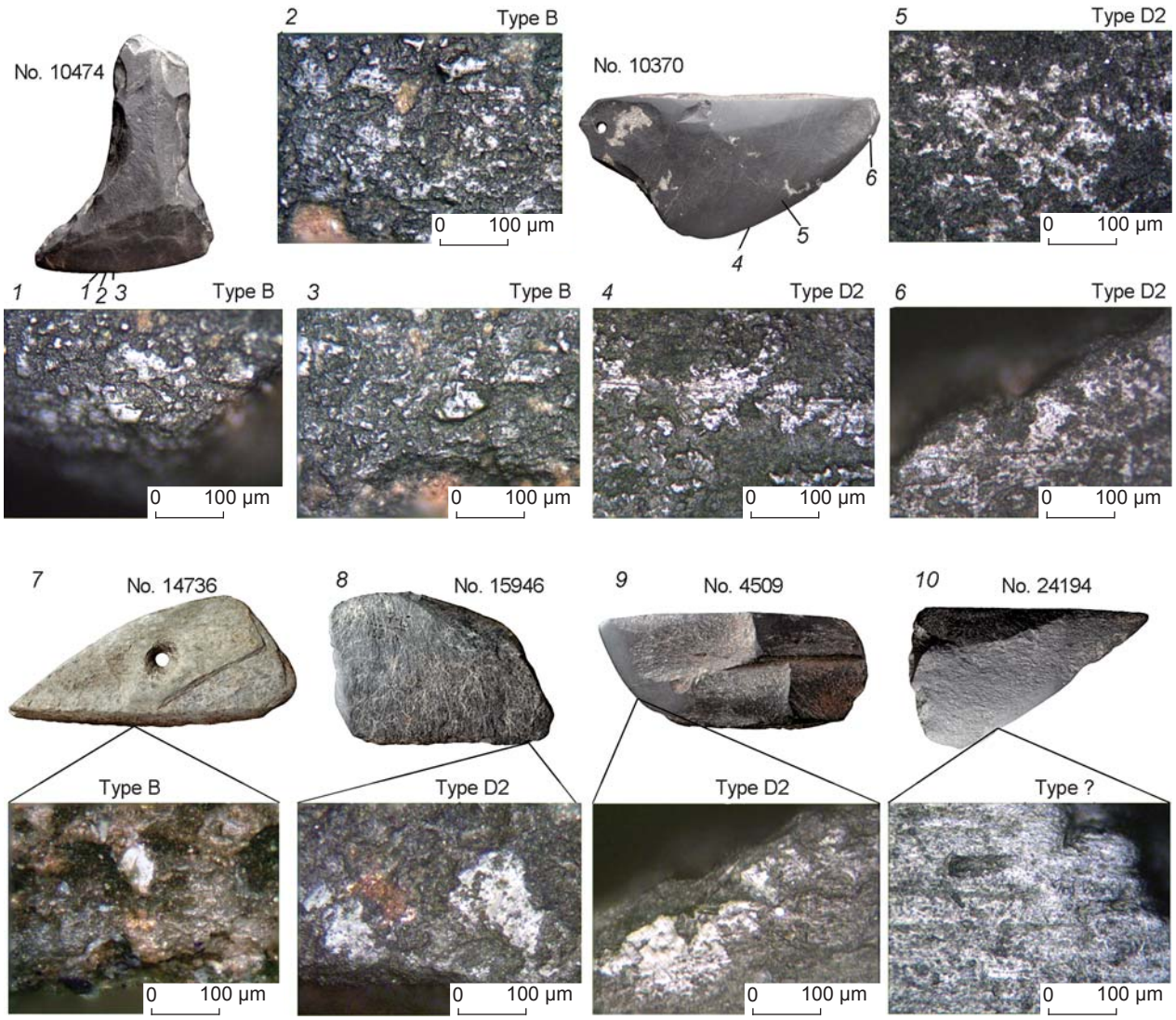


Fig. 5. Identified use-wear traces on the working elements of knives.

In the second group, diagnostic wear marks were identified on four knives. Barely noticeable polishing of type B (parallel striations) was recorded on limited areas near the edge of tool No. 14736 (Fig. 5, *7*). The noted use traces indicate that the tool was used for cutting plants. It is noteworthy that this artifact was made from a fragment of the middle part of a reaping knife.

Polishing of type D2 (clear vertical striations) was found in the separate areas of the blade formed on one of the faces of a fragment of chert tablet No. 15946 (Fig. 5, *8*). Judging by the features of the traces, the tool was used as a knife for processing bones or horns. The working blade prepared on the sharp face of a fragment of chopping tool No. 4509 shows areas of polishing of type D2 (clear vertical striations), which are brighter and smoother than on knives No. 15946 and 10370 (Fig. 5, *9*). This item was apparently used to open shells of bivalve mollusks.

The sharp face of a fragment of chopping tool No. 24194 reshaped into a working blade, shows polished areas (parallel striations), which type could not be determined. The character of abrasion and the direction of wear marks (Fig. 5, *10*) suggest that this knife was used to process soft material.

Spearheads and projectile points. There are five artifacts (two intact and three fragments). Judging by the dimensions of the artifacts and the shape of their wings, tips, blades, and nozzles, they were classified as spearheads and projectile points. Polishing subject to functional diagnostics was recorded on only one artifact. However, traces of wear indicating the use of the specimens were found on three points.

A comparatively small area of polishing was traced along the edge of an asymmetrically sharpened blade on one side of spearhead No. 10104, made of gray-green chert (Fig. 6, *1*). The isolated traces of wear do not allow us to classify its type reliably. However, their roundness and localization suggest the attribution of the polishing to type B. Probably, after disposal, the spearhead was used secondarily, as a tool for the processing of herbaceous plants. These data are of special interest for the analysis of the morphological features of the item. The leaf-like shape with a rhomboid rib, as well as the specified character of the blade-sharpening, indicate that this artifact belongs to the Lidovka culture of the Early Iron Age (Dyakov, Konkova, 1981). However, the context of discovery, and traces of reuse in the form of drilled biconical holes, as well as evidence of secondary use, suggest the use of this point also in the Yankovsky period. Notably, no traces of contact with rope were observed in the areas of the holes.

Wear marks in the form of deep long grooves running parallel to each other and forming a kind of flute in the center of the artifact (Fig. 6, *2*) were noted on projectile point No. 12843 with elongated blades. The grooves run from the stem to the tip of

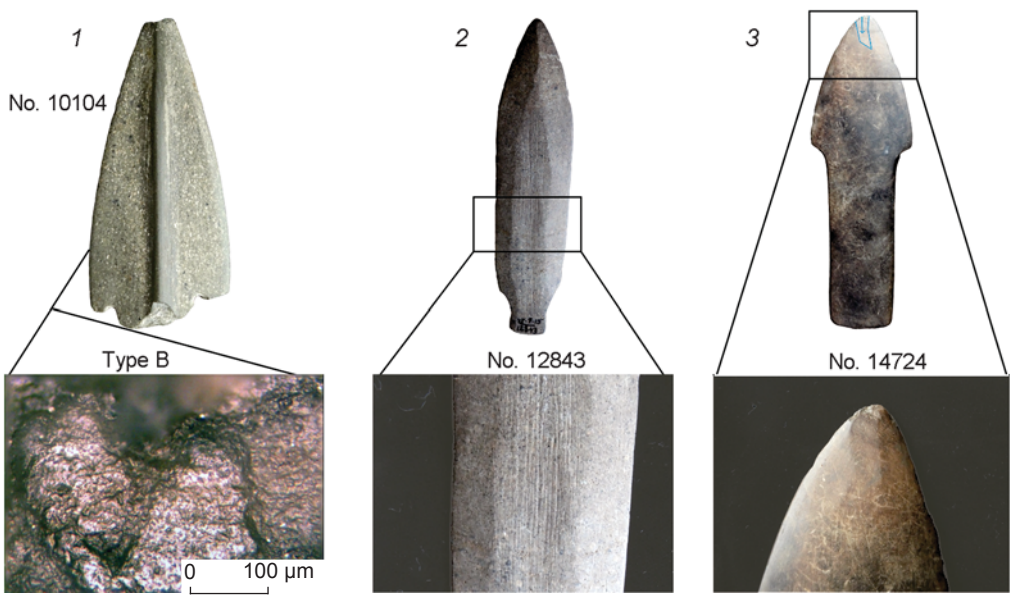


Fig. 6. Identified use-wear traces on the working elements spearheads and projectile points.

the point. The macro-traces of wear indicate that this point was fastened on the shaft, and also mark the approximate area of fastening.

A trace of a crack formed as a result of a thrusting motion was noted at the tip of the asymmetrically triangular blade of spearhead No. 14724 (Fig. 6, *3*). The damaged area was almost completely destroyed in the process of re-modification, re-sharpening, and polishing of the head.

Discussion

Despite the small size of the analyzed samples (62 spec.), we managed to draw a number of interesting conclusions and to outline promising directions for further research. First, the derived results propose a new insight into the existing typological classification of the Yankovsky lithics. Among the implements traditionally considered as woodworking tools (adzes and chisels), end-scrapers for leatherworking were identified for the first time. It is noteworthy that they were found at both settlements. A rectangular or trapezoidal shape and a rectangular or similar cross-section, as well as an asymmetrically sharpened blade, are common morphological features of adzes, chisels, and the identified end-scrapers. The end-scrapers show the following features: clear polishing spread all over the tool, average dimensions in the range of 9.2 × 4.6 × 1.2 cm, blade-sharpening angle in the range of 32° to 50°, raw material green tuff, and absence of heavy edge damage. These characteristics quite conditionally distinguish the products intended for skin-scraping from woodworking tools, because they are also typical for the latter. Hence, the only way to identify adze-like and chisel-like end-scrapers reliably is functional analysis. Available publications on the Yankovsky culture do not provide information about the appearance of tools for skin-scraping. This is despite the fact that skin-processing took a significant part in the production activities of the ancient population (Andreeva, Zhushchikhovskaya, Kononenko, 1986: 149–176). It is noteworthy that the tools under discussion were fastened on the handle. There is no information about the composite structure of end-scrapers from the earlier periods in Primorye. Relying on the published functional studies of such tools of the Old Koryak culture (15th–17th centuries AD) (Takase, 2011), we can suggest two possible options for the location of the working blade in relation to the handle: perpendicular or parallel to its length axis. This issue requires further research. However, even now we can say that the identified end-scrapers with handles not only expand our knowledge about the leatherworking toolkit, but also specify information about the technique and structure of this craft.

Second, the microanalysis of the working surfaces of the reaping knives confirmed the information about their functions that was derived earlier by comparing our data with the results of traceological studies by N.A. Kononenko (1978), and also reconstructed the process of using these tools.

Third, among the analyzed knives, we were able to identify two for processing bones and horns, and one probably used to open shells of bivalve mollusks. Judging by the importance of bone carving and the great role of collecting mollusks in the subsistence system of the Yankovsky population (Andreeva, Zhushchikhovskaya, Kononenko, 1986: 149–176), we assume the existence of specialized tools for these activities. However, this issue requires the analysis of functions of a larger sample of knives.

A fairly large number of artifacts with macro-traces of use (edge damage, linear traces, grinding, etc.), but without traces of functional wear (34 spec.), in our opinion, may be a consequence of the reuse of these tools: re-modification in case of breaking or resharpening of the blade. The evidence supporting this assumption is recorded in the results of the analysis. Other options involve a short use of tools, as well as the destruction of polishing marks during archaeologization of the artifacts; but they do not disaffirm the above.

Conclusions

As a result of the traceological study, the functions of 28 stone tools from the collections of Yankovsky artifacts from the settlements of Cherepakha-7 and Solontsovaya-2 were determined. The obtained data clarify the existing type list of woodworking tools, and add significant information on the technique of collecting herbaceous plants and on the set of leatherworking tools. Tools for processing bones and, probably, for opening shells have been identified.

One of the most interesting results was the identification of function of the products that were traditionally considered chisels and adzes based on their shape and, accordingly, were attributed to woodworking tools. It turned out that the well-polished medium-sized adze- and chisel-like tools are end-scrapers for dry-skin working. At the Yankovsky sites, such tools most often occur in their intact form, without traces of strong blade damage—in contrast to chopping tools.

The derived results indicate the need to develop traceological studies of artifacts of the Primorye archaeological cultures. However, currently, there is a lack of experts in traceology engaged in macro- and microanalysis in Primorye. Implementation of this method will make it possible to specify, significantly, information about the subsistence system of the ancient population.

Promising directions for further functional research are the clarification of data on the technique of using the identified end-scrapers and their attribution to the longitudinal or transverse type; detailed analysis of a representative series of knives for identification of specialized groups; and microanalysis of tools with known functional purposes for more detailed reconstructions of the processes of their use.

Acknowledgements

The study was supported by the Japan Society for the Promotion of Science (Project No. 16KK0020). We are grateful to Harada Motoki (Aichi Asahi Site Museum, Japan) for valuable advice on the study of use wear on ground tools, to A.V. Tabarev (Institute of Archaeology and Ethnography SB RAS) for consultations, and to the members of the Educational and Scientific Museum of the Far Eastern Federal University E.I. Dyukov and E.Y. Nikitin for technical and informational assistance.

References

Akoshima Kaoru. 1989
Sekki no siyo:-kon [Use-wear traces on stone tools]. Tokyo: Niu:saiensu-sya. (In Japanese).

Andreeva Z.V., Zhushchikhovskaya I.S., Kononenko N.A. 1986
Yankovskaya kultura. Moscow: Nauka.

Brodyansky D.L. 1987
Vvedeniye v dalnevostochnuyu arkheologiyu: Ucheb. posobiye. Vladivostok: Izd. Dalnevost. Gos. Univ.

Brodyansky D.L. 2013
Maikhe: Yankovskiye poseleniya. Vladivostok: Izd. Dalnevost. Federal. Univ.

Dyakov V.I., Konkova L.V. 1981
Funktsionalnoye, khronologicheskoye i kulturnoye znacheniye kamennykh "kinzhalov" s odnostoronney protivolezhashchey zatochkoy klinka. In *Materialy po arkheologii Dalnego Vostoka SSSR*. Vladivostok: DVNC AN SSSR, pp. 35–42.

Kanomata Yoshitaka. 2012
Sekki siyo:-kon ko:taku-men no keisei katei ni kansuru toraiborodzi: ni yoru rikai [Tribological ideas]. *Bunka*, vol. 75 (3/4): 125–140. (In Japanese).

Keeley L.H. 1980
Experimental Determination of Stone Tool Uses: A Microwear Analysis. Chicago: Univ. of Chicago Press.

Kononenko N.A. 1978
K voprosu o funktsionalnom naznachenii kamennykh shlifovannykh nozhey. In *Arkheologicheskiye materialy po drevney istorii Dalnego Vostoka SSSR*. Vladivostok: DVNC AN SSSR, pp. 14–22.

Kononenko N.A. 1982
K voprosu o naznachenii terochnikov (po materialam pamyatnikov Primorya III–I tysacheletiya do n.e.). *Sovetskaya arkhgeologiya*, No. 2: 214–218.

Kononenko N.A. 1986
Eksperimentalno-trasologicheskiy metod issledovaniya v arkheologii. In *Problemy arkheologicheskikh issledovaniy na Dalnem Vostoke SSSR*. Vladivostok: DVNC AN SSSR, pp. 128–133.

Korobkova G.F., Shchelinsky V.E. 1996
Metodika mikro-makroanaliza drevnikh orudiy truda, pt. 1. St. Petersburg: IIMK RAN.

Lazin B.V., Popov A.N. 2019
Noviye danniye po arkheologii epokhi paleometalla na beregakh Ussuriyskogo zaliva v Primorye. *Gumanitarniye issledovaniya v Vostochnoy Sibiri i na Dalnem Vostoke*, No. 2: 5–12.

Lutaenko K.A., Artemyeva N.G. 2017
Mollyuski iz rakovinnoy kuchi pamyatnika Telyakovskogo 2 v Yuzhnom Primorye (yankovskaya arkheologicheskaya kultura), ikh paleoekologiya i rol v paleoekonomike. *Byulleten Dalnevostochnogo malakologicheskogo obshchestva*, iss. 21 (1/2): 61–128.

Okladnikov A.P. 1963
Drevneye poseleniye na poluostrove Peschanom u Vladivostoka: Materialy k drevney istorii Dalnego Vostoka. Moscow, Leningrad: Izd. AN SSSR.

Okladnikov A.P., Derevianko A.P. 1973
Dalekoye proshloye Primorya i Priamurya. Vladivostok: Dalnevost. kn. izd.

Popov A.N., Lazina A.A., Fedorets A.N., Lazin B.V., Kanomata Y. 2021
Kompleksnoye issledovaniye keramiki rannego zheleznogo veka mnogosloynogo pamyatnika Solontsovaya-2. *Gumanitarniye issledovaniya v Vostochnoy Sibiri i na Dalnem Vostoke*, No. 2: 18–30.

Popov A.N., Rudenko M.K., Nikitin E.Y. 2020
Kamenniy inventar yankovskoy arkheologicheskoy kultury poseleniya Cherepakha-7. *Gumanitarniye issledovaniya v Vostochnoy Sibiri i na Dalnem Vostoke*, No. 1: 49–62.

Rowley-Conwy P., Vostretsov Y.E. 2009
Yankovsky economics: Animal bones from the 1st millennium BC settlements in Primorye, Russian Far

East. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 2: 79–84.

Semenov S.A. 1957

Pervobytnaya tekhnika. Moscow: Izd. AN SSSR. (MIA; No. 54).

Serizawa Chosuke, Kajiwara Hiroshi, Akoshima Kaoru. 1982

Dzikken siyo:-kon kenkiu: to sono kano:sei [Experimental study of use-wear traces and their potential]. *Ko:kogaku to sidzen kagaku*, vol. 14: 67–87. (In Japanese).

Takase K. 2011

Skrebki drevnekoryakskoy kultury: Issledovaniye problemy na primere poluostrovov Kamchatka i Taigonos. *Vestnik Kamchatskoy regionalnoy assotsiatsii "Uchebno-nauchny tsentr"*, No. 1 (17): 13–34.

Volkov P.V. 2013

Opyt eksperimenta v arkheologii. St. Petersburg: Nestor-Istoriya.

Zhushchikhovskaya I.S. 2014

Pokazatel vodopogloshcheniya drevney keramiki yuga Dalnego Vostoka: Opyt issledovaniya. *Tikhookeanskaya arkheologia*, iss. 29: 27–49.

Zhushchikhovskaya I.S. 2017

Opyt primeneniya elektronnoy mikroskopii v izuchenii arkheologicheskoy keramiki yuga Dalnego Vostoka. *Zapiski IIMK RAN*, No. 16: 75–91.

Zhushchikhovskaya I.S., Nikitin E.Y. 2019

Novaya goncharnaya traditsiya na pamyatnikakh Yankovskoy kultury perioda paleometalla v Primorye. *Rossiyskaya arkheologiya*, No. 2: 43–60.

Received February 10, 2022.

doi:10.17746/1563-0110.2022.50.2.071-080

P.K. Dashkovskiy
Altai State University,
Pr. Lenina 61, Barnaul, 656049, Russia
E-mail: dashkovskiy@fpn.asu.ru

Burial of the Pazyryk Elite Members at Khankarinsky Dol, Northwestern Altai

This article presents the results of an interdisciplinary study of kurgan 30 at Khankarinsky Dol, located on the left bank of the Inya River, 1–1.5 km southeast of Chineta, Krasnoshchekovsky District, Altai Territory (northwestern Altai). This is a Pazyryk kurgan, under which a looted double burial of a male and an adolescent was found. Their heads were apparently oriented toward the east. Along the northern wall of the grave, an accompanying burial of seven horses was found, placed in two rows, heads oriented to the east. The morphological analysis showed all of them to be stallions, resembling those from other mounds of this group. Morphological comparison with horses from other Pazyryk kurgans in the Altai revealed both similarities and differences. Analysis of the grave goods, including iron bits, a bone pipe-shaped bead, tiny bronze daggers in wooden scabbards, a pickaxe, numerous fragments of gold foil from the horse harness, and fragments of Chinese wooden lacquer ware, suggests that the burial was made no earlier than the 4th century BC—possibly in the late 4th to early 3rd century BC. Radiocarbon analysis was carried out at the Tomsk Institute for Monitoring Climatic and Ecological Systems of the SB RAS Center for Isotopic Studies. The funerary rite and the artifacts suggest that kurgan 30 was constructed for members of the nomadic elite of the northwestern Altai.

Keywords: *Altai, Scythian-Saka period, Pazyryk culture, funerary rite, grave goods, radiocarbon dating.*

Introduction

The Khankarinsky Dol cemetery is a part of the Chineta archaeological microdistrict located in the vicinity of the village of Chineta, in Krasnoshchekovsky District, Altai Territory (northwestern Altai). The site is in the eastern part of the second floodplain terrace on the left bank of the Inya River (left tributary of the Charysh River), 1–1.5 km southeast of that village (Fig. 1). For over twenty years, archaeological research at this cemetery has been carried out by the Krasnoshchekovo Archaeological Expedition of the Altai State University. Currently, more than thirty objects dated to the Scythian-Saka period have been excavated. The present article introduces the preliminary results from studying kurgan 30 at Khankarinsky Dol, which belongs to the Pazyryk culture of the Altai.

Description of the funerary rite

Kurgan 30 was found in the southern part of the Khankarinsky Dol cemetery. The diameter of the stone mound, composed of two to four layers of small and medium-sized stones, reached 9.75 m along the N-S line, and 11 m along the W-E line (Fig. 2). The height of the stone structure was 0.5 m, and reached 0.7 m together with the layer of soil. A hollow reaching 4 m in diameter was in the central part of the mound. A subrectangular grave-pit measuring 3.3 × 3.2 × 3.04 m (the depth of

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 71–80 E-mail: Eurasia@archaeology.nsc.ru

Fig. 1. Location of the Khankarinsky Dol cemetery.

the grave is given from the zero reference point) was found under the mound. It contained a paired burial of people, badly damaged by robbers. Although the bones of the skeletons turned out to be severely damaged and scattered over the grave, it was possible to establish the sexes and ages of the buried persons: a male 23–25 years of age, and adolescent male 13–14 years of age*. The crushed skull of an adult was discovered in the central part of the grave-pit, at a depth of 3 m. Two bronze daggers and wooden scabbard lay 0.35 m to the west of it, and a bronze pickaxe with a wooden socket was found 0.3 m to the south. Two accumulations of lacquer fragments on the wooden base, possibly from lacquer items (cups?), were discovered near the skull, on the northern and southern sides. The jaw of a teenager was in the northeastern corner of the grave, near the skull of horse No. 5. The dead persons were oriented with their heads to the east. The remains of tibia bones, probably from the skeleton of the teenager, and ribs were located 1.1 m northwest of the man's skull. Two more bronze daggers and fragments of a poorly preserved wooden scabbard were next to them. Fragments of pelvis, tibia, and vertebrae remaining from the male skeleton were discovered to the east of the skull. Ritual food (sheep bones) and an iron ringed knife were near them. Three clusters of gold foil fragments were among the bone fragments. A wooden chopping-block 1.45 m long, probably remaining from a burial structure in the form of a frame, has been preserved along the southern wall of the grave.

An accompanying burial of seven horses, which were laid in two rows one after another and oriented with their heads to the east, was along the northern wall of the grave-pit, at a depth of 2.72–3.01 m (Fig. 3). Iron ringed bits were found in the teeth of five of them. Two bits were wrapped in gold foil. A fragment of a round bone flat bead was discovered near the ribs of one horse. In addition, numerous fragments of foil, which might have remained from harness-decoration, were in the area of the ribs and three skulls of horses.

Cultural and chronological attribution of the grave goods

Despite the robbery of the kurgan, grave goods included various types of items. Weaponry was represented by four bronze daggers in wooden scabbards, and a bronze pickaxe. All daggers were replicas of real items reduced in size, and each had a pommel in the form of a bar, and a straight crossbar. The total length of the first dagger (Fig. 4, *1*), which is the best preserved, is 19.3 cm; the length of the rhombic blade is 10.6 cm; width at the crossbar 2.1 cm; thickness 0.9 cm. The blade-tip of the second dagger had been broken off (Fig. 5, *3*). The length of the surviving part of the blade is ca 8 cm; length of the handle 6.2 cm. The crossbar is somewhat

Fig. 2. Kurgan 30 after removing the mound.

*Sex and age were identified by S.S. Tur, whom we thank for her assistance.

Fig. 3. Burial in kurgan 30.

arcuate, but is closer to straight line. The third dagger (Fig. 5, *1*) was heavily oxidized. Its maximum width in the area of the crossbar is 2.3 cm; thickness is about 1 cm. The total length of the surviving part of that item is 18 cm; length of the blade 9.5 cm; length of the handle 6.6 cm. The fourth dagger (Fig. 6, *1*, *2*) was broken in three places. The original total length was probably 19.5 cm; length of the blade 10.1 cm. The width of the blade in the area of the crossbar is 2.0 cm; length of the handle 1.5 cm, maximum thickness at the crossbar 0.8 cm.

Items of this type are well known from the Pazyryk sites in the Altai (Kiryushin, Stepanova, 2004: 54–55; Kubarev, 1991: 73–75; Kubarev, Shulga, 2007: 74–81). For example, bronze and wooden miniature replicas of daggers with pommels in the form of a bar and straight crossbars have been found in burials at the cemeteries of Aragol (kurgan 1), Barburgazy II (kurgan 18) (Surazakov, 1989: 41–42, fig. 16, *4*, 6), Kaindu (kurgan 13) (Kiryushin, Stepanova, 2004: 55, fig. 18, *2*), Yustyd II (kurgan 23) (Kubarev, 1991: Pl. LII, 23), and others. A bronze dagger from kurgan 3 at Kyzyl-Dzhar V may be attributed to the same type. Although its crossbar retained a slight "brokenness" of shape, it tended towards the straight line (Mogilnikov, 1983: 40–47; Surazakov, 1989: 42, fig. 16, *3*). In some cases, these specimens had slotted handles. This

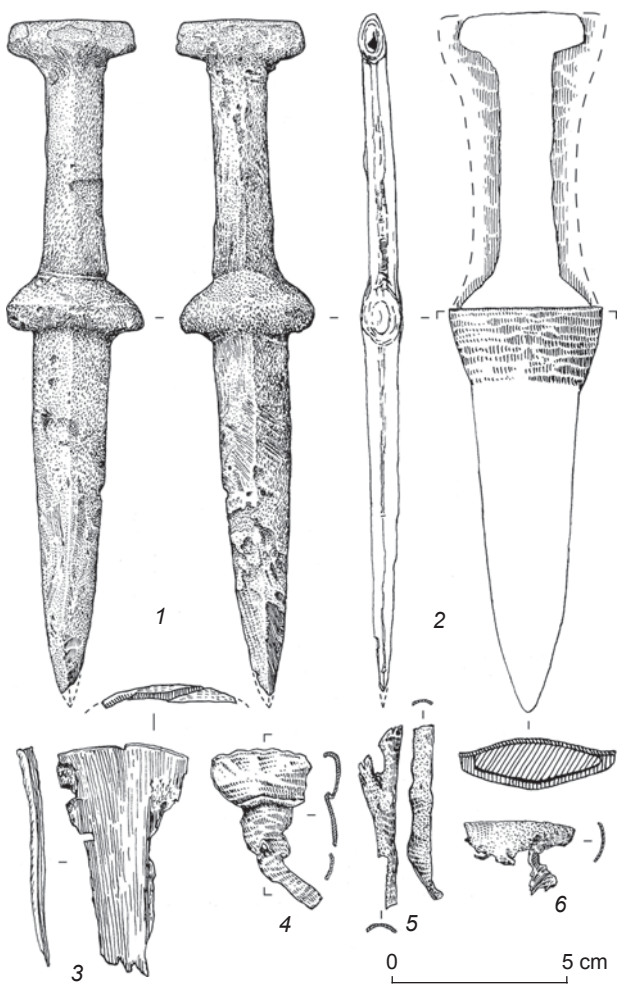


Fig. 4. Bronze dagger (*1*), fragments of wooden scabbard (*3–6*), and reconstructed dagger in the scabbard (*2*).

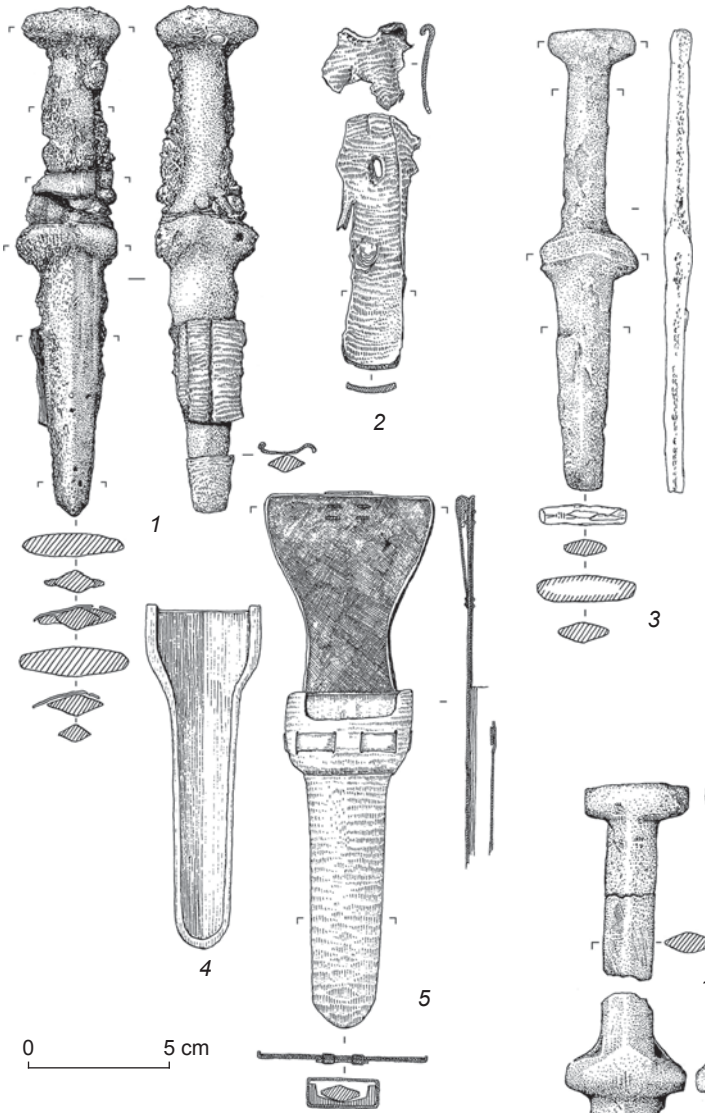


Fig. 5. Bronze daggers (*1*, *3*), fragment of wooden scabbard (*2*), and their reconstruction (*4*, *5*).

distinguishes them from the daggers found in kurgan 30 at Khankarinsky Dol. Daggers (and their reduced replicas) with straight crossbars are traditionally considered to be later, existing from the 4th century BC and becoming widespread in the 3rd–2nd centuries BC (Surazakov, 1989: 49). Daggers of the type under consideration, but made of iron, occur among the evidence of the Kamen culture; for example, in burial 2 of kurgan 16 at the Novotroitsk II cemetery, dated to the late 4th–3rd centuries BC (Mogilnikov, 1997: 46, fig. 37, *4*). Bronze daggers with straight crossbars but mushroom-shaped pommels have been found in the contemporaneous Sagly sites of Tuva, such as in kurgan 5 at the Sagly-Bazhi II cemetery (Grach, 1980: 169, fig. 31). However, it may be the case that bronze daggers with straight crossbars could have existed at the initial stage of the Pazyryk culture of the Altai (Kubarev, Shulga, 2007: 82). A dagger of the 6th century BC from grave 38 at the Staroaleika-2 cemetery, in the Upper Ob region, had an almost straight crossbar (Kiryushin, Kungurov, 1996: Fig. 9, *2*).

Fragments of three scabbards were also found in kurgan 30 at Khankarinsky Dol. The best-preserved scabbard was from the fourth dagger (Fig. 6, *3*, *4*). The lower part of the scabbard was made of wood; the upper part, of leather. Special grooves were cut inside the wooden base, according to the shape of the dagger. The length of its surviving part is 10.5 cm; width at the bottom 1.4 cm; width at the top

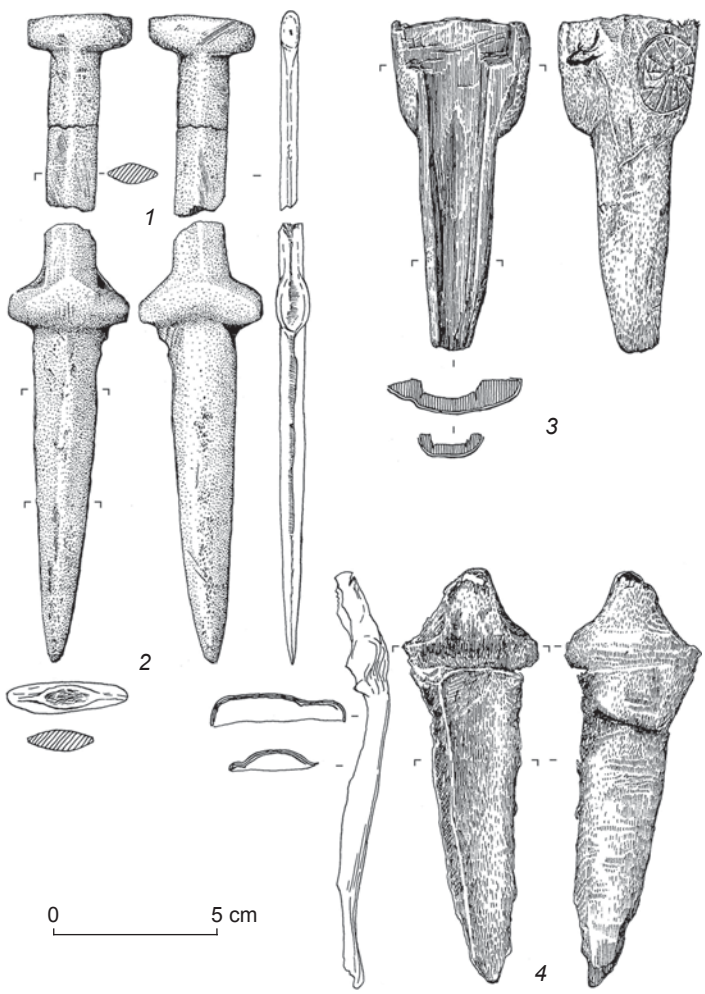


Fig. 6. Bronze dagger (*1*, *2*) and wooden scabbard (*3*, *4*).

4.2 cm. Notably, the upper part of the wooden base retains the rectangular shape of dagger's crossbar, which it originally had. The length of the preserved leather part of the scabbard is 12.6 cm. It repeated the shape of the wooden part. Similar scabbards, consisting of two parts, might have been made for the rest of the daggers. At least this was possible to observe for the first and third dagger, despite the poor preservation of the scabbards (see Fig. 4, *2–6*; 5, *2*, *4*, *5*). This allowed us to perform their reconstruction (see Fig. 5, *4*, *5*).

Scholars believe that real scabbards for daggers consisted of two planks, while those with wooden bases and leather tops were specially made for funerary rites (Kubarev, 1981: 48; Kubarev, Shulga, 2007: 84–85). At the same time, scabbards consisting of one wooden plank and a leather part are known both from the early and late stages of the Pazyryk culture (Rudenko, 1953: 240, fig. 149; Sorokin, 1974: 90; Kubarev, 1981: 44–45). This type of item, used by the Altai nomads of the Pazyryk time, evolved from a single prototype—the Saka scabbards of the 6th–5th centuries BC. Scabbards similar to Saka scabbards were quite widespread among the Sauromatians, Scythians, and many Iranian peoples. It is no coincidence that V.D. Kubarev even suggested the term "scabbard of the Iranian-Altai type". He emphasized that many nomadic peoples wore them in the same manner. For example, as has been repeatedly established, nomads usually wore their dagger in the scabbard on their hip, and fastened it to their legs with special straps so that it would not dangle (Kubarev, 1981: 51–52; Kubarev, Shulga, 2007: 103–105). Obviously, similar fastening elements must have been present on the scabbards from kurgan 30 at Khankarinsky Dol.

The bronze pickaxe was 14 cm long (Fig. 7, *1*); the maximum width of the striking part was 1.2 cm; the maximum width of the back 1.6 cm; the outer diameter of the socket 1 cm, and the inner diameter 0.8 cm. The item under discussion survived, together with a fragment of leather strap and a wooden socket 5.6 cm long, which made it possible to reconstruct the item (Fig. 7, *2–6*, *8*). Different approaches to the classification of pickaxes have been proposed (Kocheev, 1988; Surazakov, 1989: 51–54; Hudiakov, 1995; Kubarev, 1991: 77–76; Kiryushin, Stepanova, 2004: 58–59). Depending on the size, they were divided into real, reduced, and miniature items. V.A. Kocheev mentioned (1988: 147) that the length of real bronze shaft-hole pickaxes was 18–20 cm, and the length of iron pickaxes was over 20 cm. Accordingly, he considered the group of pickaxes with this parameter less than 18 cm as reduced items. A.S. Surazakov pointed out that pickaxes with the striking part less than 20 cm long could also be considered as reduced (1989: 51). A more differentiated approach was suggested by Kubarev. He identified three groups: full-sized iron battle pickaxes with a total length of 20–24 cm, reduced pickaxes made of bronze (total length of 12–15 cm), and miniature bronze and wooden pickaxes (total length of 9–10 cm). Contrary to the opinion of many other scholars, Kubarev emphasized that reduced bronze replicas most likely were not used on the battlefield. In support of his view, he mentioned the analysis of the items and traces from the blows of real combat pickaxes on the skulls of killed people and horses (Kubarev, 1991: 79).

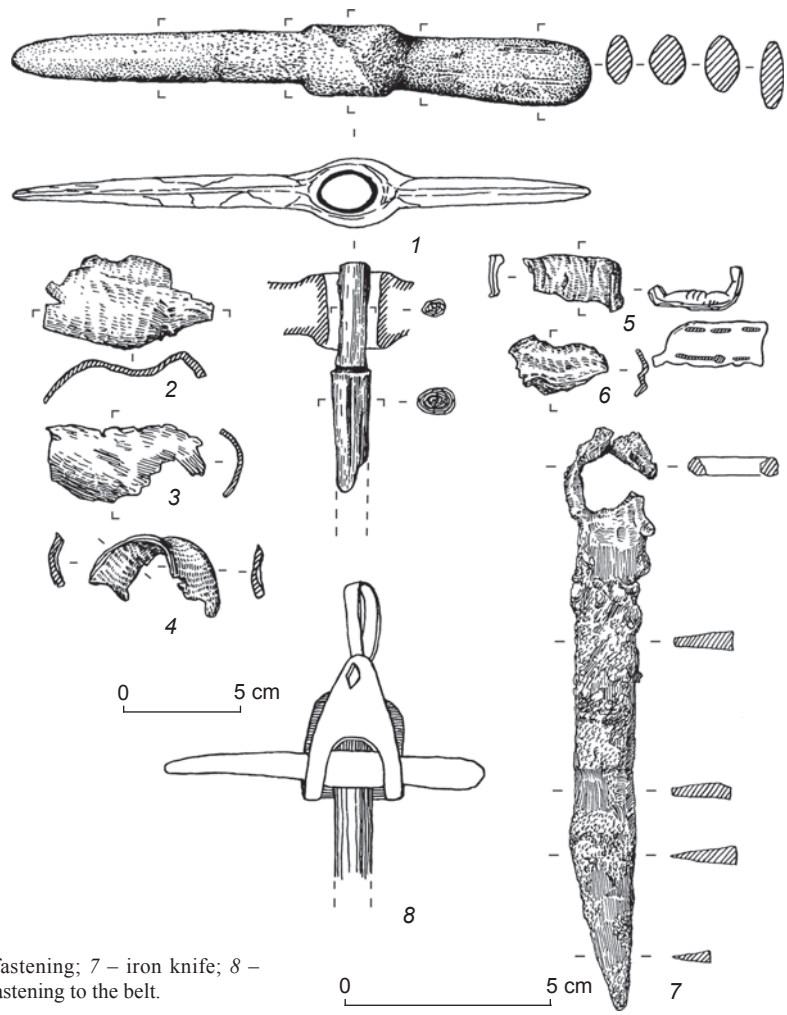


Fig. 7. Grave goods.
1 – bronze pickaxe; *2–6* – leather fragments from fastening; *7* – iron knife; *8* – reconstruction of the pickaxe with leather fastening to the belt.

The item from kurgan 30 at Khankarinsky Dol belongs to shaft-hole pickaxes with rounded back and striking parts (Surazakov, 1989: 52; Kiryushin, Stepanova, 2004: 58). This was one of the most common types of weaponry among the nomads in the Altai Mountains in the Pazyryk period (Kubarev, Shulga, 2007: 86–87; Surazakov, 1989: 53–54). Such pickaxes have been found at the cemeteries of Tytkesken VI (kurgans 6, 11, 29), Biyke III (kurgan 2), Kaindu (kurgan 12) and others (Kiryushin, Stepanova, 2004: 58, fig. 20, *4*; 21, *1*, *2*, *4*; 22, *6*). Moreover, such pickaxes, as well as items with the very short, barely noticeable socket, are known from Tuva (Grach, 1980: 170, fig. 32, *4–6*; 53) and northwestern Mongolia (Tsevendorj, 1978: Fig. 2, *5*). There are almost no pickaxes of this type in the Upper Ob region and Kazakhstan, with the exception of two items (Mogilnikov, 1997: 48–52; Kiryushin, Stepanova, 2004: 60–61).

In addition to weapons, elements of horse harness, including a round bone flat bead (Fig. 8, *6*) and five ringed iron bits (Fig. 8, *1–5*), were discovered in kurgan 30 at Khankarinsky Dol. The bead, of which only a half has survived (Fig. 8, *6*), originally had a diameter of 3 cm, a thickness of 0.5 cm, and a round hole 0.9 cm in diameter. One of its sides was slightly convex. This item is interpreted as simple flattened saddle bead used as a locking button-plaque. The role of the loop was played by the knot at the end of the strap passed into it. In kurgans of the Early Pazyryk period and times close to this, such beads were usually found one at a time (Shulga, 2015a: 156). They could have also been used for tightening the front saddlebows (supports) together with small pendants (Stepanova, 2006: 133). Beads of that type have been found in burials at Chendek-6a (kurgan 5) (Kireev, Shulga, 2006), Kaindu (kurgan 7) (Kiryushin, Stepanova, 2004: 53–56, Fig. 55, *8*), Kok-Su I (kurgan 31) (Sorokin, 1974), Borotal-1 (kurgan 99), Borotal-3 (kurgans 2, 4), Ala-Gail-3 (kurgan 11) (Kubarev, Shulga, 2007: 224, Fig. 30, *12–16*; 234, fig. 39, *12–16*; 238, fig. 43, *6*, *10*), Kool I (kurgan 501) (Bogdanov, Slyusarenko, 2003), Chineta II (kurgan 21) (Dashkovskiy, 2018), etc.

Two-piece iron bits with the single-ringed end of the links are represented by four sets (Fig. 8, *2–5*) and one link (Fig. 8, *1*). In all cases, the end of the link look rather like a loop than a ring. The links in two sets of bits were 15.0–15.7 cm long; the rest were 10.7–11.3 cm long; the diameter of the outer ring-loop was 4 cm and 2.5–4.5 cm. Bits of that type have been found in large numbers both at the cemeteries of Khankarinsky Dol and Chineta II, and at other Pazyryk sites in the Altai (Dashkovskiy, Meikshan, 2015; Kubarev, 1991: 42–44; Kubarev, Shulga, 2007: 270, fig. 4, *11–18*; Shulga, 2015a: 93–97; Kiryushin, Stepanova, 2004: 45–46; and others). They appeared in the Altai Mountains in the 6th century BC and existed throughout the entire period of the Pazyryk culture. Some scholars have mentioned the predominance of bits with sub-quadrangular cross-section of the rod and loop-shaped end of the link in the Late Pazyryk culture, and round cross-section of the rod and ring-shaped outer end in the Early Pazyryk culture (Surazakov, 1989: 25; Kubarev, 1992: 32). However, more detailed analysis has revealed that both varieties occurred both in early and late burials of the Pazyryk culture (Shulga, 2015a: 96). Four bits out of those found in kurgan 30 at Khankarinsky Dol had sub-quadrangular cross-sections of the rod, and one item probably had a round cross-section. Two bits discovered between the

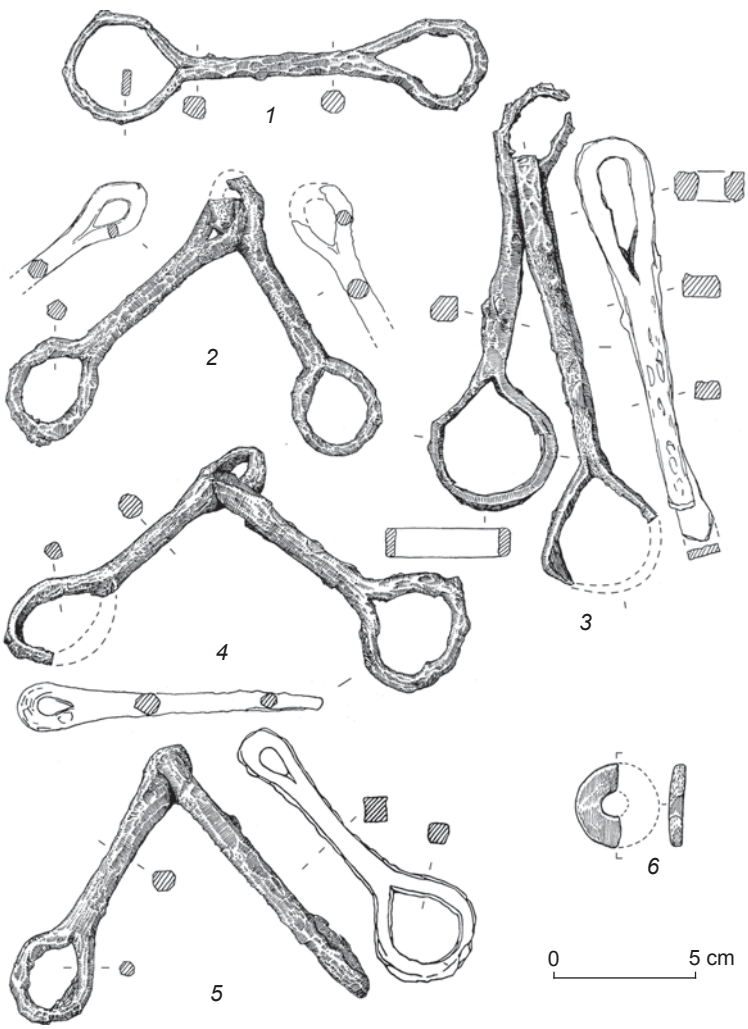


Fig. 8. Iron bit (*1–5*) and bone tubular bead (*6*).

skulls of the first and second, as well as the fourth and sixth horses, were wrapped in golden foil. The foil's fragments, probably remaining from harness decoration, were found near the skulls (or under them) of the second, fourth, and fifth horses. Accumulations of foil were located in the area of the hind hooves of the sixth horse, and in the central and eastern parts of the grave.

Valuable finds—two clusters of lacquer fragments (red and black) on the wooden base (they will be analyzed in a separate study)—were discovered near the skull of the man. At this stage, it can be assumed that these were the remains of wooden lacquerware, possibly *er-bei* wine cups (?). Previously, similar items of Chinese import were found in kurgans 21 and 31 at Chineta II, located in the same river valley as the Khankarinsky Dol necropolis (Dashkovskiy, Novikova, 2017). These kurgans date back to the second half of the 4th–3rd centuries BC. Chinese items have been discovered in the elite Pazyryk kurgans also dated mainly to the 4th–3rd centuries BC (Shulga, 2015b: 370).

Radiocarbon dating

The dating of kurgan 30 at Khankarinsky Dol on the basis of grave goods was supplemented by radiocarbon analysis, which was carried out at the Analytical Center for Isotope Research at the Institute of Monitoring of Climatic and Ecological Systems SB RAS in Tomsk. The ^{14}C date of 2562 ± 150 BP was obtained from a horse bone sample. Its calibration was performed using the CALIB REV-8.2 software by G.V. Simonova, and gave the following values: 768–416 BC by 1δ (68 %), 910–198 BC by 2δ (95 %), and the average date of 585 BC.

The results point to a somewhat early date, but generally within the period of the Pazyryk culture in the Altai. They complement the information on kurgans at Khankarinsky Dol and Chineta II in the Chineta archaeological microdistrict (Dashkovskiy, 2018, 2020; and others) obtained by radiocarbon dating. In the future, it is planned to re-analyze the samples in another laboratory, also using the AMS-method, which will make it possible to clarify the age of the site. As a result of studying the archaeological evidence, it has been established quite accurately that this burial did not contain any items that would indicate its exceptionally early date within the Pazyryk period. However, a kurgan belonging to the early stage of that culture with a typical set of grave goods was previously excavated at Khankarinsky Dol, which indicates the penetration of the "Pazyryks" into this area at the turn of the 6th–5th centuries BC (Dashkovskiy, 2020). Distinctive features of the goods discovered in the burial under discussion, including the presence of Chinese imported items, makes it possible to conclude that kurgan 30 was made no earlier than the 4th century BC, possibly in the second half of the 4th to early 3rd century BC.

