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The Early Paleolithic Go Da Site and the Bifacial Lithic Industries of Southeast Asia

The lithic industry of the stratified site Go Da in Central Vietnam is described, and its place among the contemporaneous Early Paleolithic sites of East and Southeast Asia is determined. Results of a morphological techno-typological analysis of the Go Da assemblage are provided. Go Da is attributed to the An Khe-type sites situated in the eponymous area of Vietnam. Cores and tools were made from pebbles, less often from flakes. Primary reduction focused on simple pebble cores with natural striking-platforms, whereas radial cores were less common. Predominant among the tools are picks, scrapers of various modifications, choppers, and chopping tools, as well as denticulate and notched tools; also, bifaces occur. These tools belong to a single homogeneous industry, showing common features in primary reduction, preparation, and design of key artifacts. On the basis of analysis of the stratigraphic sequence of Go Da and the absolute date of 806 ± 22 ka BP, generated by the potassium-argon analysis of tektites, it is proposed that the site is older than other dated locations with the An Khe industry. Apparently, it resulted from a convergent evolution of the pebble-flake industry introduced by the first wave of Homo erectus from Africa. Go Da and other An Khe sites likely belong to a vast habitation zone of Southeast Asian hominins with technologically and typologically similar industries dating to the boundary between the Lower and the Middle Pleistocene.

Keywords: *Vietnam, Early Paleolithic, An Khe industry, handaxes, bifacial tools.*

Introduction

Bifacial industries that emerged in Southeast Asia ca 1 million years ago resulted from convergent development of lithic industries in a particular natural and climatic zone. In this region, many archaeological cultures and lithic industries have been identified, characterized by detachment of flakes from pebble, radial, orthogonal, etc. cores, which flakes were used for the manufacture of tools, and by the great number of pebble chopping tools. Notably, the lithic industry of East and Southeast Asia underwent significant changes over 1.5 million years. The Early Paleolithic bifacial industry of central Vietnam is a result of these

changes. In 2015–2019, the Joint Russian-Vietnamese expedition discovered 28 Early Paleolithic sites with a pebble-flake industry and bifacial handaxes in the in the An Khe Region of Gia Lai Province (Fig. 1). The toolkit and the primary reduction technique of the An Khe lithic industry are described and analyzed in detail in various publications elsewhere (Derevianko, 2018; Derevianko, Gladyshev, Nguyen Ziang Hai et al., 2017a, b; Derevianko, Kandyba, Gladyshev et al., 2019; Derevianko, Gladyshev, Kandyba et al., 2020). Two dates (806 ± 22 and 782 ± 20 ka BP) were generated on tektites found in association with bifaces and pebble tools in the An Khe cultural layer through the 40K/38Ar-method (Derevianko, Kandyba, Nguyen Khac Su et al., 2018). The overwhelming majority of sites with this lithic industry are located on the left bank of the Ba River. The cores and tools were made from pebbles and boulders of quartzite hydrothermalite—a fine-grained quartz rock formed by vein quartz (identification by N.A. Kulik). The fine and medium water-wear of the pebble-boulder substrate of the modern alluvium in the river close to the site leaves no doubt about the local origin of the pebbles. Moreover, the outcrops of non-rounded quartz in the form of blocks were found on the slope of Dat—the mountain in the immediate vicinity of Roc Tung locality, where sites with the An Khe industry are concentrated. In 2020, the additional survey upstream and downstream of the river from the concentration of the main archaeological sites showed that the number of sites with archaeological finds sharply decreases with distance from the sources of raw materials. The artifacts found were quite few, scattered over a large area and forming no accumulations (Gladyshev et al., 2020). In general, the An Khe industry represents a typical pebble-flake technology of the Early Paleolithic, which is characterized by ordinary parallel primary reduction. The toolkit includes side-scrapers of various modifications, choppers, chopping tools, notched-denticulate tools, and core-shaped scrapers. Noteworthy is the presence of bifacially worked tools such as handaxes, picks, and implements with tips fashioned through flaking and retouching. Despite the fact that part of the archaeological material was discovered in an exposed state owing to the destruction of the cultural layer by agricultural works, the surviving stratified sites showed a similar stratigraphy and were confined to the same geomorphological position. All the sites were located on one high hilly plain, which is a denudation structural plateau with remnant hills and a thin layer of loose sediments. Archaeological materials found *in situ* were located directly on top of the ancient weathering crust, in the pebble-boulder-gravel horizon, and were overlain by a layer of loose sediments of varying thickness. Go Da is the only site with differently-originated deposits in this area. Archaeological materials from this site have hardly been described before.

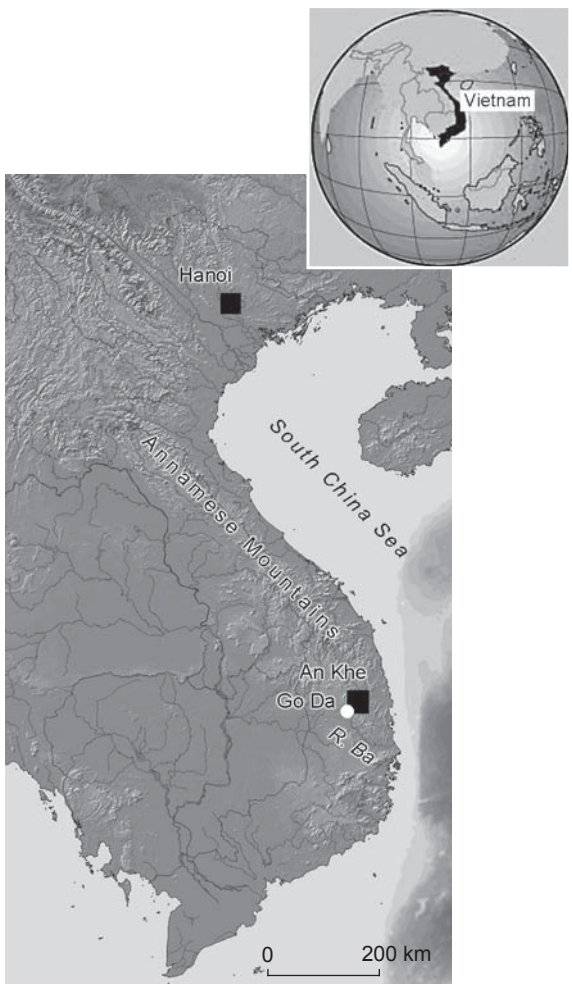

Fig. 1. Location of the Go Da site.