Morphological description of the horses

Studying horse remains from kurgans of the Pazyryk culture in the northwestern Altai is an important field of research. Some of its results have been published (Plasteeva, Dashkovskiy, Tishkin, 2020). Therefore, we shall present only the most important morphological parameters of seven horses from kurgan 30 at Khankarinsky Dol and findings*. It has been established that all the individual horses were stallions. Three horses were 15–18 years of age; the rest were of different ages, namely, 3–4, 4–5, 5–6, and 9–12 years. According to the height at the withers, they corresponded to two categories: medium height (136–144 cm) and height below average (128–136 cm). According to the massiveness of their bones, the horses were distinguished as medium-legged and semi-thin-legged. In terms of the height at the withers, they resembled the horses from other Pazyryk cemeteries in the Altai. There were no horses above average height in any excavated kurgans at the site. This might have been caused by local features of horse keeping and use, or adapting to the natural and climatic conditions of the region. Another possible factor is that most of the kurgans at the Khankarinsky Dol site date back to the final stage of the Pazyryk culture (4th–3rd centuries BC), when horses could have been smaller. In terms of bone massiveness, these animals also did not differ much from Pazyryk horses from other regions of the Altai. Noteworthy is the predominance of medium-legged horses in kurgan 30, since semi-thin-legged horses were more typical of the burials at the Pazyryk cemeteries (Grebnev, Vasiliev, 1994; Kosintsev, Samashev, 2014: 136–141; Plasteeva, Tishkin, Sablin, 2018).

According to the dimensional features of skeletal bones, the horses from kurgan 30 did not differ from horses found in other burials of Khankarinsky Dol, which indicates the morphological homogeneity of horses from the northwestern Altai. Generally, horses from kurgans at that site were somewhat larger in skull size than those buried at the well-known cemeteries of Ak-Alakha-1 and Ulandryk I–II, and in their length they were smaller only than horses from Berel, Pazyryk, and Shibe. According to the main features of humerus, radius, femur, and tibia, as well as length of metacarpal and metatarsal bones, they were somewhat smaller than horses from the latter three cemeteries. They were comparable to horses from Ak-Alakha-1 and Kuturguntas I, but larger than horses

*Paleozoological identification was made by N.A. Plasteeva, to whom the author is especially grateful.

from Ulandryk I and II. These preliminary comparisons additionally indicate the decrease in sizes of horses at the late stage of the Pazyryk culture (Plasteeva, Dashkovskiy, Tishkin, 2020: 124–128).

Social attribution of burials

The area of the Pazyryk sites suggests the presence of an extensive political entity of nomads, which had both a center headed by political elite, and a periphery with its own power system (Tishkin, Dashkovskiy, 2019). "Royal" burials remaining from the representatives of the supreme power are quite easily identified from their scale and the richness of the grave goods. However, identification of burial sites of the regional elite is hampered by the absence of similar clear markers. At the present stage, problems associated with the study of the elite in the structure of nomadic societies, including the Scythian-Saka period, are well investigated in the Nomadic Studies (Elita…, 2015: 11–98). The indicators of the regional elite, along with the parameters of the burial complexes, should include "prestigious" items that had the greatest value in the nomadic society (Kharinsky, 2004: 108). In addition to determining the dynamics of changes in the social system, an important function of the elite was the formation of a certain "nomadic fashion" (Dashkovskiy, 2005: 241). This was manifested by the desire of the local authorities to imitate political leaders in possessing the most "high-status" items. For the Pazyryk culture, these included imported goods, such as lacquerware, weaponry, elements of clothing complex made with gold, and jewelry in the Scythian animal style (Elita…, 2015: 11–98).

"Royal" and elite sites of the Pazyryk culture are located mainly in the central and southeastern Altai, delineating the sacred center of the political entity of the "Pazyryk people" (Kiryushin, Stepanova, Tishkin, 2003: 8–14, fig. 3). However, the geographical spread of this entity was much larger, and included vast areas in the foothills and mountains of the Russian Altai, as well as adjacent areas of Mongolia, Kazakhstan, and China. The geographical locations of the sites and results of their research have made it possible to identify several political zones where the population was concentrated, as well as "royal" and elite burial complexes (Anufriev, 1997; Tishkin, Dashkovskiy, 2019). N.V. Polosmak pointed out the presence of elite burials that differed from "royal" burials in an individual region, in particular in the southeastern Altai. In the social context, she used the terms "middle layer", "clan aristocracy", or "elite layer" as synonyms (Polosmak, 1994: 56; 2001: 280). The northwestern Altai was one of the areas of the Pazyryk culture, which included the so-called Charysh (northwestern) group of sites in the Charysh River basin, with a complex in the valley of the Sentelek River and the cemeteries of Khankarinsky Dol and Chineta II. So far, only one Pazyryk "royal" kurgan has been reliably identified there at the Urochishche Balchikova-3 cemetery (kurgan 1), in the Sentelek River valley (Shulga, Demin, 2021: 43–63). It was previously mentioned that it is possible to identify the burials belonging to the representatives of the regional elite at the Khankarinsky Dol and Chineta II sites (Elita…, 2015: 99–107). Analysis of the evidence confirmed the attribution of the kurgan under discussion to such burials, taking into account several important points. According to its parameters, kurgan 30 at Khankarinsky Dol belongs to the group of small barrows, since its maximum diameter is 11 m; its height reaches 0.7 m, and the volume of the grave-pit is about 28 m^3. However, the paired burial of a male adult and a teenager was accompanied by the burial of seven horses, which is the most important sign of the relatively high social status of the buried persons. Approximately 37 % of the Pazyryk burials contained an accompanying burial of one to three horses. Burials with more than three horses (from 4 to 22) were found only in a little more than twenty excavated kurgans (Tishkin, Dashkovskiy, 2003: 147–149). However, all of them were distinguished by the relatively large sizes of both the mound and the intra-burial structure. Importantly, kurgan 30 at Khankarinsky Dol yielded Chinese wooden lacquerware, which is interpreted as a sign of a rather high social status of the buried persons of the Pazyryk culture (Dashkovskiy, Novikova, 2017). Weapons (four miniature daggers in wooden scabbards, and a pickaxe), as well as a significant amount of golden foil, including the foil remaining from decorating the elements of horse equipment, were found in the burial, despite its robbery. By the character of its grave goods and the presence of the accompanying burial of seven horses, kurgan 30 at Khankarinsky Dol stands out noticeably among other excavated kurgans both in the Chineta archaeological microdistrict and in the entire northwestern Altai. This makes it possible to draw a conclusion about the relatively high social status of the buried persons.

Conclusions

The study has shown that kurgan 30 at Khankarinsky Dol belonged to the Pazyryk culture of the Altai. The analysis of the archaeological evidence, and radiocarbon dating, have shown that the time of this paired burial was not earlier than the 4th century BC—possibly the second half of the 4th to early 3rd century BC. The presence of the accompanying burial of seven horses, imported Chinese items, four miniature daggers in wooden scabbards, and the rich decoration of horse equipment, indicates high

social status for the buried persons and their affiliation with the regional elite.

Morphological analysis of the horse remains from kurgan 30 has shown that all animals were stallions; they did not differ from horses buried in other burials at Khankarinsky Dol. Comparison with horses from other Pazyryk kurgans, studied in different regions of the Altai, has revealed both morphological similarities and differences.

References

Anufriev D.E. 1997
Sotsialnoye ustroistvo pazyrykskogo obshchestva Gornogo Altaya. In *Sotsialno-ekonomicheskiye struktury drevnikh obshchestv Zapadnoy Sibiri: Materialy Vseros. nauch. konf*. Barnaul: Izd. Alt. Gos. Univ., pp. 108–111.

Bogdanov E.S., Slyusarenko I.Y. 2003
Arkheologicheskiye issledovaniya na pamyatnike Kool-1 v doline r. Aktru (Gornyi Altai). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. IX (I). Novosibirsk: Izd. IAET SO RAN, pp. 272–276.

Dashkovskiy P.K. 2005
Formirovaniye elity kochevnikov Gornogo Altaya v skifskuyu epokhu. In *Sotsiogenez v Severnoy Azii: Materialy Vseros. nauch. konf. s mezhdunar. uchastiyem*. Irkutsk: Irkut. Gos. Tekhn. Univ., pp. 239–244.

Dashkovskiy P.K. 2018
Radiouglerodnoye i arkheologicheskoye datirovaniye pogrebeniya skifskogo vremeni na mogilnike Chineta II (Altai). *Narody i religii Yevrazii*, No. 2: 9–23.

Dashkovskiy P.K. 2020
An Early Pazyryk kurgan at Khankarinsky Dol, Northwestern Altai: Chronology and attribution of artifacts. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 48 (1): 91–100.

Dashkovskiy P.K., Meikshan I.A. 2015
Izucheniye regionalnoy elity kochevnikov Yuzhnoy Sibiri, Zapadnogo Zabaikalya i Severnoy Mongolii epokhi pozdney drevnosti (na primere pazyrykskogo obshchestva i khunnu). In *Elita v istorii drevnikh narodov Yevrazii*, P.K. Dashkovskiy (ed.). Barnaul: Izd. Alt. Gos. Univ., pp. 99–107.

Dashkovskiy P.K., Novikova O.G. 2017
Chinese lacquerware from the Pazyryk burial ground Chineta II, Altai. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 45 (4): 102–112.

Elita v istorii drevnikh i srednevekovykh narodov Yevrazii. 2015
P.K. Dashkovskiy (ed.). Barnaul: Izd. Alt. Gos. Univ.

Grach A.D. 1980
Drevniye kochevniki v tsentre Azii. Moscow: Nauka.

Grebnev I.E., Vasiliev S.K. 1994
Loshadi iz pamyatnikov pazyrykskoy kultury Yuzhnogo Altaya. In *Polosmak N.V. "Steregushchiye zoloto grify" (ak-alakhinskiye kurgany).* Novosibirsk: Nauka, pp. 106–111.

Hudiakov Y.S. 1995
Kollektsiya oruzhiya skifskogo vremeni iz mogilnikov Saldam i Ust-Edigan. In *Izvestiya laboratorii arkheologii*, No. 1. Gorno-Alt. Gos. Univ., pp. 87–101.

Kharinsky A.V. 2004
Prestizhniye veshchi v pogrebeniyakh Baikalskogo poberezhya kontsa I tys. do n.e. – nachala II tys. n.e. kak pokazatel regionalnykh kulturno-politicheskikh protsessov. In *Kompleksniye issledovaniya drevnikh i traditsionnykh obshchestv Yevrazii*. Barnaul: Izd. Alt. Gos. Univ., pp. 108–114.

Kireev S.M., Shulga P.I. 2006
Sbruyniye nabory iz Uimonskoy doliny. In *Izucheniye istoriko-kulturnogo naslediya narodov Yuzhnoy Sibiri*, iss. 3/4. Gorno-Altaisk: pp. 90–107.

Kiryushin Y.F., Kungurov A.L. 1996
Mogilnik rannego zheleznogo veka Staroaleika-2. In *Pogrebalniy obryad drevnikh plemen Altaya*. Barnaul: Izd. Alt. Gos. Univ., pp. 115–134.

Kiryushin Y.F., Stepanova N.F. 2004
Skifskaya epokha Gornogo Altaya. Pt. III: Pogrebalniye kompleksy skifskogo vremeni Sredney Katuni. Barnaul: Izd. Alt. Gos. Univ.

Kiryushin Y.F., Stepanova N.F., Tishkin A.A. 2003
Skifskaya epokha Gornogo Altaya. Pt. II: Pogrebalno-pominalniye kompleksy pazyrykskoy kultury. Barnaul: Izd. Alt. Gos. Univ.

Kocheev V.A. 1988
Chekany Gornogo Altaya. In *Problemy izucheniya kultury naseleniya Gornogo Altaya*. Gorno-Altaisk: GANIIIYaL, pp. 144–162.

Kosintsev P.A., Samashev Z.S. 2014
Berelskiye loshadi: Morfologicheskoye issledovaniye. Astana: Filial Inst. arkheologii im. A.K. Margulana. (Materialy i issledovaniya po arkheologii Kazakhstana; vol. V).

Kubarev V.D. 1981
Kinzhaly iz Gornogo Altaya. In *Voyennoye delo drevnikh plemen Sibiri i Tsentralnoy Azii*. Novosibirsk: Nauka, pp. 29–54.

Kubarev V.D. 1991
Kurgany Yustyda. Novosibirsk: Nauka.

Kubarev V.D. 1992
Kurgany Sailyugema. Novosibirsk: Nauka.

Kubarev V.D., Shulga P.I. 2007
Pazyrykskaya kultura (kurgany Chui i Ursula). Barnaul: Izd. Alt. Gos. Univ.

Mogilnikov V.A. 1983
Kurgany Kyzyl-Dzhar II–V i nekotoriye voprosy sostava naseleniya Altaya vo vtoroy polovine I tys. do n.e. In *Voprosy arkheologii i etnografii Gornogo Altaya*. Gorno-Altaisk: GANIIIYaL, pp. 40–71.

Mogilnikov V.A. 1997
Naseleniye Verkhnego Priobya v seredine – vtoroy polovine I tys. do n.e. Moscow: Nauka.

Plasteeva N.A., Dashkovskiy P.K., Tishkin A.A. 2020
Morfologicheskaya kharakteristika loshadey iz pamyatnikov pazyrykskoy kultury Severo-Zapadnogo Altaya. *Teoriya i praktika arkheologicheskikh issledovaniy*, No. 4: 123–130.

Plasteeva N.A., Tishkin A.A., Sablin M.V. 2018
Loshadi iz Bolshogo Katandinskogo kurgana (Altai). In *Sovremenniye resheniya aktualnykh problem yevraziyskoy arkheologii*, iss. 2. Barnaul: Izd. Alt. Gos. Univ., pp. 107–109.

Polosmak N.V. 1994
"Steregushchiye zoloto grify" (ak-alakhinskiye kurgany). Novosibirsk: Nauka.

Polosmak N.V. 2001
Vsadniki Ukoka. Novosibirsk: INFOLIO.

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

Shulga P.I. 2015a
Snaryazheniye verkhovoy loshadi v Gornom Altaye i Verkhnem Priobye, Pt. II: (VI–III vv. do n.e.). Novosibirsk: Izd. Novosib. Gos. Univ.

Shulga P.I. 2015b
Datirovka kurganov Pazyryka i kitaiskikh zerkal s T-obraznymi znakami. In *Arkheologiya Zapadnoy Sibiri i Altaya: Opyt mezhdistsiplinarnykh issledovaniy*. Barnaul: Izd. Alt. Gos. Univ., pp. 366–371.

Shulga P.I., Demin M.A. 2021
Kurgany Senteleka. Novosibirsk: Izd. SO RAN.

Sorokin S.S. 1974
Tsepochka kurganov vremen rannikh kochevnikov na pravom beregu r. Kok-Su (Yuzhniy Altai). *ASGE*, iss. 16: 62–91.

Stepanova E.V. 2006
Evolyutsiya konskogo snaryazheniya i otnositelnaya khronologiya pazyrykskoy kultury. *Arkheolologicheskiye vesti*, iss. 13: 102–150.

Surazakov A.S. 1989
Gornyi Altai i yego severniye predgorya v epokhu rannego zheleza: Problemy khronologii i kulturnogo razgranicheniya. Gorno-Altaisk: GANIIIYaL.

Tishkin A.A., Dashkovskiy P.K. 2003
Sotsialnaya struktura i sistema mirovozzreniy naseleniya Altaya skifskoy epokhi. Barnaul: Izd. Alt. Gos. Univ.

Tishkin A.A., Dashkovskiy P.K. 2019
The social complexity of the Pazyryk culture in Altai, 550–200 BC. *Social Evolution and History*, vol. 18 (2): 73–91.

Tsevendorj D. 1978
Chandmanskaya kultura. In *Arkheologiya i etnografiya Mongolii*. Novosibirsk: Nauka, pp. 108–117.

Received December 13, 2021.
Received in revised form January 26, 2022.

doi:10.17746/1563-0110.2022.50.2.081-089

V.P. Mylnikov
Institute of Archaeology and Ethnography,
Siberian Branch, Russian Academy of Sciences,
Pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia
E-mail: mylnikov@archaeology.nsc.ru

Analysis and Museumization of a Wooden Burial Structure from Pazyryk Kurgan 5, the Altai Mountains: A Methodological Study

This article describes the methods used in the multidisciplinary study, preservation, and museumization of a wooden structure from a grave under the Early Iron Age kurgan 5 at Pazyryk in the Altai. The structure consisted of two chambers with additional elements on top. Its technological analysis was carried out during the excavations, and the structure was subjected to special treatment after extraction. At the side the mound, the outer cribwork was reconstructed; its details and technologies were evaluated. The stages in the field conservation of all artifacts are described. The museumization of the outer cribwork at the Anokhin National Museum of the Republic of Altai is outlined.

Keywords: *Archaeological site, Altai, Scythian period, Pazyryk cemetery, kurgan 5, wooden burial structure, multidisciplinary study, museumization.*

Introduction

Large-sized wooden items from the Scythian period in the Altai have been excavated for over one hundred and fifty years. These finds rarely become museum exhibits; they are not viewed as potentially important for scholarship and culture. However, according to the common scholarly opinion, museumization is the main trend in museum activities; its objectives include preservation of archaeological objects and identification of their historical, cultural, scholarly, and artistic value. Many studies by archaeologists discuss the issues of including archaeological items in museum expositions as an important scholarly field (Voskresenskaya, 1969; Bulatov, 1975; Altshuller et al., 1980; Medved, 2004). In our opinion, the additional research into kurgan 5 at the Pazyryk cemetery of the Scythian period—carried out by the team of scholars, working in related fields, from the Gorno-Altaysk State University, State Hermitage, and Institute of Archaeology and Ethnography of the Siberian Branch of the Russian Academy of Sciences in 2019 (Konstantinov et al., 2019; Mylnikov, 2019)—has a clear scholarly value. In 2019, ninety years had passed since the exploration of the archaeological sites of the Scythian period in the Pazyryk locality (in the Altai Mountains) began. Excavations of kurgan 1 by M.P. Gryaznov laid the foundations for the study of the Pazyryk archaeological culture, now known all over the world. Twenty years later, excavations of the largest, most distinctive and most representative elite kurgan (kurgan 5) were arranged. The unique world-class artifacts discovered in the kurgan—a wooden chariot, Persian carpets, inner cribwork with the coffin made of a hollowed-out log, a chief's mummy, and various adornments and items made mostly of wood—became a part of expositions at the State Hermitage Museum (St. Petersburg). The excavations of kurgan 5 by Gryaznov were not completed, and many finds, including

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 81–89 E-mail: Eurasia@archaeology.nsc.ru

one of the two cribworks, were left in the grave-pit. For a long time, there were scholarly discussions concerning the further destiny of this cribwork from the double-cribwork burial structure.

The main purpose of this article is to share information on preservation methods for large-sized archaeological objects of wood that are threatened with destruction by environmental impact. The ways to save and extend the lives of such artifacts after excavations are their conservation and immediate inclusion into museum exhibits, with subsequent monitoring of their condition.

Study results

The first excavations of kurgan 5 at Pazyryk were conducted in 1949 by the expedition from the State Hermitage Museum under the leadership of S.I. Rudenko, and revealed a burial chamber consisting of two cribworks (a smaller cribwork inside a larger cribwork) on the bottom of the grave-pit. A frame-and-post canopy was above the chamber. Three thick log-posts reaching 0.6 m in diameter, butt-ends up, were set vertically along each of the northern and southern walls of the larger cribwork. Three thick beams were laid horizontally into the grooves cut in the upper ends of the vertical posts. A layer of about sixty boulders was laid on three rows of logs placed under the beams directly on the ceiling of the outer cribwork in the meridional direction (across the logs of the ceiling). Two hundred and fifty logs were laid in five rows on the beams (Rudenko, 1953: 38–39). The multi-layered log cover was packed with multi-ton boulders, smaller rubble, and soil with large gravel, probably to protect the grave-pit from robbers. For various reasons, the site could not be fully explored at that time; many artifacts, including one cribwork of the double-cribwork burial structure, were left in the backfilled grave-pit (Ibid.: 33, fig. 11, pl. XIV). At the end of the field season of 2018, while re-examining the grave-pit unearthed in 1949, archaeologists discovered logs from the upper layers of the cribwork (Konstantinov et al., 2018). Technical and technological analysis of the logs revealed that the pit contained parts of the interior burial structure left undisturbed by the expedition of Rudenko. Its complete interdisciplinary research and museumization was carried out in the next field season.

In 2019, the cribwork was completely unearthed and studied inside the grave-pit. The results of the study confirmed that in terms of building technique, the burial structure of wood from Pazyryk kurgan 5 was a cribwork frame-and-post structure (Mylnikov, 2006: 33). In terms of social status, the people buried in it belonged to the elite (Mylnikov, 1999a: 26). This sophisticated burial structure consisted of two cribworks, rectangular in plan view, placed one inside the other. The cribwork that was excavated in 2019 was 2.03 m high, 7.0 × 3.9 m in size along the outer contour, and consisted of ten layers of logs (Fig. 1). Judging by its size, it was the external one. The inner cribwork (currently in the exposition of the State Hermitage Museum) consisted of eight layers; its height was 1.41 m; the size along the inner contour was 5.19 × 2.28 m (Mylnikov, 1999b).

After studying the outer cribwork in the grave-pit, it was sequentially disassembled, and all logs were moved to an open, specially prepared area next to the kurgan. Each log was carefully re-examined there, to obtain information about the woodworking. Analysis of complexity and quality of round notches in corner-joints, which was conducted during field research and rapid reconstruction, revealed that these notches were made by several carpenters, of different levels of skill. A whole team of at least five woodworkers might have participated in construction of the cribwork. This is indicated by the variety of techniques and high quality of processing of the ends of the logs, which show both rounded ends with slight convexity (created by a circular cutting movement of a facing adze, from the sides towards the center of the end), and flat vertical ends (Mylnikov, 2019).

Additional data concerning the skills of the Pazyryk carpenters, as well as information on dendrochronology and conservation, were obtained during the rapid reconstruction (re-assembly) of the cribwork on an open, specially prepared ground (Fig. 2, 3). After that, the log structure was sequentially disassembled, and samples of saw-cuts and cores were taken for dendrochronological analysis. Then, each artifact was additionally treated with preservative solutions, and the entire structure was transported to the Anokhin National Museum of the Republic of Altai, in Gorno-Altaysk.

Discussion

Re-examination of kurgan 5 in 2019 made it possible to discover the outer cribwork in the composite double-cribwork elite burial structure of wood, and to conduct an interdisciplinary study of its technological, reconstruction-related, and chronological aspects. Notably, the archaeologically intact entire outer cribwork, which was examined seventy years after the pit of Pazyryk kurgan 5 had been backfilled with soil, was the most important part of the double-cribwork burial structure. It completely lacked the ceiling, most of the central part of the northern wall, and three logs of the western wall (these were sawn out by the members of the expedition in 1949) (see Fig. 1, *2*, *4*).

The rarest technological feature of the wooden burial structure in kurgan 5 was a through sub-rectangular opening in the logs of the third to fifth layers in the

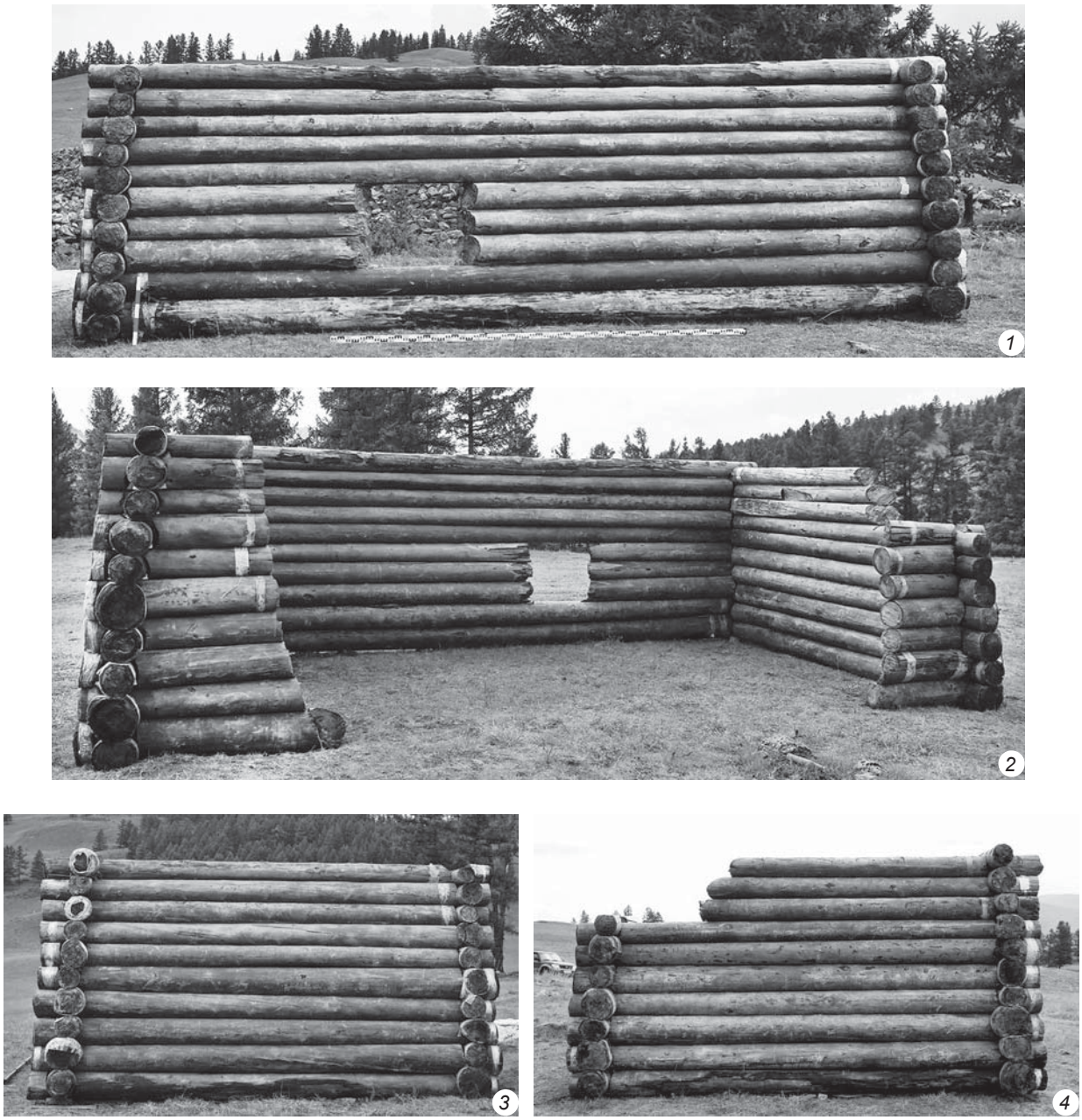


Fig. 1. Walls of the outer cribwork from kurgan 5 of the Pazyryk cemetery, after rapid reconstruction. 2019.
1 – southern; *2* – northern; *3* – eastern; *4* – western.

southern walls of each cribwork. These were intended for seven short logs, which jammed the lid of the coffin and thus hindered the actions of any robbers.

There are several hypotheses about the origin of these openings. The discoverers believed that the windows, at least in the outer cribwork, were cut through hastily and carelessly not by the robbers, but by those people who "performed the burial" inside the grave-pit (Rudenko, 1953: 54–56, fig. 26, pl. XV). Later, the author of the present article suggested that the window-like openings were made by the Pazyryk woodworkers during the building of both cribworks on a special ground, before disassembling and transporting them to the burial place (Mylnikov, 1999b). This conclusion emerged after studying a neatly designed opening-window in the wall of the inner cribwork: each of its logs was cut from the outer and inner sides at an obtuse angle to each other (Mylnikov, 2008: 268, fig. 103). Our colleagues suggested another explanation, supporting the opinion of Rudenko, who found a small amount of wood chips in cultural deposits at the bottom of the grave-pit, in a groove tightly packed with soil opposite to the opening,

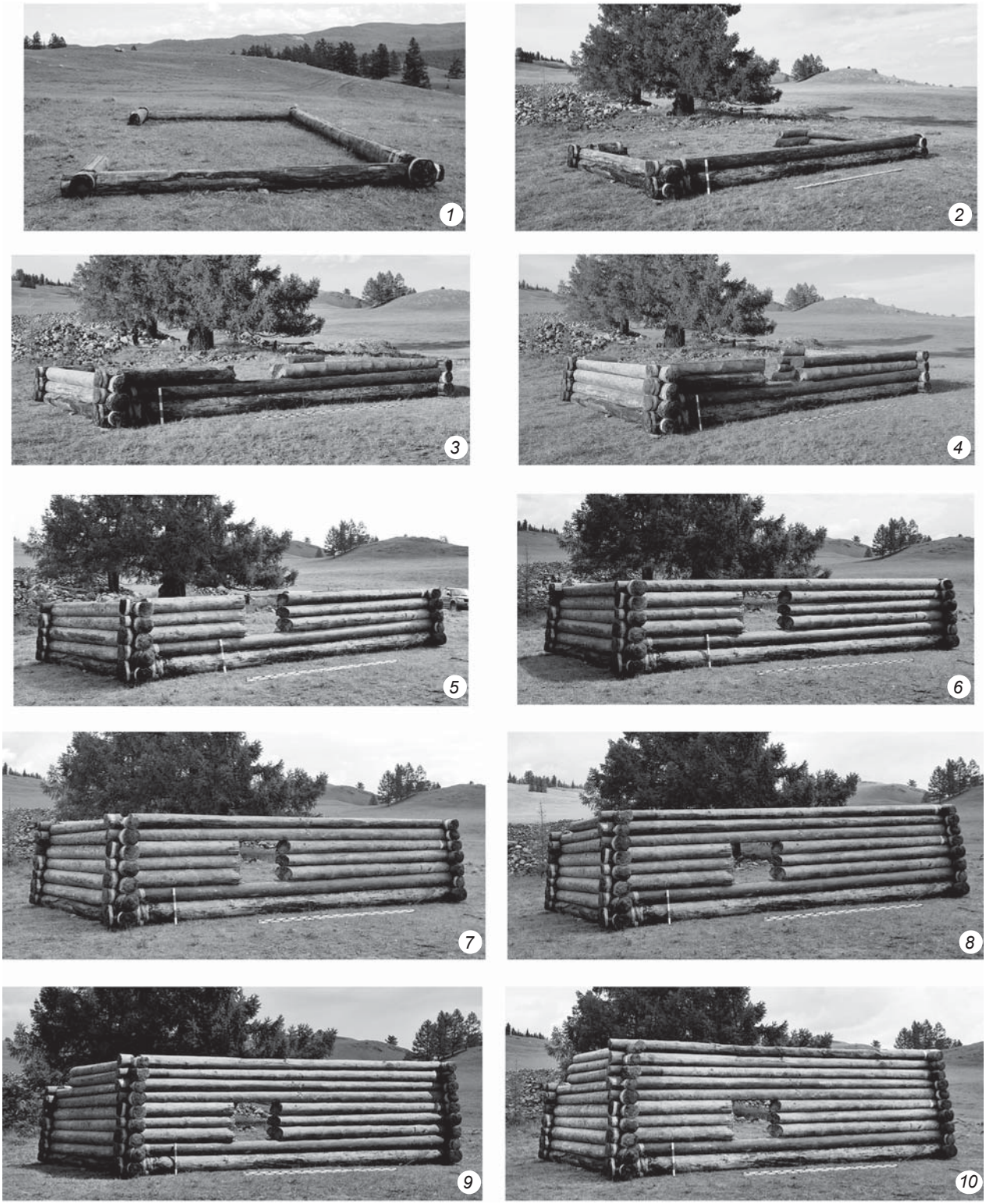


Fig. 2. Rapid reconstruction. Assembling the cribwork layer by layer on a special open ground.

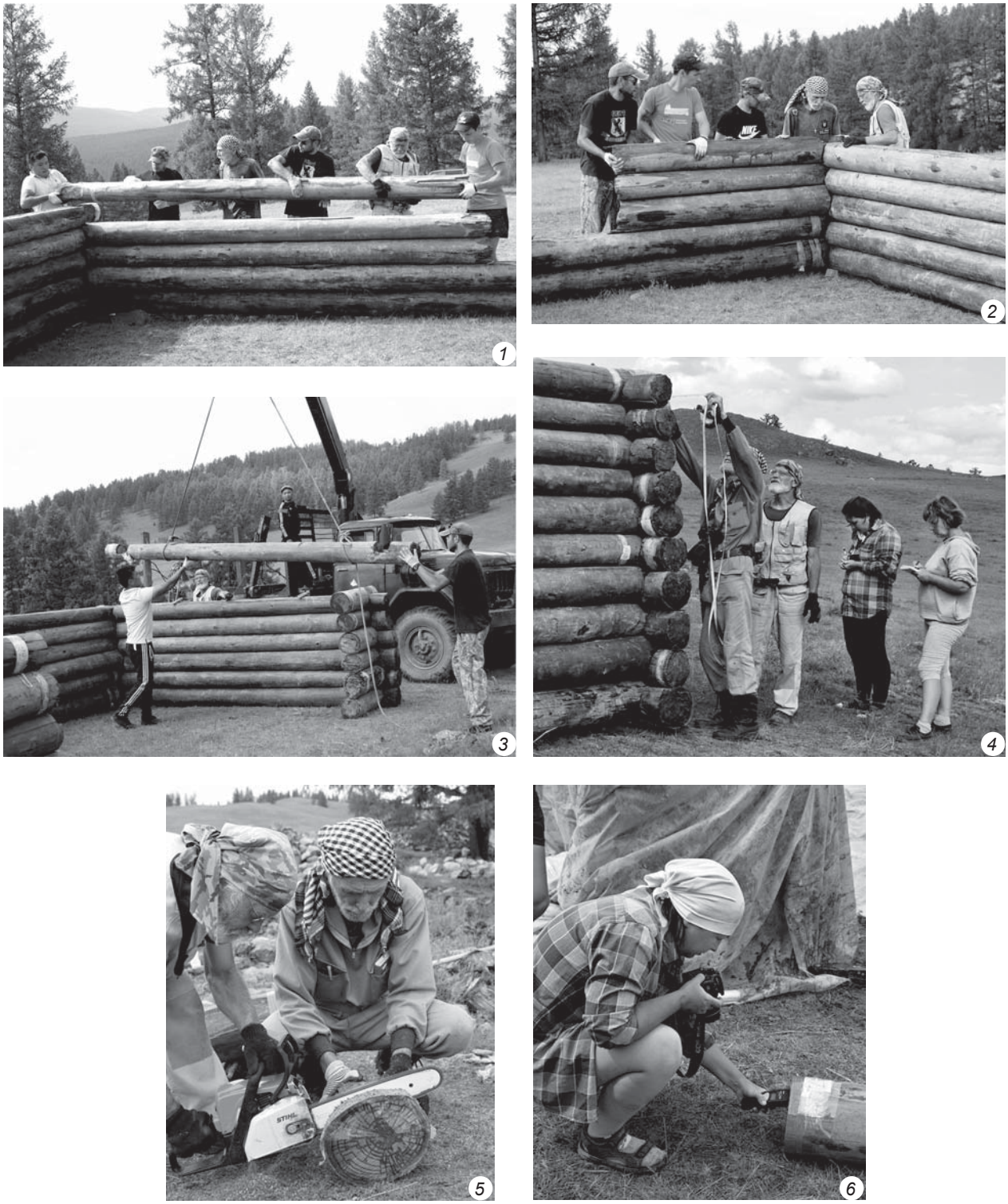


Fig. 3. Rapid reconstruction.
1–3 – manual assembling of the cribwork; *4* – technical and technological examination of cribwork walls; *5* – sampling for dendrochronological analysis; *6* – attribution of a log in the outer cribwork for conservation and restoration.

during the additional study of the site in 2019. In the course of a thorough examination of the structure and analysis of its position in the pit, it was discovered that the southern wall of the structure was almost adjacent to the southern wall of the outer cribwork. In this situation, it would have been physically impossible to work with a carpentry tool. As reconstructive experience suggests, the opening in the outer cribwork could have been made not from the inside in the cramped space of the grave-pit, but from the outside on the daylight surface before setting the inner cribwork into the outer one—and certainly in a hurry, since it was made less accurately than the other openings. In addition, according to the results of use-wear analysis, this opening was cut only from the outside inward by long, unilaterally directed powerful strikes of an adze blade. Such actions require the maximum span of the carpenter's arms; but this would not have been possible if he were between the wall of the grave-pit and the wall of the cribwork. The fact that cutting was carried out from the outside is also confirmed by the one-sided inclination of the planes on the cut logs and the different sizes of the opening: larger and wider on the outside, and smaller on the inside (see Fig. 1, *1*, *2*) (Mylnikov, 2019). Wood chips might have been thrown into the grave-pit by the Pazyryk carpenters, or have remained after auxiliary work by the members of the former expedition, who used logs and poles of the burial structure for making ladders and structures protecting the walls of the deep grave-pit from collapsing.

During re-examining of kurgan 5 in 2019, it was confirmed that the outer cribwork of the burial structure had remained in the grave-pit since 1949. Thus, the discussion on whether the cribwork on display at the State Hermitage was outer or inner (Gavrilova, 1996; Marsadolov, 1996; Mylnikov, 1999b), which had lasted for many years, was finally resolved. Previous laboratory studies have revealed that the inner cribwork of Pazyryk kurgan 5 was the only cribwork of the Pazyryk culture where the logs inside the chamber were hewn to plain surface with rounding at all four corners (Mylnikov, 1999b). We discovered the traces of this carpentry tradition in 2002 during the excavations of burial structures in an earlier kurgan 2 at the Arzhan-2 site in Tuva (Mylnikov, 2010; Mylnikov, 2017). Although the difference in construction time was almost four centuries, the similarity of the kurgans in terms of structure and specific manufacturing techniques of the objects located inside suggests that in the Early Iron Age the population of the Altai borrowed house-building traditions from the inhabitants of the neighboring Tuva, and adapted them to the local carpentry and burial customs of the elite of the nomadic nobility.

After multidisciplinary study of the data obtained during the excavation, conservation, and restoration works, as well as rapid reconstruction of the outer cribwork near the kurgan in 2019, it was established that since the time of their creation, both cribworks of the burial structure had been repeatedly assembled and disassembled. Technical and technological analysis made it possible to establish the sequence and specific features of the multi-stage process of cutting and assembling a log burial structure.

The first time, according to dendrochronological analysis, the outer cribwork of the two-chamber burial complex was made (simultaneously with the inner cribwork) ca 2300 BP, to accommodate the inner structure with the coffin made of a hollowed-out log where the local "king and queen" were to be buried according to all canons of the Pazyryk culture of the Altai Mountains. During assembly, each log in ten layers of both outer and inner cribworks was marked with notches on the outside (the count was taken from the lowest layer). In the assembled state, the cribworks were kept for some time at the construction site, so all elements of the structures received necessary shrinkage accompanying the natural drying of the freshly cut timber. After this procedure, the cribworks were disassembled and logs were transported to the burial place.

The second time, the outer cribwork was assembled by the Pazyryk carpenters directly in the grave-pit. First, wide and thick boards of the floor were laid in the grave-pit. A large coffin with the bodies of a man and woman was placed on the floor. Then, the smaller inner cribwork was sequentially assembled; its through opening was located next to the coffin. The larger outer cribwork was assembled around the inner cribwork in the same sequence. The lid of the coffin was jammed with seven short logs inserted into through openings in the southern walls of the cribworks. Both cribworks were covered on top with ceilings made of logs. Ten killed horses with full equipment and accompanying goods consisting of elements of a festive chariot and household travoises, Persian carpets with elements of large frames for hanging them, poles with the dome of a portable dwelling, and many more things were placed behind the northern wall of the outer cribwork.

The third time, the outer cribwork was assembled after completion of field works in 2019, next to the mound, on a specially prepared open area in accordance with the methodology of rapid reconstruction (Mylnikov, 2012, 2014; Mylnikov, 2010). In the assembled state, the cribwork was again carefully examined for additional information on woodworking, dendrochronology, and restoration (Konstantinov et al., 2019; Mylnikov, 2019) (Fig. 3, *4–6*). After the third assembly, each log was treated again (after impregnation, which was done inside the grave-pit) with special preservative solutions of medium concentration polyethylene glycol, packed in polyethylene sheets and cling wrap.

Fig. 4. The fourth assembling of the cribwork in the Anokhin National Museum of the Republic of Altai.
1 – logs of the cribwork laid out according to their location in specific walls in the courtyard and prepared for assembling; *2* – conservation and reconstruction of each log by restorers; *3*, *4* – assembling of the cribwork on the exposition ground of the museum.

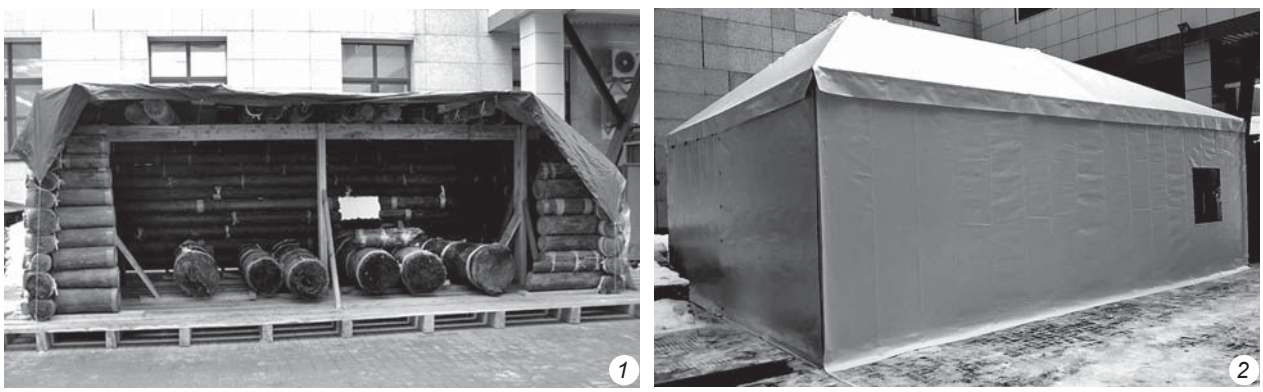


Fig. 5. Burial structure made of logs on the museum exposition ground (*1*); protective pavilion above the cribwork (*2*).

The fourth time, the outer cribwork of the double-chamber burial structure from elite kurgan 5 at the Pazyryk cemetery of the Scythian period was assembled according to the approved methodology in the courtyard of the Anokhin National Museum of the Republic of Altai, and was prepared for permanent exhibition in a tent-pavilion (Fig. 4, 5).

Methodology for follow-up research of burial structures

A prerequisite for preservation of an object is its multidisciplinary study by experts in the technology of ancient woodworking, dendrochronology, restoration and conservation technology, and custodians of museum

valuables. We have elaborated and tested a set (system) of procedures for studying such objects.

1. Interdisciplinary examination of all wooden artifacts that can be found during excavations.

2. Conservation of wooden objects during the excavation process in the grave-pit, then on a special open ground.

3. Comprehensive study of the wooden structure directly in the grave-pit.

4. Sequential disassembly of the structure and its transportation to a previously prepared open ground.

5. Rapid reconstruction (construction) of the wooden structure on the open ground.

6. Re-examination of the assembled structure for more information.

7. Disassembly of the cribwork, sampling from each log for dendrochronological analysis.

8. Additional conservation of each log and their transportation to the museum.

9. Conservation and restoration of each log on the museum's exposition ground.

10. Final assembly of the cribwork and its integration in a museum exposition.

11. Regular monitoring of the state of the expositional cribwork and conduction of preventive maintenance works aimed at the preservation of this artifact.

Conclusions

During the field season of 2019, a complete technical and technological study of a large wooden structure from kurgan 5 at Pazyryk was performed. In the course of the excavations, specialists examined the large cribwork, carried out restoration and conservation works on the object, made a rapid reconstruction of the structure near the excavation site, disassembled and transported the logs of the cribwork to the museum, and made its second rapid reconstruction, conservation, and museumization. This led to elaboration of the methodology of rescue excavation, conservation, and placement of a unique burial structure of wood from the Scythian period into museum exposition.

The scholarly and cultural value of that archaeological object, examined during the excavations and placed into museum space, is as follows. First, it has been established that the previously explored outer cribwork was an integral part of a single double-chamber burial complex belonging to the elite of the ancient Altai nomads of the Scythian period. Second, the opinion that the cribwork located in the State Hermitage was an inner one has been confirmed by material evidence. Third, the largest archaeologically intact wooden structure of the Pazyryk culture known today has been preserved and has become a museum exhibit. Fourth, a large amount of new and diverse information (type of cribwork, time and place of cutting the openings in the southern walls of the cribworks, place of this burial structure among the objects of the same type, etc.) was obtained from interdisciplinary studies of all elements of the outer cribwork of the double-chamber burial structure. This information has enriched the databank on the chronology and traditions of woodworking and house-building in ancient times.

Acknowledgments

This study was performed under the Project "Multidisciplinary Studies of the Ancient Cultures of Siberia and Adjacent Territories: Chronology, Technologies, Adaptation, and Cultural Relations" (FWZG-2022-0006).

References

Altshuller B.L., Krolenko I.I., Postnikova O.N. 1980
Problemy sokhraneniya arkheologicheskikh pamyatnikov. In *Problemy okhrany pamyatnikov arkheologii v naselennykh mestakh: Materialy Vsesoyuzn. konf*. Yerevan: pp. 27–43.

Bulatov N.M. 1975
Printsipy organizatsii arkheologicheskikh muzeyev-zapovednikov. In *Voprosy okhrany, restavratsii i propagandy pamyatnikov istorii i kultury*, iss. III. Moscow: NII kultury, pp. 77–113.

Gavrilova A.A. 1996
Pyatiy pazyrykskiy kurgan. Dopolneniya k raskopochnomu otchetu i istoricheskiye vyvody. In *Zhrechestvo i shamanizm v skifskuyu epokhu: Materialy Mezhdunar. konf*. St. Petersburg: pp. 89–102.

Konstantinov N.A., Mylnikov V.P., Slyusarenko I.Y., Stepanova E.V., Vasilieva N.A. 2019
Zaversheniye polevogo dosledovaniya vnutrimogilnoy konstruktsii Pyatogo pazyrykskogo kurgana. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXV. Novosibirsk: Izd. IAET SO RAN, pp. 415–424.

Konstantinov N.A., Mylnikov V.P., Stepanova E.V., Vasilieva N.A. 2018
Polevoye dosledovaniye vnutrimogilnykh konstruktsiy Pyatogo Pazyrykskogo kurgana na Altaye (predvaritelniye soobshcheniya). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIV. Novosibirsk: Izd. IAET SO RAN, pp. 275–279.

Marsadolov L.S. 1996
Kratkoye poslesloviye k statye A.A. Gavrilovoy. In *Zhrechestvo i shamanizm v skifskuyu epokhu: Materialy Mezhdunar. konf*. St. Petersburg: pp. 105–107.

Medved A.N. 2004
Muzeyefikatsiya pamyatnikov arkheologii v Rossii (proshloye i nastoyashcheye). Moscow: GNOM i D.

Mylnikov V.P. 1999a
Obrabotka dereva nositelyami pazyrykskoy kultury. Novosibirsk: Izd. IAET SO RAN.

Mylnikov V.P. 1999b
Pogrebalniy kompleks Pazyryk-5. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. V. Novosibirsk: Izd. IAET SO RAN, pp. 467–471.

Mylnikov V.P. 2006
Polevoye i kameralnoye izucheniye arkheologicheskikh derevyannykh predmetov (po materialam pogrebalnykh pamyatnikov). Novosibirsk: Izd. IAET SO RAN.

Mylnikov V.P. 2008
Derevoobrabotka v epokhu paleometalla (Severnaya i Tsentralnaya Aziya). Novosibirsk: Izd. IAET SO RAN.

Mylnikov V.P. 2010
Die Holzbearbeitungstechnik der Balkenkammer aus Grab 5. In *Čugunov K.V., Parzinger H., Nagler A. et al. Der skythenzeitliche Fürstenkurgan Aržan 2 in Tuva*. Berlin: Verlag Philipp von Zabern, pp. 232–242. (Archäologie in Eurasien; Bd. 26).

Mylnikov V.P. 2012
Obrabotka dereva v skifskoye vremya na Mongolskom Altaye. In *Zamerzshyie pogrebalniye kompleksy pazyrykskoy kultury na yuzhnykh sklonakh Sailyugema (Mongolskiy Altai)*. Moscow: Triumf print, pp. 409–490.

Mylnikov V.P. 2014
Izucheniye arkheologicheskikh derevyannykh predmetov (pogrebalniye pamyatniki Altaya i sopredelnykh territoriy). Moscow: IA RAN.

Mylnikov V.P. 2017
Tekhniko-tekhnologicheskiy analiz pogrebalnogo sooruzheniya iz mogily 5 kurgana Arzhan-2. In *Tsarskiy kurgan skifskogo vremeni v Tuve Arzhan-2: Rezultaty izucheniya nakhodok*. Novosibirsk: Izd. IAET SO RAN, pp. 233–244.

Mylnikov V.P. 2019
K voprosu o metodike izucheniya derevyannykh predmetov v protsesse raskopok arkheologicheskikh pamyatnikov i kameralnoy obrabotki artefaktov. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXV. Novosibirsk: Izd. IAET SO RAN, pp. 498–506.

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

Voskresenskaya L.P. 1969
Organizatsiya otkrytogo pokaza arkheologicheskikh pamyatnikov v RSFSR. Moscow: VOOPIK.

Received January 21, 2022.
Received in revised form February 4, 2022.

doi:10.17746/1563-0110.2022.50.2.090-100

N.N. Seregin[1], M.A. Demin[2], and S.S. Matrenin[1]
[1]Altai State University,
Pr. Lenina 61, Barnaul, 656049, Russia
E-mail: nikolay-seregin@mail.ru; matrenins@mail.ru
[2]Altai State Pedagogical University,
Molodezhnaya 55, Barnaul, 656031, Russia
E-mail: mademin52@mail.ru

Decorative Belts of Xianbei Period Nomads from Karban I, Northern Altai

In 1989–1990, five decorative belts worn by the Xianbei Period nomads were excavated from the Karban I cemetery in the Chemalsky District, Altai Republic. Their details (33 plaques, five buckles, six "units", and two "pendant tips") were found in four undisturbed graves of males (mounds 11, 27, 33, and 39). They are described with regard to function, decoration, and chronology. Parallels from the Altai and adjacent territories, dating to the late 1st millennium BC–early 1st millennium AD, are listed. A more precise attribution is the Early Xianbei Period (100–300 AD), correlating with the Bulan-Koby culture of the Altai. Available facts suggest that the style of these artifacts was influenced by the Xiongnu and Xianbei traditions. On the basis of the finds in situ, several variants of belt sets, some of which are hitherto unknown, have been reconstructed. The composition of the belts is unrelated to the owners' age and evidently mirrors their personal preferences. The results demonstrate the social relevance of the belts, since most were found in burials of top-ranking males.

Keywords: *Altai, Xianbei Period, cemeteries, decorative belts, reconstruction, chronology.*

Introduction

Belts for fastening outer garments and attaching various items were one of the main types of equipment used by the peoples of Eurasia in Late Antiquity, the Middle Ages, and the Modern Period. The analysis of the surviving elements of belts discovered in archaeological excavations testify to their importance for dating the sites, obtaining their more accurate chronology, and reconstructing various aspects of intercultural interaction and social organization of populations. Such items have been subject to multidisciplinary analyses, the results of which have been described in comprehensive monographs and numerous special publications.

Judging by the results of excavations of archaeological sites, decorative belts were an important part of the material culture of the population living in the Altai from the 2nd century BC to the 5th century AD. Various aspects of decorative belts have been researched. One of the first scholars to study them was V.N. Dobzhansky. He proposed reconstructions of belts from the necropolises of Balyktyyul and Kok-Pash (Dobzhansky, 1990: 26–27, pl. XVII, *1*; XIX, *1*). These results were taken into consideration while analyzing belt sets from the Kok-Pash site (Vasyutin, 2000), and were summarized in a book on the evidence discovered in the excavations of that site (Bobrov, Vasyutin A.S., Vasyutin S.A., 2003: 25–27). Individual belts from the Verkh-Uimon cemetery were

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 90–100 E-mail: Eurasia@archaeology.nsc.ru

described in a monograph by V.I. Soenov and A.V. Ebel, which made it possible to demonstrate some features of items from the archaeological sites of the Rouran Period (1992: 53–55). Decorative belts of the Altai population were analyzed by Y.V. Teterin (1995). A number of important observations on the specific features of belts from the Xianbei Period in the Northern Altai were made by A.Y. Borisenko and Y.S. Hudiakov, who used evidence from the Ulug-Choltukh I cemetery (2004). Chronological interpretation and reconstruction of decorative belts from the Xiongnu Period, based on the finds from the Yaloman II site in the Central Altai, appeared in the publications of A.A. Tishkin and S.S. Matrenin (Matrenin, 2017: 99–102; Tishkin, Matrenin, 2020). The results of studying the decorative belts of nomads in the 4th century AD appeared in a series of works on the evidence from the excavations of the Stepushka complex (Tishkin, Matrenin, Kungurov, 2015; Soenov, Konstantinov, Trifanova, 2018: 41–43; Tishkin, Matrenin, Shmidt, 2018: 97–109).

According to the history of research briefly described above, the comprehensive reconstruction of decorative belts directly depends on the degree of preservation of belt sets made of metal (mainly iron), as well as on careful records on the location of items in the burials. However, it should be kept in mind that in some cases incomplete ("symbolic") belts, serving as an expression of the entire set, could have been placed in graves. An important factor is that a significant part of the available sources remains unpublished. This article intends to partly fill this gap by describing a series of well-preserved and carefully recorded finds from undisturbed burials at the Karban I necropolis, and reconstructing several variants of decorative belts used by the population of the Northern Altai in the Xianbei Period on the basis of these finds.

Description of the sources

The burial and memorial complex of Karban I is located on the left bank of the Katun River, 1.7 km northwest of the village of Kuyus in the Chemalsky District of the Altai Republic (Fig. 1). In 1989–1990, a series of burials of the Bulan-Koby culture was excavated at that site by an expedition from the Barnaul State Pedagogical Institute (now the Altai State Pedagogical University), led by M.A. Demin in the framework of rescue archaeological works (Seregin, Demin, Matrenin, 2021). Metal decorative belt sets were found *in situ* in four male burials. Gradual clearing of the discovered items, while keeping all finds in place before and after extracting the bones of the postcranial skeletons, has made it possible to establish the order of their placement from the buckle to the supposed end of the belt. The description of the identified sets and information important for reconstructing the belts are presented here.

Fig. 1. Location of the Karban I burial and memorial complex.

Mound 11. The decorative belt includes a large number of metal elements unearthed mainly above the pelvic bones of a deceased male 25–35 years of age*. The location of the preserved items revealed the contour of a completely decayed leather belt. An iron buckle with movable prong directed toward the left side lay on a lumbar vertebra (Fig. 2, *1*). Seven bronze plaques in the form of clips (Fig. 2, *2–8*), and two iron attached plaques with pins (Fig. 2, *16*, *17*), which decorated the front right half of the belt, were found 6 cm from the buckle. When the skeleton was removed, an iron half-clip plaque was found in the area of the center of the back (Fig. 2, *18*). A large iron attached plaque (Fig. 2, *20*) which overlapped the bronze clip/plaque (Fig. 2, *9*), was above the left wing of the pelvis. Judging by the size of the attached plaque and the surviving pins in the corners, the leather base of the belt in most areas was 3.5 cm wide. In the projection of the belt bend, near the left side of the man, a bronze clip-plaque (Fig. 2, *10*) and an iron half-clip plaque with movable ring (Fig. 2, *21*) were located. The front left half of the belt was decorated with four bronze clip-plaques (Fig. 2, *11–14*) and two iron attached plaques (Fig. 2, *22*, *23*). An iron "unit" in the form of a ring (Fig. 2, *19*), which probably hung on a short strap, was found below this accumulation of artifacts. The length of the unpreserved leather base

*Owing to the poor preservation of the material evidence, the sex was established based on the composition of the grave goods. Hereafter, anthropological identifications were made by S.S. Tur.

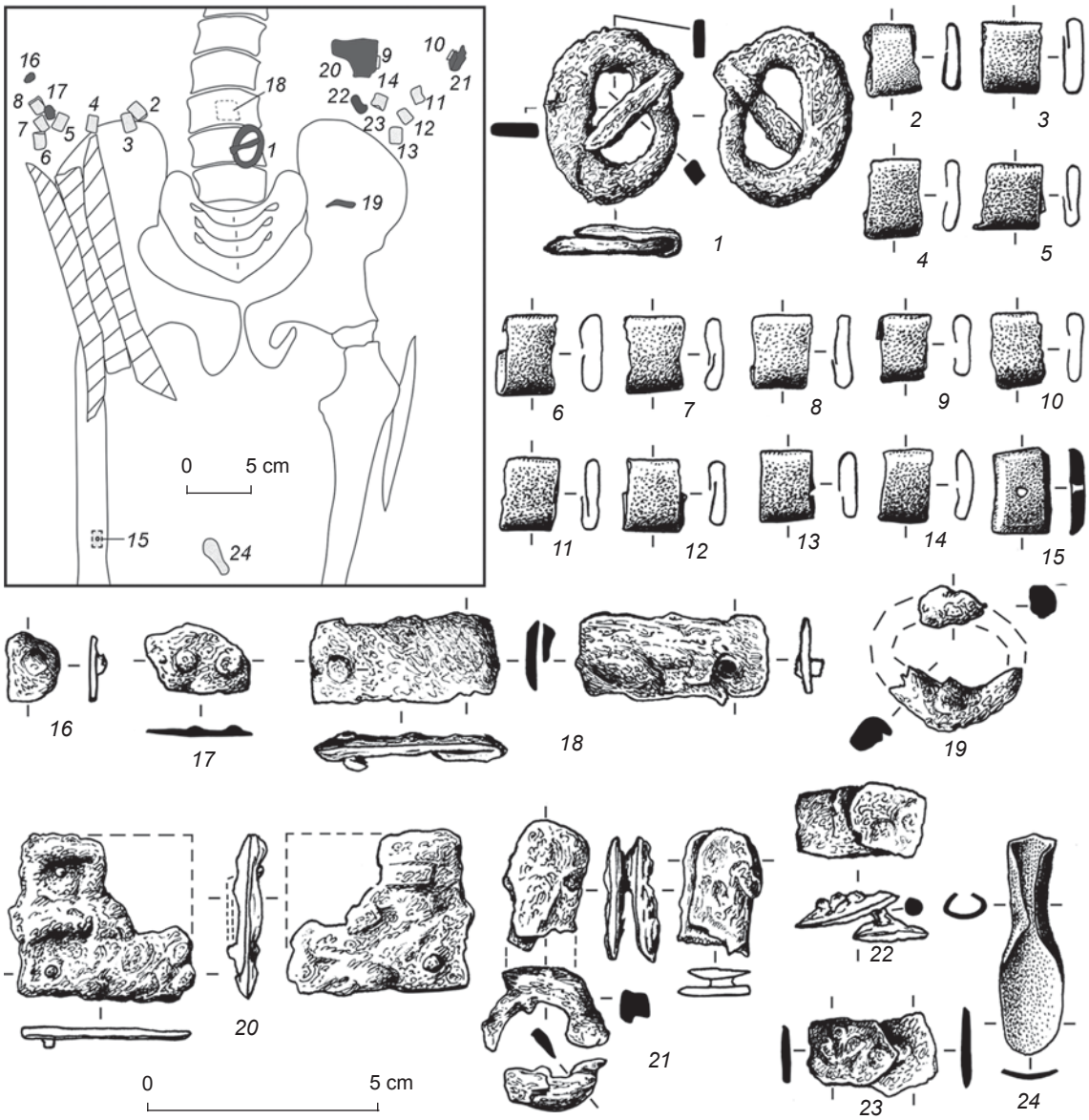


Fig. 2. Decorative belt sets from mound 11 (*1*, *16–23* – iron; *2–15*, *24* – non-ferrous metal).

between the farthest metal objects on the sides was at least 34 cm. The elements of the belt might have also included a bronze attached plaque found under the right femur (Fig. 2, *15*), and a spoon-shaped "pendant tip" discovered between the leg bones (Fig. 2, *24*). These items were most likely attached to long straps hanging down.

Mound 27. Iron parts of the decorative belt were located mainly near the pelvic bones of a deceased male of mature age. A buckle with movable prong (Fig. 3, *1*) lay on the right wing of the pelvis and was directed toward the left side. Two iron attached plaques (Fig. 3, *2*, *3*) were found 15 cm from it, near the right side of the man. A "unit" of rounded-trapezoid shape (Fig. 3, *4*) and a half-clip plaque with movable ring (Fig. 3, *5*) which a whetstone and a whip with bone handle were hung from, were discovered at the left wing of the pelvis, in the projection of the lateral bend of the belt. In addition, the belt included an iron attached plaque in the form of a four-petalled rosette (Fig. 3, *6*) and a bone spoon-shaped "pendant tip" (Fig. 3, *7*).

Mound 33. Simple and decorative belts were found in the burial of a male 35–45 years of age. The decorative belt lay in the abdomen area of the deceased and included the following iron items: a rectangular buckle with movable prong (Fig. 4, *1*) oriented toward the left side; a ring-shaped "unit" (Fig. 4, *3*) found at the elbow joint of the right arm and attached to the belt probably with the help of a movable leather loop; two rectangular attached plaques with pin fastening (Fig. 4, *4*, *5*), placed on the

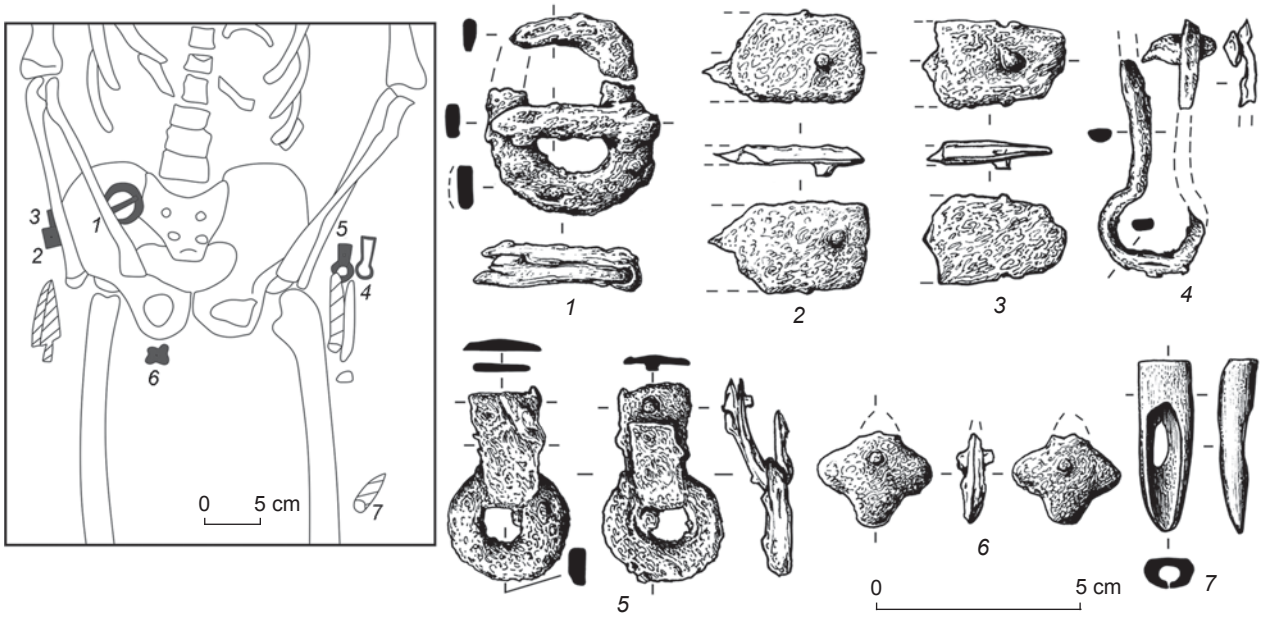


Fig. 3. Decorative belt sets from mound 27 (*1–6* – iron; *7* – bone).

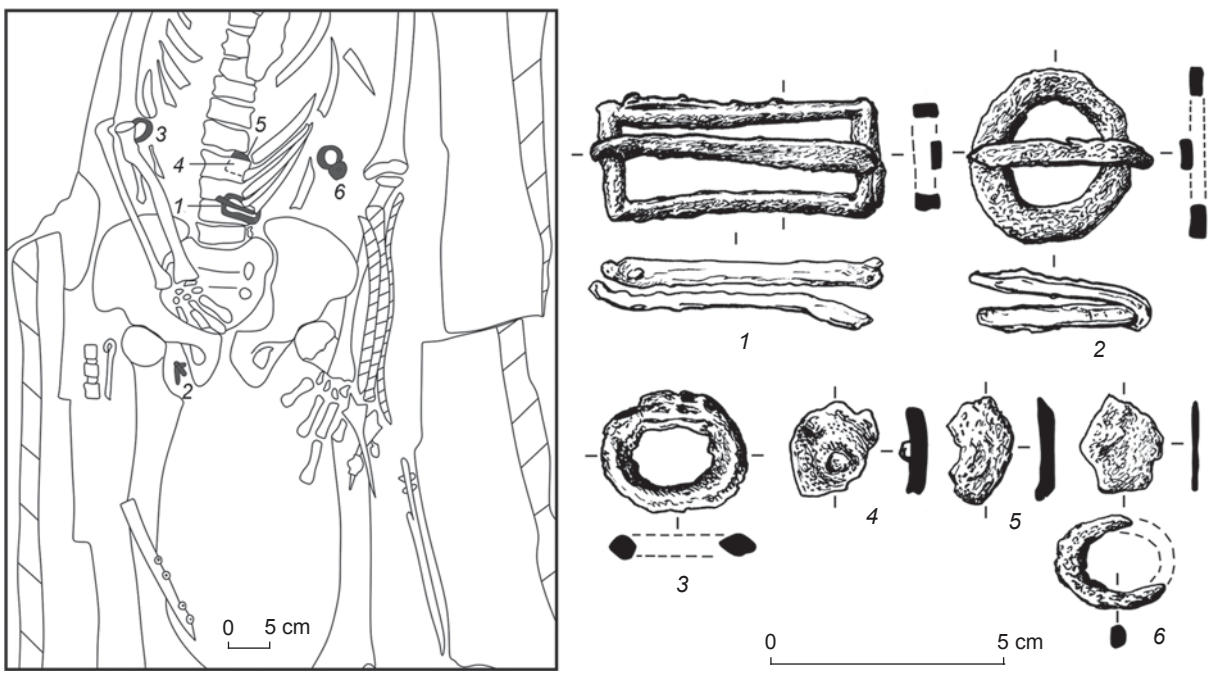


Fig. 4. Iron decorative belt sets from mound 33.

belt at the back almost in the center, and a half-clip plaque with movable ring (Fig. 4, *6*), located at the left elbow, in the projection of the lateral bend of the belt. The distance between the farthest items, symmetrically located on either side, indicates that the length of the belt along the back was about 30 cm; the length of the front section on the right half of the body was about 16 cm, and the length on the left front side was at least 25 cm. The simple belt was placed below the pelvis, had an oval buckle with movable prong oriented toward the left side (Fig. 4, *2*).

Mound 39. Two decorative iron belt sets were unearthed in the burial of a male 35–50 years of age. The elements of the "upper" belt were located in the abdomen area of the deceased. A rectangular buckle with movable prong directed toward the left side lay on the ribs of the right half of the chest (Fig. 5, *1*); a half-clip plaque

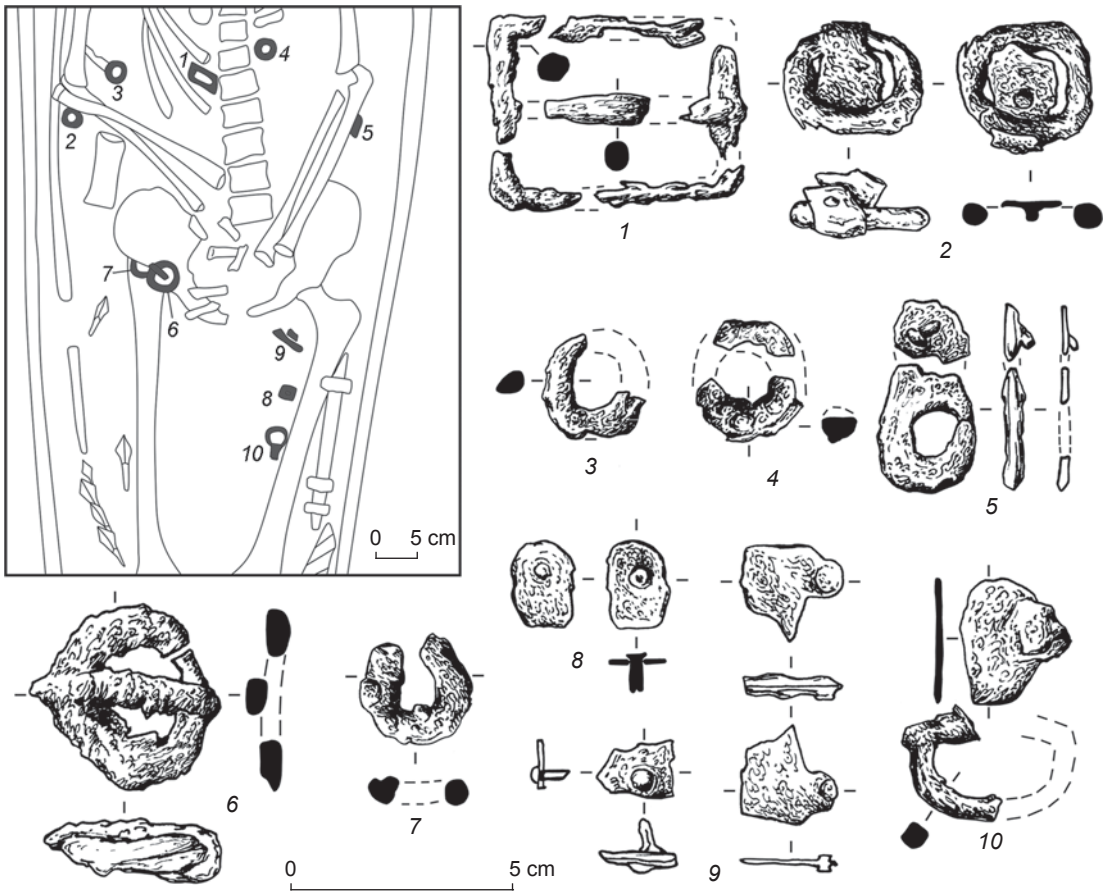


Fig. 5. Iron decorative belt sets from mound 39.

with movable ring (Fig. 5, *2*) and a bone item, which was probably a clasp, were near the elbow joint of the right arm. A ring-shaped "unit" was found 8 cm from the plaque (Fig. 5, *3*). A similar item was unearthed under the skeleton in the area of the center of the back (Fig. 5, *4*). A plaque with immovable ring was found under the bones of the left forearm, in the projection of the lateral bend of the belt (Fig. 5, *5*). Judging by the location of the farthest metal parts, the length of the belt on the back was at least 34–38 cm. The remaining metal elements of the second belt were found at the lower part of the pelvic bones and on the inside of the left femur. A buckle with movable prong and oval frame (Fig. 5, *6*) was located on the right wing of the pelvis. A "unit" in the form of a ring (Fig. 5, *7*) was almost right next to it. Metal elements were absent from a significantly extended section of the belt corresponding to the back and area of the left lateral bend. Two attached plaques of different sizes with pin fastening (Fig. 5, *8*, *9*) and a half-clip plaque with movable ring (Fig. 5, *10*) were found on the inner side of the left femur. These items decorated the front left half of the belt. There are reasons to believe that the "lower" decorative belt was placed in the grave unfastened.

Most of the discovered elements of the belt sets were in a good and satisfactory state of preservation. This makes it possible to perform a complete study of their typologically important morphological features and compare them with the known evidence from other necropolises of the Bulan-Koby culture of the Altai, as well as with the data obtained during the excavations of archaeological sites from the last quarter of the 1st millennium BC to the first half of the 1st millennium AD in Central, Northern, and Middle Asia.

Analysis of the evidence

Analysis of the decorative belts from the burials of the Karban I cemetery includes their detailed morphological description based on the chronological attribution of the items. These decorative belts were fastened with iron buckles with movable prong attached to the base of the frame without a shield. The oval items from mounds 11, 27, and 39 (see Fig. 2, *1*; 3, *1*; 5, *6*) were the most common variety of belt fasteners among the Bulan-Koby people in the Altai in the 2nd–5th centuries AD (Matrenin, 2017:

30–31, 43). Buckles with shortened rectangular frame, as that discovered in mound 39 (see Fig. 5, *1*), could be found from the 1st century BC until the first half of the 4th century AD (Ibid.: 43). The rectangular buckle with horizontally elongated body from mound 33 (see Fig. 4, *1*) has dated parallels in the evidence of the Early Xianbei Period (late 1st–early 3rd century AD) from the Southeastern Transbaikal region and Tuva (Mandelshtam, Stambulnik, 1992: Pl. 81, 41; Yaremchuk, 2005: Fig. 97, *3*; 102, *4*, *8*), and belongs to relatively rare examples of equipment used by the cattle breeders of the Altai in the late 1st–4th centuries AD (Matrenin, 2017: 31, 43; Tishkin, Matrenin, Shmidt, 2018: 76, pl. 17, *8–9*).

All the belts from the burials of the Karban I complex had metal plaques, the number of which considerably varied from 4 to 20 in a set. The study of such items (33 spec. in total) in terms of combination of variable parameters (method of fastening to the belt, structure of the body, presence/absence of rings and method of their connection with the plaque, shape of the frontal part, size of the item) makes it possible to draw the following conclusions.

Iron attached plaques in the form of straight or slightly bent plates of subsquare and rectangular shape and various sizes without rings, which were attached to the belt with one or more inserted pins (see Fig. 2, *16*, *17*, *20*, *22*, *23*; 3, *2*, *3*; 4, *4*, *5*; 5, *8*, *9*), have numerous parallels in the Xianbei equipment of the late 1st–4th centuries AD (Yaremchuk, 2005: Fig. 96, *6*; 97, *4*, *7*; 99, *1*, *2*, *5–7*, *10*). The distribution of these items among the nomads of Tuva in the 2nd–4th centuries AD was associated with the Xianbei influence (Dyakonova, 1970: Pl. XII, *9*; Pamyatniki…, 2010: 61, 65; and others). In the Altai, such plaques resulted from the local development of belt sets based on the imitation of Xianbei models (Tishkin, Matrenin, Kungurov, 2015: 128). Considering these parallels and the trend of some "delay" of the archaeological evidence of the region in relation to the Xianbei sites, the emergence of such belt attached plaques among the Bulan-Koby population can be dated to the 2nd century AD. Similar iron items were widely used in the Altai until the mid 1st millennium AD, demonstrating the "survival" of individual items in the material culture of the Turkic peoples in the second half of the 5th–6th centuries AD (Ilyushin, 2000: Fig. V, *10*).

Iron attached plaques, in the form of half-clips with movable ring on the lower side of the body (5 spec. in total) (see Fig. 2, *21*; 3, *5*; 4, *6*; 5, *2*, *10*), first appeared in Central Asia among the Xianbei people of the Eastern Transbaikal region (late 1st–early 3rd century AD) and population of Tuva (2nd–4th centuries AD) (Dyakonova, 1970: Pl. XI, *13–24*, 47; XII, *5–7*, *23–28*; Nikolaev, 2000: Fig. 1, *4*, *6*, *10*; 3, *4*, *12*; Yaremchuk, 2005: Fig. 96, *5*). In the Altai, such belt plaques were common among the Bulan-Koby people during the 2nd–5th centuries AD (Bobrov, Vasyutin A.S., Vasyutin S.A., 2003: Fig. 6, *29–31*; 11, *25–27*; 13, *12–13*; Matrenin, 2017: 75; Tishkin, Matrenin, Shmidt, 2018: 89–90).

The iron plaque in the form of a rectangular plate bent into a half-clip without rings (see Fig. 2, *18*) is one of the items that does not have known exact parallels at the Bulan-Koby sites of the Altai. In comparison, we can point to iron specimens with supposedly lost rings and a narrow bronze plaque from the burials of the 4th century AD at the Stepushka complex (Tishkin, Matrenin, Shmidt, 2018: Pl. 19, 13; fig. 40, *11–13*). The emergence of plaques of this type can be viewed in the context of the genesis of buckles with movable, laminar, shield-like half-clips, as well as belt tips with similar design from the Altai sites dated not earlier than to the late 2nd century AD.

The iron plaque with immovable ring on the short side of an oval-rectangular frame (see Fig. 5, *5*) shows parallels to belt sets from the Xiongnu sites of the late 1st century BC–1st century AD (Konovalov, 1976: Pl. XIII, *1*, *2*, *4–7*; Miller et al., 2008: Fig. 8; and others). In the Altai, iron attached plaques with immovable rings are quite rare and are dated with a broad range from the 2nd to the 5th centuries AD (Matrenin, 2017: 64, 74).

The iron rosette-shaped plaque with pin fastening (see Fig. 3, *6*) has no parallels among the evidence of the Bulan-Koby culture. In its shape it resembles the polychrome plaques of the Xiongnu of Mongolia and Transbaikal region of the late 1st century BC–1st century AD (Konovalov, 1976: Pl. XIX, 19; Erôôl-Erdene, Gantulga, 2008: 244, 248, 251, 278, 287).

Noteworthy is a series of belt plaques made of non-ferrous metal (mound 11), which very rarely occur in the Altai at the sites of the first half of the 1st millennium AD. The thirteen distinctive items are flat, subsquare bronze plates folded into a clip and having no attachment elements (see Fig. 2, *2–14*). These items were placed close to each other in the middle of the belt with a width of 3.5 cm. The plaques might have been attached to the belt by threading through narrow horizontal slots in the leather belt and tightly pressing the front and back parts of the frame against it. The high probability of such a method of fastening is confirmed by the evidence from the Bulan-Koby Stepushka burial ground (Central Altai) of the Xianbei-Rouran Period, where a bronze half-clip plaque with the remains of the leather base was found *in situ*. The bent plate located with the open side down and fixed with an inserted pin was passed through a small, horizontal slot near the upper edge of the belt (Tishkin, Matrenin, Shmidt, 2018: 99, pl. 19, *13*, fig. 77, *13*).

Bronze clip-plaques were discovered as a part of the Bulan-Koby belt sets in the Altai for the first time. Taking into account the archaeological age of the burial where they were found, these finds have tentatively been dated to the 2nd–3rd centuries AD. Typologically, they can be

considered as one of the prototypes of similar but later (3rd–4th centuries AD) belt half-clip plaques with pin fastening (Matrenin, 2017: 78–79; Tishkin, Matrenin, Shmidt, 2018: 91).

The bronze plaque in the form of a straight quadrangular plate attached to the belt with an inserted pin (see Fig. 2, *15*) has no morphological parallels in the materials from the Xiongnu sites, which definitely suggests its dating to no earlier than the 2nd century AD. Production of such plaques by the Bulan-Koby people was associated with similar iron modifications that received distribution in the region and reflected the influence of the Xianbei traditions. The closest specimens, which were not identical and probably came from a later period, were found in burials at the Balyktyyul (mid 3rd century AD) and Stepushka (4th century AD) cemeteries (Sorokin, 1977: Fig. 6, *9–10*; Tishkin, Matrenin, Shmidt, 2018: 90, pl. 19, *9*).

The decorative belts from mounds 11 and 27 were equipped with "pendant tips" attached to the ends of freely hanging straps. The bronze, inserted specimen in the form of a solid tube-socket with a cut-off, spoon-shaped front edge (nose), having a tongue-like shape in plan view (see Fig. 2, *24*), has parallels in the evidence from the Central Asian Xiongnu sites of the late 1st century BC–1st century AD (Erôôl-Erdene, Gantulga, 2008: Zur. 13; Brosseder, 2011: Fig. 50, *36*). This specimen is dated later than cast samples with slotted socket that became widespread among the peoples of Northern Asia under the influence of the Xiongnu in the 2nd–1st centuries BC (Matveeva, 1994: Fig. 58, *21*; Savinov, 2009: Pl. XXIV, *44*; XXV, *3–4*; XLVII, *14–15*; Kuzmin, 2011: Pl. 40, *22–24*; 74, *3*, *4*, *24*, *29*; 89, *16–17*; Leus, 2011: Fig. 20, *3*; Borodovsky, Larichev, 2013: 85, 95, 98; fig. 16, *1*, *2*; 31, *17*, *18*; 33, *8*, *18*; 38, *4*, *8*). The evidence from the Karban I cemetery indicates that the upper chronological boundary of inserted tips of this type among the population of the Altai was the 2nd–3rd centuries AD.

The belt "pendant tip" in the form of a solid bone tube with a cut spoon-shaped front edge showing a keeled outline (see Fig. 3, *7*) is close in appearance to the items from the sites of the Bulan-Koby culture, dated mainly to the 2nd century BC–1st century AD (Chendek, Pazyryk, Ust-Edigan, Yaloman II) and less often to the 2nd–3rd centuries AD (Bosh-Tuu I) (Sorokin, 1977: Fig. 10, *1*; Mamadakov, 1990: Fig. 65, *15*; Soenov, Ebel, 1992: Fig. 21, *2*; and others).

Three decorative belts from the Karaban I site were equipped with iron "units" in the form of small round or oval rings without attachment elements (see Fig. 2, *19*; 4, *3*; 5, *3*, *4*, *7*). Their number in sets varied from one to three; these "units" might have been used to connect and tighten belts, or to hang some things (whips, whetstones, handbags, containers) from. They could have been attached to a movable leather loop or a loosely hanging shoulder strap. Similar elements of the waist set became widespread among the Bulan-Koby people in the 2nd–5th centuries AD (Matrenin, 2017: 94–95; Tishkin, Matrenin, Shmidt, 2018: 94, 96). Outside the Altai, they were most common among the nomads of Tuva in the 3rd–4th centuries AD (Kenk, 1984: Abb. 29, *F*, *8*; 33, *B*, *2*; 35, *E*, *1*; 38, *D*, *3*, *J*, *2*, *K*, *3*; 41, *A*, *8*; 42, *A*, *17*; Nikolaev, 2000: 70–71).

The iron, rounded-trapezoid "unit" from mound 27 (see Fig. 3, *4*) has no parallels in the known collections from the Bulan-Koby sites of the Altai. It can be approximately dated to the Xianbei Period (2nd century to first half of the 4th century AD). At the same time, it should be mentioned that the item under discussion resembles in its appearance those T-shaped buckles and belt dispensers that became widespread in the Altai in the 3rd–5th centuries AD (Matrenin, 2017: 44–45, 50, 53, 54, 93; Tishkin, Matrenin, Shmidt, 2018: 79–80).

Discussion

The study of the sets remaining from decorative belts (4 buckles, 33 plaques, 5 "units", 2 tips) from the Karban I necropolis makes it possible to conclude that most of these items appeared among the Altai population no earlier than the 2nd century AD, and were local replicas of the Xiongnu and Xianbei equipment. According to a comparative analysis, the finds under consideration can be attributed to the Early Bely Bom stage of the Bulan-Koby culture of the Altai (2nd to the first half of the 3rd century AD).

Despite the fact that the leather bases of the belts have not survived in any burial, the location of the parts found *in situ* relative to the bones of postcranial human skeletons makes it possible to make reconstruction drawings of the decorative belts, taking into account a number of procedural and methodological aspects. First, a most accurate measurement of the distance between the elements was crucial when analyzing the data at their location. Second, the burials might have contained individual parts of belts as a symbolic expression of the whole set. Third, the interpretation of the functional purpose of several items was not always unambiguous.

The decorative belt from mound 11 was the most distinctive and sophisticated in its composition (Fig. 6, *1*). The reconstructed set had a main belt with iron oval-framed buckle, 14 bronze clip-plaques, five iron attached plaques, and two iron half-clip plaques, including those with movable ring. A long (about 29 cm) hanging strap with bronze plaque was attached to the right side; two hanging straps were attached to the left side; an iron "unit" was attached to one of the straps (about 6 cm long), and a bronze spoon-shaped "pendant tip" was attached to the other strap (about 30 cm long). The maximum width of the belt was 3.5 cm. The belt was passed into the slot of

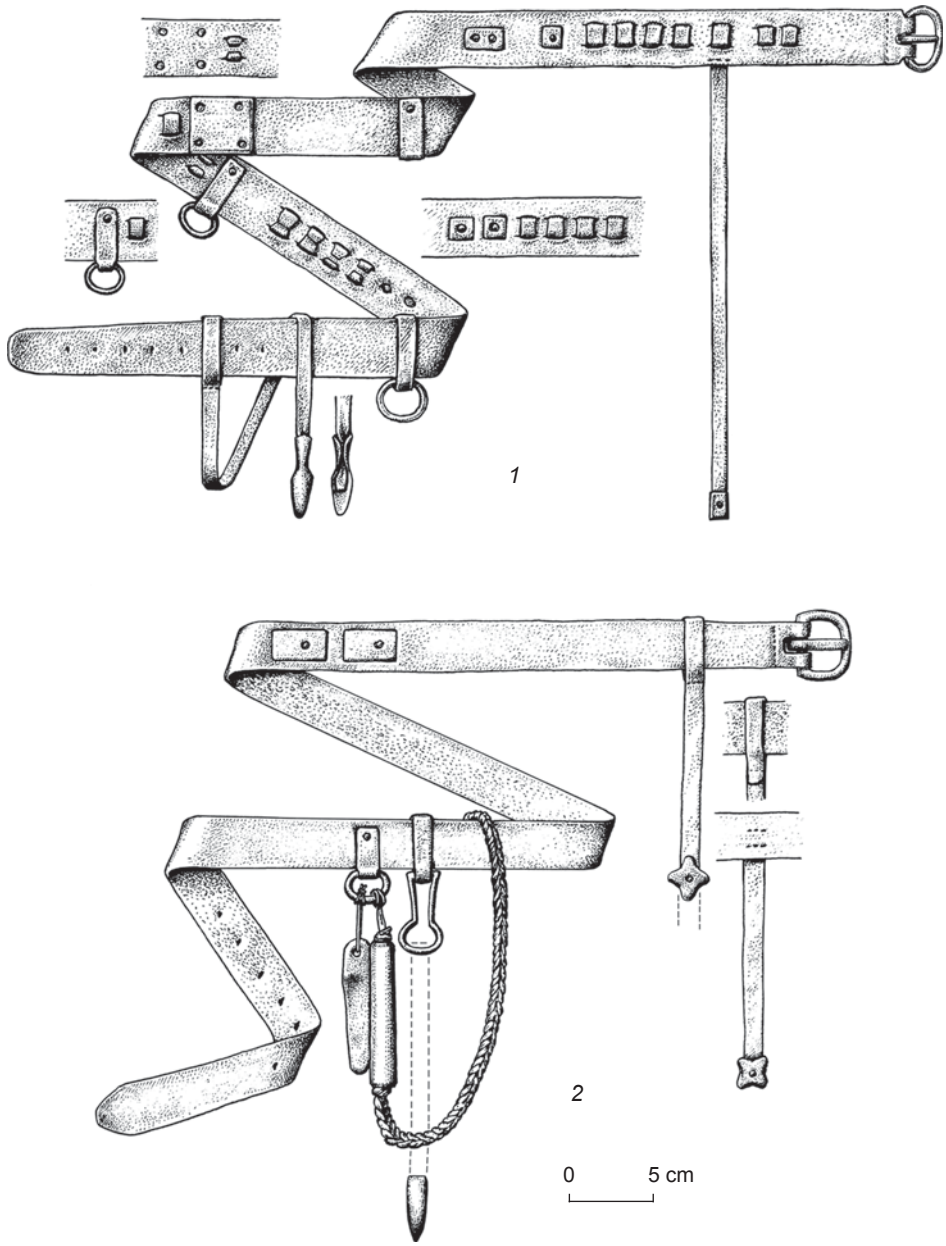


Fig. 6. Reconstruction of decorative belts from mounds 11 (*1*) and 27 (*2*).

the buckle from left to right. Such a belt was found in the burials of the Bulan-Koby culture of the Altai for the first time.

The decorative belt from mound 27 (Fig. 6, *2*) was fastened with an oval-framed buckle and had various decorative and functional elements of a main belt (two attached plaques, "unit" of a round-trapezoidal shape, half-clip plaque with movable ring), and hanging straps (attached plaque in the form of a rosette, bone "pendant tip"). The belt was passed into the slot of the buckle from left to right. Exact parallels to this set in the archaeological evidence from the Altai are unknown to the current authors.

The decorative belt from mound 33 (Fig. 7, *1*) turned out to be the simplest: it had a rectangular buckle, half-clip plaque with movable ring, two quadrangular attached plaques, and a ring-shaped "unit". The belt at the buckle was fastened to the left. Its width was believed to have been about 2.0–2.5 cm. Parallels to such a belt in the Altai have been found among the evidence from the sites of the 2nd–5th centuries AD (Matrenin, 2017: 111).

Mound 39 contained two decorative belts. The "upper" belt (Fig. 7, *2*) had an iron set (rectangular buckle, pair of plaques with rings on the sides, and two ring "units" on the back), and was about 2.0–2.5 cm wide. The belt at the buckle was fastened to the left.

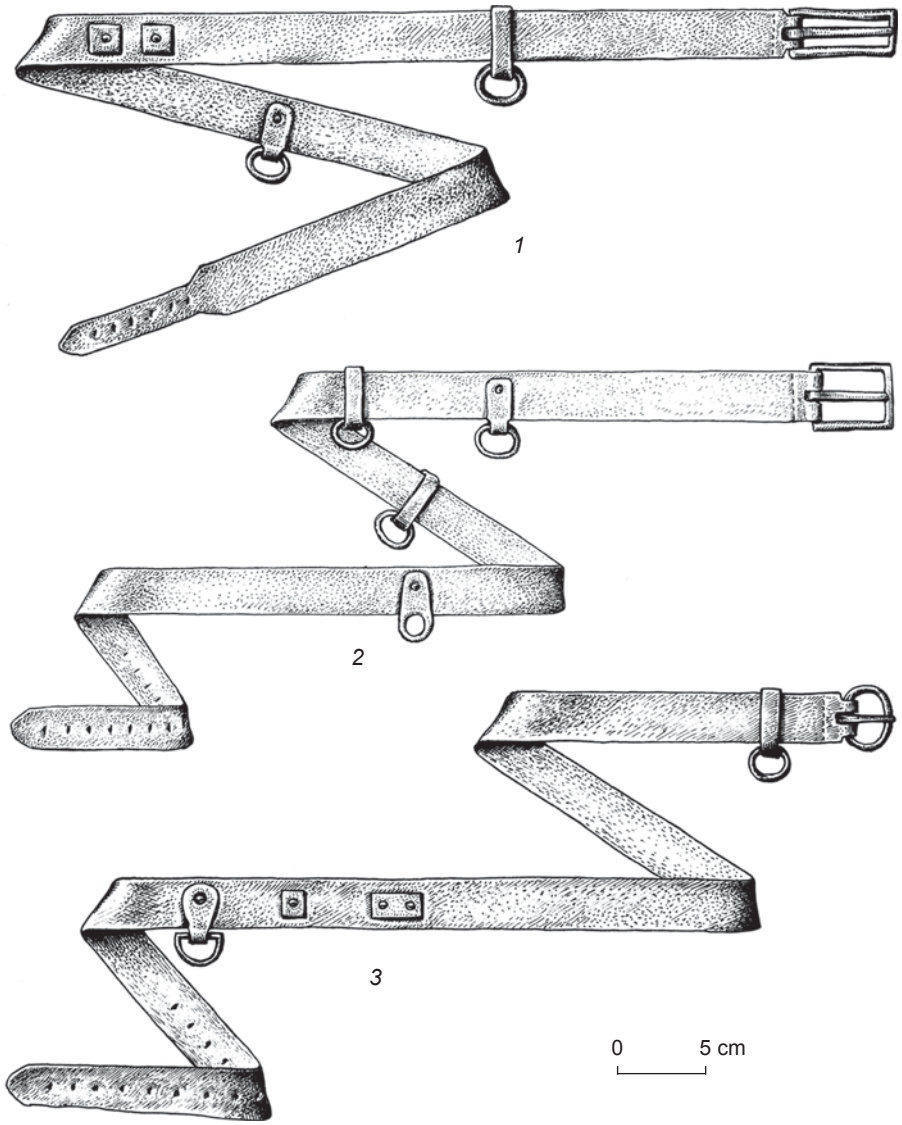


Fig. 7. Reconstruction of decorative belts from mounds 33 (*1*) and 39 (*2*, *3*).

A similar set has been found in a Bulan-Koby burial of the 4th century AD at the Stepushka cemetery (Tishkin, Matrenin, Shmidt, 2018: 98–99, pl. 24, *II*). The "lower" decorative belt (Fig. 7, *3*) also had only iron elements (oval-framed buckle, "unit", two attached plaques, and a half-clip plaque with movable ring), and was 2.0–2.5 cm wide. This belt was fastened to the left. Belts similar in the composition of elements have been found in the Altai in the complexes of the Xianbei (Airydash I, Bulan-Koby IV) and Rouran (Verkh-Uimon, Dyalyan, Yaloman II) periods (Matrenin, 2017: 111).

The distinctive sets of decorative belts from mounds 11, 27, and 39 suggest that they existed for a relatively short period in the 2nd–first half of the 3rd century AD. The difference in sets of elements does not reveal any connection with the age of the deceased males, and apparently reflected the personal preferences of their owners.

The evidence confirms the social role of decorative belts, most of which have been found in the burials of males with numerous grave goods (primarily weapons and tools), who had high status in the social and property-related stratification of the local group of representatives of the Bulan-Koby culture buried at Karban I.

Conclusions

Publication and interdisciplinary studies of finds (buckles, plaques, "units", "pendant tips") from the burials at the Karban I cemetery have made it possible to obtain common, specific, and individual characteristics of

decorative belts used by the population of the Northern Altai in the first half of the 1st millennium AD. Analysis and chronological attribution of the belt sets indicate that in the 2nd–3rd centuries AD these items evolved among the Bulan-Koby people of the Altai under the influence of the equipment used by the Central Asian nomads. Qualitative and quantitative diversity of the functional and decorative elements of belts, including the presence of items with no parallels among the evidence of the Bulan-Koby culture, is noteworthy. The dating of some types of items to the Xianbei Period can be corrected taking into account the archaeological age of the closed complexes where they were found.

The discovery of the items in graves *in situ* has made it possible to perform fairly objective reconstruction drawings of several types of decorative belts, including their rare and previously unknown varieties. Differences in the composition of the belt sets reflected the personal preferences of their owners. Decorative belts came from the burials that contained the richest goods among the male burials excavated at Karban I. This observation emphasizes the high position of these individuals in the social and property-related stratification of the local group of the Bulan-Koby living in the Xianbei Period.

Acknowledgments

This study was supported by the Russian Science Foundation (Project No. 20-18-00179). Treatment of the materials from the excavations at the Karban I cemetery was carried out under the program of strategic academic leadership of the Federal State Budgetary Educational Institution of Higher Education at the Altai State University.

References

Bobrov V.V., Vasyutin A.S., Vasyutin S.A. 2003
Vostochniy Altai v epokhu Velikogo pereseleniya narodov (III–VII veka). Novosibirsk: Izd. IAET SO RAN.

Borisenko A.Y., Hudiakov Y.S. 2004
Naborniye poyasa kochevnikov Edigana v syanbiyskiy period. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. X (1). Novosibirsk: Izd. IAET SO RAN, pp. 194–199.

Borodovsky A.P., Larichev V.E. 2013
Iyusskiy klad (katalog kollektsii). Novosibirsk: Izd. IAET SO RAN.

Brosseder U. 2011
Belt plaques as an indicator of East-West relations in the Eurasian steppe at the turn of the millennia. In *Xiongnu Archaeology: Multidisciplinary Perspectives of the First Steppe Empire in Inner Asia*. Bonn: Universität Bonn, pp. 349–424.

Dobzhansky V.N. 1990
Naborniye poyasa kochevnikov Azii. Novosibirsk: Novosib. Gos. Univ.

Dyakonova V.P. 1970
Bolshiye kurgany-kladbishcha na mogilnike Kokel (po rezultatam raskopok za 1963, 1965 gg.). In *Trudy Tuvinskoy kompleksnoy arkheologo-etnograficheskoy ekspeditsii*, vol. III. Leningrad: Nauka, pp. 80–209.

Erôôl-Erdene C., Gantulga Z. 2008
Umard khunnùgiyn yazguurtny negen bulshny sudalgaa. *Arkheologiyn sudlal*, vol. VI (XXVI): 149–189. (In Mongolian).

Ilyushin A.M. 2000
Mogilnik Kudyrge i voprosy drevnetyurkskoy istorii Sayano-Altaya. In *Pamyatniki drevnetyurkskoy kultury v Sayano-Altaye i Tsentralnoy Azii*. Novosibirsk: Izd. Novosib. Gos. Univ., pp. 157–169.

Kenk R. 1984
Das Gräberfeld der hunno-sarmatische Zeit von Kokel', Tuva, Süd-Sibirien: AVA-Materialien. München: Verl. C.H. Beck.

Konovalov P.B. 1976
Khunnu v Zabaikalye (pogrebalniye pamyatniki). Ulan-Ude: Buryat. kn. izd.

Kuzmin N.Y. 2011
Pogrebalniye pamyatniki khunno-syanbiyskogo vremeni v stepyakh Srednego Yeniseya: Tesinskaya kultura. St. Petersburg: Aising.

Leus P. 2011
New find from the Xiongnu period in Central Tuva: Preliminary communication. In *Xiongnu Archaeology: Multidisciplinary Perspectives of the First Steppe Empire in Inner Asia*. Bonn: Universität Bonn, pp. 515–536.

Mamadakov Y.T. 1990
Kultura naseleniya Tsentralnogo Altaya v pervoy polovine I tysyacheletiya nashey ery: Cand. Sc. (History) Dissertation. Novosibirsk.

Mandelshtam A.M., Stambulnik E.U. 1992
Gunno-sarmatskiy period na territorii Tuvy. In *Stepnaya polosa Aziatskoy chasti SSSR v skifo-sarmatskoye vremya*. Moscow: Nauka, pp. 196–205.

Matrenin S.S. 2017
Snaryazheniye kochevnikov Altaya (II v. do n.e. – V v. n.e.). Novosibirsk: Izd. SO RAN.

Matveeva N.P. 1994
Ranniy zheleznyi vek Priishimya. Novosibirsk: Nauka.