Study materials

The Go Da site (13°58′306″ N, 108°9′136″ E) is situated 2 km to the northwest of the main bridge over the Ba River, in the city of An Khe. The site is located at an altitude ca 440 m above sea level and ca 50 m above the river edge. The archaeological excavation area was located 900 m westwards of the river, on a hilly plateau composed of bedrocks (Fig. 2, *A*). The site was partially destroyed, owing to the open-cut mining of granite in the southeastern part of the hill. The 41 m long section

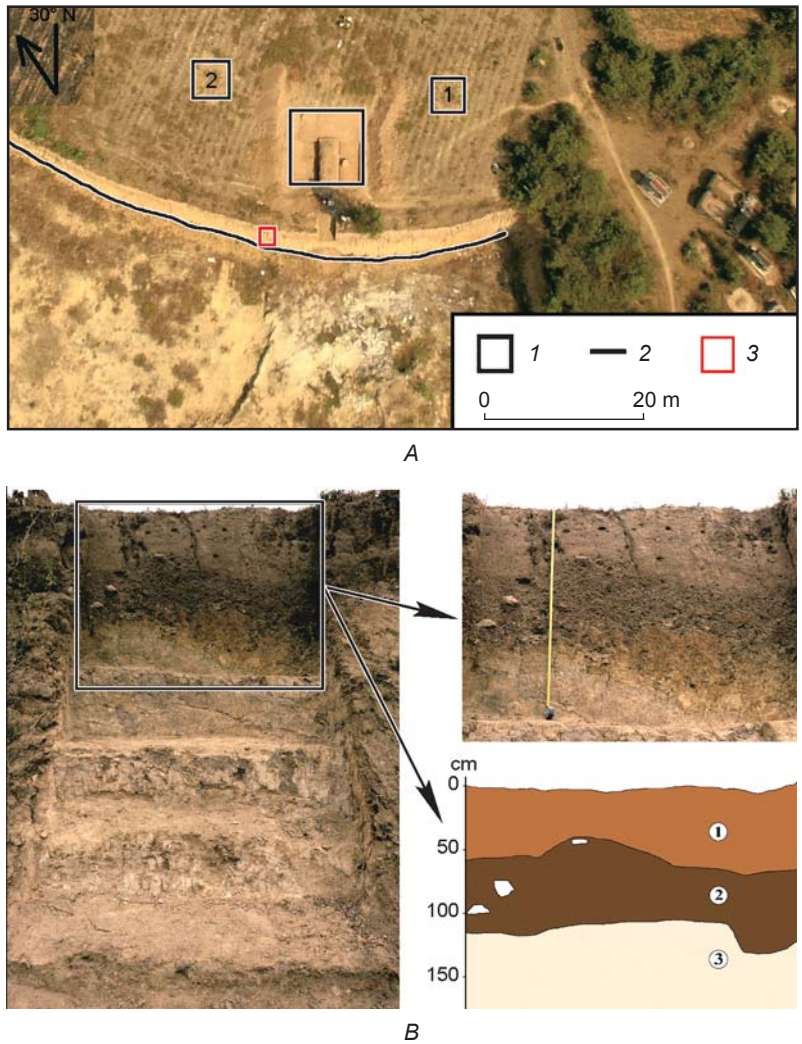

Fig. 2. Locations of excavation areas and quarry (*A*), stratigraphic column (*B*) at Go Da.
1 – excavation area and test pits 1 and 2; *2* – quarry boundary; *3* – established stratigraphic section.

was established along the wall of the quarry, oriented from west to east, declining in the western direction. The stratigraphic column shows a weathering crust up to 1.5 m thick (layer 3) overlying the granite stratum (Fig. 2, *B*). It is overlain by slopewash sediments, consisting of coarse sandy loam, angular grus, and debris (layer 2). In some places, in particular in the central part of the section, an accumulation of coarse-grained material is observed. Certain areas of the slopewash sediments had been affected by erosion processes. The artifacts were located in the top of the weathering crust and in the lower part of the slopewash sediments 30–50 cm thick. The sediments are overlaid by polygenetic deposits of multi-colored loams (20–30 cm thick), heavily disturbed in the course of agricultural activities (layer 1). An excavation area and several test pits were established at the unaffected part of the site, which was a slope—slightly declining in the northwestern direction—of the hill, strongly denuded by anthropogenic impact; the bulk of the lithic artifacts were found here.

The excavation area of 2014–2016 totaled 110 m^2 and yielded 103 artifacts. The sections of the excavation areas and test pits are generally similar to the stratigraphic sequences in the quarry described above.

Primary reduction technique is illustrated by 71 artifacts, including 25 split pebbles, which are usually large and retain negative scars from several test removals. The collection comprises four hammerstones—rounded granite pebbles with wear traces.

In total, 22 cores were identified. Simple parallel pebble cores predominate. The single-platform unifacial cores can be subdivided into two groups. The first group includes artifacts with signs of reduction