Miller B.K., Ollard F., Erdenebaator D., Li K. 2008
Pogrebalniy kompleks syunnu: Raskopki mogilnika Gol Mod-2 (Mongoliya, 2002–2005 gg.). *Arkheologicheskiye vesti*, iss. 15: 55–71.

Nikolaev N.N. 2000
Poyasniye nabory mogilnika Kokel. In *Mirovozzreniye. Arkheologiya. Ritual. Kultura*. St. Petersburg: Izd. SPb. Gos. Univ., pp. 70–85.

Pamyatniki kokelskoy kultury Tuvy: Materialy i issledovaniya. 2010
St. Petersburg: ElikSis.

Savinov D.G. 2009
Minusinskaya provintsiya khunnu (po materialam arkheologicheskikh issledovaniy 1984–1989 gg.). St. Petersburg: IIMK RAN.

Seregin N.N., Demin D.A., Matrenin S.S. 2021
Obyekty syanbiyskogo vremeni kompleksa Karban I (Severniy Altai). *Narody i religii Yevrazii*, vol. 26 (2): 81–91.

Soenov V.I., Ebel A.V. 1992
Kurgany gunno-sarmatskoy epokhi na Verkhney Katuni. Gorno-Altaysk: Gorno-Alt. Gos. Ped. Inst.

Soenov V.I., Konstantinov N.A., Trifanova S.V. 2018
Mogilnik Stepushka-2 v Tsentralnom Altaye. Gorno-Altaysk: Gorno-Alt. Gos. Univ.

Sorokin S.S. 1977
Pogrebeniya epokhi "Velikogo pereseleniya narodov" v rayone Pazyryka. *SGE*, iss. 18: 57–67.

Teterin Y.V. 1995
Poyasniye nabory gunno-sarmatskoy epokhi Gornogo Altaya. In *Problemy okhrany, izucheniya i ispolzovaniya kulturnogo naslediya Altaya*. Barnaul: Izd. Alt. Gos. Univ., pp. 131–135.

Tishkin A.A., Matrenin S.S. 2020
Voinskiye poyasa kochevnikov Altaya khunnuskogo vremeni iz mogilnika Yaloman II. In *Kulturnoye naslediye v kontekste traditsionnykh i mezhdistsiplinarnykh issledovaniy: Materialy Mezhdunar. nauch. kruglogo stola, 28–30 marta 2019 g., g. Pendzhikent*. Dushanbe: Donish, pp. 43–58.

Tishkin A.A., Matrenin S.S., Kungurov A.L. 2015
Naborniye poyasa kochevnikov Altaya epokhi Velikogo pereseleniya narodov iz pamyatnika Stepushka I. *Rossiyskaya arkheologiya*, No. 1: 121–135.

Tishkin A.A., Matrenin S.S., Shmidt A.V. 2018
Altai v syanbiysko-zhuzhanskoye vremya (po materialam pamyatnika Stepushka). Barnaul: Izd. Alt. Gos. Univ.

Vasyutin A.S. 2000
Zashchitno-portupeiniye poyasa predkudyrginskogo vremeni Vostochnogo Altaya. In *Pyatiye istoricheskiye chteniya pamyati M.P. Gryaznova*. Omsk: Om. Gos. Univ., pp. 24–25.

Yaremchuk O.A. 2005
Mogilnik Zorgol-1 – pamyatnik khunno-syanbiyskoi epokhi Stepnoy Daurii: Cand. Sc. (History) Dissertation. Chita.

Received November 22, 2021.
Received in revised form January 21, 2022.

doi:10.17746/1563-0110.2022.50.2.101-110

I.V. Zhurbin, A.G. Zlobina, A.S. Shaura, and A.I. Bazhenova

Udmurt Federal Research Center, Ural Branch, Russian Academy of Sciences, T. Baramzinoy 34, Izhevsk, 426067, Russia
E-mail: zhurbin@udm.ru; elf54@yandex.ru; shauraa@mail.ru; aigul_bazh@udman.ru

Occupation Layer at the Kushman Cluster of Sites (9th–13th Centuries) According to Multispectral Imaging Data

This study proposes a novel methodological approach to reconstructing the boundaries and structure of medieval settlements without relief features. In recent centuries, the areas of most sites were used for plowing, destroying their relief features. Erosion eventually redistributed the soil of the destroyed occupation layers. Therefore, not only the area of a site must be studied, but the adjoining areas as well. Tendencies in the distribution of the transported occupation layer mirror the thickness of the original culture-bearing deposits. Such estimates can be obtained by collating archaeological and science-based data. First, multispectral aerial photographs are subjected to statistical analysis. The results are then used to subdivide the settlement territory into smaller areas differing in vegetation density. Comparison with the results of geophysical, soil, and archaeological studies allows us to interpret those areas, to assess the state of preservation of the occupation layer (superficially disrupted, replaced, or transported). Previous multidisciplinary studies at the Kushman cluster of sites (9th–13th centuries AD) revealed substantial differences from the traditional classification (fortified settlement and group of unfortified rural settlements). Two sites can be defined as fortified settlements (Uchkakar and Kushmanskoye III), whereas Kushmanskoye II is an economic development area. The use of statistical analysis of multispectral imaging enabled us not only to confirm the previously proposed reconstruction, but also to substantiate the hypothesis about the initial boundaries and structure of the settlements.

Keywords: *Medieval settlements, multispectral imaging, statistical analysis, multidisciplinary study, occupation layer, superficially disrupted, replaced, transported.*

Introduction

The complexity and ambiguity of the reconstructed boundaries and structures of medieval sites is caused by various disruptions of the occupation layer. In recent centuries, and especially in the 20th century, the areas of most sites have been used as agricultural lands. Plowing has gradually destroyed upper horizons of culture-bearing strata. Owing to erosion, soil from the destroyed occupation layer was displaced into subordinate landforms. In this situation, assessing the arrangement and configuration of areas differing in the thickness of occupation horizons over the entire surface of the site and of the adjoining territory enables us to test hypotheses about the original boundaries and structure of the settlement.

In the situation of land surface "leveled out" by plowing, vegetation features of the occupation layer appear

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 101–110 E-mail: Eurasia@archaeology.nsc.ru

to be more informative. In general, the composition and thickness of vegetation cover in an area is determined by a variety of factors such as relief, steepness, and exposition of slopes, hydrological system, background humidity, and others (Chupina et al., 2018). At the micro-regional level (area of an ancient settlement or a compact group of archaeological sites), local factors are most important: thickness of soil horizon, types of soils, humidification, modern anthropogenic impact, etc. Alteration of these factors determines the character of vegetation in various parts of the site (Calleja et al., 2018; Verhoeven, Vermeulen, 2016). These features are clearly revealed by multispectral aerial photography, providing a group of images for each area in various ranges of the electromagnetic spectrum. In every spectral band, certain landscape objects are more contrasting than others: green vegetation, open areas of soil, water surface, wetted areas, and others.

Filtering and contrast enhancement are used to enhance the clarity of initial images. Such an approach is efficient for detection of objects with linear elements partially visible in the relief (Lasaponara et al., 2012; Noviello, Ciminale, De Pasquale, 2013). Joint analysis is conducted using data of different types: vegetation indices and thermal imagery (Carmona et al., 2020); satellite and multisensory aerial imagery; vegetation indices and digital landscape models (Lasaponara et al., 2012). Mathematical procedures are developed to conduct segmenting of the image into spatially disjoint regions of uniform properties. Areas varying in vegetation are eventually pinpointed on the territory. The reliability of the analysis has been proved for archaeological sites of various ages and types, located in drastically different landscapes in South Africa, Western Iran, and Cyprus (Agapiou, 2020; Sharafi et al., 2016; Thabeng, Merlo, Adam, 2019).

Interpretation of the discovered areas is based on a set of independent data. High-precision aerial photographs and satellite imagery in the visible range, as well as data received though terrestrial prospection (including excavations), are used in most cases. Geophysical data are less commonly used (Carmona et al., 2020; Noviello, Ciminale, De Pasquale, 2013). Apparently, the study of settlements lacking distinct relief features requires the widest range of reference data. If compared with aerial photography, other techniques provide information only about a fragment of the study area. Geophysical survey areas are limited by landscape boundaries (sloping surface of the promontory); excavations encompass much smaller areas; and soil studies are patchy. A comparative analysis of local interdisciplinary data, findings of multispectral surveys, and the subsequent extrapolation of the resulting standards on the entire site area provide a reliable general distribution pattern of the preserved and transported occupation layer. Such a mapping can be used to estimate the thickness of the original occupation layer in various parts of the settlement, and to delimit its boundaries.

Kushman cluster of sites

The Kushman cluster of archaeological sites is located at the northwestern boundary of the Cheptsa culture area (northern part of the Udmurt Republic). The Kushmanskoye fortified settlement of Uchkakar, unfortified settlements of Kushmanskoye I–III, and Shaivyl burial ground were traditionally included into this cluster (Arkheologicheskaya karta…, 2004: 200–203). However, systematic multidisciplinary studies conducted in the 2010s substantially changed these assumptions. For instance, the structure of Uchkakar turned to be more sophisticated than it seemed from topographic parameters (Mezhdistsiplinarnye issledovaniya…, 2018: Fig. 1, 7). The internal line of fortifications without relief features was revealed. As a result, four structural parts of the settlement were singled out: the inner part (promontory area delimited by the "hidden" fortification lines); the medial part; the outer part delimited by salient features of fortification; and the external part outside the outer fortification line. Kushmanskoye III was shifted to a different typological category (Zhurbin et al., 2019). Two fortification lines without relief features were revealed, boundaries between the structural parts of the site were determined, and their functional interpretation was proposed. The totality of complementary data does not support the presence of settlement at Kushmanskoye II (Zhurbin, 2021). Thus, instead of the "traditional" scheme of settling (a fortified settlement and a group of rural settlements), two fortified settlements and an economic development area without building elements were identified.

Preservation and characteristics of the occupation layer

The territory occupied by the Kushman cluster of sites was possibly used for agricultural lands from the early 17th century till the end of the 20th century. That the Kushman village existed within "the old fort" was mentioned in the *List of Survey Registers of Voivodes, Compiled by Prince Fedor Andreyevich Zvenigorodsky, Vasily Terentyevich Zhemchuzhnikof, and the Scribe Mikhail Ordintsov* (1615) (RGADA, F. 1209, Inv. 1, D. 1030, fol. 525r–525v). The current condition of the sites attributable to the Cheptsa culture makes it possible to single out the areas with superficially disrupted, replaced, and transported occupation layers.

The superficially disrupted occupation layer is characterized by the upper part, destroyed by plowing, and the lower part preserved *in situ*. This type of destruction is typical of gentle slopes in the zone of transit of erosion material.

The transported occupation layer consists of unstructured humified soil with archaeological remains. It is the occupation layer destroyed by plowing and transported by erosional processes. It forms the basis of topsoil and subsoil horizons in various parts of the settlement territory and adjoining areas. The transported occupation layer is also recorded on slopes of high promontories where sites of the Cheptsa culture are situated.

The replaced layer can be described as the topsoil horizon formed in place of the destroyed occupation layer. Owing to the gradual lowering of the surface, plowing affected increasingly deeper soil strata, reaching the soil-forming rocks. Therefore, the topsoil horizon is composed primarily of parent material, with occasional inclusions of artifacts. In fact, it represents the limit condition of the superficially disrupted layer. The situation of this sort is usually encountered at the tops of local watersheds in a zone of severe erosion. There, the soil material from destroyed culture-bearing strata forms the transported layer. In the building-zone of settlement, only the lower portions of constructions deepened into bedrock have been preserved. In some cases, these are covered by thin beds of the original occupation stratum or by the transported layer.

To estimate the thickness of the original occupation layer, not only the settlement area must be examined, but the adjoining areas as well (slopes of promontories or sloping surfaces outside the settlements). Tendencies in the distribution of the transported occupation layer in the adjoining areas mirror the thickness of the original culture-bearing deposits during the period of the settlement's functioning, as well as the process of their subsequent destruction.

Multispectral aerial photography

Aerial photography was carried out using a Supercam S350-F unmanned aerial vehicle (Finco LLC, Izhevsk). Owing to long-term plowing, relief features of medieval constructions in most cases are absent (Fig. 1, *a*). The orthophotomap is matched with a set of multispectral images in Green, NIR, and Red bands (Fig. 1, *b–d*). In the general case, the highest reflectance of green vegetation coincides with the near infrared (NIR) and visible green (Green) ranges of the electromagnetic spectrum (Kallepalli et al., 2016).

Visual analysis of raw multispectral images is uninformative. All the images demonstrate only the differences in vegetation structure in the southern promontory part of the site and in its northern part beyond the field's road (Fig. 1, *b–d*). Parallel lines in the northern part are possibly the evidence of long-term agricultural activities: the territory of the site was plowed for a long time, and starting from the late 1990s has been used as a hayfield. The image in Green band (Fig. 1, *b*) shows only contrasting arboreal and shrub vegetation in deep gullies and on the abrupt southern slope of the bedrock river-bank. Images in NIR (Fig. 1, *c*) and Red (Fig. 1, *d*) bands differ substantially in reflectance. In the center of the promontory and in the territory adjoining the field's road, local areas of a heterogeneous structure were recorded, with highly reflecting elements. In general, multispectral images supplement photographs in the visible range. However, raw images cannot locate areas with various thicknesses of the occupation layer so as to delimit site boundaries. More information can be gained from the segmentation of multispectral images and the subsequent classification of vegetation features (Zlobina et al., 2021).

Kushmanskoye III

Judging by the *a priori* information, it can be conjectured that some areas attributable to class 1 (Fig. 2) correspond to the superficially disrupted occupation layer. Compact zones of class 1 are located on the territory of the settlement, in its border with the inner fortification line and between the fortifications. The interpretation of these zones is based on geophysical data proving the existence of a thick occupation layer in these places, and on the information obtained by soil coring and excavations (Zhurbin et al., 2019). A test pit near the outer fortification-line revealed the superficially disrupted occupation layer, 0.7 m thick (Kirillov, 2012).

Areas of class 1 are also present on slopes of the ravines delimiting the settlement on the west and east. These areas of linear shape are situated in the upper part of the slopes. Considering their configuration, apparent proximity to the subordinate landforms, and distribution along the perimeter of the settlement, the areas can be attributed to the transported occupation layer. Inclusion of these areas into class 1 is possibly determined by the chemical and biological properties of soils, rather than by the thickness of the humified stratum. The occupation layer at the settlements shows high content of phosphates, organic carbon, certain enzymes, and microorganisms. A substantial concentration of these matters determines the high density of vegetation. The transported layer is also traceable on gently sloping areas adjoining the outer fortification line from the outside. This is a thin humified layer with high values of chemical and biological indices (Zhurbin, 2019: 108–109). The higher vegetation density in the economic periphery might have resulted from the combined effect of redistribution of the destroyed occupation layer during plowing, and anthropogenic transformation of the soils outside the fortifications in the Middle Ages.

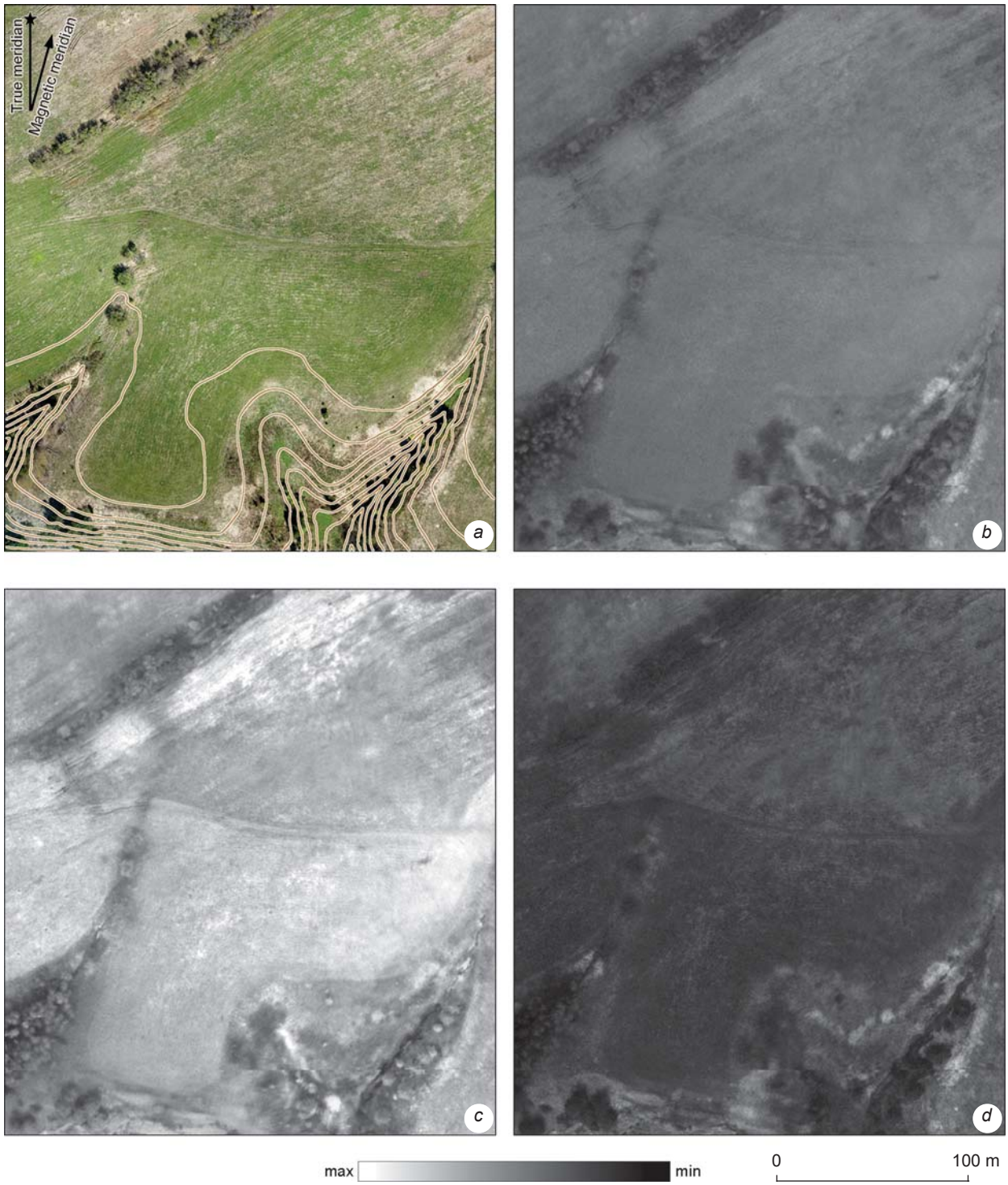


Fig. 1. Orthophotomap (N.G. Vorobyeva, Finco LLC OOO; contour interval, 2.5 m) of Kushmanskoye III (*a*) and reflectance maps in bands Green (*b*), NIR (*c*), and Red (*d*).

Areas attributable to class 4 correspond to the replaced occupation layer. These possibly mirror the extreme situation in which the topsoil horizon consists primarily of redeposited parent material. In this case, large amounts of the destroyed occupation layer were displaced into subordinate landforms where the transported layer had been formed (class 1). The distribution of replaced areas is representative: in the promontory part (at the top of the local watershed) and along the outer perimeter of the economic periphery.

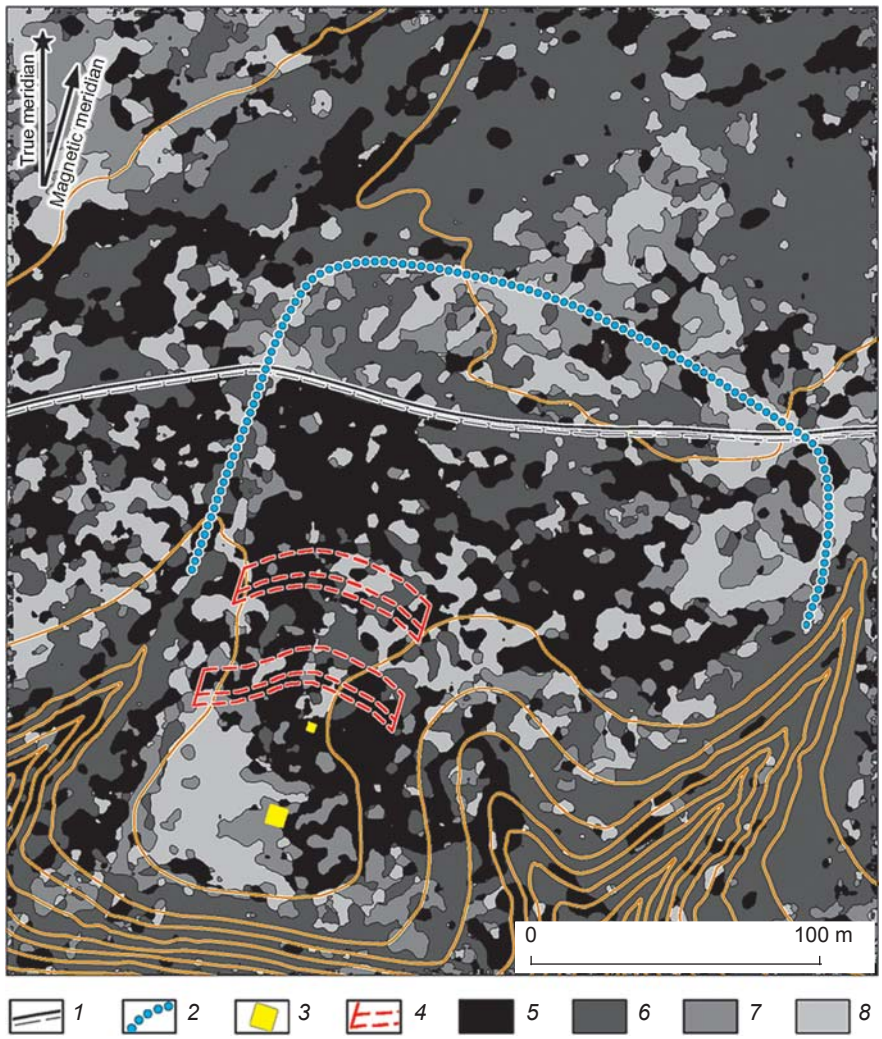


Fig. 2. Segmentation of multispectral images of Kushmanskoye III (contour interval, 2.5 m).
1 – road; *2* – boundaries of the economic periphery; *3* – test pit and excavation; *4* – fortifications; *5–8* – areas of classes 1 (*5*), 2 (*6*), 3 (*7*), and 4 (*8*).

Areas of classes 2 and 3 probably correspond to an intermediate situation in which some interlayers of the original occupation stratum have been preserved, or the parent material is overlain by a thin transported layer with high values of chemical and biological indices. Such a variant is present in the promontory part of the settlement, in the excavation area attributable to class 3. In the excavation, the total thickness of humified strata outside the deepened objects does not exceed 0.45 m (Modin, Ivanova, Zhurbin, 2021).

Generally speaking, segmentation of multispectral imaging data suggests that on gently sloping surfaces of promontories, the superficially disrupted and transported occupation layer can be recorded. Areas of the replaced layer are located at the tops of watersheds. Evidence of the original culture-bearing deposits can be represented by linear areas of the transported occupation layer on slopes of the promontory, if their location matches that of the replaced layer. Areas of the transported layer are presumably located along the perimeter of the residential, economic, and production zones of the settlement.

The Kushmanskoye fortified settlement of Uchkakar

Segmentation of the Uchkakar area (Fig. 3) largely coincides with that of Kushmanskoye III. A well-preserved occupation layer is detectable in the medial part of the settlement. Areas of the superficially disrupted layer up to 1.5 m thick (excavation 1) belong to class 1. In the western and northwestern parts, the thickness decreases to 0.8–0.9 m (excavation 3). This area is mostly attributed to class 2. The tendency of change in the thickness

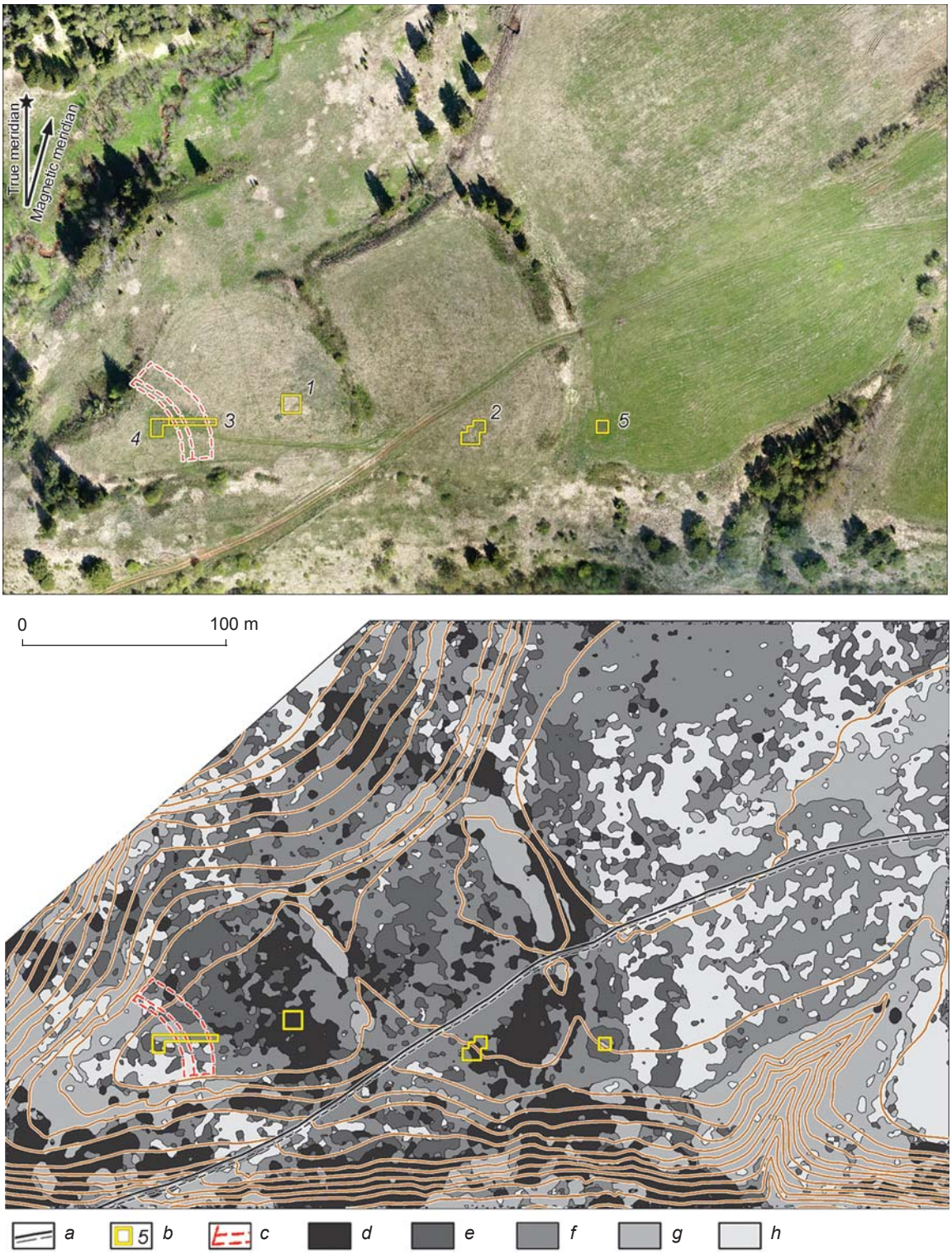


Fig. 3. Orthophotomap and segmentation of multispectral images of the Kushmanskoye fortified settlement of Uchkakar (base by N.G. Vorobyeva, Finco LLC; addition by R.P. Petrov, Physical-Technical Institute, Udmurt Federal Research Center, Ural Branch RAS; contour interval, 2.5 m).

a – road; *b* – excavation and its number; *c* – inner fortifications; *d*–*h* – areas of classes 1 (*d*), 2 (*e*), 3 (*f*), 4 (*g*), and 5 (*h*).

of occupation layer accords with geophysical and geobotanical data (Mezhdistsiplinarnye issledovaniya…, 2018: 51–54, 202–207). Dry meadow vegetation prevails in this part of the settlement. Areas of class 1 located at the junction of the medial rampart and the field's road, as well as in the recultivated excavations, correlate with sporadic occurrences of moisture-loving ruderal plants.

In the outer part of the settlement, delimited by salient features of fortifications, the occupation layer is in a significantly poorer state of preservation. In the center, the superficially disrupted layer is traceable, with its thickness comparable with that in the northwestern part of the medial portion of the settlement (class 2). The area is mostly occupied by the replaced layer, with preserved thin interlayers of the original culture-bearing deposit (class 3). This observation is confirmed by data from excavation 2, where the thickness of the humified stratum does not exceed 0.5 m (Ibid.: 91–97). According to geobotanical data (Ibid.: 202–207), in this place, in contrast to the previous area, the vegetation points to a dry meadow with almost total absence of moisture-loving plants. The southeastern area of the outer part of Uchkakar, attributable to class 1, is probably an accumulation zone of the transported layer, transferred by planar erosion to the subordinate area on the gently sloping surface of the site. The tendency of change in the thickness of the occupation layer generally agrees with the results of geophysical studies (Ibid.: 54–57).

Apparent zones of the transported layer are present in flattened ditches of the medial and outer fortification lines (class 1 in the central and northern parts of the ditches). Localized areas occupied by moisture-loving plants on the background of dry meadow vegetation serve as additional indicators of deepened medieval constructions. For example, the ditch leveled out by plowing at the outer rampart marks a dense growth of reed canary grass (*Phalaroides arundinacea*) (Ibid.: 202–207).

At Uchkakar, same as at Kushmanskoye III, linear areas of the transported occupation layer were recorded on the slopes of the promontory (Fig. 3). Such areas are located on the southern slope of the hill, and run along the inner, medial, and outer parts of the settlement. They were probably formed not only by slope-wash erosion, but also by solifluction. Processes of this sort arise on south-facing slopes, in places with the soil horizon affected by seasonal freezing. The transported layer serves as an additional evidence of the thick original occupation layer that existed in all three structural parts of the settlement.

The thickness of occupation layer changes significantly in Uchkakar's inner part, located on the tip of the promontory. In the area adjoining the ruined fortifications, zones of the superficially disrupted (class 2) and replaced (class 3) occupation layers were recorded. Excavation 4, located in this area outside deepened objects, revealed the superficially disrupted occupation layer, 0.8–0.9 m thick (Ibid.: 69–84). This coincides with the situation observed in excavation 3 in the medial part of the settlement. The rest of the inner territory is attributed to classes 4 and 5—area where the occupation layer was not formed, or has nearly entirely disappeared. Geophysical prospection and soil-coring confirmed the minimal thickness of the humified stratum in this part of the settlement: the layer of modern soil, 0.3 m thick, overlies the parent material, consisting of carbonate clay (Ibid.: 49–51). It is possible that in this case we are dealing with an extreme condition of the replaced occupation layer: soils of culture-bearing deposits were shifted completely to subordinate landforms. Indicators of this situation are segments of the transported layer of class 1 located around the tip of the promontory, mostly on the southern and southwestern slopes. Plants of dry meadow prevail in this area, and small two-storied forest communities are formed there (Ibid.: 202–207). In the Middle Ages, supposedly, both the territory of the settlement and adjacent areas were permanently cleared of trees and bushes.

Areas representing class 4 correspond mostly to zones with a dense growth of trees and shrubs. In deep parts of gullies and on river floodplains, anthropically undisturbed vegetation consists of mixed forest dominated by dark coniferous plants (Ibid.). Dense thickets of wild rose cover ridges of ramparts in the medial and outer fortification lines. These features are especially salient on the orthophotomap (Fig. 3).

Thus, judging by the distribution of vegetation, it can be assumed that the dense building area at Uchkakar included the site's medial and outer parts. Large segments of the superficially disrupted occupation layer have been preserved there. The promontory area (the inner part of the settlement) and the external unfortified part of the settlement were used less intensively. The presence of the replaced layer may be caused not only by small thickness of the original culture-bearing deposits, but also by a greater inclination of the land's surface at the top of the promontory. As at Kushmanskoye III, segments of the thick original occupation layer are marked by linear areas of the transported occupation layer on slopes of the promontory.

Kushmanskoye II

Statistical analysis revealed a distribution of vegetation that differs fundamentally from the situation at the sites described above (Fig. 4). Areas of the superficially disrupted layer are actually absent at the settlement. At Uchkakar and Kushmanskoye III, this layer is present on a large portion of the sloping surface. At Kushmanskoye II, however, localized "inclusions" are recorded only in linear depressions located on tops of gullies, and in a

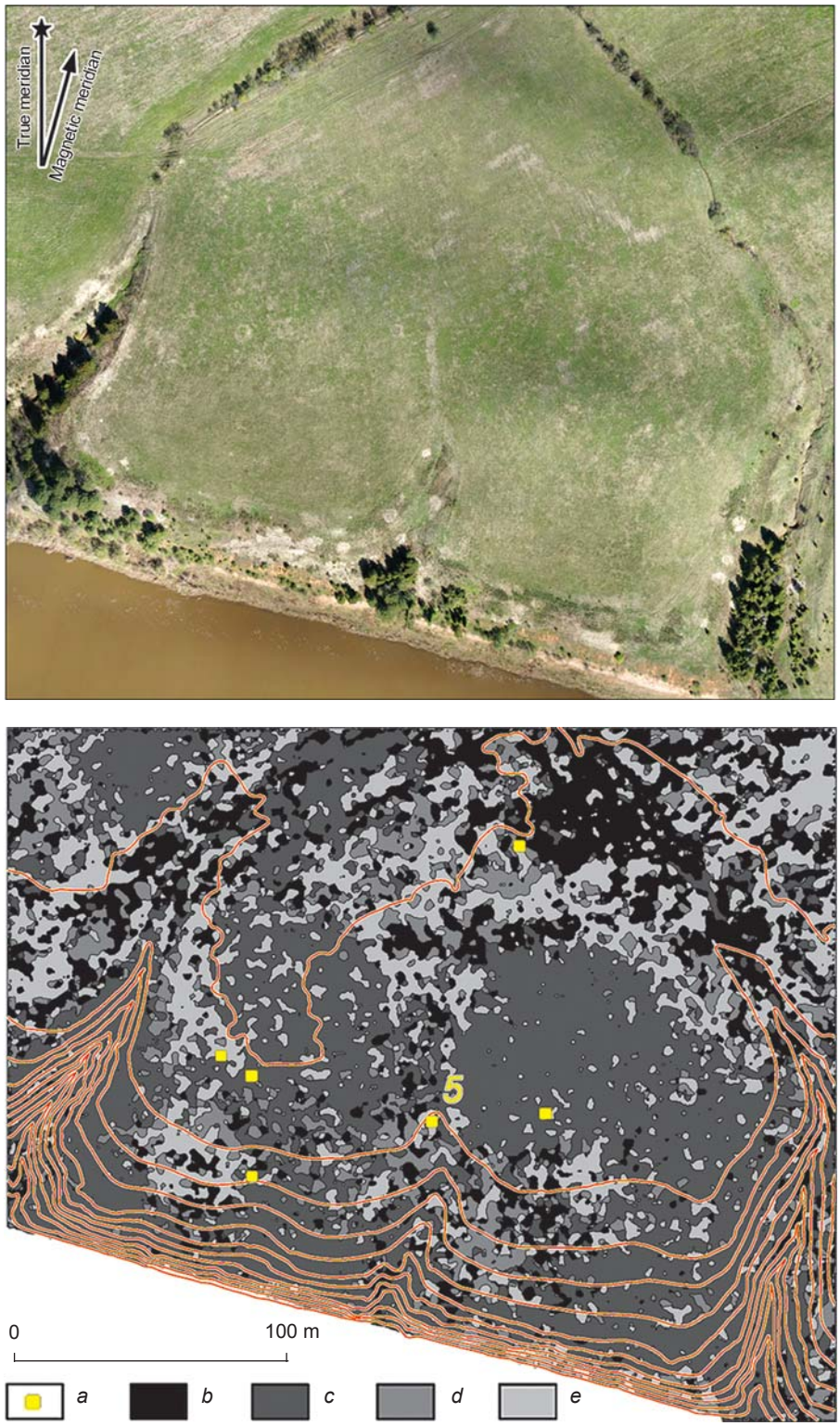


Fig. 4. Orthophotomap and segmentation of multispectral images of Kushmanskoye II (base by N.G. Vorobyeva, Finco LLC; addition by R.P. Petrov, Physical-Technical Institute, Udmurt Federal Research Center, Ural Branch RAS; contour interval, 2.5 m).
a – test pit; *b*–*e* – areas of classes 1 (*b*), 2 (*c*), 3 (*d*), and 4 (*e*).

shallow dry valley in the center of the settlement. Original soils at such areas are buried under the transported soils. A rather thick transported layer was traced in test pit 5 (Kirillov, 2011).

Areas of class 2 occupy the largest territory. From the experience of segmenting Kushmanskoye III, they are represented by the thin replaced layer whose segments usually adjoin areas of the superficially disrupted stratum (see Fig. 2 and 3). It is noteworthy that at Kushmanskoye II, the layer of class 2 prevails not only on the entire gently sloping surface of the promontory, but also on walls of gullies (see Fig. 4).

Segmentation of multispectral images, thus, demonstrates rather homogeneous vegetation throughout the gently sloping surface of the promontory. The noted variations are associated with the lowering of the relief and the plowing-practiced in the 20th century (in the northern part of the site). The vegetation cover of Kushmanskoye II is comparable with that observed in areas with the replaced occupation layer at other sites in the Kushman cluster. It is possible that in the Middle Ages, the entire gently sloping surface of the promontory was evenly covered with organic matter—possibly, manure and household rubbish. Such a structure of segmented imagery, combined with geophysical, palynological, and archaeological data, upholds the conclusion that no traces of the settlement are present, and that this territory was possibly part of the agricultural development zone.

Conclusions

The interpretation of segmented imagery resulting from the statistical analysis of multispectral data is based on the following considerations. Vegetation intensity evaluated by multispectral images depends on the thickness of the humified layer and on the amount of anthropogenic organic remains in the soil. Tentative conclusions about the presence of the occupation layer varying in thickness can be based on the analysis of the configuration of areas on segmented images and their correlation with landscape features. The assessment of the archaeological context and of the preservation of the occupation layer (superficially disrupted, replaced, or transported) is possible only through the use of additional geophysical and soil data and the findings of targeted excavations. Step-by-step enhancement of interpretation with the use of those data is the key principle underlying multidisciplinary studies at the Kushman cluster of sites.

Acknowledgements

This study was supported by the Russian Science Foundation (Project No. 22-28-00189). Classification of the occupation layer segments was suggested by A.V. Borisov (Institute of Physicochemical and Biological Problems in Soil Science RAS, Pushchino). Geobotanical studies were carried out by A.Y. Sergeev (Institute of Archaeology RAS, Moscow).

References

Agapiou A. 2020
Evaluation of Landsat 8 OLI/TIRS level-2 and Sentinel 2 level-1C fusion techniques intended for image segmentation of archaeological landscapes and proxies. *Remote Sensing*, vol. 12 (3): 579–598.

Arkheologicheskaya karta severnykh raionov Udmurtii. 2004
A.G. Ivanov, M.G. Ivanova, T.I. Ostanina, N.I. Shutova. Izhevsk: UIIYaL UrO RAN.

Calleja J.V., Pages O.R., Diaz-Alvarez N., Peon J., Gutierrez N., Martin-Hernandez E., Relea A.C., Melendi D.R., Alvarez P.F. 2018
Detection of buried archaeological remains with the combined satellite multispectral images and UAV data. *International Journal of Applied Earth Observation and Geoinformation*, vol. 73: 555–573.

Carmona J.A.S., Quiros E., Mayoral V., Charro C. 2020
Assessing the potential of multispectral and thermal UAV imagery from archaeological sites: A case study from the Iron Age hillfort of Villasviejas del Tamuja (Cáceres, Spain). *Journal of Archaeological Science: Reports*, vol. 31. Article 102312.

Chupina D.A., Zolnikov I.D., Smolentseva E.N., Lashchinsky N.N., Nikulina A.V., Kartoziya A.A. 2018
Geoinformatsionnoye kartografirovaniye territorii po reaktsii k issusheniyu i uvlazhneniyu (yug Zapadno-Sibirskoi ravniny). *Izvestiya RAN*, Ser. Geograficheskaya, No. 5: 81–90.

Kallepalli A., Kumar A., Khoshelham K., James D.B. 2016
Application of spectral and spatial indices for specific class identification in Airborne Prism Experiment (APEX) imaging spectrometer data for improved land cover classification. *Proceedings of SPIE: Earth Resources and Environmental Remote Sensing/GIS Applications VII* (Edinburgh), vol. 10005: 246–265.

Kirillov A.N. 2011
Istoriko-kulturnye issledovaniya Potapovskogo mestorozhdeniya v Krasnogorskom raione i razvedochnye raboty na Kushmanskom II i III selischakh v Yarskom raione Udmurtskoi Respubliki. In *Archives IKMZ UR "Idnakar"*. D. 02–03.

Kirillov A.N. 2012
Arkheologicheskiye raboty po opredeleniyu granits obiektov arkheologicheskogo naslediya v Glazovskom raione i razvedochnye raboty v Yarskom raione Udmurtskoi Respubliki. In *Archives IKMZ UR "Idnakar"*. D. 02–03.

Lasaponara R., Masini N., Holmgren R., Forsberg Y.B. 2012
Integration of aerial and satellite remote sensing for archaeological investigations: A case study of the Etruscan site of San Giovenale. *Journal of Geophysics and Engineering*, vol. 9 (4): S26–S39.

Mezhdistsiplinarnye issledovaniya Kushmanskogo gorodishcha Uchkakar IX–XIII vv.: Metodika kompleksnogo analiza. 2018
I.V. Zhurbin, E.E. Antipina, M.G. Ivanova, E.Y. Lebedeva, R.N. Modin, A.Y. Sergeyev, L.V. Yavorskaya. Moscow: Taus.

Modin R.N., Ivanova M.G., Zhurbin I.V. 2021
Struktura kulturnogo sloya i khronologiya Kushmanskogo III selishcha X–XII vv. v basseine r. Cheptsa (po dannym noveishikh issledovaniy). *Rossiyskaya arkheologiya*, No. 3: 97–115.

Noviello M., Ciminale M., De Pasquale V. 2013
Combined application of pansharpening and enhancement methods to improve archaeological cropmark visibility and identification in QuickBird imagery: Two case studies from Apulia, Southern Italy. *Journal of Archaeological Science*, vol. 40 (10): 3604–3613.

Sharafi S., Fouladvand S., Simpson I., Alvarez J.A.B. 2016
Application of pattern recognition in detection of buried archaeological sites based on analysing environmental variables, Khorramabad Plain, West Iran. *Journal of Archaeological Science: Reports*, vol. 8: 206–215.

Thabeng O.L., Merlo S., Adam E. 2019
High-resolution remote sensing and advanced classification techniques for the prospection of archaeological sites' markers: The case of dung deposits in the Shashi-Limpopo Confluence area (southern Africa). *Journal of Archaeological Science*, vol. 102: 48–60.

Verhoeven G., Vermeulen F. 2016
Engaging with the canopy – multi-dimensional vegetation mark visualisation using archived aerial images. *Remote Sensing*, iss. 8 (9): 752–768.

Zhurbin I.V. 2021
Unfortified settlements of the Cheptsa culture (9th–13th centuries): Ambiguity of interpretation and delimitation of boundaries. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 49 (1): 85–93.

Zhurbin I.V., Borisov A.V., Nazmutdinova A.I., Milich V.N., Petrov R.P., Ivanova M.G., Modin R.N., Knyazeva L.F., Vorobyeva N.G., Zinchuk S.V. 2019
The use of remote sensing, geophysical methods and soil analysis in the study of sites disturbed by agricultural activity. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 47 (2): 103–111.

Zlobina A.G., Shaura A.S., Zhurbin I.V., Bazhenova A.I. 2021
Algorithm for statistical analysis of multispectral survey data to identify the anthropogenic impact of the 19th century on the natural environment. *Pattern Recognition and Image Analysis*, vol. 31 (2): 345–355.

Received December 21, 2021.
Received in revised form January 25, 2022.

doi:10.17746/1563-0110.2022.50.2.111-118

A.Y. Borisenko
Institute of Archaeology and Ethnography,
Siberian Branch, Russian Academy of Sciences,
Pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia
E-mail: aborisenko2@mail.ru

Philip Johan Tabbert von Strahlenberg: An 18th Century Swedish Prisoner's Research in Siberia

This article analyzes the work done by the Swedish prisoner of the Great Northern War Philip Johan Tabbert von Strahlenberg during his stay in Siberia and aimed at exploring ancient and traditional cultures of Western Siberia and the Minusinsk Basin. A brief overview of earlier studies is presented. The conditions of Strahlenberg's work are outlined. His main interests, from his arrival in Siberia's capital until his return to Sweden, concerned the cartography, ethnology, and archaeology of the environs of Tobolsk and of the entire Western Siberia, Minusinsk Basin, and Southern Siberian highlands in particular. Some episodes in Strahlenberg's activities as a researcher and collector are described with a focus on the difficulties he experienced, specifically when collecting ancient artifacts and written documents. Certain results of his research are highlighted. From the modern standpoint, the article examines the significance of Strahlenberg's work for Russian archaeology at the stage when its basis of sources was being formed. His place among the first experts in Western and Southern Siberian ancient and traditional cultures is assessed. The key role in the organization and consolidation of research in the remote fringes of the Russian State in the early 1700s belonged to the Russian Academy of Sciences.

Keywords: *18th century expeditions, early archaeology of Siberia, P.J. Strahlenberg, ancient and traditional cultures, Siberian peoples, history of archaeology, Russian Academy of Sciences.*

Introduction

The first half of the 18th century witnessed a surge of interest in Russia on the part of Western European countries. The active foreign policy of Tsar Peter I was one of several reasons for that. Russia was at war with Sweden; according to various estimates, from 15,000 to 25,000, Swedish citizens were taken prisoners of war (Makarova, 2013: 125). New attempts to build a sea route to China and India through Russian territories were being made (Alekseev, 1932: 59). These reasons might have triggered the emergence of works on the Russian State, its history, outstanding personalities, and cultural features in the 1720s and 1730s in Europe (Savelieva, 1984: 65). Another reason was the need for a more detailed study of new, remote regions, which arose in the early 18th century in Russia owing to expansion of the Russian boundaries in the previous century. In order to secure the status of the Russian Empire as maritime power, which it gained during the Northern War, it was important to find a strait between Asia and America. This might have been one of the reasons that Peter I was extremely interested in organizing a research expedition to the eastern outskirts of the country (Grishchev, 2007: 5–6). Shortly before his death on December 23, 1724, Peter issued a decree on organizing the First Kamchatka (First Siberian-Pacific) Expedition. The decrees Peter issued in February 1718 and February 1721 on submitting and selling ancient

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 111–118 E-mail: Eurasia@archaeology.nsc.ru

items and "curiosities" to the treasury testify to his interest not only in geographical, but also in historical and cultural research on the Russian lands.

The lack of Russian national scholars and knowledge of how to conduct scholarly studies fostered the need to engage various foreign experts in research works. This need drew Russia into the international process of personnel exchange, which was already familiar to European scholarly institutions by that time when Italian scholars worked in France, and German scholars England. By the early 18th century, scholarly infrastructure already existed in Europe; and French, German, Italian, and other scientific academies had been created. During the "Great Embassy", Peter visited European museums and scientific societies. He personally knew famous scientists, such as Gottfried Leibniz, Nicolaes Witzen, and others. The creation of the Academy of Sciences in 1724 was intended to demonstrate the desire of the Russian State to take its rightful place among the contemporaneous enlightened countries. Close connection of the Russian Empire with the German states can explain, to some extent, why primarily German scholars were invited to participate in research activities in the newly created Russian Academy of Sciences. In the first twenty years of existence, forty out of fifty academic positions were occupied by the representatives of the German lands, including L.L. Blumentrost, G.S. Bayer, G.F. Miller, and many others (Alekseeva, 2007: 130). Although by the early 19th century, the Germans in the Russian Academy were somewhat pushed out by the representatives of other European states, over 75 % of the Academy's members were still German professors.

Interest in Siberian antiquities arose in Europe long before creation of the first scholarly institution in Russia. In the 15th century, a native of Munich, Johann Schiltberger, visited Western Siberia. After his journey, he wrote a book wherein for the first time in Western European literature he cited the word "Ibissibur". This can be considered the first mention of Siberia (Schiltberger, 1879: 34–36). In this book, Schiltberger briefly described the customs of Siberian people. However, until the 18th century, European interest in Siberia was hardly scholarly. Information often contained many fables, which can be explained by ignorance about the region. The situation substantially changed in the 17th century, after annexation of new lands and the Yermak's campaign. This period can be viewed as transition from "ignorance to knowledge" (Kitova, 2014: 8), when testimonies ceased to be unfounded and were given by eyewitnesses based on their own impressions.

In the early 18th century, Europe's interest in the eastern regions of the Russian state took the form of purposeful scholarly study. Europeans who were engaged in gathering information in various fields of knowledge, compiling collections, etc. appeared in Siberia. Thanks to the efforts of these "pioneers of science", Russian archaeology has received valuable finds, such as unique items (including those from the excavations of grave-robbers), which were not found during archaeological study of these territories in the subsequent centuries, and could have been irretrievably lost to science had they not been acquired or described by the European travelers. The immigrants from Europe carried out first excavations of archaeological sites in Siberia for scholarly purposes, recorded the ruins of ancient and medieval structures, rock paintings, and stone sculptures, as well as the cultural traditions of the local population before they became transformed by the arrival and settlement of Russians. The results of these studies were published in main European languages, such as German, French, etc., thanks to which new data became available to scholars not only in Russia, but also in Europe. Therefore, the evidence collected in Russia by scholars from Northern and Central Europe is important not only for the history of archaeological research, but also for expanding the knowledge of sources on the ancient and traditional cultures of the peoples of North and Central Asia.

History of research and historiography of the topic

The members of the Second Academic (Great Northern) Expedition had an opportunity to address the materials of P.J. Strahlenberg and analyze them critically. For example, G.F. Miller indicated some errors by his colleague in the designation of geographical names. In addition, he considered erroneous the report of Strahlenberg's about the spread of the rite of cremation among the population of the Irtysh region. Over two hundred years later, scholars confirmed that the carriers of some cultures in the Upper Irtysh region and Minusinsk Basin had such a tradition of burying the dead; consequently, Strahlenberg was not wrong (Arslanova, 2013: 205–212; Evtyukhova, 1948: 10–11).

P.S. Pallas highly appreciated the work of Strahlenberg. During his travels in Siberia, Pallas complained that the book was delivered to him too late. Since he had a significantly larger number of sources, including those on ancient languages, than Strahlenberg, Pallas, like his predecessor, came to a conclusion about the affinity between the Southern Siberian and Northern European cultural complexes (Belokobylsky, 1986: 22). Citing the data on looting in Southern Siberia, V.V. Radlov referred to the works of Philip Strahlenberg, which mentioned the burials disturbed by grave-robbers (1891: 32–34).

At the turn of the 19th–20th centuries, N.F. Katanov gave a high appraisal of the archaeological studies of Strahlenberg, and proposed "to pay tribute to justice" for the great variety of information about Siberia contained in

the works of scholars of the 18th century. He pointed to the value of the information collected by Philip Strahlenberg concerning languages that had lost their independence by the early 20th century (Katanov, 1903). After a hundred years, the importance of the Strahlenberg's contribution to the study of several language groups, such as Turkic, Mongolian, and Finno-Ugric, was mentioned by L.D. Bondar (2016).

After the Second World War, the activities of German scholars who studied Siberia in the pre-revolutionary period were not appreciated objectively, and there was a tendency to oppose their research to the research of Russian scholars. Personal and academic disagreements between scholars started to be viewed as disagreements between Russians and Germans. A small book by M.G. Novlyanskaya on life and work of Strahlenberg (1966) contains an extensive biographical chapter, which it is not easy to supplement even now, and information on his research activities. The author highly appreciated the Strahlenberg's contribution of to the study of Siberia. According to Novlyanskaya, although the scholar did not have time to publish much after his return to his homeland because of poor health, even "what he did is already enough to range him with those wonderful people who through their work made a valuable contribution to the history of research into our country" (Ibid.: 92).

In 1975, a facsimile edition of Strahlenberg's book *Das Nord- und Ostliche Theil von Europa und Asia* was published. This edition made the materials collected by the researcher more accessible to specialists working on the history of archaeological research of Siberia, as well as on individual archaeological cultures of Western and Southern Siberia (Strahlenberg, 1975). This is all the more important since only a few extracts from the Strahlenberg's materials had been known in Russian before. Unfortunately, to date, his work has not yet been fully translated and published in Russian. However, some materials of Strahlenberg's are still available to the Russian-speaking reader today. In 1985 and 1986, individual chapters of his work were published in Russian in Leningrad (Strahlenberg, 1985, 1986).

The contribution of Philip Strahlenberg to the study of the Tagar culture was mentioned by E.B. Vadetskaya in a historiographic review appearing in the work on the archaeological sites of the Middle Yenisei region (1986: 51).

In his book on the history of studying archaeological sites in Southern Siberia, Y.G. Belokobylsky paid some attention to the scholarly activities of Strahlenberg in connection with the expedition of 1721–1727 led by D.G. Messerschmidt. The author emphasized that these scholars were colleagues and certainly discussed their findings and plans, and thus their ideas can be considered to be the result of joint efforts. However, Strahlenberg stayed in Siberia for a longer time, used a different methodological approach, and was able to advance "much further in the final results of research" (Belokobylsky, 1986: 10).

In 1989, in his book about the discoverers of the Altai antiquities, M.A. Demin also mentioned the research activities of Strahlenberg and his colleagues in the expedition (1989: 9–10). In the 1980–1990s, the contribution of Philip Strahlenberg to the study of Siberia was noted by the authors of articles on German scholars who visited some sites in that part of Asia (Kulemzin, 1985: 107–108; Kulemzin, Borodkin, 1985: 6–7; Kurochkin, 1999: 9–13).

In the 2000s, the interest of scholars in the history of archaeological research in Siberia, as well as in the role of European scholars in fostering archaeological, ethnographic, and oriental knowledge in Russia, continued to grow. The activities of foreign scholars of Siberia were reflected in articles, conference papers, and in thematic exhibitions (Malysheva, Poznansky, 2000). A report by M.B. Kardaeva on the history of research into the Tomsk petroglyphs, published in 2001, mentions the contribution of Strahlenberg to the study of that site (2001: 430–431).

The work of the Swedish scholar F.R. Martin, published by A.Y. Trufanov, provides some information about the research carried out by the members of the expedition of 1721–1727: for example, about the discovery by Strahlenberg and Messerschmidt of a Chinese mirror with a runic inscription (Martin, 2004: 103, 133–134).

The importance of evidence collected by the expedition of Messerschmidt and Strahlenberg for studying ancient sites in East Kazakhstan was emphasized in the article by D.A. Baitileu, who also pointed out that the activities of these scholars initiated the "whole new era" in the study of this region (2004: 181–182). The article by V.A. Erlikh on research of the Krasnoyarsk Territory, published in 2005, provides some information about research by German scholars of the 18th–19th centuries, including Strahlenberg (2005: 142–145).

In 2000, the author of this article defended a dissertation on the contribution of German scholars to the study of the antiquities of Southern Siberia (Borisenko, 2000). Later, the dissertation was reworked into a book that summarized the study of Southern Siberian antiquities by German scholars of the 18th–19th centuries (Borisenko, Hudiakov, 2005). Later, several articles and study-aids on this issue—in particular, on the contribution of P.J. Strahlenberg to the study of ancient and traditional cultures of Siberia and Central Asia—have been published by the same author (Borisenko, 2007, 2011, 2014a, b).

The article by A.M. Burovsky analyzed scholarly expeditions to Siberia in the 18th century, including those with the participation of German scholars. The author pointed out the encyclopedic nature of the first research expeditions, such as the expeditions of Messerschmidt and Strahlenberg. He also observed that

owing to the large amount of evidence collected, the scholars did not have time to comprehend and publish it fully. As a result, these data had remained unpublished for a long time (and some remain unpublished even today) (Burovsky, 2005: 18–20).

In a publication on the participation of Europeans in organizing academic science in Russia, E.V. Alekseeva mentioned Philip Strahlenberg as a person who "made a great contribution to the exploration and development of territories in our country… who made a great input in studying the Far North of Russia, Trans-Urals, Altai, Far East, and Russian America in the 18th century" (2007: 132).

A Russian translation of diary entries about the journey of D.G. Messerschmidt and P.J. Tabbert (Strahlenberg) in Southern Siberia from November 1721 to May 1722 was published in 2012. These contain some information about the antiquities and culture of the indigenous population (Messerschmidt, 2012: 25–28, 30, 32, 43, 108, 110, 123, 129, 132).

The scholarly activities of the participants in the first expedition to Siberia have become the subject of research supported by the Russian Foundation for Basic Research (RFBR). In 2019, the results of research supported by the Foundation were published by I.V. Tunkina. She introduced new archival materials—fragments of personal correspondence by Strahlenberg, which contained information on the evidence collected during the expedition with Messerschmidt. Tunkina emphasized the importance of these fragments, taking into account the loss of Strahlenberg's archive during a fire in his house in Stockholm in 1737 (2019: 50).

This historiographic overview shows that interest in the activities, personality, and biography of Philip Johan Strahlenberg during his stay in Russian captivity not only does not decrease, but has been increasing.

Research by Captain P.J. Strahlenberg in Western Siberia

In the 18th century, memoirs, diaries, and descriptions left by the people who under various circumstances ended up in the places they described, were of the greatest interest in Europe. The Swedish prisoners of war (the subjects of Charles XII) a large group of whom lived in Tobolsk, were precisely the people who left such "narratives" (Savelieva, 1984: 66). Some of these people were educated in the German city of Halle and were the students of the well-known Pietist preacher Christoph Eberhard (Winter, 1962: 4). A similar worldview made them more united in Siberian captivity. Such unity was probably expressed in the creation of their own gymnasium, the need for which was quite understandable, since the Swedish diaspora of Tobolsk amounted to over a thousand people with wives and children (Glavatskaya, Tolvardsen, 2015: 221). This educational institution was attended not only by the Swedish, but also by Russian children.

Philip Johan Tabbert von Strahlenberg (1676–1747) was a member of the Tobolsk community. He participated in the Battle of Poltava, but was captured and sent to Moscow. According to the other version of events mentioned by Martin, the elder brother of P.J. Strahlenberg, the future scholar told him that he was not captured near Poltava. In a letter to G.S. Bayer, Martin wrote that Philip, together with their younger brother, accompanied Charles XII after the defeat and fled from Poltava to Turkey. Soon he was sent on a special mission to Wallachia, and was captured on the way to Suceava (Hoffman, (s.a.)). M.G. Novlyanskaya considered this version to be the most plausible, because it was recorded from the words of Strahlenberg himself. The version on captivity near Poltava was included in the *Genealogical Book of the Swedish Nobility* (*Schwedischen Adelsverzeichnis*) in 1719 in his absence (Novlyanskaya, 1966: 28). After it became known in Moscow that Swedish prisoners of war were preparing to escape, about nine thousand captives, including Strahlenberg, were sent to Siberia from the European part of Russia. In the summer of 1711, he arrived in Tobolsk (Ibid.: 8).

Seven years after returning to his homeland, Strahlenberg published the results of his research that was carried out during his stay in captivity in Siberia (1730). While in Tobolsk, with the support of his compatriots, he periodically traveled outside Tobolsk for a short time, in order to collect information on the geography of the surrounding areas, as well as the history and ethnography of the Siberian peoples. It was not always easy to get such information, because one had to ask the local residents, and they did not really trust the captured foreigner. Nevertheless, Strahlenberg managed to draw up several maps of the Tobolsk area and all of Western Siberia; some of these, unfortunately, were lost (Borisenko, Hudiakov, 2005: 80). According to E. Winter, the active cartographic activities of the prisoners of war were most likely associated to some extent with their desire to improve their living conditions, but mainly with scholarly and educational interests (1962: 7). The author's assumption about material interest was based on the fact that geographical maps were quite expensive at the time (Grishchev, 2007: 11), and Strahlenberg had to be aware of that. The first copy of the map he compiled was lost during a fire in Tobolsk in 1715. The second copy was confiscated by M.P. Gagarin in 1717, and only the third, probably the most complete, copy was sent to Moscow in 1718. This copy of the map was intended for sale to English merchants (Novlyanskaya, 1966: 31), which indirectly confirms the hypothesis on material interest as a basis for his cartographic activities.

At present, five copies of Strahlenberg's map are known in Russian archives and libraries (Grishchev, 2007: 8). During the period when his book *Das Nord- und Ostliche Theil von Europa und Asia* was published in various languages, the map was not included in all editions; for example, it was not present in the edition in German language. Some copies of the map were colored (Andreev, 1965: 42). Probably, not all information appearing on the map was gathered by Philip Strahlenberg himself. Personal acquaintance with S.U. Remezov, knowledge of the available European maps where Siberia was indicated, the help of compatriots in collecting information, and certainly his own diligence and interest determined the content of Strahlenberg's map, which has become an object of active interest on the part of the European society (Grishchev, 2007: 18).

By the time Strahlenberg became acquainted with Messerschmidt in 1721, he already had a certain amount of archaeological and ethnographic data at his disposal, which he could share with his future supervisor and expedition colleague. Messerschmidt, with some difficulties, managed to get permission from the Siberian Governor-General, Prince A.M. Cherkassky to include Strahlenberg in the expedition team.

On March 1, 1721, the expedition left Tobolsk. This year, Messerschmidt and Strahlenberg traveled a large part of the routes in Western and Southern Siberia together, and Strahlenberg also made separate trips on the instructions of the head of the expedition. The results of the research of each scholar can be compared, which is very important for identifying the "curiosities" mentioned in the diaries of Messerschmidt.

Acquiring such things was no easy task. For example, learning that the Narym governor had "an elegant bronze idol, half animal, half man", Strahlenberg repeatedly tried to see this figurine, and referred to the instructions on collecting ancient things that were given to the expedition; but the governor refused, explaining that he wanted to take the thing to Tobolsk himself (Messerschmidt, 1962: 131–132). This item—a Western European aquamanile in the form of a hollow sculpture of a centaur—was indeed later submitted to the Kunstkamera. It has not survived; it was probably destroyed during a fire in 1747. However, there is a drawing of it, which has made it possible for modern scholars to identify this item as a product of medieval Western European artisans (Borisenko, Hudiakov, 1999: 40).

An unsuccessful attempt was also made by Strahlenberg to buy from the Tomsk commandant the pages with prayer texts originating in the Dzungarian lamaist monasteries of the Upper Irtysh region. A relatively large number of these texts was collected in the early 18th century by the participants in the campaigns of P. Stupin and I.M. Likharev, and later delivered to Peter I (Borisenko, Hudiakov, 2009: 29; Knyazhetskaya, 1989: 18–23).

Noteworthy is the report by Strahlenberg, dated April 19, 1721, mentioning "various noble Tatar women" who rode through the streets of one Siberian settlement "on horseback, with great pomp and honor. They were dressed in green and red clothes, sat straight on their horses like men, held whips in their hands, and rode at slow pace. They were followed by maids" (see (Messerschmidt, 1962: 90)). Fifty years later, J.G. Georgi published some drawings of Tatar women from various clans, wearing colorful outfits. A Kazan Tatar woman and Kacha women were depicted wearing red outerwear. The former woman was shown in open-fronted clothes with the wrap on the right side. The Kacha women (both married and young girls) were depicted wearing *khalat* robes. The married woman was represented wearing a *khalat* with the wrap on the right side; young girl was wearing an open *khalat* and pants more suitable for "straight" men's horse-riding style, which was mentioned by Strahlenberg (Borisenko, 2012: 45).

In February 1722, the members of the expedition left for Krasnoyarsk. On the banks of the Yenisei River, near the village of Novoseltsevo, the expedition discovered a rock-drawing representing a man and an animal in red paint. The images were located at a height of about 4–5 cubits (180–230 cm) (Messerschmidt, 1962: 181).

Several "monuments"—stone steles with written characters and drawings—were discovered in the vicinity of the Yus-Beltyr yurts. The heights of the steles were about 170 cm; width was about 140 cm, and thickness reached 35 cm. Expedition members guessed that these stelae were border signs for the Yenisei Kirghiz and Chinese. As a confirmation, Strahlenberg cited Chinese records that said that the Chinese border reached the Yenisei River (Ibid.: 298).

During the expedition, Strahlenberg and Messerschmidt were able to acquire several items with inscriptions and individual characters. Some of these were described in the book of Strahlenberg's, such as an amulet and a mirror with Arabic inscriptions, which were studied and attributed by G.J. Kehr, one of the first specialists in Eastern numismatics in Europe and author of a two-volume catalog of "Kufic and Jochid" coins (Borisenko, Hudiakov, 2005: 82).

During trips as a part of the expedition of Messerschmidt, Philip Strahlenberg recorded (and later published descriptions of) several stone statues that can be considered classic for the territories where they were discovered. Such finds include the "Tes mighty warrior"—an ancient Turkic stone statue of a male with a runic inscription; it was discovered in January 1722 on the Tes River and was later described by Strahlenberg (1730: Pl. XII). The "Tes mighty warrior" was located in the center of graves arranged in a circle, and was facing west (Messerschmidt, 2012: 32). As was established by I.V. Tunkina and D.G. Savinov, the "Tes mighty warrior"

was the only stone sculpture in the Minusinsk Basin, and made in the Uighur tradition, which can be dated to the 8th–9th centuries (2017: 94).

Before meeting with Messerschmidt, Strahlenberg already had some information about ancient monuments: in particular about the statue of "Kosen-kis" ('Rabbit-maiden') in the Minusinsk steppe. The statue was discovered in the interfluve of the Chernyi and Belyi Iyus Rivers on Lake Astrakhan. The statue was very much revered by the local Kyrgyz, who considered the figure to be female and who were extremely concerned that its head had been broken off. This statue was also known under the name of "Kezen-kys-tash"; it was believed that it embodied the image of a male warrior with a saber and *kaptargak* bag on his belt, a vessel in his hand, a sparse beard, and a mustache "in the Polish style" (Messerschmidt, 1962: 159–160).

Conclusions

The time when Philip Johan Strahlenberg participated in the research expedition of Messerschmidt was marked by success. New information was obtained, artifacts were acquired, and excavations were carried out. After the conclusion of the Treaty of Nystad, all prisoners were allowed to leave Siberia and return to their homeland. Messerschmidt was notified about this at the beginning of 1722. However, Strahlenberg did not immediately leave his colleague, and accompanied him for another four months, which showing him to be a devoted friend and true scholar, who highly valued joint work. At the end of May 1722, together with Karl Schulman, who was a Swedish prisoner of war and expedition artist, Strahlenberg left for Moscow, taking some of the materials and collections of Messerschmidt's to deliver to St. Petersburg (Messerschmidt, 2012: 72).

Seven years after returning to his homeland, Strahlenberg published his book entitled *Das Nord- und Ostliche Theil von Europa und Asia*. The book described various types of archaeological sites, such as graves, inscriptions, medallions, and obelisks (Strahlenberg, 1730: 360–362). The author divided the graves into soil graves, which were located in a chain, had enclosures, and an earthen mound; and rich and poor graves, which differed in the compositions of their burial goods. Strahlenberg considered all flat items, most of which were mirrors, to be "medallions", and viewed steles and statues as a part of "obelisks".

In his work, Philip Strahlenberg offered interpretations of some items, and made suggestions about who might be the authors of various written characters and what were the methods of making ancient artifacts (Ibid.: 362–363). Strahlenberg emphasized that no country in the world had such rare spiritual values as the Russian State, and one could only regret that their study had not started earlier (Ibid.: 312).

During his eleven-year stay in Siberia, Philip Strahlenberg conducted research in various scholarly fields. Some of the evidence he collected is still relevant for scholarship of today. Undoubtedly, it should be evaluated taking into account the level of knowledge and methodological approaches of the early 18th century. Yet, much of what was collected by Strahlenberg three hundred years ago is of interest to modern scholars in the history of science, archaeology, ethnography, and linguistics even today.

The creation of the Russian Academy of Sciences in 1724 had an important effect on organizational capacities for scholarly research on Siberia, its natural resources, and the traditional and ancient cultures of the peoples. Thanks to the consolidating role of the Academy of Sciences, for many years to come, expeditions became the main method of studying new territories, fostering discoveries of new archaeological sites, and gathering new material evidence, which provided material and informative bases of sources for further research on the ancient sites and traditional culture of the peoples of Siberia.

Acknowledgments

This study was performed under the Project "Integrated Studies of the Ancient Cultures of Siberia and Adjacent Territories: Chronology, Technologies, Adaptation, and Cultural Relations" (FWZG-2022-0006).

References

Alekseev M.P. 1932
Sibir v izvestiyakh zapadnoyevropeiskikh puteshestvennikov i pisateley. Irkutsk: Kraygiz.

Alekseeva E.V. 2007
Yevropeiskiy vklad v stanovleniye i razvitiye rossiyskoy nauki (XVIII–XIX vv.). *Vestnik DVO RAN*, No. 3: 127–136.

Andreev A.I. 1965
Ocherki po istochnikovedeniyu Sibiri, iss. 2. Moscow, Leningrad: Nauka.

Arslanova P.K. 2013
Kurgany s truposozhzheniyem v Verkhnem Priirtyshye. In *Materialy i issledovaniya po arkheologii Kazakhstana*. Astana: Inst. arkheologii im. A.K. Margulana, pp. 205–223.

Baitileu D.A. 2004
K istorii izucheniya naskalnykh izobrazheniy Kazakhstana (po materialam XVIII–XIX vv.). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. X (1). Novosibirsk: Izd. IAET SO RAN, pp. 180–184.

Belokobylsky Y.G. 1986
Bronzoviy i ranniy zhelezniy vek Yuzhnoy Sibiri. Novosibirsk: Nauka.

Bondar L.D. 2016
Lingvisticheskiye ekspeditsii Imperatorskoy Peterburgskoy akademii nauk v Sibir v XVIII–XIX vv.: Vklad v stanovleniye otechestvennogo yazykoznaniya v oblasti yazykov sibirskikh narodov. *Ucheniye zapiski Sankt-Peterburgskogo universiteta upravleniya i ekonomiki*, No. 1 (53): 23–34.

Borisenko A.Y. 2000
Arkheologicheskoye izucheniye Yuzhnoy Sibiri nemetskimi uchenymi XVIII–XIX vv.: Cand. Sc. (History) Dissertation. Novosibirsk.

Borisenko A.Y. 2007
Nemetskiye issledovateli XVIII veka o voyennom dele i voyennykh stolknoveniyakh yeniseiskikh kyrgyzov s russkimi v pozdnem srednevekovye. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 6. Iss. 7: Arkheologiya i etnografiya: 58–62.

Borisenko A.Y. 2011
Svedeniya o traditsionnoy kulture tatarskogo naseleniya i arkheologicheskikh pamyatnikakh Barabinskoy lesostepi v dnevnikovykh zapiskakh D.G. Messershmidta. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 10. Iss. 3: Arkheologiya i etnografiya: 69–74.

Borisenko A.Y. 2012
Izucheniye "tatarskikh drevnostey" D.G. Messershmidtom i F.I. Tabbertom na puti ot Tobolska do Abakanska (po materialam polevogo dnevnika D.G. Messershmidta za 1721 god). *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 11. Iss. 3: Arkheologiya i etnografiya: 42–49.

Borisenko A.Y. 2014a
Svedeniya o drevnikh i traditsionnykh kulturakh, sobranniye yevropeiskimi uchenymi i puteshestvennikami XVIII veka na territorii Ob-Irtyshskogo mezhdurechya. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 13. Iss. 5: Arkheologiya i etnografiya: 43–51.

Borisenko A.Y. 2014b
Istoriya arkheologicheskikh issledovaniy v Yuzhnoy Sibiri i Tsentralnoy Azii: Uchebnoye posobiye, pt. 1. Novosibirsk: RITs NGU.

Borisenko A.Y., Hudiakov Y.S. 1999
Nakhodki zapadnoyevropeiskikh bronzovykh vodoleyev XII–XV vv. na territorii Zapadnoy Sibiri. In *Nemetskiy etnos v Sibiri: Almanakh gumanitarnykh issledovaniy*, iss. 1. Novosibirsk: Izd. Novosib. Gos. Univ., pp. 38–44.

Borisenko A.Y., Hudiakov Y.S. 2005
Izucheniye drevnostey Yuzhnoy Sibiri nemetskimi uchenymi XVIII–XIX vv. Novosibirsk: Novosib. Gos. Univ.

Borisenko A.Y., Hudiakov Y.S. 2009
Predmety zapadnoyevropeiskoy i lamaistskoy torevtiki v sostave Ablaikitskoy kollektsii: K istorii izucheniya. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 8. Iss. 5: Arkheologiya i etnografiya: 28–35.

Burovsky A.M. 2005
Ekspeditsii Peterburgskoy akademii nauk v XVIII veke. Stolknoveniye kultur. In *Nemtsy v Sibiri: Istoriya, yazyk, kultura: Materialy Mezhdunar. konf*. Krasnoyarsk: pp. 15–21.

Demin M.A. 1989
Pervootkryvateli drevnostey. Barnaul: Alt. kn. izd.

Erlikh V.A. 2005
Izucheniye Krasnoyarskogo kraya rossiyskimi nemtsami i nauchnaya kniga Sibiri i Dalnego Vostoka. Dorevolyutsionniy period. In *Nemtsy v Sibiri: Istoriya, yazyk, kultura: Materialy Mezhdunar. nauch. konf*. Krasnoyarsk: pp. 142–147.

Evtyukhova L.A. 1948
Arkheologicheskiye pamyatniki yeniseiskikh kyrgyzov (khakasov). Abakan: KhakNIIYaLI.

Glavatskaya E., Torvaldsen G. 2015
Sibirskiy Vavilon: Shvedskiye uzniki v nachale XVIII v. *Quaestio Rossica*, No. 4: 215–240.

Grishchev V.A. 2007
Karta Sibiri Filippa Ioganna fon Strahlenberga. In *Krayevedcheskiye zapiski*, iss. 14. Irkutsk: Izd. Inst. geografii SO RAN imeni V.B. Sochavy, pp. 4–19.

Hoffman P. (s.a.)
Deutsche Biographie. Strahlenberg (bis 1707/1723 Tabbert) Philipp Johan. URL: https://www.deutsche-biographie.de/pnd100632025.html (Accessed March 29, 2022).

Kardaeva M.B. 2001
Istoriya izucheniya Tomskoy pisanitsy. In *Istoriko-kulturnoye naslediye Severnoy Azii: Itogi i perspektivy izucheniya na rubezhe tysyacheletiy: Materialy XLI Region. arkheol.-etnogr. stud. konf*. Barnaul: pp. 430–432.

Katanov N.F. 1903
Shved Filipp Iogann Strahlenberg i trudy yego o Rossii i Sibiri. In *Izvestiya Obshchestva arkheologii, istorii i etnografii Kazanskogo Universiteta*, vol. XIX. Kazan: pp. 170–174.

Kitova L.Y. 2014
Istoriya arkheologii Sibiri: Idei i issledovaniya (XVII v. – seredina XX v.). Kemerovo: Kem. Gos. Univ.

Knyazhetskaya E.A. 1989
Noviye svedeniya ob ekspeditsii I.M. Likhareva (1719–1720). In *Strany i narody Vostoka*, iss. XXVI. Moscow: Gl. red. vost. lit., pp. 10–35.

Kulemzin A.M. 1985
Istoriya izucheniya arkheologicheskikh pamyatnikov Kemerovskoy oblasti. In *Arkheologiya Yuzhnoy Sibiri*. Kemerovo: Kem. Gos. Univ., pp. 107–115.

Kulemzin A.M., Borodkin Y.M. 1985
Arkheologicheskiye pamyatniki Kemerovskoy oblasti. Kemerovo: Kem. kn. izd.

Kurochkin G.N. 1999
Bolshaya okhota za sibirskim "mogilnym zolotom". In *Sankt-Peterburg i otechestvennaya arkheologiya: Istoriograficheskiye ocherki*. St. Petersburg: SPb. Gos. Univ., pp. 9–17. (Trudy seminara "Problemy istorii i istoriografii arkheologicheskoy nauki").

Makarova N.N. 2013
Shvedskiye voyennoplenniye na Urale v pervoy chetverti XVIII v. *Problemy istorii, filologii, kultury*, No. 1 (39): 122–129.

Malysheva M.P., Poznansky V.S. 2000
Zhizn, otdannaya osvoyeniyu Sibiri. In *Nemetskiy etnos v Sibiri: Almanakh gumanitarnykh issledovaniy*, iss. 2. Novosibirsk: Izd. Novosib. Gos. Univ., pp. 107–117.

Martin F.R. 2004
Sibirika. Nekotoriye svedeniya o pervobytnoy istorii i kulture sibirskikh narodov, A.Y. Trufanov (ed.). Yekaterinburg, Surgut: Uralskiy rabochiy.

Messerschmidt D.G. 1962
Forschungsreise durch Sibirien 1720–1727, vol. 1. Berlin: Akademie-Verlag.

Messershmidt D.G. 2012
Dnevniki. Tomsk – Abakan – Krasnoyarsk. 1721–1722. Abakan: Ministerstvo kultury Respubliki Khakasiya.

Novlyanskaya M.G. 1966
Filipp Iogann Strahlenberg: Yego raboty po issledovaniyu Sibiri. Moscow, Leningrad: Nauka.

Radlov V.V. 1891
Sibirskiye drevnosti, vol. 1 (2). St. Petersburg: Izd. Imp. Arkheol. Komissii. (Materialy po arkheologii Rossii).

Savelieva E.A. 1984
"Severnaya i Vostochnaya chast Yevropy i Azii" F.I. Strahlenberga i yeyo russkiye perevody v XVIII v. In *Kniga i knigotorgovlya v Rossii v XVI–XVIII vv.* Leningrad: Biblioteka AN SSSR, pp. 65–79.

Schiltberger J. 1879
The bondage and travels of Johann Schiltberger, a native of Bavaria, in Europe, Asia and Africa, 1369–1427. London.

Strahlenberg P.J., von. 1730
Das Nord-und-Ostliche Theil von Europa und Asia. Stokholm: in Verlagung des Autoris.

Strahlenberg P.J., von. 1975
Das Nord-und-Ostliche Theil von Europa und Asia, J.R. Kreuger (intr.). Scedet.

Strahlenberg P.J., von. 1985–1986
Zapiski kapitana Filippa Ioganna Strahlenberga ob istorii i geografii Rossiyskoy imperii Petra Velikogo: Severnaya i vostochnaya chast Yevropy i Azii. In 2 vols. Moscow, Leningrad: AN SSSR.

Tunkina I.V. 2019
Arkheologiya Sibiri v dokumentakh D.G. Messershmidta. *Vestnik RFFI. Gumanitarniye i obshchestvenniye nauki*, No. 3: 45–61.

Tunkina I.V., Savinov D.G. 2017
Daniel Gotlib Messershmidt: U istokov sibirskoy arkheologii. St. Petersburg: ElekSis.

Vadetskaya E.B. 1986
Arkheologicheskiye pamyatniki v stepyakh Srednego Yeniseya. Leningrad: Nauka.

Winter E. 1962
Einleitung. In *Messerschmidt D.G. Forschungsreise durch Sibirien.* 1720–1727, vol. 1. Berlin: Akademie-Verlag, pp. 1–20.

Received February 11, 2022.
Received in revised form March 30, 2022.

doi:10.17746/1563-0110.2022.50.2.119-127

A.V. Baulo
Institute of Archaeology and Ethnography,
Siberian Branch, Russian Academy of Sciences,
Pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia
E-mail: bau194@yandex.ru

Rocks in the Religious Beliefs and Rites of the Ob Ugrians

This study, based on materials collected in the 18th–20th centuries, and on the author's field findings over the last 40 years, shows the role of rocks in the Ob Ugrian worldview and ritual practices. Evidence is provided on the veneration of various natural stone objects. Reasons for the cult of worshipping such places are discussed. One reason was that the rock resembled a human or animal figure. In legends and myths, the stone houses of heroic ancestors were correlated with numerous caves in the Ural Mountains. The main part of the article introduces materials relating to the stone figures of deities and patron spirits, supported by mythical narratives explaining the ways that a mythological hero was changed into stone. Examples are given of the figures of deities with a stone base found among local groups of the Ob Ugrians, such as the Lyapin and Sosva Mansi, Synya and Polui Khanty. The role of rocks in childbirth and funerary rites is examined, as well as their role in economic practices such as fishing. In Khanty and Mansi mythological beliefs, the modifier "stony" was equivalent to "iron" or "strong".

Keywords: *Rocks, rites, legends, deities, Khanty, Mansi, legendary heroes.*

Introduction

At the current time, there are few gaps in the studies of the worldview and religious/ritual practices of the Ob Ugrians. It is now possible to combine the evidence obtained at various times in various areas, and to create monographic works or specialized overviews on the basis of the findings.

The correlation between paraphernalia and mythology is relevant for the study of the traditional culture of the Khanty and Mansi, since cultic attributes constitute the most stable core of a ritual as a concentrated expression of religious and mythological beliefs. Cultic paraphernalia among these two small peoples can be divided into natural and man-made items; rocks play an important role among the former. Over the past three centuries, travelers and scholars have collected rich evidence on the use of rocks in the rituals of the Ob Ugrians and have recorded information about revering natural stone objects. Fairy tales, legends, and oral traditions contain brief references to rocks. However, there has not been a single overview of this topic and the present article is intended to fill that gap.

Natural stone objects

Revering natural objects of stone is typical of both the Khanty and Mansi. In the 18th century, there was information on the special attitude toward the "Ostyak prayer stone on the Shakva", as well as on the "carved deer stone, or 'elk calf' stone, over the Sosva River, over which a special yurt was built, to which the Voguls came from distant lands to ask with sacrifices and small gifts for a fortunate hunt" (Bakhrushin, 1935: 26–27). In the first quarter of the 18th century, one could see the sacred stone of the Voguls inscribed with magical

signs near the Blagodatsky mine in the north of the Ural Mountains (Ibid.).

According to G.F. Miller, in the early 18th century, in the Yalpyng-ya River basin (the right tributary of the Northern Sosva River above the village of Lyulikara), there was a sacred stone (of ordinary shape), which was called an idol (*Lunkh* or *Pupyg*), as well as a sacred tree. These were venerated through the sacrifice of deer (Sibir XVIII veka…, 1996: 237).

The Mansi call a forested promontory about 70 m high over the right bank of the Northern Sosva River, 2 km above the village of Manya (Berezovsky District of the Khanty-Mansi Autonomous Okrug–Yugra), *Akhtys-us* 'Stone town'. According to a legend about a cave near the cliff Vangrenyol, "a stone bridge used to be between Vangrenyol and Akhtys-us, connecting these two areas, on which skirmishes often took place between the warriors who lived in Akhtys-us and those who came from down the river" (Gondatti, 1888: 38). Most likely, this was the Iskar Old Settlement (Stone town) located, according to Miller (1740), on the right bank of the Northern Sosva River (Sibir XVIII veka…, 1996: 245).

A legend says that a stone island in the middle of the Northern Sosva River, opposite the confluence of the Yalbynyi River, emerged after a battle between *Takht kotil torum* 'The old man of the middle Sosva River' and the forest spirit *menkv*, which ended in the victory of the former. When passing by this place, people would throw money into the water; if during a storm the boat would get stuck on a stone spit, which was a reminder of the victory over the *menkv*, those on the boat would throw a cauldron and some food into the water to propitiate the spirit (Gondatti, 1888: 25). According to the legend, an afflicted woman turned into the stone that lies on the left bank of the Northern Sosva River near the village of Sartynya. She and her seven sons robbed travelers, but her sons were killed by mighty warriors sent against them by *Takht kotil torum* (Ibid.: 38). In another myth, *Tovlyng paster* fell through the ice during a hunt and turned into the stone that lay at the bottom of the Lyapin River near the village of Munkes. When the level of the water went down, the stone would become visible above the water (Kannisto, Liimola, 1958: 192). In the legend of the Pelym Voguls, the Son of the Ob Prince captured the owner of the underworld and put him in a sack; the sack hung on a larch tree for the winter and summer, after which the skeleton was shaken out into the water, and a rocky promontory emerged (Ibid.: 141).

According to the evidence collected by A. Kannisto in the early 20th century, two stones were known in the upper reaches of the Vizhai River near the Prayer stone, *Yalpyng Ner* 'Sacred Urals'. The Voguls revered these stones—the "stone-man" and "stone-woman"—as patron spirits of the area; the former was called *Khus-oyka* 'Servant-old man' or *Tagt-kotil-oyka-pyg* 'Son of the old man of the Middle Sosva River'. "Let the couple from the upper reaches of the sacred river bring good luck in fishing", fishermen would say when catching fish in the Vizhai (Kannisto, Liimola, 1951: 280–281). There was a special prayer to these deities: "Two of stone who live in the high town of stone, two dressed in an ice coat, two dressed in an icy robe! The stone edge of your clothes, the stone hem of your clothes extends to the opening of the smoking pot which I placed! Oh, if only you would bring up fish with tails, fish with fins!" (Ibid.: 445–446).

A.A. Dunin-Gorkavich wrote that the Ostyaks revered stones that had distinctive sizes or shapes (having "at least the remote resemblance to the figure of a person or animal"). Pieces of cotton fabric, shawls, and money, as well as horse, sheep, or deer skins, were placed upon them. Among such sacred places, Dunin-Gorkavich mentioned the high hill "Bell Tower" at the Kul-egan River near Tyumkiny Yurty, Yegutskaya Mountain at the Yugan River, as well as Kamenny and Bartsev promontories in the vicinity of Surgut (1911: 36).

Even today, the Khanty revere many stone natural objects in the Synya River basin. For example, "a stone looking like a man lies not far from the village of Ovgort on the forest road. Old people say that once a man was killed there and turned into stone. They would put tobacco near it when they walked by" (Sokolova, 1971: 223). Another stone lying in the water near the bank of the Synya River above the village of Loragort is revered; it is called *Vulkev iki* 'Stone big man or Stone old man'. According to the legend, a man was turned into this stone by a god (Taligina E.L., 2002: 71).

Stone houses of legendary heroes

According to the myths and legends of the Ob Ugrians, dwellings of deities and patron spirits are often houses made of stone: *Akhvtas kol* 'stone house', or *Akhvtas-us* 'stone town' (Balandin, 1939: 34). In the legend from the Konda River, the Lord raised the guardian spirits to the sky and hid them in a stone house (Kannisto, Liimola, 1958: 183). According to the beliefs of the Voguls, the third son of *Numi-Torum* named *Ner-oyka* lives on Elbyn-ner not far from the sources of the Northern Sosva River in a stone house with his wife and children (Gondatti, 1888: 20). In one of the legends, *Ner-oyka* lives in a stone *chum* (Istochniki…, 1987: 44).

In the legend "The Fiery Flood", *Torum* ordered his wife to lock her newly born son in a "round stone house" (Mify, predaniya, skazki…, 1990: 70). The identification of dwellings of deities with stone houses is especially typical of the Ob-Ugrian groups living on the eastern slopes of the Urals. This can be explained by familiarity of the local population with the numerous caves located in this region.

Transformation of heroes into stone

Ethnographers have repeatedly recorded the tradition of revering deities represented by stones among the Ob Ugrians. There are many myths and legends that describe the origin of this phenomenon. "[Heroic] strong people, people brought down from the sky, were all the sons of *Torum*. Those who were strong, were turned into stone" (Munkácsi, 1896: 410). In a military song recorded by B. Munkácsi in 1889, one of the mighty warriors of the Trans-Urals, who was killed by a hero's arrow, turned into a bare stone: "His scalp didn't fall into my hands…" (Geroicheskiy epos…, 2010: 197).

According to a myth of the Sosva Voguls, "In the beginning, mighty warriors lived on the earth. They lived here for two thousand years. They fought with each other; the weak were defeated; some were turned into stone; the strongest survived as protective spirits" (Kannisto, Liimola, 1958: 82). The Voguls of the Konda River believed that the Lord of the Underworld would punish the bad deeds of those who would not take a stranger into their house or who would steal a bedding mat from another person—he would turn them into two grains of sand, or into two pebbles (Kannisto, Liimola, 1951: 125).

According to a legend, seven princes used to live near the village of Shaitanka on the Northern Sosva River. All of them died. An army of strangers came and killed their old mother and she was turned into stone; the mark of the sword was visible on the stone. When a person who was destined to live a long life put his hand on the stone, he felt that it was hot, but it would seem cold to a person who did not have much time left to live (Kannisto, Liimola, 1958: 156, 210, 257). A later version of the legend said that a large stone called *Akhtas eka* 'Stone woman', the patron spirit of the Mansi Animovs, lies on the bank near the village of Shaitanka. A mighty warrior once lived there on a high promontory. His wife betrayed him; he was killed, and the woman married the victor. Many years later, the relatives of the warrior attacked the woman; she wanted to slide down the cliff, but did not have time; she was caught with an iron lasso and turned into stone. In the past, the Mansi would stop at this stone and make a sacrifice (Bardina, 2009: 49).

In the fairy tale "The Crow with beads on its ears", *Matum-ekva* turned two brothers into stone with the blow of a club; they came to life after drops of living water were sprinkled upon the stones (Mify, skazki, predaniya…, 2005: 95–101). In the fairy tale "*Tirp-nyolp-ekva*", dogs attacked the older brothers, but they managed to turn into stone (Ibid.: 103–109). In the family legend of the Lyapin Mansi Albins, "When a Nenets shot at their father, he turned into a mountain, into stone" (Baulo, 2016a: 220). *Ekva-pyrishch* turned the king-*khon* into a stone, saying that "When people appear, the Mansi, the hunters should set up a cauldron to this stone, cook meat, grains, and then the hunters will make a good catch—with furs and fish" (Ibid.: 240).

Information on the stone figures of deities and patron-spirits

According to the information of N. Witsen, in the late 17th century, the Ostyaks in the vicinity of Surgut made idols from cloth and scarves, whose heads could be made of stone (Karjalainen, 1995: 53). In the early 18th century, G. Novitsky wrote that the Voguls in Chernye Yurty (near Pelym) "worshipped some spear to which a small stone of some kind was tied, which they considered to be a real idol revered from antiquity by their elders…" (1941: 80–81). In 1746, "a little stone idol was found" among the newly baptized Ostyaks from the Uvatskie Yurty, "to which they made sacrifices" (Ogryzko, 1941: 91). According to the evidence collected by I.G. Georgi, "along with human-like stones, idols were 'strangely formed stones'" (1776: 74). The same observation (idols of the Obdorsk Ostyaks were unprocessed stones) was made by M.A. Castrén in the mid 19th century (1860: 186) and by I.N. Glushkov in the late 19th century (1900: 69). The god Yalmal, revered by both the Samoyeds and Ostyaks, was represented in myths as a human figure carved out of stone and lying in a coffin; it was believed that he helped in sea hunting and fishing (Kushelevsky, 1868: 113).

Dunin-Gorkavich described several objects of religious worship from the collection of the Museum of the Tobolsk Governorate: an Ostyak stone idol whose base was a flat, elongated stone brought from the Lyapin River (28 cm long and 14 cm wide), "wrapped with scraps of woolen cloth in such a way that its end sticks out in the form of a head, and is covered with a hat of black and yellow woolen cloth; the outer clothing of the figure is a black woolen coat" (1911: 45); a roughly polished piece of granite in the form of a cross 21 cm long (Ibid.: 46); and two sacred stones—the first in the form of a child's head and the second in the form of a frog's head (Ibid.: 47). Previously, these stones had been located in the front corner of a yurt belonging to the Ostyak Asynkin (Asynkiny Yurty in Lokosovsky Volost of Surgut Okrug) along with the furs of fox, sable, and squirrel offered to them. The artifacts were given to the museum in 1889 by a certain N.A. Blinov from whom L.E. Lugovsky recorded the legend about their origin. The legend is tied with the unsuccessful matchmaking process of one mighty warrior. He cut off the head of a frog with a sword; the head "turned into stone, like the head of a holy creature"; trying to grab the child of a fleeing woman, the warrior tore off its head, and it also turned into stone because "the child was holy" (Lugovsky, 1894: 1, 3).

P.P. Infantiev saw a representation made of stone among the Voguls: "A small stone tile on which the likeness of a human face was extremely crudely carved… Two holes were supposed to represent two eyes; a third hole represented the mouth, and several lines were made for the eyebrows and nose" (1910: 161). On the watershed of the Yukonda and Morda Rivers, the Mansi revered a "stone woman" standing on an elevated, rocky place (Gorodkov, 1912: 199). U.T. Sirelius (late 19th century) described the Ostyak spirit-protector "Daughter of the earth god" as being in the form of a wooden anthropomorphic figure wearing clothes containing a small stone wrapped in a strip of fabric—the helper of the spirit (2001: 291).

Evidence from the early 20th century mentions a patron spirit of the Konda Voguls called "Prince resembling a red elk", who lived in a cave on Denezhnyi Kamen (Money Stone); his figure was made of stone (Kannisto, Liimola, 1958: 167). In the village of Toshemka, there was also the representation of an elk made of natural stone, which was believed to help in hunting (Ibid.: 386). Kannisto wrote about the veneration of a "stone idol" as a spirit-protector. During the chase of the celestial elk, a stone was found, for which a sacred barn was built; a bloody sacrifice was made, and people began to venerate it (Ibid.: 136).

The figure of a deity, based on a Neolithic stone axe (17.0 × 8.5 cm in size) wearing clothes, was kept in the Museum of the History of Religion and Atheism of the Soviet Academy of Sciences (now the State Museum of the History of Religion) in the collection of cultic objects belonging to the Khanty Dmitry Dunaev from Loktokurt (Grevens, 1960).

New evidence on the veneration of patron spirits with a stone base has been obtained in the course of field research in the Khanty-Mansi Autonomous Okrug–Yugra and Yamal-Nenets Autonomous Okrug over the last forty years. The patron spirit *Akhvtas-oyka* 'Stone old man' was known among the Lyapin Mansi in the village of Munkes in the mid 20th century. The base of the figure of *Luski-oyki* was a black stone with the figure of a man "with arms and legs" scratched on it (Gemuev, Sagalaev, 1986: 26).

The figure of *Akhvtas-oyka* 'Stone old man' from the house of K. Pakin, who lived in the village of Verkhneye Nildino in the basin of the Northern Sosva River, was described as a piece of ore with high iron content. It was dressed in six shirts made of fabrics of various colors and wore a specially sewn hat made of young reindeer fur (unborn reindeer). Another stone of unusual shape, dressed in a specially sewn shirt, was in the chest next to the ore idol (Gemuev, 1990: 113–115). A female figure *Torum-shchan* was in a chest in the attic of the house of I. Endyrev in the village of Aneevo. The base of its head was a "stone from lightning and thunder" with a natural grid-like pattern. The stone was wrapped in three pieces of silk and fourteen small head scarves tied at the throat (Ibid.: 125).

Among the Synya Khanty, the lord of the Synya River and patron of reindeer breeding was considered to be *Khoran ur-iki* 'Reindeer Nenets old man' (Synskiye khanty, 2005: 145), also known as *Kev-ur-khu iki* or *Keiv ur khu akem iki* 'Stone Nenets old man' (Perevalova, 2002: 45). His sacred place was located a few kilometers from the village of Vytvozhgort. The weight of the figure was 60–80 kg; it was with difficulty taken out of the sacred barn by four men (Fig. 1). Such a heavy weight suggests that the figure was made of stone most likely brought from the Ural Mountains; the choice of stone was determined by its belonging to an especially sacred place or the presence of a petroglyphic image on it (Baulo, 2016b: 56–57).

Figures of family patron spirits with the base being small pieces of unprocessed stone are quite common on the Synya River. In the village of Tiltim, a stone was dressed in a green shirt and deerskin overcoat, girded with red cord. The figure of the Kurtyamov family patron spirit is kept in an old house in the village of Yamgort. Its base was a flat round stone about 15 cm in diameter; the stone was dressed in a shirt and robe made of yellow woolen cloth, which was girded with red cord. The robe and stone were additionally bound with yellow trim (Fig. 2, *a*). According to the description of the figure of a female deity from the village of Ovolyngort, its base was a stone of unusual shape (8.5 × 6.5 cm in size), wrapped in dark fabric and covered with a miniature head scarf with a fringe, which symbolized the gray hair of the goddess. On top, the figure was dressed in a robe made of thick, woolen fabric of yellow-brown color; large, round, copper bells were sewn on the sleeves, and false braids of twisted red woolen cord were sewn to the collar. The robe was tied with a belt of red woolen cord, to which a large copper ring and seven small copper rings were tied (Fig. 2, *b*). A stone resembling an animal vertebra is kept in a sacred sled near the village of Muvgort.

In the Polui River basin (Priuralsky District of the Yamal-Nenets Autonomous Okrug), in the village of Zeleny Yar, several stone idols from home sanctuaries of the Khanty have been described. The simplest type was a stone dressed in a broadcloth caftan or deerskin overcoat (the figures were 20–25 cm long) (Fig. 2, *c*). A "family couple" included the male *loong*, represented by a stone with three brass plaques (Central Asian ornamentation) tied to it; the female *loong* was represented by a stone tied with a rope; it had round earrings of brass with glass inlays (Fig. 3).

Such figures of deities among the Polui Khanty are believed to "protect" reindeer breeding. One of the informants spoke about the circumstances of the

Fig. 1. Figure of *Khoran ur-iki* (Reindeer Nenets old man) at a sacred place, 2000.
Hereafter, photos by the author.

a

b

appearance of the stone *loongs*: "If a reindeer breeder experiences a decrease in deer, he goes to the shaman in the Polar Urals. There is a cave in *Yemyn Kev* 'Sacred stone'. The man enters the cave, strips himself naked, and begins to listen carefully. The shaman tells him: 'Get up and listen. If you hear the sound of a she-deer, you will be rich in deer; if you hear the sound of a he-deer, you will be poor.' Our father also went there. He heard

c

Fig. 2. Figures of patron spirits with a stone base.
a – Yamgort, 2001; *b* – Ovolyngort, 2004; *c* – Zelenyi Yar, 2017.

Fig. 3. Spirit-stone. Zeleny Yar, 2002.

Fig. 4. Stone idol. Sobtyegan River Basin, 2020.

the sound of a she-deer as if she was calling a fawn. And after that he had a lot of deer. People would take a stone from that place and keep it in their house as a patron spirit" (Ibid.: 146). S.V. Ivanov mentioned the *syadai*-patrons made of stones chipped from sacred cliffs by the Nenets (1970: 76).