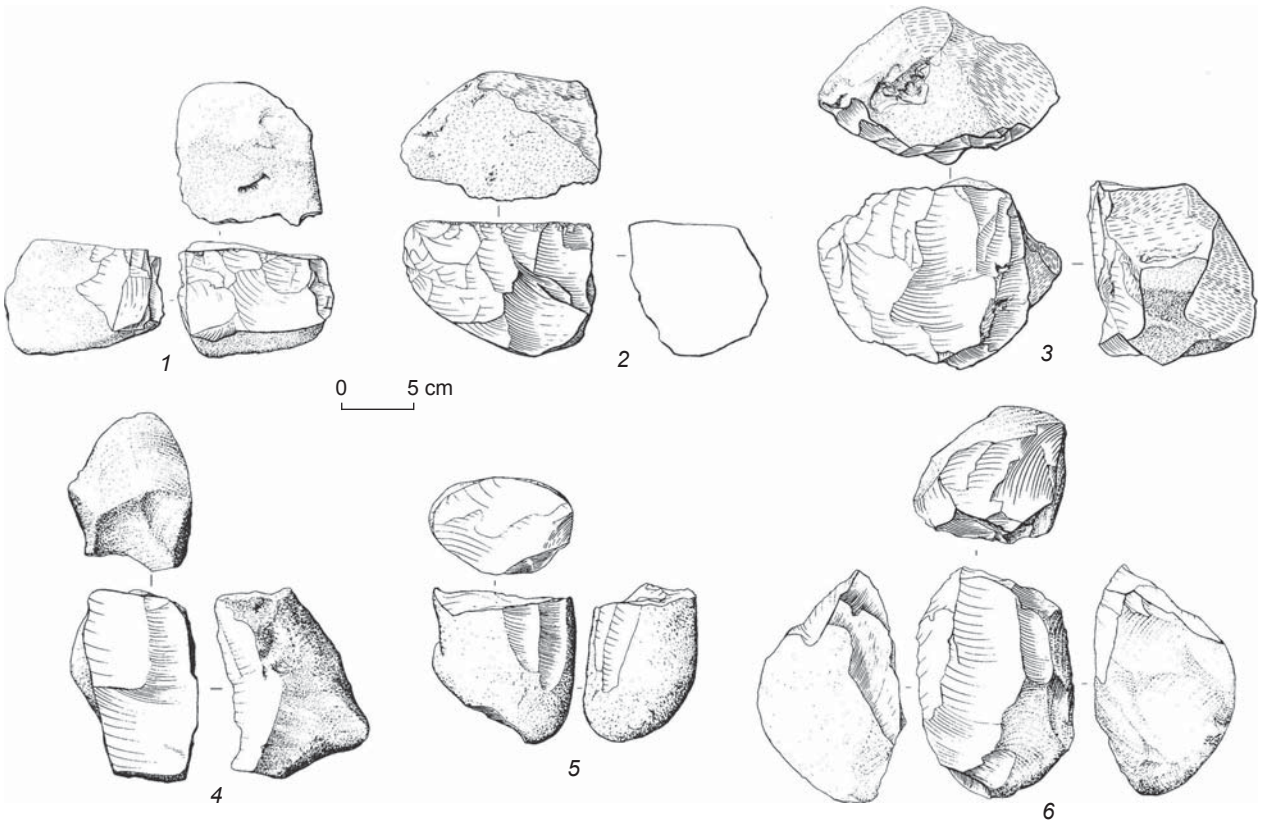

Fig. 3. Pebble single-platform unifacial cores from the Go Da site.

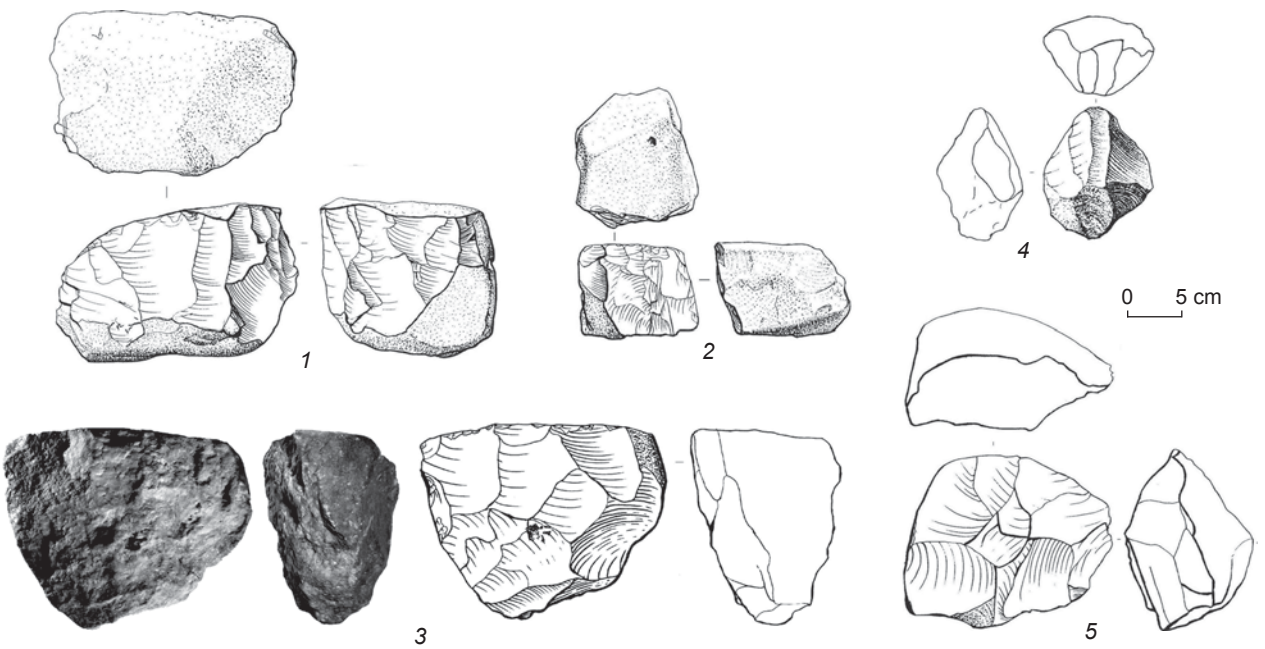

Fig. 4. Pebble single-platform bifacial (*1*), double-platform unifacial (*2*), and radial (*3–5*) cores from the Go Da site.

executed from an unprepared striking-platform, retaining the natural crust (9 spec.). Such cores were made on flat rectangular pebbles, with flaking carried out across the long axis of the blank (Fig. 3, *1–3*). There are also longitudinally-oriented cores. One of these bears signs of knapping from the narrow end (Fig. 3, *4*). The second group includes two single-platform unifacial cores with striking-platforms prepared by several large removals (Fig. 3, *5*, *6*). The products of reduction of both groups were large, short or elongated, flakes. Three single-platform bifacial cores were identified. They show traces of reduction, which was carried out across the longitudinal axes of the blanks, without preliminary preparation of the striking-platforms (Fig. 4, *1*). The flaking surfaces were located both on adjacent and on opposite sides. Three double-platform unifacial cores were identified. These suggest that the reduction was carried out from adjacent natural striking-platforms located at right angles (Fig. 4, *2*).

Three radial nuclei with one flaking surface (Fig. 4, *3–5*), and two amorphous cores were recorded. Notably, all the described core-types are situational variations of the simple parallel pebble-knapping aimed at production of flakes.

The industry of spalls includes 20 specimens. The majority are massive elongated decortication spalls, mostly large (8 spec.) or medium (6 spec.) in size. There are only 4 small chips. The dorsal faces usually retain the natural pebble crust over 2/3 of the surface. Natural residual striking-platforms have been partially destroyed by knapping. The collection contains two large fragments.

The Go Da lithic industry includes 32 implements. The most numerous are pick-like tools (9 spec.). These are large implements, characterized by a triangular pointed tip and an opposing massive and non-prepared back. Two tools were made on highly fractured quartzite fragments; six items were manufactured on pebbles; one more piece was made on a tablet. The shape of a tool was initially determined by the outline of the original blank; the contour of the tool, triangular in cross-section, was produced by processing two faces (Fig. 5, *3*) or one face. Removals of modification spalls were usually directed from the face retaining the natural surface. This led to the formation of numerous fractures. The tips of two tools are damaged (Fig. 5, *1*, *2*).

Chopping tools are represented by transverse choppers (5 spec.). The tools were fashioned on large massive elongated quartzite pebbles. Four choppers show strongly convex semi-abrupt working edges prepared by removing a series of medium-sized and small spalls (Fig. 5, *4*). One chopper was made on a triangular pebble. It shows a straight, almost vertical working edge prepared through direct percussion and modified with small removals (Fig. 6, *7*).