A remarkable image of a Khanty family deity was kept in a sacred barn destroyed over time in the Sobtyegan River basin (Priuralsky district of the Yamal-Nenets Autonomous Okrug). According to its photograph, its base was a stone head with human features; it was tightly bound with a piece of thick, yellow woolen cloth (such cloth is usually dated to the period from the first quarter to the mid 19th century) (Fig. 4).

There are references to the external features of mythical hero-ancestors in the folklore of the Ob Ugrians. Stone-eyed mighty warriors ("seven stone-eyed female *por*") is a common designation for the opponents of the heroes (Mify, predaniya, skazki…, 1990: 136, 513; Shteinits, 2009: 152–153). There was a belief that the endurance of a person depended on the size and strength of his heart. The heart of the younger brother of the "Mighty Warrior of Two Mountain Ridges" consisted of three stone eggs the size of a duck egg; therefore, that character could not be completely killed (Kannisto, Liimola, 1958: 18).

Amulets and offerings of stone

According to the Khanty, stones "could move from place to place and go towards individual fortunate people… The Ostyaks consider the owner of such a stone to be a fortunate and successful person in all kinds of fishing and hunting activities" (Startsev, 1928: 100).

The use of rocks by the Ostyaks as talismans (a stone was kept in the sacrificial chest together with other things) was observed by O. Finsch and A. Brehm (1882: 373). In the 1880s, K.D. Nosilov saw an old Vogul man on the Lyapin River, who kept his talismans in a small purse. They included stones made into the shape of animal heads. The Vogul Lobsinya gave the scholar a talisman as a gift, which was a pebble of dark green jasper made into the shape of small flatbread; a loon was depicted on one side of the talisman, and a beaver was represented on the other side. This talisman helped the Vogul man in hunting (Nosilov, 1997: 17).

In the early 20th century, S.I. Rudenko purchased a small stone with a natural hole inside—a so-called thunder stone—from the Voguls on the Sosva River. This stone was tied as an amulet to a shaman's tambourine. Rudenko often observed crystals of rock crystal (quartz) wrapped in rags in sacred barns ((s.a.): Fol. 258, 277). The author of the current article also encountered similar crystals in complexes of the 19th century (Baulo, 2013: Fig. 223) (Fig. 5).

Among the cultic paraphernalia of the Mansi and Khanty, scholars have found archaeological tools, mainly arrowheads or adzes from the Neolithic and Early Bronze Age. A stone, tanged Neolithic arrowhead was kept in a sacred Mansi chest in the village of Khurumpaul (Gemuev, Sagalaev, 1986: 158); an adze was discovered at the sanctuary in the basin of the Norkoln-urai oxbow (2014) at the sacred place of the thunder god *Syakhyl-Torum*. Such items were called *Torum-sankv* 'God's wedge' or 'God's arrow'. It was believed that *Syakhyl-Torum* struck the evil spirits *kuli* and *menkvs* with these arrows (Gemuev, 1990: 139); the Emder mighty warriors from the epics were struck with thunder stone arrows from the sky (Patkanov, 1891: 17).

Fig. 5. Pieces of rock crystal (quartz) as a part of cultic paraphernalia of the Lyapin Mansi. Yasunt, 2008

Rocks in rituals of the life cycle and economic practices

Rocks were used in rituals associated with the birth and death of a person. During the time when a child had no teeth, the Lyapin Mansi put *nyor akhvtas* (a transparent crystal stone) on the bottom of the cradle. It was believed that in this case the household spirit would not approach the baby (Baulo, 2016a: 53). A piece of rock crystal was also placed as a talisman on the bottom of the cradle among the Northern Khanty (Sokolova, 2009: 388); another kind of stone might also serve as such a talisman (Taligina N.M., 2004: 82).

On the Middle Konda River, when the deceased was brought out of the dwelling, a grindstone heated in a furnace was placed on the bed (Kannisto, Liimola, 1958: 49). Residents of Tremyugan placed a pebble or piece of flint into the mouth of a dead child to protect people from the dead; while the Vakhovo Ostyaks put a small stone on the heart of a stillborn child for the same purpose (Karjalainen, 1994: 96). Among the Northern Khanty, it was forbidden to put flint with the dead, since it was believed that the dead were afraid of stones. Among the Mansi, it was forbidden to put flint and grindstones into a coffin (Sokolova, 2009: 451–452). The legend "How man became mortal" says that in order to revive a dead person, one has to place a stone on his legs? (Mify, predaniya, skazki…, 1990: 75).

Stones were often endowed with special properties when they were used in everyday life. Drawings of a magical kind were scratched on stone sinkers for nets; this was expected to ensure good luck in fishing (Ivanov, 1954: 48). According to V.N. Chernetsov, the Mansi and Khanty tried to give a certain shape to drag-net stone sinkers. If the stone was intended to ensure successful fishing, an image of a caught fish was engraved on it and even a small sacrifice was made to it (Chernetsov, 1971: 85). Representations of fish and a water lock with twig traps installed in it for catching fish appear on the surface of a drag-net stone sinker from the museum of the village of Sosva in Berezovsky District of the Khanty-Mansi Autonomous Okrug–Yugra (Gemuev, 1990: 114), and two fish were scratched on a stone from the village of Evrigort (Fig. 6).

Fig. 6. Stone drag-net sinker with representations of fish. Evrigort, 2002

Conclusions

In the mythology and ritual practices of the Mansi and Khanty, rocks have played an important role since the moment of creation of man by God. In the legend of creation, *Torum* saw a stone, touched it with his hand, and heat came from the stone. There was another small stone

next to it. Taking it, *Torum* struck the large stone which crumbled, and woman-fire came out of it. Then he began to hit the stones against each other, lit a fire, gathered the people together, and began to warm them by the fire (Mify, predaniya, skazki…, 1990: 63).

The living space of a person was filled with natural objects made of stone. It is also obvious that stones were included into the religious and ritual practices less often among the inhabitants of the taiga and swamplands as compared to the inhabitants of the areas near the Ural Mountains. The former revered stones because they were rare. In 1790, the author of a note about the "Samoyeds from the vicinity of Berezovo" wrote: "…when a stone is found in a place where there are no stones, people revere it as an idol, and make sacrifices…" (Opisaniye…, 1982: 70). According to Karjalainen, the possibility of revering such stones as spirits was mainly based on the fact that the silty and swampy soil of the Ob region is poor in stones, and therefore individual stones that ended up on the banks of rivers attracted attention. If a stone was thrown ashore by spring high water, it could be considered a mysterious object and perceived as a petrified spirit. A piece of coal that was brought by the ice could be perceived as the liver of a mythical mammoth living underground (Karjalainen, 1995: 34). It was the opposite among the population living in the Cis-Urals: as ornamental material, stone played an important role in manufacturing (marking) the figures of deities and patron spirits simply because it was everywhere. Most likely, numerous caves in the mountains of the Urals contributed to the emergence of ideas about the life of gods in stone houses.

As far as economic specialization of rocks is concerned, they are more often involved in rituals among those groups of the Ob Ugrians who are engaged in fishing and reindeer herding. Fishermen often catch stones of intricate shapes with their drag-nets or see such stones on the banks of rivers; reindeer herders, who are forced to take their herds to the Ural Mountains in the summer, interact with stones directly.

As a rule, reverence paid to natural objects is associated with discerning anthropomorphic or zoomorphic features in their shape (cf. "at least a remote resemblance to the figure of a person or animal" (Dunin-Gorkavich, 1911: 36); "there is the 'Stone old woman' cliff on the Konda River, in which, as they say, one can recognize the outline of the nose" (Karjalainen, 1995: 34)).

Concerning such a feature of gods as "being of stone", one should probably consider it as including the meaning of being strong. It is no coincidence that we see the equivalence of the epithets "being of stone" and "being of iron": on the Upper Lozva River, the *menkv* forest spirits were said to have iron or stone skins (Kannisto, Liimola, 1958: 156–157, 218); "the goddess *Als-ekva* puts on iron clothes, stone clothes, so nothing could be done to her; a bullet from the gun will not hit her; an arrow from the bow will not hit her" (Ibid.: 166); the Vasyugan spirit was called a "prince having the form of a stone, having the form of iron, possessing an image" (Karjalainen, 1995: 34).

Thus, the combination of sources of different types—historical, ethnographic, and folk—has made it possible to create a specialized study on their basis, which reveals general and specific features in the attitude of the Khanty and Mansi toward natural objects made of stone, and describes the use of stone paraphernalia in religious and ritual practices of the 18th to early 21st century.

References

Bakhrushin S.V. 1935
Ostyatskiye i vogulskiye knyazhestva v XVI–XVII vv. Leningrad: Izd. Inst. narodov Severa.

Balandin A.N. 1939
Yazyk mansiyskoy skazki. Leningrad: Glavsevmorput.

Bardina R.K. 2009
Obskiye i nizhnesosvinskiye mansi: Etnosotsialnaya istoriya v kontse XVIII – nachale XXI veka. Novosibirsk: Izd. SO RAN.

Baulo A.V. 2013
Svyashchenniye mesta i atributy severnykh mansi v nachale XXI veka: Etnograficheskiy albom. Khanty-Mansiysk, Yekaterinburg: Basko.

Baulo A.V. 2016a
Ekspeditsii Izmaila Gemueva k mansi: Etnokulturniye issledovaniya v Nizhnem Priobye. Vol. 1: 1983–1985 gody. Novosibirsk: Izd. IAET SO RAN.

Baulo A.V. 2016b
Svyashchenniye mesta i atributy severnykh khantov v nachale XXI veka: Etnograficheskiy albom. Khanty-Mansiysk: Tender.

Chernetsov V.N. 1971
Naskalniye izobrazheniya Urala, pt. 2. Moscow: Nauka. (SAI; B 4-12).

Dunin-Gorkavich A.A. 1911
Tobolskiy Sever, vol. 3. Tobolsk: [Gub. tip.].

Finsch O., Brehm A. 1882
Puteshestviye v Zapadnuyu Sibir. Moscow.

Gemuev I.N. 1990
Mirovozzreniye mansi: Dom i Kosmos. Novosibirsk: Nauka.

Gemuev I.N., Sagalaev A.M. 1986
Religiya naroda mansi. Kultoviye mesta XIX – nachala XX v. Novosibirsk: Nauka.

Georgi J.G. 1776
Opisaniye vsekh v Rossiyskom gosudarstve obitayushchikh narodov, pt. 1. St. Petersburg.

Geroicheskiy epos mansi (vogulov): Pesni svyatykh pokroviteley. 2010
E.I. Rombandeeva, T.D. Slinkina (comp.). Khanty-Mansiysk: Print-klass.

Glushkov I.N. 1900
Cherdynskiye voguly. *Etnograficheskoye obozreniye*, vol. 15 (2): 15–78.

Gondatti N.L. 1888
Sledy yazycheskikh verovaniy u inorodtsev Severo-Zapadnoy Sibiri. Moscow: [Tip. Potapova].

Gorodkov B. 1912
Reka Konda. Moscow: [s.n.]. (Zemlevedeniye; vol. 19, bk. 3/4).

Grevens N.N. 1960
Kultoviye predmety khantov. In *Yezhegodnik Muzeya istorii religii i ateizma AN SSSR*, iss. 4. Moscow, Leningrad: AN SSSR, pp. 427–438.

Infantiev P.P. 1910
Puteshestviye v stranu vogulov. St. Petersburg: [Izd. N.V. Elmanova].

Istochniki po etnografii Zapadnoy Sibiri. 1987
N.V. Lukina, O.M. Ryndina (publ.). Tomsk: Izd. Tom. Gos. Univ.

Ivanov S.V. 1954
Materialy po izobrazitelnomu iskusstvu narodov Sibiri XIX – nachala XX v. Moscow, Leningrad: Nauka. (TIE, nov. ser.; vol. 22).

Ivanov S.V. 1970
Skulptura narodov Severa Sibiri XIX – pervoy poloviny XX v. Leningrad: Nauka.

Kannisto A., Liimola M. 1951
Wogulische Volksdichtung. Bd. 1: Texte mythischen Inhalts. Helsinki: Suomalais-Ugrilainen Seura.

Kannisto A., Liimola M. 1958
Materialien zur Mythologie der Wogulen. Helsinki: Suomalais-Ugrilainen Seura. (MSFOu; vol. 113).

Karjalainen K.F. 1994, 1995
Religiya yugorskikh narodov. N.V. Lukina (trans.). In 2 vols. Tomsk: Izd. Tom. Gos. Univ.

Castrén M.A. 1860
Puteshestviye po Laplandii, Severnoy Rossii i Sibiri (1838–1844, 1845–1849). In *Magazin zemlevedeniya i puteshestviy*, vol. VI (II). Moscow.

Kushelevsky Y.I. 1868
Severniy polyus i zemlya Yamal. St. Petersburg: [Tip. MVD].

Lugovsky L.E. 1894
Legenda, svyazannaya s dvumya ostyatskimi idolami iz kollektsii "prinadlezhnostey shamanskogo kulta" v Tobolskom gubernskom muzeye. *Yezhegodnik Tobolskogo gubernskogo muzeya*, iss. 2: 1–3.

Mify, predaniya, skazki khantov i mansi. 1990
N.V. Lukina (trans. from Khanty, Mansy, German, comp., intro., and notes). Moscow: Nauka.

Mify, skazki, predaniya mansi (vogulov). 2005
E.I. Rombandeeva (comp.). Novosibirsk: Nauka. (Pamyatniki folklora narodov Sibiri i Dalnego Vostoka; vol. 26).

Munkácsi B. 1896
Vogul népköltési gyüjtemény, vol. IV. Budapest.

Nosilov K.D. 1997
U vogulov: Ocherki i nabroski. Tyumen: SoftDizain.

Novitsky G. 1941
Kratkoye opisaniye o narode ostyatskom. Novosibirsk: Novosibgiz.

Ogryzko I.I. 1941
Khristianizatsiya narodov Tobolskogo Severa v XVIII v. Leningrad: Izd. Leningr. Gos. Ped. Inst.

Opisaniye Tobolskogo namestnichestva. 1982
Novosibirsk: Nauka.

Patkanov S.K. 1891
Tip ostyatskogo bogatyrya po ostyatskim bylinam i geroicheskim skazaniyam. St. Petersburg.

Perevalova E.V. 2002
Voiny i migratsii severnykh khantov (po materialam folklora). *Uralskiy istoricheskiy vestnik*, No. 8: 36–58.

Rudenko S.I. (s.a.)
Ugry i nentsy Nizhnego Priobya. *Arkhiv RAN (SPb.)*. F. 1004, Inv. 1, item 66.

Shteinits V. 2009
Totemizm u ostyakov v Sibiri, iss. 3. N.V. Lukina (trans. from German). Tomsk: Izd. Tom. Gos. Ped. Univ., pp. 151–164. (Arkheologiya i etnografiya Priobya: Materialy i issledovaniya).

Sibir XVIII veka v putevykh opisaniyakh G.F. Millera. 1996
Novosibirsk: Sibirskiy Khronograf. (Istoriya Sibiri. Pervoistochniki; iss. VI).

Sirelius U.T. 2001
Puteshestviye k khantam. N.V. Lukina (trans. from German, publ.). Tomsk: Izd. Tom. Gos. Univ.

Sokolova Z.P. 1971
Perezhitki religioznykh verovaniy u obskikh ugrov. In *Religiozniye predstavleniya i obryady narodov Sibiri v XIX – nachale XX veka*. Moscow: Nauka, pp. 211–238. (Sbornik MAE; vol. 27).

Sokolova Z.P. 2009
Khanty i mansi: Vzglyad iz XXI v. Moscow: Nauka.

Startsev G. 1928
Ostyaki. Leningrad: Priboy.

Synskiye khanty. 2005
G.A. Aksyanova, A.V. Baulo, E.V. Perevalova, E. Ruttkai, Z.P. Sokolova, G.E. Soldatova, N.M. Taligina, E.I. Tylikova, N.V. Fedorova. Novosibirsk: Izd. IAET SO RAN.

Taligina E.L. 2002
Toponimy Synskogo kraya. In *Narody Severo-Zapadnoy Sibiri*, iss. 10. Tomsk: Izd. Tom. Gos. Univ., pp. 70–77.

Taligina N.M. 2004
Obryady zhiznennogo tsikla u synskikh khantov. Tomsk: Izd. Tom. Gos. Univ.

Received December 1, 2021.

doi:10.17746/1563-0110.2022.50.2.128-139

I.V. Oktyabrskaya[1], S.K. Alymkulova[2], I.I. Nazarov[3], and E.V. Samushkina[1]

[1]Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, Pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia
E-mail: siem405@yandex.ru; khakassie@yahoo.com
[2]Arabaev Kyrgyz State University, Iskhaka Razzakova 51A, Bishkek, 720016, Kyrgyzstan
E-mail: kadyrkyzy@rambler.ru
[3]Institute of History and International Relations, Altai State University, Pr. Lenina 61, Barnaul, 656049, Russia
E-mail: nazarov@mail.asu.ru

The Kyrgyz Republic: Concept, Strategies, and Practices for the Preservation of the National Cultural Heritage

This study deals with the concept of "cultural heritage" in the Kyrgyz Republic, including both material culture and traditional ideology. We describe their codification, and strategies for their preservation and popularization. We draw on a large database, which includes findings of original fieldwork. We outline the elaboration of the concept of cultural heritage and its content, presenting a systematic description of institutional aspect and meaning, and we analyze the practices of its implementation. The historical and cultural heritage is viewed as a multifactorial space. The realities of modern Kyrgyzstan suggest that the nation implements integration strategies in foreign policy. While using the notions of cultural heritage and traditional values, the republic strengthens its ties with other members of the CIS, raising the level of its integration into the Central Asian community and maintaining its status as part of the world civilization. Cultural heritage is a key resource of social change and the economic stabilization of local communities. Its preservation at the level of everyday culture, academic, and educational practices, museums, festivals, etc. is a condition of national consolidation.

Keywords: *Kyrgyzstan, historical-cultural space, intangible cultural heritage, folk art crafts, epic tradition, national identity.*

Introduction

One of the key issues of the humanitarian discourse of the modern world is the assessment and preservation of cultural heritage. It is marked on the Eurasian scale at the global and national levels. It is significant that according to the decision of Council of Heads of State of the CIS (Commonwealth of Independent States) 2022 was declared as the Year of Folk Art and Cultural Heritage. On December 30, 2021, the President of the Russian Federation signed the Decree "On Observing the Year of Cultural Heritage of the Peoples of Russia in the Russian

Federation". In this context, the study of the experience of the Commonwealth countries in the implementation of national and international integration projects has acquired particular importance.

When evaluating the phenomenon of cultural heritage, it is important to take into account that its development goes back to the European humanitarian tradition of the Modern Age. Initially, it was about objects that represented the past and civilizational differences. Understanding their connection with contemporary culture determined the emergence of the category of "cultural values" in the Contemporary Period. The concept of "cultural heritage" was actively being formulated in the 20th century; in that period, its legal and organizational aspects were being developed at the international and national levels simultaneously. Academic science was addressing the phenomenon of cultural heritage in the context of global and national history, through the prism of studying collective social memory and ethnic traditions. On the scale of national discourses, the assessment of cultural heritage was projected onto the spheres of economics, philosophy, anthropology, sociology, information theory, etc. (Nora, 1997; Smith, 2004; Chepaitene, 2010; Pomian, 2010; and others).

In Kyrgyzstan, as in many other countries, the concept of "cultural heritage" in the legal, public, and academic spheres began to be developed in the 1990s. This was preceded by a long study of the history and traditional culture of the Kyrgyz. Back in the first half of the 20th century, there appeared studies by S.M. Dudin (1925), M.S. Andreev (1928), V. Chepelev (1939), and M.V. Ryndin (1948). The results of the Kyrgyz archaeological and ethnographic expedition of 1953–1955 was a breakthrough in the field. Also, there were the outstanding works by A.N. Bernshtam (1952), K.I. Antipina (1962), D.T. Umetalieva (1966), S.M. Abramzon (1990), and others.

In 1943, the Institute of Language, Literature, and History was established, whose main focus was the study of cultural heritage. Owing to its work, the study of the artifacts and objects of historical and cultural heritage achieved a new level. While Kyrgyzstan's independence was being secured, this humanitarian center was transformed into the Institute of History and Cultural Heritage of Kyrgyzstan of the National Academy of Sciences (NAS); then, in 2018, into the Institute of History, Archaeology and Ethnology of the National Academy of Sciences of the Kyrgyz Republic. In 2016, together with the Institute of Ethnology and Anthropology of the Russian Academy of Sciences, it produced a generalized publication "Kyrgyz" (Kirgizy, 2016). In recent decades, the authorial and collective projects in Kyrgyzstan in the field of cultural heritage have been carried out taking into account the analysis of the realities of the past, ethnic traditions, and the characteristics of the socio-cultural modernization of the country. Some topics dedicated to the study of traditional culture, historical and architectural records, with a focus on conservation, informational support, and the teaching of historical and cultural heritage were highlighted in the works of Z.K. Urmanbetova and S.M. Abdrasulov (2009), E.S. Luzanova (2010), A.I. Toktosunova (2009), R.S. Zainulina (2009a, b; 2010), A.Y. Malchik (2010), A.K. Bektanova (2016), N.A. Prokhorova (2020), and others. However, no attempts have been made to systematically describe the cultural heritage of Kyrgyzstan as a whole in its conceptual, institutional, and content aspects.

The purpose of this study is, while tracing the development of the "cultural heritage" concept, to assess the practices of preserving and promoting the tangible and intangible historical and cultural heritage of the Kyrgyz Republic. This involves studying the history and content of state and public initiatives, legislative developments, as well as academic and sociocultural projects.

The study is based on field materials—the results of work at museums and festival sites, in craft workshops and tourist centers of the country in 2018–2021. Normative documents, publications in periodical, specialized and popular Internet resources from Kyrgyzstan were used in this study, reflecting the processes of the codification and updating of the country's historical and cultural heritage.

The theoretical and methodological basis of this research is a modern interpretation of culture, which is considered to be a form of existence of the human community—a way of storing, transmitting, and updating social experience. Cultural heritage (integrated through its material and non-material aspects) is the embodiment of historical continuity. In the current state, it is a palimpsest, which arises as a result of the imposition of non-contemporaneous cultural layers.

Modern science interprets cultural heritage as a set of values inherited by society from the past; these are used in the system of synchronous cultural ties, acting as relatively stable forms that create a cultural tradition. Based on the assessment of the huge potential of the multidimensional cultural heritage, strategies are being developed for its conservation and use as one of the most important resources for development. The loss of cultural values is assessed as irreparable and irretrievable; it inevitably affects all areas of life of present and future generations; it leads to gaps in historical memory and spiritual gaps in ethnic and national communities. Successive cultural ties ensure the integrity and stability of these associations (Baller, 1987; Chepaitene, 2010; Toktosunova, 2009; Luzanova, 2010; Alymkulova, 2013; and others).

The Kyrgyzstan state policy for the protection and promotion of historical and cultural heritage

In Kyrgyzstan, the concept of "historical and cultural heritage" was intensively developed in the final decades of the 20th century at the administrative, legislative, academic, and educational levels. Although, the foundations for strategies for the preservation and promotion of cultural heritage sites were laid much earlier, at the beginning of this century. The Soviet Union, which united the vast expanses of Eurasia in 1922, systematically supported the socio-cultural projects of the republics that were part of it. The Turkestan Committee for Museums and Protection of Antiquities, Art, and Nature has played an important role in preserving the cultural heritage of Central Asia.

In the course of the national-territorial demarcation of Central Asia, with the support of the state and regional authorities, an academic and administrative infrastructure was formed in the macroregion, focused on the study, systematization, and protection of historical and cultural monuments, and later of cultural values, cultural heritage sites.

In 1924, the Kara-Kirghiz Autonomous Oblast was formed (as part of the RSFSR), which in 1926 was transformed into the Kirghiz ASSR, and in 1936 into the Kirghiz SSR. An important event in the life of the republic was the organization in 1966 of the Kirghiz Republican Voluntary Society for the Protection of Historical and Cultural Monuments.

In 1976, the Law of the USSR "On the Protection and Use of Historical and Cultural Monuments" was adopted. In the Kirghiz SSR, a similar law appeared in 1977. It outlined the attitude towards historical and cultural monuments, with respect to civic awareness. By 1991, the Kirghiz Republican Society registered 2659 objects (mainly archaeological and historical); 22 monuments of federal importance and 452 monuments of republican importance were registered as protected (Moskalev, 2011).

From the end of the 20th century, the process of developing the concept and strategies for the protection and promotion of the historical and cultural heritage of already sovereign Kyrgyzstan, in accordance with world trends, developed on the basis of a broad interethnic dialogue. In 1992, the Republic of Kyrgyzstan became a member of the UN. In the same year, the UNESCO World Heritage Center was established. In 1994, a UNESCO Office for Central Asia was opened in Almaty, Kazakhstan, with the participation of Kyrgyzstan, Tajikistan, and Uzbekistan. In 1999, on the basis of the Yeltsin Kyrgyz-Russian Slavic University, the UNESCO Chair for the Study of World Culture and Religions was organized. Since 2017, Kyrgyzstan has been a member of the UNESCO World Heritage Committee. In 2021, the republic was admitted to the Evaluation Body of the UNESCO Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage.

The implementation of UNESCO programs and projects has become one of the factors for Kyrgyzstan's entry into the world cultural space. This activity was based on cooperation with a number of organizations. Among them is the International Council on Monuments and Sites (ICOMOS), founded in 1965. Today it brings together 110 countries and evaluates sites proposed for inscription on the World Heritage List.

One of the partners of UNESCO in Kyrgyzstan is the Central Asian Crafts Support Association (CACSA). It was created in the early 2000s. D.I. Chochunbaeva—an actress and artist, now an honored worker of culture of the Kyrgyz Republic—became the president of the association. She began her social activities in the late 1980s; in 1996, she founded the Center for the Development of Traditional and Modern Culture "Kyrgyz Style". With the active participation of Dinara Chochunbaeva in 2000, 17 organizations of the nation united to develop traditional crafts. Emerging as a public project, CACSA was quickly gaining authority: by 2006, it included more than 60 craft groups, and several thousand Central Asian artisans were in the sphere of influence. This organization has implemented several dozen projects on traditional handicraft technologies and folk art. In 2009, on its basis, the CACSARC-kg (Resource Center in Kyrgyzstan) was established and registered as an independent public foundation (Obshchestvenny fond…, (s.a.); Ala-Toodogu…, 2016).

The effectiveness of CACSA activities in the field of cultural heritage preservation can be judged by partner projects. In 2003, the organization became a member of the World Crafts Council for the Asia-Pacific Region (WCC-APR) and a partner of UNESCO in the implementation of the UNESCO Award of Excellence for Handicrafts and the UNESCO Seal of Excellence projects in Central Asia. The UNESCO Seal of Excellence program was initiated by the UNESCO Bangkok office in 2001; in 2004, it was extended to Central Asia. In 2005, the "Asahi" handicraft group from Kyrgyzstan, which took part in the Central Asian Cultures Festival in Paris, received the UNESCO prize for traditional embroidery.

One of the partnership projects of CACSA/CACSARC-kg, with the participation of Kyrgyzstan and the Swiss Agency for Development and Cooperation, was the regional forum of cultural and art workers: "Cultural Space of Central Asia: Unity in Diversity",

held in 2009 in the capital of Tajikistan, Dushanbe. In recent years, CACSARC-kg has been actively cooperating with the Central Asian Culture and Arts Network platform, an information network created with the participation of the Goethe Institute and UNESCO in Uzbekistan to develop a dialogue in the field of cultural heritage of Central Asia.

An important condition for the development of programs for the preservation of cultural heritage in Kyrgyzstan is the strengthening of cooperation with the CIS countries (Oktyabrskaya, 2013a; Martynenko, 2017). The beginning of integration in this area was laid down with the adoption in 1993 of the Charter of the Commonwealth of Independent States. The strategic partnership was consolidated by the Agreement on the Return of Cultural and Historical Property to the States of Their Origin and the Agreement on Cooperation in the Field of Culture of 1992, as well as the Regulations on the Procedure for the Return of Illegally Exported and Imported Cultural Property of 1997. These documents outlined the conditions for the preservation of the cultural values of the Commonwealth member states on the basis of recognition of their sovereignty, originality, and equal cooperation.

In the CIS, international conferences have become a permanent platform for dialogue. Their organizer was the Likhachev Russian Research Institute of Cultural and Natural Heritage. It was created in 1992 to implement the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage. In May 2014, the institute received the status of the Commonwealth's main organization for the scientific support of a coherent cultural policy and programs for the preservation and use of the national cultural heritage. The discussions held with its support were focused on the prospects for integration of the CIS member states (Analiticheskiy material…, (s.a.)).

With the adoption by UNESCO of the Convention on Intangible Cultural Heritage in 2003, the cooperation strategy of member countries of the CIS began to be determined by the recognition of their traditions and historical and cultural heritage as a whole as the basis for national consolidation and development potential. For coordination in this area, in 2006, the Council for Humanitarian Cooperation was established, as well as the Working Group for the Study and Comparative Analysis of Legislation in the Sphere of Culture and the Working Group for Cultural Tourism of the Commonwealth countries.

The nature of the interaction of the CIS countries in the development of the concept and strategies for the preservation and promotion of cultural heritage was determined by the principles of unity and diversity, integration of world and national values as a condition for self-preservation and progressive development based on intercultural dialogue.

In accordance with an agreement signed in May 2006 at a meeting of the CIS Council of Heads of Government (Russia, Armenia, Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan), the Interstate Fund for Humanitarian Cooperation (IFHC) was established. It has become a permanent platform for dialogue between the Commonwealth countries, in particular, in the field of the preservation and promotion of cultural heritage.

In 2010, it was decided to declare the year 2011 as the Year of Historical and Cultural Heritage of the CIS countries. In accordance with its results, the "Cultural Capitals of the Commonwealth" interstate program was initiated. In May 2011, the Concept of Cooperation between the CIS member states in the field of culture was signed. In 2012, a new edition of the Model Law on Cultural Heritage Objects was approved; in 2013, the Model Law on the Protection of Intangible Cultural Heritage. The program "Main Measures of Cooperation Between the CIS Member States in the Field of Culture for 2016–2020" began to operate in 2015, and the Model Code on Culture of the CIS started in 2018.

In 2000–2020, hundreds of projects were being implemented across the CIS, aimed at preserving and popularizing cultural heritage. In 2018, the International Forum "Volunteering in the Preservation of Cultural Heritage in the CIS" was held by the IFHC. Kyrgyzstan took the most active part in it. Over the past 15 years, it supported more than 350 IFHC events (including 60 on a permanent basis). Among them are international competitions in national sports, the International Festival of Epics of the Peoples of the World, etc. (Mezhgosudarstvenny fond…, (s.a.)).

Taking into account the large contribution of Kyrgyzstan to the implementation of international projects, the CIS Council of Heads of Government decided to declare Karakol, one of the tourist and museum centers of the country, as the cultural capital of the Commonwealth for 2022.

In the last decade, integration processes have become one of the trends in the formation of the cultural policy of Kyrgyzstan. The republic has developed close relations with the countries of Central Asia, with international structures representing the Turkic world, in particular, with the Turkic Council, the Organization of Islamic Cooperation, the Research Center for Islamic History, Art and Culture, etc.

The International Organization of Turkic Culture holds an important place in the space of intercultural dialogue in Kyrgyzstan. The idea of its creation arose in 1992 in Istanbul during a meeting of the ministers of culture of Azerbaijan, Kazakhstan, Kyrgyzstan,

Turkmenistan, Uzbekistan, and Turkey. In 1993, in the capital of Kazakhstan, Almaty, a document was signed that consolidated the formation of a structure that united the Turkic-speaking countries in order to preserve and develop common historical and cultural values. Its general directorate is located in Ankara, the governing body is the Permanent Council of Ministers of Culture of the member states.

Since 1996, the International Organization of Turkic Culture has been officially cooperating with UNESCO. In 2009, it received its modern name Türk Kültür ve Sanatları Ortak Yönetimi (Tur.) – TÜRKSOY / TURKSOY, and in the same year it became a member of the Turkic Council founded in 2009. Currently, six states are members of this organization, including Kyrgyzstan. The activities of TURKSOY are focused on the implementation of educational and scientific projects to preserve and popularize the cultural heritage of the Turkic-speaking countries. The TURKSOY leadership emphasizes that the organization does not pursue political goals. However, since the 1990s, at its behest, the prospects of Islamization and geopolitical models of Turkic unity are being actively discussed in Eurasia (TÜRKSOY…, (s.a.)).

For 30 years, Kyrgyzstan has been participating in the implementation of TURKSOY programs. In 2018, the journal of the organization published materials dedicated to the Year of the Great Kyrgyz Writer Chinghiz Aitmatov, announced in honor of the 90th anniversary of his birth. In 2019, Osh in Kyrgyzstan was named the cultural capital of the Turkic world. In the spring of 2021, the Minister of Culture of the Kyrgyz Republic visited the headquarters of the organization and took part in the opening of the exhibition in honor of the 30th anniversary of the State independence. During the meeting, it was noted that cooperation between TURKSOY and Kyrgyzstan continues to develop (Ibid.).

Of great importance for the implementation of cultural heritage programs in Kyrgyzstan are the projects of the Eurasia Foundation, which operates with the support of the U.S. Agency for International Development. The foundation with offices in Kyrgyzstan (Bishkek, Osh), Kazakhstan (Almaty), and Tajikistan (Dushanbe) was founded in 2005. It supports initiatives to develop local communities, social entrepreneurship, educational systems, etc. For example, a grant allocated by the foundation for the creation of the CACSARC-kg Resource Center made it possible to increase the efficiency of work to preserve the cultural traditions of Kyrgyzstan.

The activities of the FAO (Food and Agriculture Organization of the United Nations) are aimed at the integration and preservation of the cultural heritage of Central Asia. It is designed to help the rural communities of Central Asia, in particular, to support traditional crafts. The prospect of their development is set by the FAO framework program for 2022–2031. Today, according to the experts of the organization, the problems of the macro-region are poverty and forced migration. However, under these conditions, it is ethno-local crafts (as the FAO studies of their socio-economic potential have shown) that can be an effective stabilization factor (FAO, (s.a.)).

At present, an important condition for the repeatability of traditional crafts and the preservation of cultural heritage of Kyrgyzstan is the support of a number of international organizations and foundations. These are, for example, the United Nations Development Program (UNDP), the United States Agency for International Development (USAID), the Japan International Cooperation Agency, etc. European funds also work in Kyrgyzstan. The multi-vector nature of the country's external affairs is determined by the formation and development of its cultural policy, which includes the preservation and promotion of the national heritage. The Republic attaches great importance to the preservation of traditions. Cultural heritage is considered the most important factor in the formation of national unity. The state plays a decisive role in its codification, study, and popularization.

The concept of "historical and cultural heritage" of the Kyrgyz Republic

At present, the formation of the concept of the historical and cultural heritage of Kyrgyzstan is based on the experience of its study and preservation, on a widespread global dialogue and the achievements of international scholarship.

The basis of reflection on the topic of "cultural heritage" became the interpretation that is traditional for the language and culture of the Kyrgyz. According to K.K. Yudakhin, the author-compiler of the fundamental "Kyrgyz-Russian Dictionary", the word *muras* (Arabic) denoted a stable circle of concepts: 'property', 'inheritance', 'legacy (of ancestors)', 'reliance (on relatives)' (Kirgizsko-russkiy slovar, 1985: 92). Throughout the 20th century, in the course of comprehension of the theme of heritage, there was a gradual expansion of its semantic field from a collection of memorials to a system of values, which was formed on the basis of continuity in global and local development. Cultural values served as a presentation of the achievements of the past. The totality of these meanings determined the content of the word *muras* (Oktyabrskaya, 2013a: 21–22). The transition to the understanding of their inalienability from the current

culture predetermined the emergence of the concept of "cultural heritage". Its foundation was the Convention concerning the Protection of the World Cultural and Natural Heritage, adopted in 1972. To ensure its implementation, in 1976, the Committee and the World Heritage Fund were established. According to the convention, "cultural heritage" includes: monuments—architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science; groups of buildings—groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science; sites: works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view (Konventsiya…, 1972).

The Convention concerning the Protection of the World Cultural and Natural Heritage came into force in 1975. In the USSR, it was signed in 1988. After the declaration of independence, Kyrgyzstan, like other countries in the post-Soviet sphere, began to form national legislation in the field of culture. The Law "On Culture" in the Kyrgyz Republic was adopted in 1992. It was drawn up taking into account international normative practices and cultural dialogue with the CIS countries (Oktyabrskaya, 2013a, b).

In 1995, Kyrgyzstan ratified the 1972 Convention concerning the Protection of the World Cultural and Natural Heritage, having approved the concept of *muras* ('heritage') as a key category of state policy in the field of preserving cultural traditions and values. In 1999, the Law "On the Protection and Use of Historical and Cultural Heritage" was adopted in Kyrgyzstan. Like the Law "On Culture" of 1992, it was edited during the 2000–2010s. Being coordinated with national and international acts, this document outlined the principles for compiling a national register of historical and cultural monuments, including the recognition of the diversity of cultural heritage in unison with the natural environment, and the understanding that its actualization is inseparable from the respect for human and people's rights and from the protection of comfortable living environment.

The first to be included in the Representative World Heritage List from Kyrgyzstan in 2001 were the medieval historical and architectural complex Shah-Fazil; the territory of the city of Uzgen, which arose in the 2nd–1st centuries BC on the way from the Ferghana Valley to Kashgar; the archaeological and architectural complex "Burana Tower", the main structure of which was a minaret, presumably built in the 10th–11th centuries; cultural and natural landscape of the lake Issyk-Kul. Later, these properties were removed from the Representative List. At present, the List contains: the Sulaiman-Too Sacred Mountain (since 2009), the network of routes of the Chang'an-Tian Shan Corridor of the Great Silk Road (since 2014, together with China and Kazakhstan), Sary-Chelek, Besh-Aral, Padysha-Ata nature reserves of the Western Tian Shan (since 2016).

At the end of the 20th century, the topic of intangible cultural heritage has become one of the most discussed in the world community. Its discussion was connected with the development of anthropology, folkloristic studies, with overcoming the "Eurocentrism" of cultural policy, and the growing interest in the traditions of Asia, Africa, and Latin America. Recognition of the "intangible heritage" (manifested not in objects, but in traditional skills, knowledge, ideas) of a wide range of peoples emphasized their significance and originality. In 1998, UNESCO developed a program for the proclamation of masterpieces of the oral and intangible heritage (Galkova, 2010).

In 2003, the Convention for the Safeguarding of the Intangible Cultural Heritage was adopted, which included oral traditions and their expressions, customs, rituals, festive events, knowledge and practices associated with traditional crafts, as well as tools, objects, artifacts and cultural spaces. It was recognized that the intangible cultural heritage remained relevant to the community for many generations, and determined its sustainability. It was recreated in interaction with nature, forming a sense of continuity and originality, respect for cultural diversity and creativity (Konventsiya…, 2003).

In 2006, Kyrgyzstan ratified the Convention for the Safeguarding of the Intangible Cultural Heritage. In 2012, the Law "On the Intangible Cultural Heritage of the Kyrgyz Republic" was adopted, which made it possible to integrate traditional culture into the national and global cultural space at the regulatory level (Kyrgyz Respublikasynyn tarykhyi-madaniy…, (s.a.)).

In 2012, under the President of the Kyrgyz Republic, the "*Muras*" ("Heritage") Fund for the Historical and Cultural Heritage of the People of Kyrgyzstan was established. With its support, in the 1990–2000s, objects of archaeology, history, and traditional culture, names of outstanding craftspersons, storytellers, and heroes of the past, etc. were introduced into the sphere of cultural heritage of Kyrgyzstan. In cities, villages, and natural areas of the country, monuments were erected to the heads of tribal associations and volost governors of the late 19th and early 20th centuries. A set of sacred and memorable places was compiled. The task of preserving the unique historical and cultural

heritage in the republic was outlined in the Law "On Museums and the Museum Fund" of 2015.

Museum, festival, and commemorative practices have become a form of actualization of the historical and cultural heritage, which has acquired a multi-level character, combining tribal, ethno-local, ethno-cultural, ethno-political, and civilizational components. The ideas about the phenomenon of Eurasian nomadism and Turkic unity became definitive. Images and motifs of the ethnic history of the Middle Ages and Modern times, objects and monuments from the times of the Russian Empire and the Soviet past expanded the space of the historical and cultural heritage of Kyrgyzstan at the beginning of the 21st century.

In 2015, the Concept for the Protection and Use of the Historical and Cultural Heritage of the Kyrgyz Republic for 2015–2020 was approved. At present, there are approximately two thousand outstanding monuments of history, archaeology, urban planning, and monumental art, and more than one thousand monuments of local significance, of which 583 objects (including 66 historical monuments, 335 archaeological monuments, 122 architectural monuments, 53 art monuments) are included in State List of Historical and Cultural Monuments of the Kyrgyz Republic (Kyrgyz Respublikasynyn tarykhyi-madaniy…, (s.a.)). To effectively use this potential in shaping the national development model of Kyrgyzstan, 2016 was declared as the Year of History and Culture.

The development of a conceptual framework for the cultural policy of Kyrgyzstan continued on the basis of international integration. The national legislation of the republic was harmonized with the 2013 CIS Model Law on the Protection of Intangible Cultural Heritage, the 2018 CIS Model Code of Culture, and the 2000 CIS Model Law on Items of Cultural Heritage.

In the state regulations of Kyrgyzstan, intangible cultural heritage was defined as a set of spiritual, intellectual, and moral values inherent in a community (national, ethnic, confessional, etc.), which are a reflection of its identity.

In the official interpretation, the intangible cultural heritage of the Kyrgyz Republic is ideas, knowledge, and customs concerning nature and the universe; customs, rituals, and festive events; folklore, storytelling, and other performing arts (including the art of storytellers-manaschi); traditional crafts and skills, as well as tools, objects, and cultural spaces; traditional games and sports (Zakon…, 2012). Overall, this is Kyrgystan's traditional ethnocultural array. From 2012 to 2021, ten objects were included in the World List from Kyrgyzstan (including at the level of collective applications). National legislation and programs for the preservation of historical and cultural heritage have approved their value as an integral part of the world cultural heritage. The main indication of the significance of the historical and cultural (and intangible) heritage of Kyrgyzstan at the level of political and broad public and journalistic discourse was recognized to be the cultural sovereignty of its people as the basis of state sovereignty (Kovshova, 2012).

Practices of the actualization of intangible cultural heritage of Kyrgyzstan in the past and present

The synthesis of ideas about historical and intangible cultural values that are significant for national identity and ethnocultural distinctness determined the concept of historical and cultural heritage, which was embodied in the system of normative acts of Kyrgyzstan in the 1990–2020s. It dates back to the beginning of the 20th century, when the living practices of crafts (later, intangible cultural heritage) became the object of interest of the society and the state.

In the 1920s, within the boundaries of modern Kyrgyzstan, several carpet, jewelry, and similar guilds (*artels*) and training workshops were created. In the 1930–1940s, in the city of Tokmak, there was an educational and production art center that united the best artisans of the republic. In 1937, the largest workshop of its time, "Kyzyl Kilemchi" ("Red Carpet Weaver"), began work in Osh. During the Great Patriotic War, they were redesigned.

The adoption by the Council of Ministers of the USSR of the Decree "On Measures for Further Development of Folk Art Crafts" in 1968 became an impetus for the revival of such organizations. Following the Federal Decree, the Decree of the Council of Ministers of the Kirghiz SSR "On the Results of Implementation of the Plan for the Development of the National Economy of the Kirghiz SSR for 9 Months of 1968" was issued, within the framework of which the "Kyyal" ("Dream") association was formed in 1969. Its head office was located in the capital, and branches WERE established in a number of cities and villages of the republic. Each of them specialized in one type of craft. For example, in the village of Komsomol (now, the village of Bulan-Sogottu), T. Amantaev was working, a famous woodcarver, whose heir continues today the work of his father. The Osh branch of "Kyyal" specialized in the production of traditional clothing. In Uzgen, the production of pile carpets and majolica tableware was launched, etc.

In 1973, under the Ministry of Local Industry, the Central Artistic Experimental Laboratory was created, whose employees, during expeditions around the republic, assembled a collection of 200 samples that were the

products of 50 best folk craftsmen. This collection served as the basis for applied and methodological developments in the field of preserving the folk crafts and applied art of the Kyrgyz SSR, and then independent Kyrgyzstan (Malchik, 2010: 67–75).

In the 1970–1980s, at the "Kyyal" Association of Folk Art Crafts, there was a school, the teachers and students of which created reference samples of products, adapting them to the present. The merit of the "Kyyal" association is the popularization of the *ak-kalpak* traditional male headgear. In the 1970s, six types of this item were produced. *Ak-kalpak* became the brand of "Kyyal": in 1977, it was awarded the silver medal of VDNKh (Exhibition of Achievements of the National Economy) of the USSR; in the 2000s, it was qualified as one of the symbols of the Kyrgyz Republic.

In the USSR, "Kyyal" was one of the leading folk craft centers focused on export. Having survived the difficult 1990s, the association continued its work. In 1993, it acquired national status, which is retained at the present time. In the late 2010s, more than 120 thousand artisans working throughout the republic were registered with the association. The "Kyyal" association was given the task of developing the national art crafts of sovereign Kyrgyzstan (Ibid.; Ozerov, 2017).

In addition to the "Kyyal" association, there are other similar centers, for example, the "Muras" ("Heritage") workshops in Osh, the "Ademi", "Zhez oimok" ("Bronze thimble"), "Tulpar", "Zerger" ("Handyman") enterprises in Bishkek, and many others. The ethnic jewelry industry is rapidly developing. Currently, the "Keldike" and "Ethno" brands are recognizable both in country and abroad.

In modern Kyrgyzstan, craftsmen have a very high status. Since 2006, on the second Sunday of October, the country has been celebrating Artisan's Day. Recognition of the great role of traditional technologies preserved in Kyrgyzstan served as the basis for including this "living heritage" in the world cultural arsenal.

After the ratification in 2006 of the Convention for the Protection of the Intangible Cultural Heritage and the adoption in 2012 of the relevant law in Kyrgyzstan, the title of "Master-Bearer of the Material and Spiritual Traditions of Folk Culture" was approved; the work began on compiling registers of intangible cultural heritage (Zainulin, 2009a).

In 2012, traditional felt carpets *shyrdak* and *ala-kiiz* were included in the World List of Intangible Cultural Heritage from Kyrgyzstan; likewise, in 2013, the epic trilogy "Manas-Semetey-Seitek" and the culture of its performance. In 2014, felt yurt (from Kyrgyzstan and Kazakhstan) was recognized as belonging to all mankind. In 2015, the list of world masterpieces was supplemented by the art of musical and poetic improvisation *aitysh* (from Kyrgyzstan and Kazakhstan), and in 2016 by the Nowruz / Nauryz holiday (from Kyrgyzstan, Uzbekistan, Azerbaijan, Afghanistan, India, Iran, Iraq, Kazakhstan, Pakistan, Tajikistan, Turkmenistan, and Turkey) and the traditions of cooking and serving *kalam* wheat cakes among the Kyrgyz (from Kyrgyzstan, Azerbaijan, Iran, Kazakhstan, and Turkey). The equestrian game *kook-boru* was included in the UNESCO list. Then, in 2019, the tradition of making and wearing a men's headgear from felt *ak-kalpak* was included, the day of which has been celebrated in Kyrgyzstan since 2011. In 2020, the traditional game of *toguz korgool*, a variant of chess, was added to the World List of Intangible Cultural Heritage. In 2021, the World Nomad Games, which were first held in Cholpon-Ata (Issyk-Kul Region) in 2014, were also included in the UNESCO list (O gosudarstvennoy politike…, (s.a.)).

The codification of the intangible cultural heritage in Kyrgyzstan was accompanied by the restoration of many elements of traditional culture. Much attention was paid to national sports. In 1995, large-scale competitions were held in the republic on the occasion of the 1000th anniversary of the "Manas" epic. In 2003, the Law "On National Sports" was adopted, embodying the values of the Kyrgyz people. The following competitions were classified as national: *kok-boru, oodarysh, kyz kuumai, kuresh, ordo, toguz korgool*, etc.; these were included in the Unified Sports Classification of the Kyrgyz Republic. Federations of *kuresh, toguz korgool, kok-boru* were founded; honorary titles were approved for several types of national sports. The state concept for the development of physical culture and sports in the republic approved the priority development of traditional sport games. The result of many years of efforts was the organization of the World Nomad Games with the support of the Government of the Kyrgyz Republic and the World Ethnogames Confederation. For the first time, they were held in 10 types of ethnosport, with 37 types by 2018 (O vsemirnykh igrakh…, 2018; Sporttun uluttuk…, (s.a.)).

One of the most significant elements of the intangible cultural heritage of Kyrgyzstan is the epic tradition. In 2003, at the request of China's Kyrgyz community, the "Manas" epic was recognized as a model of creativity of world significance. In 2006, the subject "Manas studies" was introduced into the curriculum of higher education in Kyrgyzstan; and in 2011, the Law "On the Manas Epic" was adopted. In 2013, Kyrgyzstan applied for inclusion of the "Manas-Semetey-Seitek" cycle (trilogy) and the art of *manaschi* into the UNESCO Representative List (Bakchiev, 2018).

In 2014, the work on the academy publication of the epic was completed. In 2015, by a decree of the Government of the Kyrgyz Republic, Manas Day was

established as a public holiday, which is celebrated annually on December 4. Over the past decade, more and more new studio schools have been opened in the country, festivals and competitions in storytelling skills have been held, and museums have been created. Many monuments to Manas adorn the cities of Kyrgyzstan. In 2019, the "Manas" National Academy, named after Chinghiz Aitmatov, was created in the country; in 2021, the "Manas" Theater was opened.

The epic tradition and its keepers (the *manaschi*) enjoy great prestige in modern Kyrgyzstan. The "Manas-Semetey-Seitek" trilogy is valued at the state and public level as an encyclopedia of folk culture and the embodiment of the national idea. In public and journalistic discourse, the "Seven Commandments of Manas" (reconstructed on the basis of a modern reading of the epic) are widely discussed: strengthening and protecting of the state; the unity and cohesion of the nation; national honor; inter-ethnic harmony and cooperation; work and knowledge as the basis of prosperity; generosity and tolerance; and healthy life in harmony with nature. These are considered the moral code of the Kyrgyz nation. At the level of public awareness, the appeal to the epic tradition is seen as a way of the renewal and unity of Kyrgyzstan and of the entire Turkic world (Ibid.; Manas, (s.a.)). The expression of this trend is the Festival of Epics of the Peoples of the World; in 2021, it was held for the sixth time at the most prestigious venues in Kyrgyzstan.

The preservation of the epic, and also the entire cultural heritage, implies the training of specialists. With the support of national and international funds, numerous courses operate in the country, as well as workshops and training courses are held. For example, in 2018, the training of rural residents of Kyrgyzstan was carried out by the Association of Hungarian Folk Artists. After the completion of the project, several artisans of the republic were invited to participate in the annual Festival of Folk Arts in Budapest.

Back in the 1990s in Kyrgyzstan, efforts were made for involving the population in socio-cultural activities. Traditional crafts began to be seen as an important resource for development. The villages of Kyzyl-Tuu (Tonsky District, Issyk-Kul Region) and Kochkor/Kochkorka (Kochkorsky District, Naryn Region) became well-known centers of national crafts in the republic. In Kochkor, there are several women's cooperatives engaged in the production of patterned felts. Kyzyl-Tuu is called a manufactory village, where yurts are made, and each yard specializes in a certain operation. In other locations of the country, for example, in Karakol, there are family workshops for the production of yurts. Today, as before, these portable dwellings are used in the republic in everyday and ritual life. They are prestigious symbols of family and state holidays, the embodiment of national treasure.

Patterned felts are the most recognizable brand of the republic. The task of their popularization is solved by the international festival "Oimo" ("Pattern"). It was first held in 2006, with the support of CACSA, within the framework of the republican program "One Hundred Cultural Projects". Originally, the festival had a regional/local character. Today, dozens of artisans from Kyrgyzstan and other countries of Central Asia take part in it.

Numerous handicraft groups engaged in the manufacture of felt have been created in the villages and cities of the republic. One of the most well-known is the "Altyn oymok" workshop-gallery, uniting craftswomen in Bokonbaevo village (Tonsky District, Issyk-Kul Region). They have been certified by UNESCO. In total, 20 artisans have UNESCO certificates in the republic. The workshop produces ca 60 patterned felts *shyrdak* and *ala-kiiz*, most of which are exported.

In modern Kyrgyzstan, artisans (keepers of traditions) are considered to be a creative stratum. In the village of Barskoon/Barskaun (Jeti-Oguzsky District, Issyk-Kul Region), traditional textiles are produced by the "Topchu" handicraft group. It was created in 2017, with the participation of FAO, within the Mountain Partnership Products (MPP) Project, which brings together producers of eco-products living in the mountains of the world. MPP branded labels provide information about the history of products and their significance to the local culture. This marking makes it possible not only to advertise the product, but also to recount the unique traditions of Kyrgyzstan. Inspired by the needlework of "Topchu" craftswomen, designer S. Zhan developed a collection of clothes with traditional Kyrgyz embroidery and felt appliqués, which was presented at Milan Fashion Week in March 2021 (Gorny voilok…, (s.a.)).

The Mountain Partnership program is effectively developing in the republic. At the initiative of Kyrgyzstan, the UN declared the year 2022 as the International Year of Sustainable Mountain Development. Of great importance for modern Kyrgyzstan is the project "One Village – One Product", initiated in 2011 by the Japan International Cooperation Agency. Initially, it covered 20 villages and about 30 local communities that formed the Issyk-Kul Region Development Association for the purpose of the production of food, clothing, and patterned felts from local raw materials, based on traditional technologies. Within this project, workshops for the production of felt products were created in the villages of Kara-Shaar (Tonsky District, Issyk-Kul Region), Kara-Oi (Issyk-Kulsky District, Issyk-Kul Region), and others. Their products represent the "Issyk-Kul Brand". The association provides villages with jobs (Kiizbaev, 2019).

In 2018, the "One Village – One Product" project brought together more than 2000 artisans, who produced (among other goods) more than 25,000 felt products for export. In 2019, the Issyk-Kul model spread to other regions of the country; approximately 300 craft groups were created, engaged in the manufacture of food additives, preserves, dried fruits, etc. Over the past decade, culinary traditions and folk recipes have become one of the national brands of Kyrgyzstan (Ibid.).

The "One Village – One Product" project is also focused on the development of tourism and hotel business using authentic practices of hospitality. International organizations, in particular, UNDP, USAID and others, which have their offices in the country, played an important role in the creation of the leisure infrastructure in Kyrgyzstan. The development of tourism business has maintained the values and objects of cultural heritage. In 2018, the slogan "Yurts, koumiss, and artisans" has once again represented the republic at one of the largest tourism exhibitions in Berlin. Historical and cultural heritage has become an effective tool for integrating Kyrgyzstan into the global cultural space.

Conclusions

Global changes in Central Asia that are rapidly gaining momentum have given the issues of cultural heritage a new dimension in the last decade of the 20th to early 21st century. The total globalization of economic processes, as well as ongoing westernization, has exacerbated the problem of preserving traditional cultures. Strategies for the modernization of the countries of the macroregion, including Kyrgyzstan, "put antiquity at the service of modernity". Theorists and practitioners of nation building began to consider historical and cultural heritage as the active factors in socio-cultural transformations. Their preservation contributed to the consolidation of national communities, for the harmonious development of the country for the benefit of future generations.

In modern times, the historical and cultural heritage in Kyrgyzstan is valued as a multidimensional space, and the interconnection of ethnic and universal values is affirmed. Cultural heritage is in the focus of political activity and public attention. The popularization of cultural values is primarily directed towards the youth. The traditional culture occupies an important place in primary, secondary, and university education. The embodiments of the cultural and political potential of the country are the heroes and rulers of the past, as well as the heads of the Kyrgyz clans. The epic tradition (the spirit of Manas) is recognized as an expression of national self-consciousness and patriotism. An appeal to cultural heritage serves as a tool for building a system of interethnic, international relationships. By appealing to traditional values, the country forms a positive image, strengthens ties in the Turkic world, integrates into the Central Asian community, and confirms its place in the global cultural space. The republic is building effective ties with the CIS countries, by adhering to common strategies for the preservation and promotion of cultural heritage. Historical and cultural heritage, shaping the mentality and way of life of the national community of modern Kyrgyzstan, is a factor in its consolidation and ensuring social stability.

Acknowledgment

This study was supported by Project No. 748715F.99.1.BB97AA00002 "Turkic-Mongolian World of the Greater Altai: Unity and Diversity in History and Modernity".

References

Abramzon S.M. 1990
Kirgizy i ikh etnogeneticheskiye i istoriko-kulturniye svyazi. Frunze: Kyrgyzstan.

Ala-Toodogu zamanbap etnografiya kôygôylôru. 2016
Bishkek: MaxPrint basmasy.

Alymkulova S.K. 2013
Etnosotsialniye protsessy v postsovetskikh respublikakh. In *Problemy polietnicheskogo obshchestva v Tsentralnoy Azii: Vyzovy i vozmozhniye resheniya*. Bishkek: [s.n.], pp. 171–175.

Analiticheskiy material "Prostranstvo obshchego naslediya". (s.a)
Internet-portal SNG. Prostranstvo integratsii. URL: https://e-cis.info/page/3537/80670/ (Accessed December 25, 2021).

Andreev M.S. 1928
Ornament gornykh tadzhikov i kirgizov Pamira. Tashkent: [s.n.].

Antipina K.I. 1962
Osobennosti materialnoy kultury i prikladnogo iskusstva yuzhnykh kirgizov. Frunze: Izd. AN KirgSSR.

Bakchiev T.A. 2018
Manasovedeniye: Ucheb. posobiye dlya vuzov. [4th edition]. Bishkek: Uluu Toolor.

Baller E.A. 1987
Sotsialniy vopros i kulturnoye naslediye. Moscow: Nauka.

Bektanova A.K. 2016
Sotsiokulturnaya transformatsiya i grazhdanskoye obshchestvo v Kyrgyzstane. In *Istoricheskiye, filosofskiye, politicheskiye i yuridicheskiye nauki, kulturologiya i iskusstvovedeniye. Voprosy teorii i praktiki*, No. 3 (65), pt. 1. Tambov: Gramota, pp. 34–37.

Bernshtam A.N. 1952
Istoriko-arkheologicheskiye ocherki Tsentralnogo Tyan-Shanya i Pamiro-Altaya. Moscow, Leningrad: Izd. AN SSSR. (MIA; No. 26).

Chepaitene R. 2010
Kulturnoye naslediye v globalnom mire. Vilnyus: Yevrop. Gum. Univ.

Chepelev V. 1939
Kirgizskoye narodnoye izobrazitelnoye tvorchestvo. *Iskusstvo*, No. 5: 33–44.

Dudin S. 1925
Kirgizskiy ornament. *Vostok*, No. 5: 10–16.

FAO. (s.a.)
Prodovolstvennaya i selskokhozyaistvennaya organizatsiya Obyedinennykh natsiy. URL: https://www.fao.org/home/ru/ (Accessed December 25, 2021).

Galkova O.V. 2010
Mezhdunarodniye dokumenty o sokhranenii i zashchite nematerialnogo kulturnogo naslediya. *Vestnik Volgogradskoi akademii MVD Rossii*, No. 4 (15): 167–172.

Gorny voilok: Novoye slovo v mode? (s.a.)
Prodovolstvennaya i selskokhozyaistvennaya Organizatsiya Obyedinennykh Natsiy. URL: https://www.fao.org/fao-stories/article/ru/c/1378822/ (Accessed December 25, 2021).

Kiizbaev M. 2019
"Odno selo – odin produkt" dlya razvitiya Kyrgyzstana. In *Kabar*. URL: https://kabar.kg/news/odno-selo-odin-produkt-dlia-razvitiia-kyrgyzstana (Accessed December 25, 2021).

Kirgizsko-russkiy slovar. 1985
K.K. Yudakhin (comp.). Bk. 2: L–Ya. Frunze: Gl. red. Kirg. Sov. Entsikl.

Kirgizy. 2016
Moscow: Nauka.

Konventsiya ob okhrane vsemirnogo kulturnogo i prirodnogo naslediya. 1972
In *OON. Konventsii i soglasheniya*. URL: https://www.un.org/ru/documents/decl_conv/conventions/heritage.shtml (Accessed December 25, 2021).

Konventsiya ob okhrane nematerialnogo kulturnogo naslediya. 2003
In *OON. Konventsii i soglasheniya*. URL: https://www.un.org/ru/documents/decl_conv/conventions/cultural_heritage_conv.shtml (Accessed December 25, 2021).

Kovshova I. 2012
Naslediye predkov – obyedinyayushchaya sila. In *Slovo Kyrgyzstana*. May 11. URL: https://slovo.kg/?p=9066 (Accessed December 25, 2021).

Kyrgyz Respublikasynyn tarykhyi-madaniy murastaryn korgoo zhana paidalanuu boyuncha 2015–2020-zhyldarga karata kontseptsiya. (s.a.)
In *Toktom No. 23*. 2015-zhyldyn 26-yanvary. URL: http://cbd.minjust.gov.kg/act/view/ru-ru/97268/10?cl=ky-kg&mode=tekst (Accessed December 25, 2021).

Luzanova E.S. 2010
Kultura kak filosofiya razvitiya. Kyrgyzstan na rubezhe tysyacheletiy. Bishkek: TAS.

Malchik A.Y. 2010
Rol ornamenta v formirovanii arkhitektury Kyrgyzstana: (Genezis, evolyutsiya, natsionalniye traditsii). Bishkek: Raritet Info.

Manas. (s.a.)
In *Beregi Kyrgyzstan*. URL: http://manas.su/o-kyrgystane/manas (Accessed December 25, 2021).

Martynenko I.E. 2017
Pravovaya okhrana nematerialnogo kulturnogo naslediya gosudarstv-uchastnikov SNG na mezhdunarodnom i natsionalnom urovnyakh. *Vestnik Voronezskogo gosudarstvennogo universiteta*, No. 2: 282–293.

Mezhgosudarstvenny fond gumanitarnogo sotrudnichestva gosudarstv-uchastnikov SNG. (s.a.)
URL: http://www.mfgs-sng.org/ (Accessed December 25, 2021).

Moskalev O.M. 2011
K istorii deyatelnosti kirgizskogo respublikanskogo obshchestva okhrany pamyatnikov istorii i kultury. *Voprosy istorii Kyrgyzstana*, No. 1: 204–212.

Nora P. 1997
La nation-mémoire. In *Les lieux de mémoire*. Paris: Gallimard, pp. 2207–2216.

Obshchestvenny fond "Resursniy tsentr v Kyrgyzstane Tsentralno-aziatskoy Assotsiatsii v podderzhku remesel – CACSARC-kg". (s.a.)
URL: https://www.cacsarc.org/about-us (Accessed December 25, 2021).

O gosudarstvennoy politike v oblasti kultury v Kyrgyzskoy Respublike. (s.a.)
In *Internet-portal SNG. Prostranstvo Integratsii*. URL: https://e-cis.info/cooperation/3143/79127/ (Accessed December 25, 2021).

O Vsemirnykh igrakh kochevnikov. 2018
In *Vsemirniye igry kochevnikov*. URL: http://www.worldnomadgames.com/ru/page/O-VIK-37/ (Accessed December 25, 2021).

Oktyabrskaya I.V. 2013a
Kontseptsiya kulturnogo naslediya: Mirovoy i rossiyskiy opyt formirovaniya. *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 12. Iss. 3: Arkheologiya i etnografiya: 20–31.

Oktyabrskaya I.V. 2013b
Strategii i praktiki sokhraneniya natsionalnogo kulturnogo naslediya stran SNG: Opyt integratsii v mirovoye kulturnoye prostranstvo. In *Mezhkulturniy dialog na Yevraziyskom prostranstve*. Gorno-Altaysk: Gorno-Alt. Gos. Univ., pp. 6–12.

Ozerov D. 2017
"Kyyal" – nepreryvayemaya nit. *Slovo Kyrgyzstana*. Obshchenatsionalnaya gazeta. URL: https://slovo.kg/?P=93622 (Accessed December 25, 2021).

Pomian K. 2010
Patrimoine et identité nationale. *Le Débat*, vol. 159 (2): 45–56.

Prokhorova N.A. 2020
Istoriko-kulturnoye naslediye Kyrgyzstana. Problema okhrany i sokhraneniya. *Vestnik Kyrgyzsko-Rossiyskogo Slavyanskyanskogo universiteta im. B.N. Yeltsina*, vol. 20 (2): 74–78.

Ryndin M.V. 1948
Kirgizskiy natsionalniy uzor. Leningrad, Frunze: [s.n.].

Smith L. 2004
Archeological Theory and the Politics of Cultural Heritage. London, New York: Routledge.

Sporttun uluttuk tùrlôrù zhônùndô. (s.a.)
In *Kyrgyz Respublikasynyn Myizamy*. URL: // http://cbd.minjust.gov.kg/act/view/ky-kg/1208?cl=ky-kg (Accessed December 25, 2021).

Toktosunova A.I. 2009

Identichnost i dialog kultur kak politicheskiy protsess v usloviyakh globalizatsii: Dr. Sc. (Politology) Dissertation. Bishkek.

TÜRKSOY. (s.a.)

Mezhdunarodnaya organizatsiya tyurkskoy kultury. URL: https://www.turksoy.org/ru/turksoy/about (Accessed December 25, 2021).

Umetalieva J.T. 1966

Kirgizskiy vorsoviy kover. Frunze: Ilim.

Urmanbetova Z.K., Abdrasulov S.M. 2009

Istoki i tendentsii razvitiya kyrgyzskoy kultury. Bishkek: Ilim.

Zainulin R.S. 2009a

Rol mezhdunarodnykh organizatsiy i regionalnykh tsentrov v sokhranenii i populyarizatsii naslediya istorii i kultury. *Voprosy istorii i kultury Kyrgyzstana*, No. 2: 88–93.

Zainulin R.S. 2009b

Kulturnoye mnogoobraziye kyrgyzskogo naroda – neotyemlemaya chast istoricheskogo naslediya Kyrgyzstana. *Nauka i noviye tekhnologii*, No. 4: 152–155.

Zainulin R.S. 2010

Istoriko-kulturnoye naslediye Kyrgyzstana: Metody izucheniya i sokhraneniya v usloviyakh informatizatsii obshchestva: Cand. Sc. (History) Dissertation. Bishkek.

Zakon "O nematerialnom kulturnom nasledii Kyrgyzskoy Respubliki" No. 163 ot 9.08.2012 g. 2012

In *Tsentralizovanniy bank dannykh pravovoy informatsii Kyrgyzskoy Republiki*. URL: http://cbd.minjust.gov.kg/act/view/ru-ru/203763 (Accessed December 25, 2021).

Received January 11, 2022.
Received in revised form January 31, 2022.

doi:10.17746/1563-0110.2022.50.2.140-149

A.S. Pilipenko, R.O. Trapezov, and S.V. Cherdantsev
Institute of Cytology and Genetics, Siberian Branch,
Russian Academy of Sciences,
Pr. Akademika Lavrentieva 10, Novosibirsk, 630090, Russia
E-mail: alexpil@bionet.nsc.ru; Rostislav@bionet.nsc.ru;
stephancherd@gmail.com

Paleogenetic Studies of Migration Processes in Eurasia

Migration processes played a key role in shaping the cultural and genetic landscapes in Eurasia. Significant progress in the field of migration studies in recent years is associated with the development of methods for studying ancient DNA, making it possible to reach a new level of understanding the population-genetic aspects of ancient migrations and significantly supplementing the evidence of paleoanthropology and genetics of modern populations, but not replacing these areas. A key challenge is the correct comparison of processes accompanying migrations at the population genetic level and at the level of material culture. The article highlights current methods used in studying ancient DNA, from the traditional analysis of individual genetic markers to the genome-wide analysis by high-throughput sequencing. Approaches to the study of ancient migrations and to the objective reconstruction of the genetic profile of populations and its dynamics in time and space are assessed. Special attention is paid to the problem of representative sampling in the study of migration processes using paleogenetic methods, and possible strategies for selecting the materials most adequate to the tasks of the study. Ways of enhancing the efficiency of the diachronic approach in reconstructing the genetic history of populations are discussed. Possible prospects of paleogenetic studies are evaluated, including the transition to more detailed reconstructions of local migration processes.

Keywords: *Paleogenetics, migrations, mitochondrial DNA, Y-chromosome, nuclear genome*

Introduction

Migrations have played the most important role in the history of humanity. The key migration events that have shaped the genetic landscape of a substantial part of the modern world population were taking place in Eurasia: from the original out-of-Africa dispersal of *Homo sapiens* to the mass movement of numerous groups of early nomads. The study of the genetic structure of modern populations by ethnogenomic techniques was essential for reconstruction of the main stages and routes of peopling of Eurasia and for evaluating the role of isolation and consequent migrations in shaping the gene pools of populations from various regions (Jobling, Tyler-Smith, 2003; Torroni et al., 2006; Underhill, Kivisild, 2007). Reconstructions of past events based on their results (i.e. the genetic structure of modern populations) usually take into account several possible alternative scenarios of every event. The same processes can be studied independently by archaeologists and biological anthropologists employing ancient artifacts and remains *per se*. But the development of paleogenetics provided for the spread of ethnogenomic techniques for studying ancient populations, thus for combining all these disciplines into a single complex approach

Archaeology, Ethnology & Anthropology of Eurasia 50/2 (2022) 140–149 E-mail: Eurasia@archaeology.nsc.ru

and reaching a new level in reconstructing ancient migrations.

The role of paleogenetics is often to test the hypotheses based on the results of archaeological, anthropological, and ethnogenetic studies. Studying a minimal number of specimens for reconstructing the most large-scale migrations has long been the main strategy of paleogeneticists. Successful examples of such an approach are the series of papers devoted to the contacts of anatomically modern humans (AMH) colonizing Eurasia with other late hominins (Reich et al., 2010; Pääbo, 2015; Krause, Pääbo, 2016; Vernot, Pääbo, 2018), dynamic of the European genetic landscape during the Last Glacial Maximum (LGM) and the "Neolithic Revolution" (Haak et al., 2010; Pinhasi et al., 2012; Lazaridis, 2018; Liu et al., 2021), large-scale Eurasian migrations in the Bronze (Haak et al., 2015; Allentoft et al., 2015) and Early Iron (Unterländer et al., 2017; Krzewińska et al., 2018) ages. The outcomes of those works can be mainly viewed as preliminary reconstructions. Unfortunately, such reconstructions do not always grow up into a series of more localized and detailed studies. But the modern level of the development of paleogenetic techniques makes obtaining large amounts of data on the genomics of ancient populations unprecedentedly accessible. In this study, we set out to discuss the necessity of the transition to systematic studies of the genetic structure of local populations of different areas of Eurasia, employing existing paleogenetic tools. The main attention is paid to the principals of forming representative samples that take into account the archaeological and anthropological context of the studied data, as well as the strategies of genotyping and interpretation of the results, including perspective approaches of the field.

Human migrations, and how they are studied

At present, *Homo sapiens* is a cosmopolitan species populating almost all inhabitable areas of the Earth. This means an important role the human migrations have played in acquiring those huge spaces with variable natural and climatic conditions. Importantly, the history of our species presents many cases of repopulation of some regions, for instance, the peopling of Central and northern Europe, which followed the retreat of glaciers after the LGM.

After the initial settling of a geographic area, population migrations remain active. As a result, widening of the inhabited area is replaced with contacts between groups from its various parts, the populations previously isolated due to geographic and other factors. At least two groups take part in such processes: migrants, i.e. the group changing its location, and the autochthonous population of the receiving territory. In such cases, a robust genetic study must not only postulate the fact of migration but also reconstruct the nature of the ethnocultural interplay between migrants and autochthons. The population genetic pattern of this contact determines the effect that the migration has had on the genetic history of the region.

The design of the studies addressing migrations should be based on an account of the archaeological knowledge about the area of interest, including the stages of regional development and possible migratory events. From the archaeological point of view, such events are typically marked by the appearance of innovations (in a broad sense) in the material culture. This always raises the question of if the spread of the innovation was or was not associated with human migration (Meiggs, Freiwald, 2018).

As any migratory event evinces a relocation of a population, being thus a population-demographic process, it can only be directly assessed via studying the biological remains of the respective migrating group. Comprehensive study of human remains by numerous methods and approaches delimits the field of bioarchaeology (Ibid.). The main bioarchaeological disciplines addressing human migrations are physical anthropology, paleogenetics, stable isotope and microelement analyses; the two former are the most effective at the population level. Notably, these disciplines employ systems of variables (markers) not directly connected with each other, thus providing independent views on the migratory events and their reconstruction.

The effectiveness of the use of paleogenetic methods for reconstructing ancient migratory processes at the population level will depend on two main factors: correct selection of study specimens (forming representative samples); choice of informative genetic markers, genotyping method, and an appropriate strategy of interpretation of the results.

Forming representative samples of specimens for studying migrations via paleogenetic techniques

A full-scale reconstruction of the population-genetic aspect of a migratory event, using paleogenetic

methods, implies solving several interrelated tasks: 1) fixation of changes in the genetic composition of a population potentially connected to an influx of migrants; 2) localization of the source of the gene flow; 3) determination of the scale of the flow, sex composition of the immigrant group, pattern and intensity of the genetic contacts between the migrant and aboriginal groups during the period of migration; 4) evaluation of the genetic legacy of the migrants in the region at later chronological stages. All these tasks together can be solved only seldom, mainly owing to the absence of the necessary number of skeletal specimens suitable for an analysis by paleogenetic methods. A comprehensive historical reconstruction requires information on the genetic structure of a series of groups of ancient populations, including those inhabiting the region before the hypothetical migratory event (in order to detect the change in the gene pool due to the migration), samples of the migration period (might include both migrants and aborigines), and the groups that emerged after the active phase of the migration had ended. Such a diachronic series of samples from a particular region makes possible the most informative analysis, leading to a reconstruction of the genetic history of the region, including the history of migrations.

In order to determine the source of migration, the genetic components associated with the immigrants should be compared with some specific fragments of the gene pool of the population potentially ancestral to the migrants. The circle of such source groups and regions can be substantially restricted based on the archaeological and anthropological knowledge regarding the direction of the ethnical and cultural contacts of studied populations. As paleogenetic data for many regions of Eurasia are scarce, such a comparative analysis employing the groups suggested by archaeologists or anthropologists requires a special study. Thus, a preliminary step is to compare new genetic data with samples and populations studied earlier. Such a "compelled" approach to sampling reference specimens, available but not necessarily relevant, often provokes skepticism of archaeologists and anthropologists towards the results obtained by paleogeneticists. These preliminary results, thus, imply verification and substantial refinement through consequent targeted additional research. As an example, the conclusion suggesting that some groups of the Yamnaya culture were the source of the genetic influence from the steppe nomads of Eastern Europe on the populations of the neighboring regions during the Early Bronze Age (Allentoft et al., 2015; Haak et al., 2015) can only be viewed as evidence of the impact from those nomads in a broader sense. This means that in fact other populations from the same area, genetically close to the Yamnaya people but not yet studied, might be the source population. A similar situation has arisen with the use of the Altaian Pazyryk culture and "classic" Scythians from the Northern Black Sea region as an "etalon" for the evaluation of the migratory influence of the early nomads from the eastern and western parts of the Eurasian Steppe Belt, respectively (Unterländer et al., 2017; Krzewińska et al., 2018). The problem with such an approach is that the early nomads from this area were extremely diverse.

In the situation of the scarcity of studied samples of ancient populations, the data on the gene pool of modern native groups, which are well studied in most regions, can be useful for a crude localization of the source of migration. The methods of phylogeny and phylogeography can help to arrive at some correct conclusions even with a diachronic comparison and to determine the role of ancient immigrants in the later genetic history of a region.

Many Eurasian areas are poorly studied from an archaeological point of view. Another complication hampering obtaining representative samples of specimens is the poor preservation of DNA in some climatic conditions: in Eurasia, genetic material is typically better preserved at higher rather than lower latitudes (excluding highland areas), while many key migratory events were taking place in the latter. Some successful (due to the development of methods) paleogenetic studies based on samples from such "unfavorable" areas were published, but in general, the misbalance in the representation of paleogenetic data between northern (temperate) and southern parts of Eurasia is expected to persist in the future.

When selecting specimens, it is crucial to include in the sample only those individuals whose association with the ancient population of interest is doubtless. Archaeological complexes with clear cultural attribution are found alongside questionable interments lacking dating inventory, even at the same burial site. Besides correct cultural attribution, direct dating of remains is becoming a standard for large-scale paleogenetic studies, in particular dealing with multilayer or syncretic sites.

The scarcity of studied paleogenetic data available for the reconstruction of migration events might be overcome via the development of statistical methods for incomplete sequences, and building respective models (see, e.g., (Loog et al., 2017)); vie careful

accounting for the results obtained by specialists of related disciplines, i.e. the use of several independent lines of evidence (Meiggs, Freiwald, 2018); and via deeper and more flexible analysis of the spectrum of genetic markers (Orlando et al., 2021).

Genetic markers for the study of migration events, strategies of genotyping and interpretation of the results

The structure of the gene pool of human populations acquires its specific features through the combined action of such factors as mutations, genetic drift, relative genetic isolation versus extensive genetic exchange with other groups, natural selection, bottlenecks (i.e. the periods of a rapid decrease followed by a rapid increase of population size), and founder effects. Immigrants bring the genetic components typical for the population of their origin to the gene pool of autochthonous groups. How difficult it is to detect a gene flow largely depends on the level of genetic differentiation between the migrant and aboriginal groups: the stronger are the differences, the easier the novel genetic components in the autochthonous population can be detected. As the pattern of genetic variation in Eurasia is mainly clinal, the following rule is generally held: the farther is the source of migration from its final point, the more genetically distinct are immigrants in respect to aboriginal groups. Another factor of a successful detection of the genetic consequences of a migration event is the quantity of migrants: the higher it is, the easier the influence of the incoming group can be detected. These two aspects are interrelated, i.e. the more genetically distinct the immigrants are in respect to the autochthons, the smaller-scale migrations might be traced via paleogenetic methods. The first examples of successful detection of ancient migrations are the advent of early agriculture in Europe from the Near East during the "Neolithic Revolution", and the most massive Bronze Age migrations (Allentoft et al., 2015; Haak et al., 2010; Pinhasi et al., 2012; Lazaridis, 2018).

The assessment of differences in the genetic structure of populations strongly depends on the genomic tools employed. Using modern paleogenetic techniques, both the spectrum of the molecular markers analyzed and the depth of the analysis of each of those markers can be variable. Methods of the polymerase chain reaction (PCR) make it possible to analyze the structure of only a relatively small number of markers for each sequence of ancient DNA (Pääbo et al., 2004). But the advent of the Next-Generation Sequencing (NGS), whereas a huge number of DNA fragments are read simultaneously, made the informative value of ancient DNA much closer to modern data. An analysis of a conventionally "full" genome of an ancient individual became possible (Stoneking, Krause, 2011; Veeramah, Hammer, 2014; Orlando et al., 2021). Thus, two strategies of paleogenetic research of the population gene pool can be discerned: analysis of single markers providing the highest phylogenetic and phylogeographic resolution (Underhill, Kivisild, 2007); and genotyping of numerous phylogenetically independent markers with a limited phylogenetic and phylogeographic value each, followed by a summary interpretation based on sophisticated mathematical models

Phylogenetically and phylogeographically informative loci as a tool for studying ancient human migrations

Phylogenetically informative are the markers for which a reconstruction of a complete genetic history, starting from the common ancestor and to the modern variety of structural variants, is possible. This history is typically visually represented in genetic studies in the form of phylogenetic trees. In order to be used for the reconstruction of migrations, such markers must be highly variable, and thus, phylogeographically informative. This means that the structural variants combined into a phylogenetic tree must have specific geographic distributions and differ in populations of various origin and locations.

Among the most phylogeographically and phylogenetically informative are the uniparental markers: mitochondrial DNA, passed only through the maternal line (Torroni et al., 2006), and the Non-recombining Region of Y-chromosome (NRY), which is only present in male genomes and passed through the paternal line (Underhill, Kivisild, 2007). The main features of these markers as paleogenetic tools for the reconstruction of ancient migrations, as well as advantages and disadvantages of the markers, have been outlined elsewhere (Torroni et al., 2006; Underhill, Kivisild, 2007; Kivisild, 2017). Importantly, owing to the high mutation rate and the absence of recombination, mtDNA and Y-chromosome greatly outperform single autosomal

nuclear phylogenetic markers from the point of view of the phylogeographic and phylogenetic resolution (Underhill, Kivisild, 2007; Jobling, Tyler-Smith, 2017). Comprehensive global phylogenetic trees reflecting the relationships between all the currently known structural variants, as well the classification of phylogenetic clusters, were built for mtDNA and Y-chromosome (Karafet et al., 2008; Oven, van, Kayser, 2009). In addition, a great amount of data on the structure of the gene pool of uniparental markers in modern human populations has been acquired. There is much less data regarding ancient groups of most regions though.

An important advantage of mtDNA and the Y-chromosome for studying ancient migrations is the opportunity to reconstruct their sex-specific patterns, e.g. to evaluate the proportion of males and females among immigrants and their relative involvement in the gene exchange with aborigines. The list of disadvantages includes a higher (as compared to the autosomal nuclear genome) susceptibility of uniparental markers to genetic drift, and a high mutation rate in mtDNA. Taken together, these features lead to independent emergence of the same structural variants, thus hampering the reconstruction of migrations that occurred more than several dozens of thousands of years ago (Underhill, Kivisild, 2007). Also, a much larger sample is required to reliably represent the mtDNA and the Y-chromosome diversity in a population as compared to a "whole-genome" analysis of autosomal markers (Veeramah, Hammer, 2014).

MtDNA. This is the first marker used for reconstruction of the genetic past of human populations, including the justification of African origins of the AMH (Cann, Stoneking, Wilson, 1987) and establishing the routes of his dispersal in Eurasia. The diversity of mtDNA markers was explored in the very first paleogenetic studies addressing the genetic structure of ancient populations (Pult et al., 1994). The methods have been developing from assessing the status of single loci and sequencing the most informative fragments to the analysis of whole mitochondrial genomes (mitogenomes) (Torroni et al., 2006; Underhill, Kivisild, 2007). Great amounts of data on the mtDNA variation in modern human populations were acquired, and its comprehensive global phylogeny was built before the advent of NGS.

Similar data were gradually obtained for ancient populations from various Eurasian regions as well. The first large-scale research of diachronic mtDNA samples was devoted to the European population (Pinhasi et al., 2012; Brandt et al., 2013) and the Bronze Age groups from the forest-steppe zone of Western Siberia (Molodin et al., 2012). The analysis of whole mitogenomes of ancient individuals has significantly simplified with the advent of the NGS techniques (Veeramah, Hammer, 2014). But the leading world laboratories have switched to the study of the nuclear genome, which has led to a decrease in the rate of targeted research of whole mitogenomes of ancient Eurasian populations. At present, the mitogenomes are commonly obtained as "byproducts" of some types of analysis of autosomal nuclear data. The number of these is typically insufficient for a comprehensive assessment of the structure of the mtDNA gene pool in a population. Thus, the great potential of exploring large-scale diachronic samples of mtDNA specimens remains unrealized for most regions of Eurasia.

Research of the interaction of *H. sapiens* with other hominins during his initial dispersal in Eurasia has clearly shown the specifics of mtDNA as a marker. The study of the Neanderthal mtDNA variation was not able to fully resolve the question of the participation of that species in the formation of the gene pool of modern humans: the high susceptibility of the haploid markers to the influence of stochastic factors, i.e. genetic drift, led to a complete absence of evidence of hybridization with Neanderthals in the modern human mitogenome. It is thus generally believed that the chronological resolution of mtDNA markers is insufficient for tracing such ancient genetic events. Based on the mtDNA data, it was only possible to suggest that if hybridization with Neanderthals even occurred, it had only a very limited effect on the modern gene pool (Serre et al., 2004). This notion was then confirmed by autosomal data. Later, a new hominin species—Denisovans—was discovered via an analysis of mtDNA (Krause et al., 2010). A new prospective trend in employing mtDNA for the reconstruction of the early stages of human history in Eurasia became the study of mitogenomes from cave sediments of the sites occupied by ancient hominins. An analysis of diachronic samples of such specimens from several caves permits tracing the periods of their occupation and the genetic turnover due to migrations, even for sites lacking skeletal material (Vernot et al., 2021).

Non-recombining region of the Y-chromosome (NRY). This region is also potentially one of the most phylogenetically informative loci in the human genome (Underhill, Kivisild, 2007; Kivisild, 2017).

The value of NRY is determined by the large length of the non-recombining region and the presence of two types of polymorphic sites: slowly evolving single nucleotide polymorphisms (SNP) and rapidly changing short tandem repeats (STR). The rich informative content of the Y-chromosome is also explained by the patrilocality of many human populations (Burton et al., 1996), which led to the long-term persistence of their phylogeographic structure according to the pattern of the male gene pool in Eurasia.

The study of the male gene pool variation in the modern human population has lagged behind as compared to mtDNA, due to the difficulties associated with the search for phylogenetically informative loci in the Y-chromosome (Karafet et al., 2008). A parallel analysis of the two types of polymorphisms permitted building a common phylogeny and a common classification of variants (based on SNPs), and assessing the diversity of the variants inside phylogenetic clusters, as well in gene pools of single populations (STR) (Ibid.; Underhill, Kivisild, 2007). The information about the diversity of structural variants in world-wide modern populations was collected, and the main routes of human dispersal in Eurasia were reconstructed. One of the factors stimulating collection of the data on the Y-chromosome is its validity for forensic science (Kayser, 2017). However, owing to the large length of NRY (unlike mtDNA), only a part of phylogenetically informative markers of the Y-chromosome were discovered before the advent of NGS. Even the researchers of modern populations have been dealing only with a part of the existing structural diversity of NRY. Only a very limited amount of data was obtained for the Y-chromosome in ancient populations of Eurasia, since its analysis by PCR-based methods is complicated and can be only carried out using specimens with relatively good DNA preservation (Kivisild, 2017). Using NGS, it is possible to substantially widen the Y-chromosome phylogeny for modern data through the detection of numerous previously unknown phylogenetically informative SNPs (Batini, Jobling, 2017; Poznik et al., 2016).

In general, owing to the absence of systematic research on the NRY variation in ancient samples because of the marker's features mentioned above, the accumulation of paleogenetic data for the Y-chromosome using NGS is progressing very slowly. The paleogenetic approaches widely employed at present—low-coverage sequencing of whole nuclear genomes, and the SNP-based whole-genome analysis of ancient individuals—provide only limited phylogenetic information regarding the Y-chromosome structure, and only for some specimens. The number of the latter is too low to obtain a representative population picture for the male gene pool. In this light, targeted research of the NRY variation, employing available PCR- and NGS-based methods, seems necessary. The development of deep sequencing of ancient Y-chromosomes is also important from the point of view of refining the phylogeny of clusters, which may not be presented in modern human populations. Thus, the potential of the study of NRY from ancient specimens for reconstructing migrations remains poorly realized at present.

Autosomal nuclear markers. Every individual has two copies of the autosomal part of the nuclear genome received from both parents, and contains the main part of the whole genetic information of an organism. Owing to recombination, autosomes are not a single phylogenetic marker but rather a system of such markers, each with its own independent evolutionary history. A phylogenetic tree can thus only be built for relatively short fragments of autosomal nuclear DNA, with a low probability of recombination that would have disrupted a continuous phylogeny. The structural diversity of single nuclear loci is much lower as compared to mt DNA and NRY (Veeramah, Hammer, 2014), which decreases their phylogenetic and phylogeographic resolution.

The autosomal nuclear genome, as a huge set of relatively independently evolving markers with their own share of phylogenetic information, is less susceptible to the influence of such factors as genetic drift. This means that even genetic events from the distant past have more chance of leaving traces in a population than mtDNA and the Y-chromosome (Ibid.). The signs of new genetic components received from migrants can persist in the nuclear genome of the descendants for a long time. While the structure of mtDNA and the Y-chromosome of an individual reflect his maternal and paternal genetic history only, the composition of the components of the autosomal nuclear genome represents the population genetic processes of multiple intersecting ancestral lineages. Therefore, even an individual nuclear genome is, to some extent, a reflection of the population history of the group to which the individual belongs. A consequence of this is that fewer specimens are required for evaluating the gene pool of a group as compared to studying mtDNA or NRY. The genetic heterogeneity of any human population must be taken into account as well. In order to obtain a

full representation of the genome, an analysis of a solid sample of genomes is essential. As a flux of immigrants leads to an increase in genetic diversity of a population, whereas individuals of different origins become members of the same group, the analysis of samples, rather than single specimens, is even more important at the genomic level when studying migrations.

Thus, numerous markers of the autosomal genome should be analyzed for reconstructing migration events. It was not possible via the PCR-based techniques even for modern DNA specimens. The development of NGS made a massive parallel analysis of a substantial number of autosomal markers, including whole-genome sequencing, possible for the first time (Ibid.). Unlike mtDNA and NRY, the autosomal markers from ancient specimens have been studied via NGS almost simultaneously with modern genomes. Parallel analyses of ancient and modern data have been carried out to compare the former with the population of various regions of Eurasia. While the employment of NGS had solved the problem of obtaining raw data, the analytic tools and interpretation of those massive results became an issue. Algorithms and software for assessing numerous parameters of the gene pool of a population have been developed (Sousa, Hey, 2013; Orlando et al., 2021). The tools suitable for comparing the genomic patterns between individuals and for discerning genetic components of various origins are particularly important for studying migrations (Patterson et al., 2012). Importantly, with a representative reference database at hand, such components can be detected both in a series of genomes from a population and in an individual genome.

The new avenues opened by the whole-genome analysis of autosomal markers are most evident in the case of reconstruction of the earliest stages of the dispersal of AMH: the use of whole-genome data led to a paradigm shift from the theory of a recent African origin of *H. sapiens* to the scenario including the hybridization of the African immigrants with late hominin species in Eurasia, at least with Neanderthals and Denisovans. These taxa, thus, are now believed to have participated in the formation of the gene pool of the modern population (Reich et al., 2010; Pääbo, 2015; Krause, Pääbo, 2016; Vernot, Pääbo, 2018). Recently, later migration events and their role in the history of the Eurasian (mainly European) population have been actively studied. Clearly, more or less representative whole-genome diachronic models of the gene pool of various regions of Europe have gradually emerged. The analysis of such models is, undoubtedly, the best tool for objective reconstruction of the genetic past of populations and the role which migrations have played in it (Aneli et al., 2021). The data for regions outside Europe begin to accumulate with some delay (Allentoft et al., 2015; Wang et al., 2021), though the representativeness of those samples in most studies leaves a lot to be desired and the detailization of reconstructions is limited. The issues related to the preservation of ancient nuclear DNA are still pressing: most of the results are based not on full genomes of a good quality but either on genomes of a very low coverage (Allentoft et al., 2015) or on large sets of SNPs spread throughout the nuclear genome. The tools for the statistical analysis and modeling the huge amounts of whole-genome data need further improvement. The full potential of this approach is yet to be explored.

Conclusions

Despite the rapid development of paleogenomic methods employed for the reconstruction of ancient migrations, we are now still at one of the earliest stages of the full exploration of the potential of these methods. This review shows that the advent of NGS triggered revolutionary progress of the technological facilities of paleogenetics. This changed the roles of different approaches to the reconstruction of both ancient migrations and the genetic history of human populations as a whole. No doubt, the tools of the whole-genome analysis of autosomal markers will hold the central position among the paleogenomic techniques, as those tools provide access to the main value of genomic data (Orlando et al., 2021). Besides this, comprehensive targeted research of the mtDNA and, especially, the Y-chromosome gene pools of ancient populations are promising, as the potential of these markers is still to be realized. Rapid accumulation of paleogenetic data for various Eurasian regions providing paleoanthropological material suitable for genetic analysis is to be expected. This, in turn, will lead to the formation of a kind of system of detailed population genetic coordinates reflecting the phylogeographic patterns not only of the modern population of the continent but of different ancient groups as well.

The most prospective way seems to be the study of non-contemporaneous groups combined in diachronic models reflecting the dynamics of the gene pool of a local population. The reconstruction of migrations based on such models would be the most objective.

A rapidly growing reference database of paleogenetic data from various Eurasian areas will be helpful in detailing the sources of migratory flows and their routes. Eliminating the disproportion between the amount of data available for Europe and other continents is also an important task. In this way, a full-scale transition from analyzing separate groups of paleogenetic samples for testing stand-alone hypotheses about the genetic past of populations to large-scale and systematic research of the genetic structure of ancient populations will occur. The most prospective approach in the field of the reconstruction of migrations would be the transition from approximate models of the most large-scale migration events to the refinement of such models, which will require much more detailed research of the local and territorial patterning of the gene pool in its temporal dynamics.

A substantial part of the skeletal data potentially available for the reconstruction of migrations and other aspects of the genetic history of the Eurasian population comes from non-contemporaneous archaeological sites in Russia. Russian specialists can make a significant contribution in the further study of the genetic past of the northern areas of Eurasia. This will be possible if the existing Russian centers of competence in the fields of paleogenetics and paleogenomics are being intensively developed, and if facilities for employing the whole cycle of paleogenetic research are created. To this end, the creation of depositories of archaeological skeletal collections studied by the methods of physical anthropology, archaeology, and molecular genetics must be intensified, and this will become a serious competitive advantage in the future.

Acknowledgements

This study was supported by the Russian Foundation for Basic Research (Project No. 20-19-50316) and the Russian Science Foundation (Project No. 17-78-20193).

References

Allentoft M.E., Sikora M., Sjogren K.G., Rasmussen S., Rasmussen M., Stenderup J., Damgaard P.B., Schroeder H., Ahlstrom T., Vinner L., Malaspinas A.S., Margaryan A., Higham T., Chivall D., Lynnerup N., Harvig L., Baron J., Della Casa P., Dąbrowski P., Duffy P.R., Ebel A.V., Epimakhov A., Frei K., Furmanek M., Gralak T., Gromov A., Gronkiewicz S., Grupe G., Hajdu T., Jarysz R., Khartanovich V., Khokhlov A., Kiss V., Kolar J., Kriiska A., Lasak I., Longhi C., McGlynn G., Merkevicius A., Merkyte I., Metspalu M., Mkrtchyan R., Moiseyev V., Paja L., Palfi G., Pokutta D., Pospieszny L., Price T.D., Saag L., Sablin M., Shishlina N., Smrcka V., Soenov V.I., Szeverenyi V., Toth G., Trifanova S.V., Varul L., Vicze M., Yepiskoposyan L., Zhitenev V., Orlando L., Sicheritz-Ponten T., Brunak S., Nielsen R., Kristiansen K., Willerslev E. 2015

Population genomics of Bronze Age Eurasia. *Nature*, vol. 522: 167–172.

Aneli S., Caldon M., Saupe T., Montinaro F., Pagani L. 2021

Through 40,000 years of human presence in Southern Europe: The Italian case study. *Human Genetics*, vol. 140 (10): 1417–1431.

Batini C., Jobling M.A. 2017

Detecting past male-mediated expansions using the Y chromosome. *Human Genetics*, vol. 136 (5): 547–557.

Brandt G., Haak W., Adler C.J., Roth C., Szécsényi-Nagy A., Karimnia S., Möller-Rieker S., Meller H., Ganslmeier R., Friederich S., Dresely V., Nicklisch N., Pickrell J.K., Sirocko F., Reich D., Cooper A., Alt K.W., Genographic Consortium. 2013

Ancient DNA reveals key stages in the formation of central European mitochondrial genetic diversity. *Science*, vol. 342 (6155): 257–261.

Burton M.L., Moore C.C., Whiting W.M., Romney A.K. 1996

Regions based on social structure. *Current Anthropology*, vol. 37: 87–123.

Cann R.L., Stoneking M., Wilson A.C. 1987

Mitochondrial DNA and human evolution. *Nature*, vol. 325 (6099): 31–36.

Haak W., Balanovsky O., Sanchez J.J., Koshel S., Zaporozhchenko V., Adler C.J., Der Sarkissian C.S., Brandt G., Schwarz C., Nicklisch N., Dresely V., Fritsch B., Balanovska E., Villems R., Meller H., Alt K.W., Cooper A., Members of the Genographic Consortium. 2010

Ancient DNA from European early neolithic farmers reveals their near eastern affinities. *PLoS Biology*, vol. 8 (11): 1–16.

Haak W., Lazaridis I., Patterson N., Rohland N., Mallick S., Llamas B., Brandt G., Nordenfelt S., Harney E., Stewardson K., Fu Q., Mittnik A., Bánffy E., Economou C., Francken M., Friederich S., Pena R.G., Hallgren F., Khartanovich V., Khokhlov A., Kunst M., Kuznetsov P., Meller H., Mochalov O., Moiseyev V., Nicklisch N., Pichler S.L., Risch R., Rojo Guerra M.A., Roth C., Szécsényi-Nagy A., Wahl J., Meyer M., Krause J., Brown D., Anthony D., Cooper A., Alt K.W., Reich D. 2015

Massive migration from the steppe was a source for Indo-European languages in Europe. *Nature*, vol. 522: 207–211.

Jobling M.A., Tyler-Smith C. 2003

The human Y chromosome: An evolutionary marker comes of age. *Nature Reviews Genetics*, vol. 4 (8): 598–612.

Jobling M.A., Tyler-Smith C. 2017

Human Y-chromosome variation in the genome-sequencing era. *Nature Reviews Genetics*, vol. 18 (8): 485–497.

Karafet T.M., Mendez F.L., Meilerman M.B., Underhill P.A., Zegura S.L., Hammer M.F. 2008
New binary polymorphisms reshape and increase resolution of the human Y chromosomal haplogroup tree. *Genome Research*, vol. 18 (5): 830–838.

Kayser M. 2017
Forensic use of Y-chromosome DNA: A general overview. *Human Genetics*, vol. 136 (5): 621–635.

Kivisild T. 2017
The study of human Y chromosome variation through ancient DNA. *Human Genetics*, vol. 136 (5): 529–546.

Krause J., Fu Q., Good J.M., Viola B., Shunkov M.V., Derevianko A.P., Pääbo S. 2010
The complete mitochondrial DNA genome of an unknown hominin from southern Siberia. *Nature*, vol. 464 (7290): 894–897.

Krause J., Pääbo S. 2016
Genetic time travel. *Genetics*, vol. 203: 9–12.

Krzewińska M., Kılınç G.M., Juras A., Koptekin D., Chyleński M., Nikitin A.G., Shcherbakov N., Shuteleva I., Leonova T., Kraeva L., Sungatov F.A., Sultanova A.N., Potekhina I., Łukasik S., Krenz-Niedbała M., Dalén L., Sinika V., Jakobsson M., Storå J., Götherström A. 2018
Ancient genomes suggest the eastern Pontic-Caspian steppe as the source of western Iron Age nomads. *Science Advances*, vol. 4 (10): 1–12.