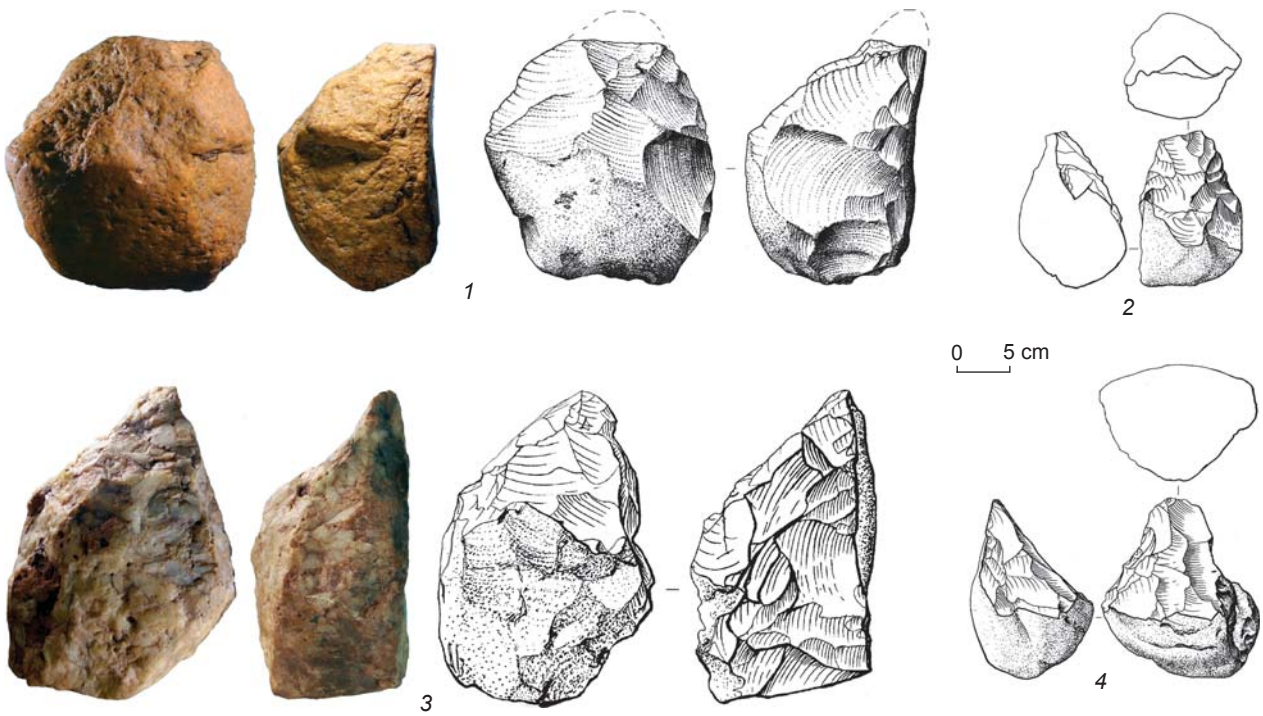

Fig. 5. Pick-like tools (*1–3*) and chopper (*4*) from the Go Da site.

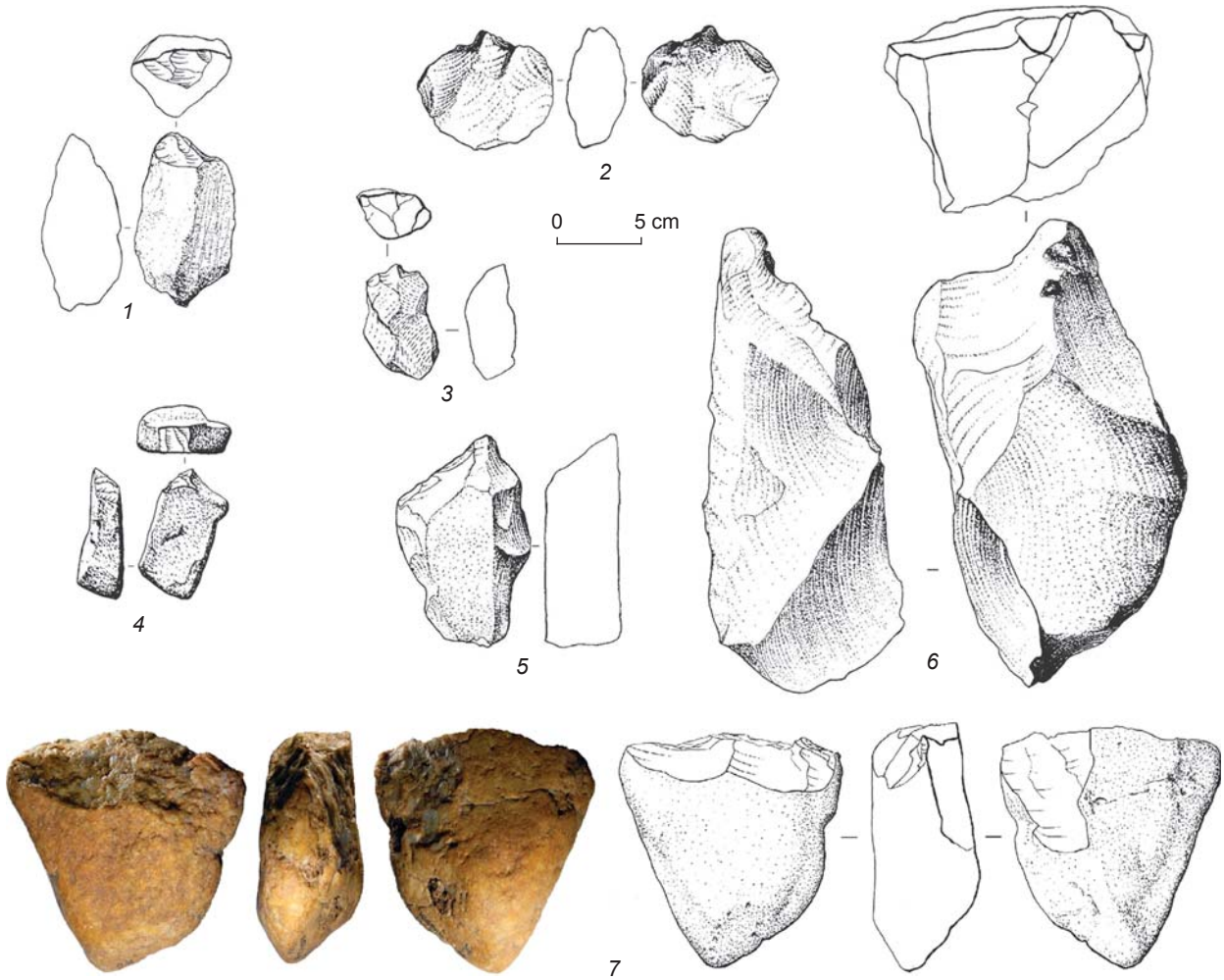

Fig. 6. Spouted tools (*1–6*) and chopper (*7*) from the Go Da site.

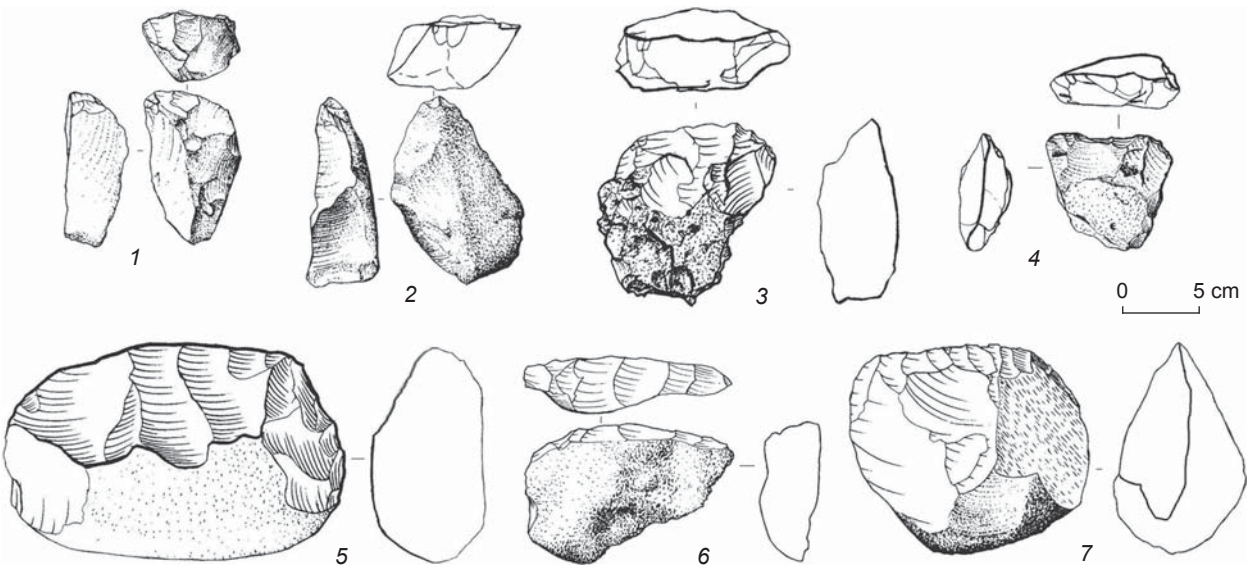

Fig. 7. Spouted tools (*1*, *2*) and side-scrapers (*3–7*) from the Go Da site.

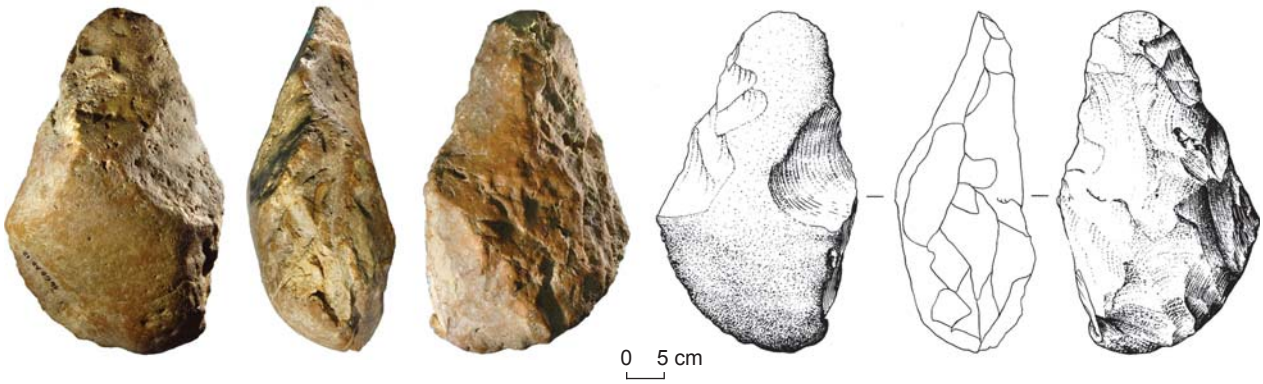

Fig. 8. Biface from the Go Da site.

The collection of spouted tools is quite large (10 spec.). Four items were made on elongated quartzite fragments. The working element was prepared on a natural sharp edge of the implement, which was modified with fine flaking (Fig. 6, *1–4*). Two tools were made on pebbles: one on a large and massive one (Fig. 6, *6*), the other on a small angular pebble (Fig. 6, *5*). The large spouted tool shows the working element prepared through few large removals and partly modified with retouch; the small tool shows a spout fashioned on the natural sharp edge and finished with small removals. Four other spouted tools were fashioned on large elongated spalls. The working element was prepared on a natural protruding edge at the distal end through small removals from the dorsal face (Fig. 7, *1*, *2*).

In the Go Da lithic industry, eight transverse scrapers were identified. Three of these were made on large fragments (Fig. 7, *3*, *4*), and four on large pebbles (Fig. 7, *5*, *7*). The secondary working techniques were continuous direct percussion and large-faceted retouch. One more side-scraper, which was made on a large primary spall, is noteworthy; its working edge was formed at the distal end by a continuous abrupt large-faceted retouch (Fig. 7, *6*).

There is one partial biface with a triangular shape in plan view (Fig. 8). The natural shape of the original blank was taken into account in the tool's preparation. One side of the tool is completely covered with negative scars from centripetal removals; the other retains a natural pebble crust on 2/3 of the surface.

Study results

The cultural horizon at Go Da, as noted elsewhere (Derevianko, 2018, 2019; Derevianko, Kandyba, Nguyen Khac Su et al., 2018), was formed mainly as a result of deflation of the granite bedrock and an insignificant shift of coarse material from the most elevated areas. The horizon was formed in the course of slopewash and erosion processes, apparently in a cooler climate than the modern one. Archaeological material was found in the bottom part of the layer and the top of the weathering crust. Laterite lens formations are confined to the top of the horizon and are partially included in the overlying polygenetic deposits, which also contain deluvial, aeolian, and clayey facies, suggesting multiple redeposition. At Roc Tung and other sites on the left bank of the Ba, cultural horizons are embodied in laterites overlying and partially included in the weathering crust on the granite bedrock. The assumption about an older age for the Go Da site, in comparison with other localities of the An Khe lithic industry, is confirmed by the fact that the tektite whose age was determined as 806 ± 22 thousand years old was located in the top of the slopewash sediments, while more than 300 tektites were in the cultural layer of the sites on the left bank of the Ba. This suggests that ancient hominins arrived at Go Da prior to the formation of the Australasian tektite placer field (ca 790 ka BP), which covered all of Southeast Asia and part of Australia (Schneider, Kent, Mello, 1992). Hominins settled in this area during a period when the climate was cooler and more arid than the modern one, and the ground surface was subjected to intense weathering and erosion. The area was still populated by early hominin groups when a significant change in the environment occurred: the climate became warmer and more humid; and the formation of loose sediments in the form of laterites began.