Lazaridis I. 2018
The evolutionary history of human populations of Europe. *Current Opinion in Genetics and Development*, vol. 53: 21–27.

Liu Y., Mao X., Krause J., Fu Q. 2021
Insights into human history from the first decade of ancient human genomics. *Science*, vol. 373: 1479–1484.

Loog L., Lahr M.M., Kovacevic M., Manica A., Eriksson A., Thomas M.G. 2017
Estimating mobility using sparse data: Application to human genetic variation. *Proceedings of the National Academy of Sciences*, vol. 114 (46): 12213–12218.

Meiggs D.C., Freiwald C. 2018
Human migration: Bioarchaeological approaches. In *Encyclopedia of Global Archaeology*, C. Smith (ed.). New York: Springer, pp. 3538–3545.

Molodin V.I., Pilipenko A.S., Romaschenko A.G., Zhuravlev A.A., Trapezov R.O., Chikisheva T.A., Pozdnyakov D.V. 2012
Human migrations in the southern region of the West Siberian Plain during the Bronze Age: Archaeological, palaeogenetic and anthropological data. In *Population Dynamics in Prehistory and Early History: New Approaches Using Stable Isotopes and Genetics*, E. Kaiser, J. Burger, W. Schier (eds.). Berlin: De Gruyter, pp. 95–113.

Orlando L., Allaby R., Skoglund P., Sarkissian C., Stockhammer P.W., Avila-Arcos M.C., Fu Q., Krause J., Willerslev E., Stone A.C., Warriner C. 2021
Ancient DNA analysis. *Nature Reviews Methods Primers*, vol. 1.

Oven M., van, Kayser M. 2009
Updated comprehensive phylogenetic tree of global human mitochondrial DNA variation. *Human Mutation*, vol. 30 (2): 386–394.

Pääbo S. 2015
The diverse origins of the human gene pool. *Nature Reviews Genetics*, vol. 16: 313–314.

Pääbo S., Poinar H., Serre D., Jaenicke-Despres V., Hebler J., Rohland N., Kuch M., Krause J., Vigilant L., Hofreiter M. 2004
Genetic analyses from ancient DNA. *Annual Review of Genetics*, vol. 38: 645–679.

Patterson N., Moorjani P., Luo Y., Mallick S., Rohland N., Zhan Y., Genschoreck T., Webster T., Reich D. 2012
Ancient admixture in human history. *Genetics*, vol. 192 (3): 1065–1093.

Pinhasi R., Thomas M.G., Hofreiter M., Currat M., Burger J. 2012
The genetic history of Europeans. *Trends in Genetics*, vol. 28 (10): 496–505.

Poznik G.D., Xue Y., Mendez F.L., Willems T.F., Massaia A., Wilson Sayres M.A., Ayub Q., McCarthy S.A., Narechania A., Kashin S., Chen Y., Banerjee R., Rodriguez-Flores J.L., Cerezo M., Shao H., Gymrek M., Malhotra A., Louzada S., Desalle R., Ritchie G.R., Cerveira E., Fitzgerald T.W., Garrison E., Marcketta A., Mittelman D., Romanovitch M., Zhang C., Zheng-Bradley X., Abecasis G.R., McCarroll S.A., Flicek P., Underhill P.A., Coin L., Zerbino D.R., Yang F., Lee C., Clarke L., Auton A., Erlich Y., Handsaker R.E., 1000 Genomes Project Consortium, Bustamante C.D., Tyler-Smith C. 2016
Punctuated bursts in human male demography inferred from 1,244 worldwide Y-chromosome sequences. *Nature Genetics*, vol. 48 (6): 593–599.

Pult I., Sajantila A., Simanainen J., Georgiev O., Schaffner W., Pääbo S. 1994
Mitochondrial DNA sequences from Switzerland reveal striking homogeneity of European populations. *Biological Chemistry Hoppe-Seyler*, vol. 375 (12): 837–840.

Reich D., Green R.E., Kircher M., Krause J., Patterson N., Durand E.Y., Viola B., Briggs A.W., Stenzel U., Johnson P.L., Maricic T., Good J.M., Marques-Bonet T., Alkan C., Fu Q., Mallick S., Li H., Meyer M., Eichler E.E., Stoneking M., Richards M., Talamo S., Shunkov M.V., Derevianko A.P., Hublin J.J., Kelso J., Slatkin M., Pääbo S. 2010
Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature*, vol. 468 (7327): 1053–1060.

Serre D., Langaney A., Chech M., Teschler-Nicola M., Paunovic M., Mennecier P., Hofreiter M., Possnert G., Pääbo S. 2004
No evidence of Neandertal mtDNA contribution to early modern humans. *PLoS Biology*, vol. 2 (3): 313–317.

Sousa V., Hey J. 2013
Understanding the origin of species with genome-scale data: Modelling gene flow. *Nature Reviews Genetics*, vol. 14 (6): 404–414.

Stoneking M., Krause J. 2011
Learning about human population history from ancient and modern genomes. *Nature Reviews Genetics*, vol. 12: 603–614.

Torroni A., Achilli A., Macaulay V., Richards M., Bandelt H.J. 2006

Harvesting the fruit of the human mtDNA tree. *Trends in Genetics*, vol. 22: 339–345.

Underhill P.A., Kivisild T. 2007

Use of Y chromosome and mitochondrial DNA population structure in tracing human migrations. *Annual Reviews of Genetics*, vol. 41: 539–564.

Unterländer M., Palstra F., Lazaridis I., Pilipenko A., Hofmanová Z., Groß M., Sell C., Blöcher J., Kirsanow K., Rohland N., Rieger B., Kaiser E., Schier W., Pozdniakov D., Khokhlov A., Georges M., Wilde S., Powell A., Heyer E., Currat M., Reich D., Samashev Z., Parzinger H., Molodin V.I., Burger J. 2017

Ancestry and demography and descendants of Iron Age nomads of the Eurasian Steppe. *Nature Communications*, vol. 8.

Veeramah K.R., Hammer M.F. 2014

The impact of whole-genome sequencing on the reconstruction of human population history. *Nature Reviews Genetics*, vol. 15 (3): 149–162.

Vernot B., Pääbo S. 2018

The predecessors within. *Cell*, vol. 173: 6–7.

Vernot B., Zavala E.I., Gómez-Olivencia A., Jacobs Z., Slon V., Mafessoni F., Romagné F., Pearson A., Petr M., Sala N., Pablos A., Aranburu A., de Castro J.M.B., Carbonell E., Li B., Krajcarz M.T., Krivoshapkin A.I., Kolobova K.A., Kozlikin M.B., Shunkov M.V., Derevianko A.P., Viola B., Grote S., Essel E., Herráez D.L., Nagel S., Nickel B., Richter J., Schmidt A., Peter B., Kelso J., Roberts R.G., Arsuaga J.L., Meyer M. 2021

Unearthing Neanderthal population history using nuclear and mitochondrial DNA from cave sediments. *Science*, vol. 372 (6542).

Wang T., Wang W., Xie G., Li Z., Fan X., Yang Q., Wu X., Cao P., Liu Y., Yang R., Liu F., Dai Q., Feng X., Wu X., Qin L., Li F., Ping W., Zhang L., Zhang M., Liu Y., Chen X., Zhang D., Zhou Z., Wu Y., Shafiey H., Gao X., Curnoe D., Mao X., Bennett E.A., Ji X., Yang M.A., Fu Q. 2021

Human population history at the crossroads of East and Southeast Asia since 11,000 years ago. *Cell*, vol. 184 (14): 3829–3841.

Received April 15, 2022.

doi:10.17746/1563-0110.2022.50.2.150-156

Lee Hyejin[1, 2], Hong Jong Ha[3], S.M. Slepchenko[4], and Shin Dong Hoon[1]

[1]Seoul National University,
103, Daehak-ro, Jongno-gu, Seoul, 03080, South Korea
E-mail: chloe110720@gmail.com; cuteminjae@gmail.com
[2]Ministry of National Defense Agency of KIA Recovery & Identification,
250 Hyunchung-no, Dongjak-gu, Seoul, 06984, South Korea
[3]Institute of Korean Archaeology and Ancient History,
Kyung Hee University,
26 Kyungheedae-ro, Dongdaemun-gu, Seoul, 02447, South Korea
E-mail: archaev@gmail.com
[4]Institute of Northern Development, Tyumen Scientific Center,
Siberian Branch, Russian Academy of Sciences,
Malygina 86, Tyumen, 625026, Russia
E-mail: s_slepchenko@list.ru

Porotic Hyperostosis Observed in the 16th to 19th Century Crania of Native Siberians, Russian Settlers, and Joseon Dynasty Koreans

Porotic hyperostosis (PH) is the skeletal marker used in the estimation of physiological stress suffered in childhood. Despite a conventional hypothesis that mankind's health conditions declined with the advent of agriculture, there are few reports comparing the PH seen on ancient crania of hunters-fishermen-gatherers and agrarian peoples. In this study, we examined the crania of 16th to 19th century Eurasian peoples: Siberian natives (hunters-fishermen-gatherers), Russian settlers, and Joseon Koreans (agriculturalists) to see whether PH could be observed to differ between populations with varying subsistence strategies. The prevalence of PH decreased in the order of Joseon people (18.9 %), Russian settlers (6.3 %), and Siberian natives (3.8 %). In brief, the hunters-fishermen-gatherers' stress level was lower than agriculture-based Joseon people and Russian settlers. In addition, Joseon people might have been exposed to more serious stressful episodes than Russian settlers were. We assume that the former might have lived under much stressful conditions than the latter did, though both people depended on intense agriculture. As for sexual dimorphism of PH: in all groups, males were identified with more PH signs than females were. Our report successfully shows that the detailed pattern of stress markers might have been influenced by complex interactions between various factors that existed under different conditions in history.

Keywords: *Porotic hyperostosis, Korea, Siberia, hunters-fishermen-gatherers, agriculturalists, crania.*

Introduction

Porotic hyperostosis (PH), small perforations on the surface of cranial bones, is regarded as an osteological indicator that is useful for the assessment of physiological stress suffered in childhood (Ortner, Putschar, 1981: 259–260; Goodman et al., 1988; Lewis, Roberts, 1997; Larsen, 1997; Novak, Slaus, 2010; Wheeler, 2012). Although PH is not an indicator of any specific diseases, its prevalence provides valuable information about

the health and nutritional status of different human populations (Huss-Ashmore, Goodman, Armelagos, 1982; Larsen, 1997: 32–33; Salvadei, Ricci, Manzi, 2001; Temple, 2010).

For a long while, researchers have wondered whether stress indicators changed with the transition of various social factors in history (Gleń-Haduch, 1995; Krenz-Niedbała, 2014: 116). For example, Kyle et al. (2020) proved that physiological stress increased with the social turmoil caused by urbanization in Albanian history. In this study, they observed increased osteological manifestations of physiological stress, possibly caused by social unrest spanning between prehistoric and historic periods (Ibid.). Judging from previous anthropological reports, stress markers are revealed to have changed during a transition from foragers to farming societies in history. In brief, hunters-fishermen-gatherers might have been healthier than agriculturalists, because the former were affected only by seasonal or periodic stresses while the latter were plagued by severe, chronic, and perennial stresses (Cohen, Armelagos, 1984: 68; Bocquet-Appel, Bar-Yosef, 2008: 505). That scenario is accepted nowadays by most academia, who presume that people's physiological stress increased rather than decreased with the advent of agriculture in mankind's history.

Nevertheless, some scholars still reported a different story concerning the changes in stress markers around the emergence of agricultural society. For example, Lopez and Godde (2019) identified no evident difference in PH prevalence between the ancient Egyptian crania of foragers and agriculturalists. Furthermore, as for Jomon foragers and Yayoi agriculturalists, stress marker (e.g., cribra orbitalia) prevalence was not remarkably different between them (Temple, 2010). Ancient Southeast Asia also showed similar patterns. Briefly, the prevalences of stress markers in mid-Holocene foragers and Bronze–Iron Age agriculturalists in Vietnam were not different from each other. In historic Thailand, foragers' physiological stress could have been even higher than agriculturalists' (Pietrusewsky, Douglas, 2002: 171–173; Oxenham, 2006). This means that the detailed pattern of PH between foragers and farmers differs depending on various spatiotemporal conditions in which each group existed.

In this regard, our research on historic Eurasian peoples is meaningful. In brief, Siberian natives, Russian settlers, and Joseon Koreans lived in the 16th to 19th century Eurasian continent, as hunters-fishermen-gatherers or agriculturalists with different subsistence strategies. To see whether physiological stress could be observed to differ between each forager and farmer group in history, we tried to examine PH, one of the physiological stress markers, in skeletons from each Eurasian group.

Materials and methods

We examined the skeletons of three different Eurasian populations of the 16th to 19th century. Total number of crania was 222 (103 male, 119 female). For those skeletons, age and sex were estimated using the standard methods of Buikstra and Ubelaker (1994). All individuals were grouped into different age categories: adolescents and young adults (15–34 years), middle adults (35–49 years), and old adults (over 50 years) (Lee et al., 2019). The homogeneities in the proportions of age and sex across each group was tested by Pearson's Chi-squared test (χ^2).

In this study, the Siberian natives were 16th to 19th century hunter-gatherers. Their skeletons (n=53; 23 males, 30 females) had originated from Siberian Tatars (Krasnoyarsk archaeological complex of the Ust-Ishim region, dated to the 9th to 18th centuries, n=34), Khanty (Alym burial ground, belongs to the presumably indigenous (Khanty) population of the second half of the 18th to early 19th centuries, n=7), and Nenets (Vesakoyacha II–IV and Nyamboito I burial grounds, n=12) peoples (Fig. 1). Siberian Tatars were pastoralists, fishermen, and hunters (Slepchenko, 2017). Khanty were hunters and fishermen in tundra and taiga zones

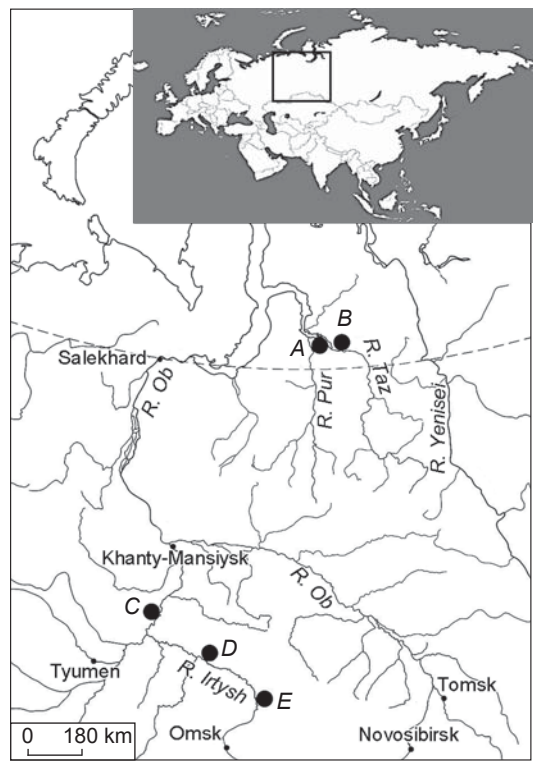


Fig. 1. The locations of archaeological sites in Siberia from which the analyzed series of crania originate: Nenets (A, B), Khanty (C), Siberian Tatars (D), and Russian settlers (E).

(Perevalova, 2004: 252–275). And Nenets were hunters, fishermen, and reindeer-herders who lived in the Arctic Circle (Slepchenko, Tsybankov, Slavinsky, 2016). These osteological collections are currently kept at the Institute of Northern Development SB RAS (Tyumen, Russia) (Lee et al., 2019).

The Russian settlers' crania consist of 79 individuals (32 males and 47 females). They were wheat-cultivation farmers who migrated from Northern or Central Russia, as well as Eastern Europe (Tataurova, 2010: 20). The archaeological excavation around the Irtysh River discovered a Russian settlers' cemetery, next to the Izyuk village built in 1648. Their crania are curated in the Institute of Northern Development SB RAS (Lee et al., 2019).

The Joseon skeletons of the 16th to 18th centuries consist of 90 individuals (48 males and 42 females). We collected the skeletons from Joseon graves of a particular type that were found at archaeological sites in South Korea. This kind of grave was first introduced in Korea in the late 15th century, then rapidly became the prototype favored by the officials and nobles in the 16th century, and was also used by middle-class people in the 17th and 18th century (Shin et al., 2008, 2012, 2021). The buried individuals had evidently been engaged in rice-cultivation. The Joseon skeletal series are currently maintained at Seoul National University College of Medicine (South Korea).

PH on parietal and occipital parts of crania were evaluated macroscopically. Slight or severe pitting forms of PH were observed in the crania, as described by Steckel et al. (2006: 13–14). However, it was recorded as *present* or *absent* categories for statistical analysis. We used package R (R Core Team, 2017) for statistical analysis in this study. PH prevalence of each group was compared by Pearson's Chi-squared test (χ^2). In cases where that sample size was less than 10, Fisher's exact test was applied to compare prevalence. We used the package ggplot2 implemented in R version 4.1.1 (R Foundation for Statistical Computing, Vienna, Austria) to draw a chart (Wickham, 2009: 20).

Results

The proportions of age in Siberian natives, Russian settlers, and Joseon people were not different (Table 1). The p-values were as follows: 0.3225 for Siberian natives-Russian settlers, 0.217 for Russian settlers-Joseon people (χ^2 test); 0.1507 for Siberian natives-Joseon people (Fisher's test). Likewise, homogeneity in sex proportions could be also confirmed by statistics (χ^2 test): 0.1013 for Siberian Natives-Russian settlers, 0.3297 for Siberian Natives-Joseon people, 0.5157 for Russian Settlers-Joseon people.

In this study, the prevalence of PH decreased in the order of Joseon people (18.9 %), Russian settlers (6.3 %), and Siberian natives (3.8 %) (Table 2; Fig. 2). The difference in PH between Joseon people and Russian settlers (p = 0.02839), as well as between Joseon people and Siberian natives (p = 0.02051), was statistically confirmed. However, the difference between Russian settlers and Siberian natives was not statistically significant (p = 0.7013).

We also compared PH prevalence of each group by sex. Among Siberian natives, PH was found only in two male crania (Fisher's exact test, p = 0.1836). Two other samples showed a similar situation: Russian settlers exhibited 12.5 % of males and 2.1 % of females (Fisher's exact test, p = 0.152). In Joseon people's crania, PH were found in 22.9 % of male skulls and 14.3 % of female skulls (χ^2 test, p = 0.4391). Thus, the PH prevalence of

Table 1. **Proportion of age in the samples under study**

Age group	Siberian natives	Russian settlers	Joseon people	Total
Young adult	33	39	42	114
Middle adult	16	26	37	79
Old adult	4	14	11	29
Total	53	79	90	222

Table 2. **Prevalence of porotic hyperostosis in the samples**

Populations	Male			Female			Male +Female		
	Total (n)	Affected (n)	Frequency (%)	Total (n)	Affected (n)	Frequency (%)	Total (n)	Affected (n)	Frequency (%)
Siberia natives	23	2	8.7	30	0	0.0	53	2	3.8
Russian settler	32	4	12.5	47	1	2.1	79	5	6.3
Joseon people	48	11	22.9	42	6	14.3	90	17	18.9

males was generally higher than that of females in all the groups we examined (Fig. 2), though the differences could not be successfully proven by statistics.

The distribution by age cohorts shows that the PH prevalence generally decreases as age increases (Table 3). This phenomenon is particularly noticeable in old age-groups of Siberian natives and Russian settlers, in whose crania we could not find any signs of PH. However, in the case of the Joseon people, we note that the tendency of the PH to decrease with age was very weak.

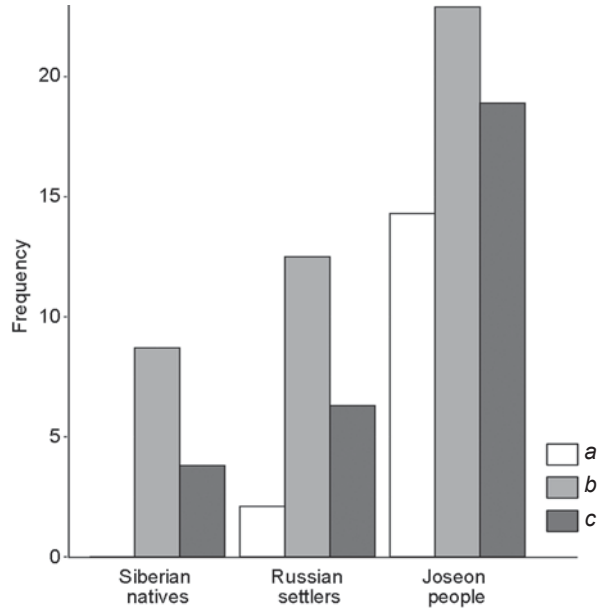


Fig. 2. The analysis of PH rates in the groups under study. *a* – females, *b* – males, *c* – total.

Discussion

Previous studies presumed that the health status of prehistoric hunters-fishermen-gatherers was historically better than that of agriculturalists (Goodman, Armelagos, Rose, 1980; Latham, 2013). On the other hand, many researchers have also presented conflicting views on the same subject. For example, in Ancient Egypt, a population increase induced the Neolithic Revolution, for which nomadic hunters-fishermen-gatherers groups gradually selected agriculture as their main subsistence strategy. When Lopez and Godde (2019) tried to test the PH of ancient Egyptian crania across time, statistical outcomes indicated no difference in prevalence between the pre- and post-agricultural Egyptians in history. In a sense, the historical pattern of stress markers could not be easily expected or interpreted for many of mankind's groups that have existed in history.

In this study on foragers and agriculturalists in 16th to 19th century Eurasia continent, our results were more like those of Goodman et al. (1980) and Latham (2013). Briefly, the prevalence of PH in hunters-fishermen-gatherers (Siberian natives) was lower than that of agriculture-based Joseon people and Russian settlers. Judging from PH, Siberian natives might have been less stressed than agriculturalist Russian settlers or Joseon people. As hypothesized by Cohen and Armelagos (1984: 68) or Bocquet-Appel and Bar-Yosef (2008: 505), agriculture-based peoples in Russia and Korea might have been plagued with more chronic and perennial stresses than foragers were. With sedentism and subsequent growth of population, the agricultural population might have experienced increased risk of infections, as well as a decline in nutritional intake, particularly on their infants or children (Cohen, Armelagos, 1984: 67; Armelagos, Goodman, 1991). This might explain in part why the Russian settlers and Joseon people of the 16th to 19th century showed higher prevalence of PH than Siberian natives.

As for the Joseon people, we also assume that they might have lived under much more stressful conditions than Russian settlers. Unlike Joseon people, Russians at that time did not rely solely on agriculture, but also engaged in more diverse economic activities. By hunting and fishing activities in Siberia, Russians seem to have been able to eat much richer food than Joseon people. Russians could have lived in less stressful conditions, which seems to be due to the abundance of natural products and lower population density in Siberia (Korona, Tataurova, 2011; Bondarev, Tataurova, Tataurov, 2020).

On the other hand, in Korean history, the 16th to 19th century was specifically a turbulent era, during which the Joseon people were involved in major

Table 3. **Prevalence of the individuals with porotic hyperostosis by age**

Age group	Siberian natives			Russian settlers			Joseon people		
	Total (n)	Affected (n)	Frequency (%)	Total (n)	Affected (n)	Frequency (%)	Total (n)	Affected (n)	Frequency (%)
Young adult	33	2	6.1	39	3	7.7	42	8	19.0
Middle adult	16	0	0.0	26	2	7.7	37	7	18.9
Old adult	4	0	0.0	14	0	0.0	11	2	18.2
Total	53	2	3.8	79	5	6.3	90	17	18.9

socioeconomic changes (Shin et al., 2018). In brief, farmers cleared slash-and-burn fields in every corner of the mountains; therefore, there were no lands that had not been utilized for farming. Since the population soared, the Joseon people came to live in highly populated villages and cities, thus more easily suffering from physiological stresses than ever (Ibid.). Those historical incidents may not have been limited only to Joseon Koreans, but have been also the cases for other East Asian countries such as Japan and China (Kim et al., 2014). In a sense, notwithstanding physiological stress-inducing environments, social changes in 16th to 19th century appear to have been a necessary evil for the East Asian peoples (Shin et al., 2018).

The results of PH rates analyzed by age factor is also significant for understanding the detailed status of physiological stress among Joseon people. Different from Siberian natives and Russian settlers, the tendency of PH prevalence to decrease with age was very weakly observed in Joseon people's crania. In fact, while PH was not found in older groups of Siberian natives and Russian settlers, difference in PH incidence according to age-groups was not observed among the Joseon people's group. In previous studies, while higher frequencies of stress markers could be observed in young age group, many of them were also healed after then on; therefore, fewer stress signs could be detected in old age groups (Hengen, 1971; Liebe-Harkort, 2012; Møller-Christensen, Sandison, 1963; Salvadei, Ricci, Manzi, 2001; Stuart-Macadam, 1985; Toso et al., 2019). In a sense, high PH incidence in older group of Joseon people means that the stress situation was not improved to the extent that PH could not be healed even after their youth.

We can also mention about PH from the perspective of sexual dimorphism. In related reports so far, a stress marker like cribra orbitalia was observed more frequently in females than in males, possibly caused by anemia due to menstruation, pregnancy, and childbirth (Armelagos, Goodman, 1991; Cohen, Armelagos, 1984: 31; Cybulski, 1977; Hengen, 1971), or cultural factors such as nutritional care-giving for a baby (Guatelli-Steinberg, Lukacs, 1999; Goodman et al., 1987; May, Goodman, Meindl, 1993). However, the contradictory phenomena were also reported for another stress marker (linear enamel hypoplasia): higher frequency in males than in females (May, Goodman, Meindl, 1993; Palubeckaite, Jankauskas, Boldsen, 2002; Hoyenga K.B., Hoyenga K.T., 1982; Guatelli-Steinberg, Lukacs, 1999). In addition, there were also reports for no significant sexual dimorphism in stress marker prevalence: in skeletons of prehistoric and historic Anasazi Indians (El-Najjar et al., 1976), California Indian population (Walker, 1986), and Neolithic human populations in Poland (Krenz-Niedbała, 2014). Lopez and Godde (2019) also identified no differences of PH prevalence across sex in ancient Egyptian crania.

In this study, when we compared PH prevalence by sex, males' prevalence was higher than females' in all groups we studied. From the perspective of stress markers, our data are similar to the results of Hoyenga and Hoyenga (1982), May et al. (1993), Guatelli-Steinberg and Lukacs (1999), and Palubeckaite et al. (2002). We presume that the detailed pattern of sexual dimorphism for stress markers might have been influenced by complex interactions of various factors under different spatiotemporal conditions in history. However, since statistical analysis of our data could not be obviously significant, such a trend of sexual dimorphism should be confirmed by more forthcoming studies on similar cases in the Eurasian continent.

Conclusions

A hypothesis that the human health condition declined with the advent of agriculture is generally accepted by academia. However, there are not sufficient reports on the physiological stress of hunters-fishermen-gatherers and agrarian people in history, especially by comparing PH visible on their crania. In this study, we can confirm the hypothesis by revealing the PH prevalence of Siberian natives (3.8 %), Russian settlers (6.3 %), and Joseon-period Korean people (18.9 %). We also assume that among agriculturalists, Joseon people of East Asia were exposed to more serious stressful episodes than Russian settlers in Siberia. As for sexual dimorphism of PH, we realized that males were identified with more PH signs than females; but more research is still needed to confirm it.

Acknowledgements

This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2020R1A2C1010708) and Korea Ministry of Education (NRF-2019S1A5C2A01083578). Author contributions are as follows. Conceptualization, design of study, and correspondence: Shin Dong Hoon and S.M. Slepchenko; anthropological data analysis and statistical analysis: Lee Hyejin and Hong Jong Ha.

References

Armelagos G.J., Goodman A.H. 1991

The concept of stress and its relevance to studies of adaptation in prehistoric populations. *Collegium Antropologicum*, vol. 15 (1): 45–58.

Bocquet-Appel J.-P., Bar-Yosef O. 2008

The Neolithic Demographic Transition and its Consequences. Dordrecht: Springer.

Bondarev A.A., Tataurova L.V., Tataurov S.F. 2020
Zhivotnovodstvo i okhota v ekonomike russkikh Tarskogo Priirtyshya: Opyt sravnitelnogo issledovaniya goroda i derevni. In *Ekologiya drevnikh i traditsionnykh obshchestv*. Tyumen: Tyum. nauch. tsentr SO RAN, pp. 292–295.

Buikstra J., Ubelaker D. 1994
Standards for data collection from human skeletal remains: Proceedings of a seminar at the Field Museum of Natural History. Fayetteville: Arkansas Archaeological Survey Press. (Arkansas Archaeological Survey Research Ser.; No. 44).

Cohen M.N., Armelagos G.J. 1984
Paleopathology at the Origins of Agriculture. Orlando: Academic Press.

Cybulski J.S. 1977
Cribra Orbitalia, a possible sign of anemia in early historic native populations of the British Columbia Coast. *American Journal of Physical Anthropology*, vol. 47 (1): 31–39.

El-Najjar M.Y., Ryan D.J., Turner C.G., Lozoff B. 1976
The etiology of porotic hyperostosis among prehistoric and historic Anasazi Indians of southwestern United States. *American Journal of Physical Anthropology*, vol. 44 (3): 477–487.

Gleń-Haduch E. 1995
Ocena stanu biologicznego populacji neolitycznych i wczesnobrązowych z Wyżyny Małopolskiej. *Zeszyty Naukowe Uniwersytetu Jagiellońskiego*, vol. 41: 115–139.

Goodman A.H., Allen L.H., Hernandez G.P., Amador A., Arriola L.V., Chavez A., Pelto G.H. 1987
Prevalence and age of development of enamel hypoplasias in Mexican children. *American Journal of Physical Anthropology*, vol. 72 (1): 7–20.

Goodman A.H., Armelagos G.J., Rose J.C. 1980
Enamel hypoplasias as indicators of stress in three prehistoric populations from Illinois. *Human Biology*, vol. 52 (3): 515–528.

Goodman A.H., Brooke-Thomas R., Swedlund A.C., Armelagos G.J. 1988
Biocultural perspectives on stress in prehistoric, historical and contemporary population research. *Yearbook of Physical Anthropology*, vol. 31: 169–202.

Guatelli-Steinberg D., Lukacs J.R. 1999
Interpreting sex differences in enamel hypoplasia in human and non-human primates: Developmental, environmental, and cultural considerations. *Yearbook of Physical Anthropology*, vol. 110: 73–126.

Hengen O.P. 1971
Cribra orbitalia: Pathogenesis and probable etiology. *Homo*, vol. 22: 57–75.

Hoyenga K.B., Hoyenga, K.T. 1982
Gender and energy balance: Sex differences in adaptations for feast and famine. *Physiology & Behavior*, vol. 28 (3): 545–563.

Huss-Ashmore R., Goodman A.H., Armelagos G.J. 1982
Nutritional inference from paleopathology. In *Advances in Archaeological Method and Theory*, M.B. Schiffer (ed.). New York: Academic Press, pp. 395–474.

Kim M.J., Ki H.C., Kim S., Chai J.Y., Seo M., Oh C.S., Shin D.H. 2014
Parasitic infection patterns as correlated with urban-rural recycling of night soils in Korea and other East Asian countries: The archaeological and historical evidence. *Korean Studies*, vol. 38: 51–74.

Korona O.M., Tataurova L.V. 2011
Khozyaystvennaya deyatelnost naseleniya russkikh pamyatnikov Omskogo Priirtyshya po karpologicheskim dannym. In *Kultura russkikh v arkheologicheskikh issledovaniyakh: Mezhdistsiplinarnye metody i tekhnologii*. Omsk: Om. Inst. (fil.) RGTEU, pp. 323–333.

Krenz-Niedbała M. 2014
A biocultural perspective on the transition to agriculture in Central Europe. *Anthropologie*, vol. 52 (2): 115–132.

Kyle B., Shehi E., Koçi M., Reitsema L.J. 2020
Bioarchaeological reconstruction of physiological stress during social transition in Albania. *International Journal of Paleopathology*, vol. 30: 118–129.

Larsen C.S. 1997
Bioarchaeology: Interpreting Behavior from the Human Skeleton. Cambridge: Cambridge Univ. Press.

Larsen C.S., Sering L. 2000
Inferring iron deficiency anemia from human skeletal remains: The case of the Georgia Bight. In *Bioarchaeological Studies in Life in the Age of Agriculture*, P. Lambert (ed.). Tuscaloosa: Univ. of Alabama Press, pp. 116–133.

Latham K.J. 2013
Human health and the Neolithic revolution: An overview of impacts of the agricultural transition on oral health, epidemiology, and the human body. *Nebraska Anthropologist*, vol. 28: 95–102.

Lee H., Hong J.H., Hong Y., Shin D.H., Slepchenko S. 2019
Caries, antemortem tooth loss and tooth wear observed in indigenous peoples and Russian settlers of 16th to 19th century West Siberia. *Archives of Oral Biology*, vol. 98: 176–181.

Lewis M., Robert C. 1997
Growing pains: The interpretation of stress indicators. *International Journal of Osteoarchaeology*, vol. 7: 581–586.

Liebe-Harkort C. 2012
Cribra orbitalia, sinusitis and linear enamel hypoplasia in Swedish Roman Iron Age adults and subadults. *International Journal of Osteoarchaeology*, vol. 22: 387–397.

Lopez K.A., Godde K. 2019
Ancient Egyptian health: The prevalence of anemia at the origins of agriculture and state level society. *Homo*, vol. 70 (3): 217–224.

May R.L., Goodman A.H., Meindl R.S. 1993
Response of bone and enamel formation to nutritional supplementation and morbidity among malnourished Guatemalan children. *American Journal of Physical Anthropology*, vol. 92: 37–51.

Møller-Christensen V., Sandison A.T. 1963
Usura orbitae (cribra orbitalia) in the collection of crania in the Anatomy Department of the University of Glasgow. *Pathobiology*, vol. 26 (2): 175–183.

Novak M., Slaus M. 2010
Health and disease in a Roman walled city: An example of Colonia Iulia Iader. *Journal of Anthropological Science*, vol. 88: 189–206.

Ortner D.J., Putschar W.G.J. 1981
Identification of Pathological Conditions in Human Skeletal Remains. Washington: Smithsonian Institution Press.

Oxenham M.F. 2006
Biological responses to change in prehistoric Vietnam. *Asian Perspectives*, vol. 45 (2): 212–239.

Palubeckaite Z., Jankauskas R., Boldsen J. 2002
Enamel hypoplasia in Danish and Lithuanian late medieval/early modern samples: A possible reflection of child morbidity and mortality patterns. *International Journal of Osteoarchaeology*, vol. 12: 189–201.

Perevalova E.V. 2004
Severnye khanty: Etnicheskaya istoriya. Yekaterinburg: UrO RAN.

Pietrusewsky M., Douglas M.T. 2002
Ban Chiang, a Prehistoric Village Site in Northeast Thailand. Vol. 1: The Human Skeletal Remains. Philadelphia: Univ. of Pennsylvania Press.

R Core Team. 2017
R: A language and environment for statistical computing. R Foundation for Statistical Computing. Vienna, Austria. URL: https://www.R-project.org/

Salvadei L., Ricci F., Manzi G. 2001
Porotic hyperostosis as a marker of health and nutritional conditions during childhood: Studies at the transition between Imperial Rome and the Early Middle Ages. *American Journal of Human Biology*, vol. 13 (6): 709–717.

Shin D.H., Oh C.S., Hong J.H., Shin M.H., Kim M.J., Lee H.J. 2021
Joseon dynasty mummies of Korea. In *The Handbook of Mummy Studies*. Singapore: Springer, pp. 1049–1072. URL: https://doi.org/10.1007/978-981-15-1614-6_29-3

Shin D.H., Oh C.S., Kim Y.S., Hwang Y.I. 2012
Ancient-to-modern secular changes in Korean stature. *American Journal of Physical Anthropology*, vol. 147 (3): 433–442.

Shin D.H., Seo M., Hong J.H., Lee E. 2018
Paleopathological considerations on malaria infection in Korea before the 20th century. *Biomed Research International*. URL: https://doi.org/10.1155/2018/8516785

Shin M.H., Yi Y.S., Bok G.D., Lee E.J., Spigelman M., Park J.B., Min S.R., Shin D.H. 2008
How did mummification occur in bodies buried in tombs with a lime soil mixture barrier during the Joseon dynasty in Korea. In *Mummies and Science: World Mummies Research*. Santa Cruz de Tenerife: Academia Canaria de la Historia, pp. 105–113.

Slepchenko S.M. 2017
Prevalence of caries among Siberian Tatars of the Omsk region in the 17th to early 20th centuries. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 45 (3): 146–154.

Slepchenko S.M., Tsybankov A.A., Slavinsky V. 2016
Traditional living habits of the Taz Tundra population: A paleoparasitological study. *The Korean Journal of Parasitology*, vol. 54 (5): 617–623.

Steckel R.H., Larsen C.S., Sciulli P.W., Walker P.L. 2006
Data Collection Codebook. The Global History of Health Project. Columbus: Ohio State Univ.

Stuart-Macadam P. 1985
Porotic hyperostosis: Representative of a childhood condition. *American Journal of Physical Anthropology*, vol. 66 (4): 391–398.

Tataurova L.V. 2010
Pogrebalnyi obryad russkikh Srednego Priirtyshya XVII–XIX vv. po materialam kompleksa Izyuk-1. Omsk: Apelsin.

Temple D.H. 2010
Patterns of systematic stress during the agricultural transition in prehistoric Japan. *American Journal of Physical Anthropology*, vol. 142: 112–124.

Toso A., Gaspar S., da Silva R.B., Garcia S.J., Alexander M. 2019
High status diet and health in medieval Lisbon: A combined isotopic and osteological analysis of the Islamic population from São Jorge Castle, Portugal. *Archaeological and Anthropological Sciences*, vol. 11 (8): 3699–3716.

Walker P.L. 1986
Porotic hyperostosis in a marine-dependent California Indian population. *American Journal of Physical Anthropology*, vol. 69 (3): 345–354.

Wheeler S.M. 2012
Nutritional and disease stress of juveniles from the Dakhleh Oasis, Egypt. *International Journal of Osteoarchaeology*, vol. 22 (2): 219–234.

Wickham H. 2009
ggplot2: Elegant Graphics for Data Analysis. New York: Springer.

Received October 27, 2021.
Received in revised form February 2, 2022.

AN SSSR – USSR Academy of Sciences

ASGE – Archaeological Collection of the State Hermitage Museum

BAR – British Archaeological Reports

DVNC AN SSSR – Far Eastern Research Center of the USSR Academy of Sciences

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

GANIIIYaL – Gorno-Altaysk Research Institute of History, Language and Literature (Gorno-Altaysk)

GIM – State Historical Museum (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)

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

IKMZ UR – Historical and Cultural Museum of the Udmurt Republic Idnakar (Glazov)

INP SB RAS – Institute of Nuclear Physics, Siberian Branch, Russian Academy of Sciences (Novosibirsk)

KhakNIIYaLI – Khakass Research Institute of Language, Literature and History (Abakan)

KSIA – Brief Communications of the Institute of Archaeology, Russian Academy of Sciences

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

RGADA – Russian State Archives of Ancient Acts (Moscow)

RGTEU – Plekhanov Russian University of Economics (Moscow)

RITs NGU – Printing and Publications Center of the Novosibirsk State University

SAI – Collection of Archaeological Sources

SGE – Reports of the State Hermitage Museum

TIE – Transactions of the Institute of Ethnography

UIIYaL UrO RAN – Udmurt Institute of History, Linguistics, and Literature, Ural Branch, Russian Academy of Sciences (Izhevsk)

UrO RAN – Ural Branch of the Russian Academy of Sciences

VOOPIK – All-Union (All-Russian) Society for the Preservation of Historical and Cultural Monuments

Alymkulova S.K., Professor, Arabaev Kyrgyz State University, Iskhaka Razzakova 51A, Bishkek, 720016, Kyrgyzstan. E-mail: kadyrkyzy@rambler.ru; https://orcid.org/0000-0001-9615-5135

Baulo A.V., Leading Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia. E-mail: bau194@yandex.ru; https://orcid.org/0000-0001-8379-3760

Bazhenova A.I., Researcher, Udmurt Federal Research Center, Ural Branch, Russian Academy of Sciences, T. Baramzinoy 34, Izhevsk, 426067, Russia. E-mail: aigul_bazh@udman.ru; https://orcid.org/0000-0001-8618-5285

Berezkin Y.E., Head of the Department, Peter the Great Museum of Anthropology and Ethnography (Kunstkamera), Russian Academy of Sciences, Universitetskaya nab. 3, St. Petersburg, 199034, Russia. E-mail: berezkin1@gmail.com; https://orcid.org/0000-0001-6001-7339

Borisenko A.Y., Senior Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia. E-mail: aborisenko2@mail.ru; https://orcid.org/0000-0001-9558-5678

Borodovsky A.P., Leading Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia; Senior Researcher, Tomsk State University, pr. Lenina 36, Tomsk, 630400, Russia. E-mail: altaicenter2011@gmail.com; https://orcid.org/0000-0002-6312-1024

Chechyotkina O.Y., Doctoral Student, Institute of Archaeology, Russian Academy of Sciences, Dm. Ulyanova 19, Moscow, 117292, Russia. E-mail: chechyotkina91@bk.ru; https://orcid.org/0000-0002-4880-1080

Cherdantsev S.V., Junior Researcher, Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 10, Novosibirsk, 630090, Russia. E-mail: stephancherd@gmail.com; https://orcid.org/0000-0002-4384-3468

Dashkovsky P.K., Professor, Department Chair, Laboratory Head, Altai State University, pr. Lenina 61, Barnaul, 656049, Russia. E-mail: dashkovskiy@fpn.asu.ru; https://orcid.org/0000-0002-4933-8809

Demin M.A., Professor, Altai State Pedagogical University, Molodezhnaya 55, Barnaul, 656031, Russia. E-mail: mademin52@mail.ru; https://orcid.org/0000-0003-0954-9297

Faizullin A.A., Junior Researcher, Orenburg State Pedagogical University, Sovetskaya 19, Orenburg, 460014, Russia. E-mail: faizullin.airat@yandex.ru; https://orcid.org/0000-0003-0658-0547

Grishchenko V.A., Head of the Educational Archaeological Museum, Sakhalin State University, pr. Kommunistichesky 33, Yuzhno-Sakhalinsk, 693000, Russia. E-mail: v.grishchenko@mail.ru; https://orcid.org/0000-0002-8221-5093

Hong Jong Ha, Research Professor, Institute of Korean Archaeology and Ancient History, Kyung Hee University, 26 Kyungheedae-ro, Dongdaemun-gu, Seoul 02447, South Korea. E-mail: archaev@gmail.com; https://orcid.org/0000-0002-9104-3908

Kanomata Yoshitaka, Professor, Tohoku University, Kawauchi 27-1, Aoba ward, Sendai, 980-8576, Japan. E-mail: yoshitaka.kanomata.d8@tohoku.ac.jp; https://orcid.org/0000-0002-9970-2015

Kobeleva L.S., Senior Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia; Senior Researcher, Novosibirsk State University, Pirogova 1, Novosibirsk, 630090, Russia. E-mail: lilyakobeleva@yandex.ru; https://orcid.org/0000-0002-4969-3771

Lazin B.V., Senior Researcher, Educational and Scientific Museum, Far Eastern Federal University, Ayaks 10, Russky Island, Vladivostok, 690922, Russia. E-mail: lazin.bv@dvfu.ru; https://orcid.org/0000-0003-2785-4260

Lee Hyejin, Visiting Researcher, Seoul National University, 103, Daehak-ro, Jongno-gu, Seoul, 03080, South Korea; Forensic Anthropologist, Ministry of National Defense Agency of KIA Recovery & Identification, 250 Hyunchung-no, Dongjak-gu, Seoul, 06984, South Korea. E-mail: chloe110720@gmail.com; https://orcid.org/0000-0002-2876-8391

Matrenin S.S., Senior Researcher, Altai State University, pr. Lenina 61, Barnaul, 656049, Russia. E-mail: matrenins@mail.ru; https://orcid.org/0000-0001-7752-2470

Mednikova M.B., Leading Researcher, Institute of Archaeology, Russian Academy of Sciences, Dm. Ulyanova 19, Moscow, 117292, Russia. E-mail: medma_pa@mail.ru; https://orcid.org/0000-0002-1918-2161

Molodin V.I., Professor, Department Head, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia; Chief Researcher, Professor, Novosibirsk State University, Pirogova 1, Novosibirsk, 630090, Russia. E-mail: Molodin@archaeology.nsc.ru; https://orcid.org/0000-0002-3151-8457

Morgunova N.L., Chief Researcher, Orenburg State Pedagogical University, Sovetskaya 19, Orenburg, 460014, Russia. E-mail: nina-morgunova@yandex.ru; https://orcid.org/0000-0002-8091-7411

Mylnikov V.P., Leading Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia. E-mail: mylnikov@archaeology.nsc.ru; https://orcid.org/0000-0002-7532-9607

Mylnikova L.N., Leading Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia; Leading Researcher, Novosibirsk State University, Pirogova 1, Novosibirsk, 630090, Russia. E-mail: l.mylnikova@yandex.ru; https://orcid.org/0000-0003-0196-5165

Nazarov I.I., Director, Institute of History and International Relations, Altai State University, pr. Lenina 61, Barnaul, 656049, Russia. E-mail: nazarov@mail.asu.ru; https://orcid.org/0000-0002-6014-6584

Nesterova M.S., Senior Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia; Senior Researcher, Novosibirsk State University, Pirogova 1, Novosibirsk, 630090, Russia. E-mail: msnesterova@gmail.com; https://orcid.org/0000-0003-4024-6753

Oktyabrskaya I.V., Leading Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia. E-mail: siem405@yandex.ru; https://orcid.org/0000-0002-4190-9478

Pashentsev P.A., Researcher, OOO "Izyskatel SakhGU", Lenina 290, Yuzhno-Sakhalinsk, 693000, Russia. E-mail: pashentsev@inbox.ru; https://orcid.org/0000-0002-8724-6462

Pilipenko A.S., Leading Researcher, Head of the Interinstitutional Laboratory, Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 10, Novosibirsk, 630090, Russia. E-mail: alexpil@boinet.nsc.ru; https://orcid.org/0000-0003-1009-2554

Popov A.N., Director of the Educational and Scientific Museum, Associate Professor, Far Eastern Federal University, Ayaks 10, Russky Island, Vladivostok, 690922, Russia. E-mail: popov.an@dvfu.ru; https://orcid.org/0000-0002-1423-8410

Rudenko M.K., Doctoral Student, Laboratory Assistant, Educational and Scientific Museum, Far Eastern Federal University, Ayaks 10, Russky Island, Vladivostok, 690922, Russia. E-mail: rudenko.mko@dvfu.ru; https://orcid.org/0000-0002-0224-5234

Samushkina E.V., Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia. E-mail: khakassie@yahoo.com; https://orcid.org/0000-0001-5481-3822

Selin D.V., Researcher, Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 17, Novosibirsk, 630090, Russia; Senior Researcher, Novosibirsk State University, Pirogova 1, Novosibirsk, 630090, Russia. E-mail: selin@epage.ru; https://orcid.org/0000-0002-6939-2917

Seregin N.N., Associate Professor, Altai State University, pr. Lenina 61, Barnaul, 656049, Russia. E-mail: nikolay-seregin@mail.ru; https://orcid.org/0000-0002-8051-7127

Shaura A.S., Senior Researcher, Udmurt Federal Research Center, Ural Branch, Russian Academy of Sciences, T. Baramzinoy 34, Izhevsk, 426067, Russia. E-mail: shauraa@mail.ru; https://orcid.org/0000-0002-0054-5073

Shin Dong Hoon, Professor, Chairperson of Department, Seoul National University, 103 Daehak-ro, Jongno-gu, Seoul 03080, South Korea. E-mail: cuteminjae@gmail.com; https://orcid.org/0000-0001-8032-1266

Slepchenko S.M., Leading Researcher, Deputy Head, Institute of Northern Development, Tyumen Scientific Center, Siberian Branch, Russian Academy of Sciences, Malygina 86, Tyumen, 625026, Russia. E-mail: s_slepchenko@list.ru; https://orcid.org/0000-0002-9365-3849

Trapezov R.O., Researcher, Institute of Cytology and Genetics, Siberian Branch, Russian Academy of Sciences, pr. Akademika Lavrentieva 10, Novosibirsk, 630090, Russia. E-mail: Rostislav@bionet.nsc.ru; https://orcid.org/0000-0002-0483-530X

Vasilevski A.A., Department Chair, Sakhalin State University, pr. Kommunistichesky 33, Yuzhno-Sakhalinsk, 693000, Russia. E-mail: vasilevski@bk.ru; https://orcid.org/0000-0001-6392-5703

Zhurbin I.V., Chief Researcher, Udmurt Federal Research Center, Ural Branch, Russian Academy of Sciences, T. Baramzinoy 34, Izhevsk, 426067, Russia. E-mail: zhurbin@udm.ru; https://orcid.org/0000-0002-7715-0459

Zlobina A.G., Researcher, Udmurt Federal Research Center, Ural Branch, Russian Academy of Sciences, T. Baramzinoy 34, Izhevsk, 426067, Russia. E-mail: elf54@yandex.ru; https://orcid.org/0000-0001-5682-2669