The Go Da lithic industry demonstrates all the features characteristic for the An Khe industry at

other archaeological sites. A significant number of split pebbles testify to the intense testing of stone raw materials at the site. The occurrence of four hammerstones suggests that Go Da was a permanent camp. Primary reduction is illustrated mainly by simple parallel flaking, with an insignificant share of radial flaking. In the toolkit, the most representative are groups of pick-like and spouted tools. The categories of choppers and side-scrapers are also numerous; while the typology and morphology of these tools are similar, the main difference is observed in size and initial blanks. These characteristics of the scrapers are inherent in the entire group of sites with the An Khe industry (Derevianko, Gladyshev, Kandyba et al., 2020). The salient feature of the analyzed collection is the presence of a partial biface. Noteworthy is the roundness of the negative scars and edges of this tool; this feature is common for all the artifacts in the Go Da collection, but is not typical of lithics from other An Khe sites. This industry differs from other sites in the absence of unifacial implements, core-like scrapers, and chopping tools. Nevertheless, taking into account the geomorphological position and stratigraphic observations, Go Da should be associated with the earliest episode of the hominin settling in the Ba valley.

New data on the occupation of the Ba basin by ancient hominins were collected during the archaeological survey in the Phu Thien area, 50 km to the southwest of An Khe, in March 2020. The sites of Kinh Peng-1, -2, Chu Rung, and Phu Thien-1, -15 were located on the left bank of the Ayun River, both in exposed and in stratified context. The materials of this complex of sites show similarities with the An Khe industry in their geomorphological position, raw materials, and the presence of such types of artifacts as simple parallel cores, choppers, transverse side-scrapers, pick-like tools, and bifacial implements (Gladyshev et al., 2020). No large-scale excavations have been carried out at the above sites. According to preliminary geomorphological observations, the complex of sites in the Phu Thien area, discovered in 2020, is located on the Lower Quaternary terrace of Ayun, the age of which is determined as in the range from 1500 to 780 ka BP. The geomorphology of these sites, along with the techno-typological characteristics of the archaeological collection, makes it possible to attribute the Phu Thien materials to the Early Paleolithic An Khe industry. However, the absence of tektites and laterite formations at the stratified localities in the Ayun valley may indicate an older age of their lithic industry as compared to the Go Da collection.

Discovery of new localities with bifacial tools in Southeast Asia is not uncommon for this region; in the first half of the 20th century, the Pacitanian lithic industry was found on the islands of Indonesia. The lithics of the Pacitanian industry constitute a kind of typological series, which includes choppers, chopping tools, and bifacially worked tools designated as handaxes (Movius, 1944, 1949). H. Movius noted that in this industry, as also in An Khe, bifaces are certainly a typological marker, although their proportion is small. Leaving the discussion about the Movius line aside, we note that the researcher was right in identifying the difference between the lithic industries of Southeast and East Asia, and the Paleolithic complexes of the rest of Eurasia and Africa (Movius, 1956, 1958).

As was shown in earlier publications, the An Khe lithic industry, in terms of techno-typological characteristics and absolute age (ca 800 ka BP), bears the greatest similarity to archaeological materials found on the Baise plateau in China (Derevianko, 2018; Derevianko, Kandyba, Nguyen Khac Su et al., 2018). These parallels are also recognized by Chinese researchers (Lin, Xie, 2019). The bifacially worked tools, various choppers, and chopping tools were found in the stratified context, their age was established by tektites (Hou Yamei et al., 2000; Lycett, Norton, 2010); these tools determine the unique outlook of the Early Paleolithic of Southeast and East Asia (Xie, Bodin, 2007). However, though some researchers attribute this lithic industry to the Acheulean (Zhang, Huang, Wang, 2010), the Baise archaeological materials differ from the classic Acheulean forms in techno-morphological characteristics. In addition, there is a large time gap between these technocomplexes (Derevianko, 2019).

The known area of dispersal of the Early Paleolithic industries has recently expanded owing to the discovery of more than 60 localities in the Nenjiang River valley (Guangdong province, China) (Xie, Lin, Li, 2019). Lithic industry was recorded both in exposed and in stratified context; the age of the most ancient peopling period was determined as in the range of 600–800 ka BP, on the basis of geomorphological features of Modaoshan and the techno-typological characteristics of artifacts (Ibid.).

Discussion

The issue of the peopling of Eurasia has been and remains the key one in archaeological science. Many researchers, including G.H.R. von Koenigswald (Koenigswald, von, 1936; Koenigswald, von, Gosh, 1973), H.R. van Heekeren (1955, 1972), R.P. Soejono (1961), G.J. Bartstra (1978, 1982, 1984, 1992) were engaged in the search for traces of Paleolithic humans in Southeast Asia. Studying the archaeological complexes of Indonesia, they tried to identify the presence or absence of the Acheulean traditions on the basis of the analysis of forms of the bifacially worked tools and the typological series of lithic industries. Later, attempts to carry out the same analysis of the exposed artifacts from the islands of Indonesia (Sumatra (Baturaija), Java (Patjitan, Sangiran), and Sulawesi (Kanbengian)) were undertaken by other researchers (Forestier, 2007; Keates, Bartstra, 2001; Sémah et al., 2014). Despite the fact that the age of the Sangiran assemblages, according to preliminary estimates, is 800 ka BP (Mishra et al., 2010), and the absolute age of the choppers and spalls, some of which were identified as "cleavers", from the Ngebung-2 Sangiran stratified site, is 860–880 ka BP (Simanjuntak, Sémah, Gaillard, 2010), researchers continued to associate the Patjitan and Sangiran collections with the Acheulean wave of human migration to Southeast Asia. At the same time, some experts admitted that the artifacts from Indonesia differ considerably from the obvious Acheulean items (bifaces, cleavers, and pick-like tools) in their specifically Asian (Indonesian) appearance of rather archaic morphology (Simanjuntak, Forestier, 2008, 2009; Brumm, Moore, 2012).

Over the past 30 years, more than 200 sites with artifacts of both surface occurrence and in a stratified context have been discovered in Southeast Asia (Fig. 9). The most abundant and fully dated archaeological material was found in South China (Baise, Nanjiang industries) and Central Vietnam (An Khe and Phu Thien industries). These lithic industries represent the Early Paleolithic bifacial trend of development that originated on a local basis, i.e. convergent development. Archaeological research carried out elsewhere in this vast region adds information on the ancient hominin settlement at the boundary between the Lower and Middle Pleistocene. Artifacts from the site of Sao Din in northern Thailand reveal an undeniable closeness to the South Chinese and Vietnamese collections (Zeitoun et al., 2012). Moreover, the researchers of this site argue not only similar features (bifacial technology), but also the specificity typical of the Early Paleolithic industries of Southeast Asia (Ibid.). In the Philippines, bifacial tools are rare (Huluga site, Ille Cave); these were surface finds (Dizon, Pawlik, 2010). The semi-buried bifaces at Arubo-1 on Luzon Island (Pawlik, 2004) show morphological similarity with the An Khe and Baise bifacial artifacts (Pawlik, 2019). Discovery of the Kalinga stratified site, dated

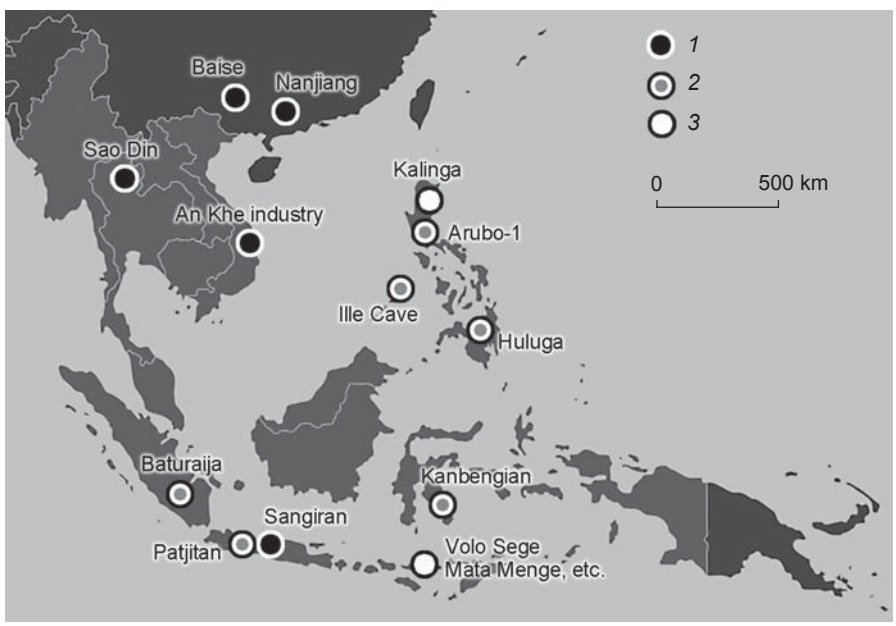

Fig. 9. Location of the Early Paleolithic complexes in Southeast Asia.
1 – with bifacially worked tools found *in situ*; *2* – with bifacially worked tools found on the surface; *3* – without bifacially worked tools.

to more than 700 ka BP, in the north of Luzon Island made it possible to shift back the age of the first peopling of the Philippine archipelago to the Early Middle Pleistocene (Ingicco et al., 2018). The tektite found in the cultural layer and identical in mineral composition to the Australasian (Ibid.) suggests the chronological proximity of the Kalinga lithic industry to the continental Early Paleolithic technocomplexes. Lithic artifacts are represented mainly by small flakes with utilization retouch, the use of which is confirmed by the presence of rhinoceros bones with traces of butchering (Ibid.). As noted by A. Pawlik, the Arubo-1 and Kalinga assemblages show the same reduction strategy and selection of raw material (2019). The absence of bifacial tools in the Kalinga collection is possibly a consequence of the narrow specialization of the site (the place of rhino carcass butchering). No artifacts of this type have been found at the sites of Volo Sege and Mata Menge, dated to ca 1 Ma, in the basin of the Soa River, on Flores Island (Brumm et al., 2010). Noteworthy is the occurrence of a pick-like tool at the site of Volo Sege (Brumm, Moore, 2012) that is morphologically similar to those in the An Khe and Baise industries. All of the above suggests that at the turn of the Lower and Middle Pleistocene, Southeast Asia was a vast habitation zone of ancient hominins with lithic industries that were almost identical in techno-typological characteristics.

Conclusions

The Early Paleolithic Go Da industry is characterized by pebble-flake reduction. The main raw materials were quartzite pebbles and boulders from the channel alluvium. The primary reduction is dominated by single-platform unifacial cores with natural striking-platforms. Double-platform unifacial cores and radial varieties of cores are extremely rare.

Prevalent among the tools are picks, choppers, spouted tools, and transverse side-scrapers. Particularly noteworthy is a bifacially worked implement that is a triangular biface fragment. In general, the archaeological material from excavation at Go Da is completely identical to the lithics from both the Roc Tung group of sites and other localities from the left bank of the Ba. All these artifacts characterize the material culture of the Early Paleolithic An Khe industry, which arose in central Vietnam ca 800 ka BP.

Despite the rare occurrence of bifaces in the cultural layers of the sites of the An Khe industry (at Go Da, only one specimen was found), these are a marker suggesting attribution of the An Khe archaeological complexes to the Early Paleolithic bifacial cultures of Southeast Asia. The An Khe bifacial tools were made mainly on large sub-triangular pebbles. Only the upper parts of pebbles were prepared through large and deep removals, while the bases remained intact. Pick-like tools and other points were treated using the same techniques. Notably, these bifaces or handaxes from Vietnam are absolutely not identical to the Acheulean bifaces of Africa and Europe. The only feature linking the bifacial industries of Vietnam with the Acheulean is the presence of bifacially flaked tools. There are no cleavers at An Khe sites; nor is there any evidence of the Levallois technique. There is every reason to believe that the bifacial technique emerged in Vietnam and China owing to convergent evolution.

The discovery of the Early Paleolithic (final Early Pleistocene) bifacial An Khe industry in Vietnam strongly suggests that Southeast Asia in the Early Paleolithic was one of the regions where bifacial industries were formed.

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Paleolithic Personal Ornaments from Xiaogushan Cave: The Formation of Early Symbolism and Its Regional Features in Northeast China

This article presents the results of a comparative study of personal ornaments from Xiaogushan Cave in the interregional and regional context of the formation of modern behavior. Xiaogushan is a Paleolithic and Neolithic site in Northeast China. In the Upper Paleolithic layers of the site, apart from tools, personal ornaments were found—pendants made from animal teeth, and a decorated bone disc. The date of the site is a matter of debate; ornaments from layers 2 and 3 date to ~30 ka BP. Like other bone artifacts (harpoon, needles, point), and together with types of stone tools and lithic technology, they mirror the local process of Middle to Upper Paleolithic transition. We focus on similarities between the Xiaogushan ornaments and Upper Paleolithic pendants from northern China and Eurasia in general, attesting to modern behavior during the transitional period and being an important marker of the spread of Upper Paleolithic innovations from the centers to the periphery. Xiaogushan is the first Upper Paleolithic industry in Northeast China known to date, and demonstrates skills and symbolic behavior typical of the initial Upper Paleolithic. The Xiaogushan pendants follow the general tendencies, while being specific markers of the evolution of symbolic behavior in Eastern Eurasia.

Keywords: *Ornaments, symbolism, religion, Upper Paleolithic, China, Xiaogushan.*

Introduction

This article presents the results of a comparative study of personal ornaments from Xiaogushan Cave and those from other sites in Eurasia. The study was based on the materials of field research carried out by the Laboratory for Archaeology and Anthropology of the Amur State University in 2013–2014 in the area adjacent to the Xiaogushan site (Zabiyako, Wang Jianlin, 2015). The aim of the research was to study the sites of Yufoshan, Cuoshishan, Zhongxinbu, and others with cup-marks. At that stage of research, Xiaogushan Cave was regarded as an important additional site. The results of research on cup-marks have been published elsewhere (Zabiyako, Wang Jianlin, 2017). At the current stage of the study of the symbolic behavior of the ancient population of Northeast China, the research is focused on the personal ornaments from Xiaogushan Cave. The subject of the study is general trends in the formation of early symbolism, and its regional features expressed in the ornaments from Xiaogushan Cave.

In recent years, studies of Paleolithic ornaments have gained relevance primarily in connection with archaeological and anthropological discoveries, which provided the symbolic items with significantly older dates than previously thought, and assumed the involvement of different species of *Homo* in

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ornament use. These discoveries stimulate heated discussions about the genesis of modern behavior and its anthropological basis.

The history of study, lithic industries and dates of the site

Xiaogushan Cave is located in Northeast China, on the Liaodong Peninsula, 1 km southeast of the village of Xiaogushan, Haicheng county, at the Qingyunshan Mountain on the right bank of the Haichenghe River. Geomorphologically, the Liaodong Peninsula belongs to the Liaodong mountain area in Northeast China. The Qianshan ridge (Changbai mountain range), ca 500 m above sea level, runs along the peninsula. Xiaogushan is located on the western slope of the Qianshan ridge. The ridge contains a lot of karst caves in dolomite marbles.

The Xiaogushan site was discovered in 1972 after the earthquake: employees of the Administration for Historical Monuments of the Liaoning Province found an entryway to a new cavity next to the previously known cave. Xiaogushan Cave is part of the Xianrendong cave system. The cavity is 19 m long, ca 6 m wide, and up to 10 m high; the cave is situated at an altitude of 6–7 m above the river level. In 1979, a survey of the cave cavity was carried out (Zhang Xirong, Wang Xiaobin, 1981). In 1981, there began excavations of cave deposits, containing the Pleistocene and Holocene technocomplexes (Fu Renyi, 1983). In 1983, excavations of the Pleistocene deposits yielded artifacts made of stone, bone, and horn; in the Holocene layer, a burial, individual human bones, ceramics, and tools were found; stratigraphic observations showed that some parts of the Pleistocene layers contained Holocene inclusions (Zhang Zhenhong et al., 1985; Huang Weiwen et al., 1986: 264). In 1990, the cultural horizon of the site was subdivided into five layers: layers 1–4 were attributed to the Late Pleistocene, and layer 5 to the Holocene. In total, ca 10 thousand artifacts of stone and bone were recovered; the hearths, charred animal bones, and faunal remains were identified. Most of the finds were discovered in layers 1–3 (Xiaogushan…, 2009).

In layers 1–4, bone remains of ca 40 animal species were found (Jia-Fu Zhang et al., 2010: 516). The main representatives of the fauna are the northern red fox, mammoth, woolly rhinoceros, Chinese deer, northeastern roe deer, and others (Fu Bo, 2010: 552). Fragments of fish bones were also found. Fluctuations in the climate and biota of the region have been established on the basis of palynological materials. In the initial period of human habitation of the cave (ca 70 ka BP), in a relatively cold and dry climate, coniferous vegetation prevailed; ca 60–30 ka BP, in a warmer and more humid climate, coniferous-deciduous vegetation prevailed; cooling, which reached its peak ca 17 ka BP, resulted in the next phase of changes in the biota of the region (Dong Wei, Fu Renyi, Huang Weiwen, 2010).

The process of stone tool manufacturing at the site is illustrated by blanks, cores, tools, waste products, and stocks of raw materials. The raw material was mainly quartz; two items were made of jade. Along with artifacts on flakes, there are Levallois blade cores, points, and other tools manufactured using laminar technology. The toolkit includes bifaces, points of various shapes, side-scrapers, end-scrapers (including double ones), burins, discs (not exceeding 50 mm in diameter), choppers, denticulate and notched tools, perforating borers (points), spheroids, etc. In the sample of 551 implements, tools with an intentionally pointed tip in the form of a spout (spike) make up 39 %, spheroids 18 %, borers 10 %, discs 6 %, bifaces 5 %, denticulate and notched tools 5 %, pick-like tools 5 %, side-scrapers 4 %, choppers 2 %, and points 1 %. The cores were prepared mainly by bipolar reduction with a hard hammer. The pressure technique was used less often, mainly for the production of microblades and retouching. Bone artifacts are represented by a harpoon, a spearhead, three needles, and ornaments (Huang Yunping, 1993). The Xiaogushan industry suggests the coexisting of Middle and Upper Paleolithic traditions (Xiaogushan…, 2009: 113–148). This agrees with the regional trend in the development of the Upper Paleolithic technologies, which consisted in the use of "old techniques in primary reduction and use of flakes as blanks" and persisted in China till the Neolithic (Derevianko, 2011: 116).

The age of the Xiaogushan cultural layers is still a matter of debate, despite multiple age estimations through various techniques. The main problem is that some parts of the cultural deposits had shifted, so their stratigraphic position and dates are controversial.

On the basis of the dates derived earlier for layers 2–5 on charcoal and bone samples by the AMS-method, and the new OSL-dates obtained for layers 1–3, and 5, the following chronological sequence of layers was proposed: layer 1 – 70 ka BP, layer 2 – 60–30 ka BP, layer 3 – 30–20 ka BP, layer 4 – 17 ka BP, layer 5 – 10–4 ka BP. Layer 4 is related to the period of low temperatures, which, judging by the decrease in traces of human activities, forced the population to leave the cave. About 10 ka BP, humans returned to

the cave, as evidenced by layer 5, dating back to the Holocene and containing Neolithic materials. Human remains from a burial inlet from layer 5 to layer 4 date back to the period ca 6 cal ka BP (Jia-Fu Zhang et al., 2010: 523).

Description of ornaments

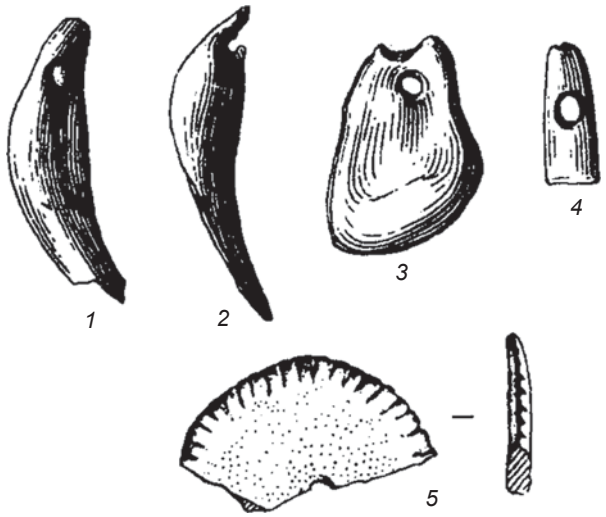
The set of personal ornaments from Xiaogushan Cave includes four pendants and a decorated disc (see *Figure*).

Pendants 1 and 2 were recovered from layer 2, sq. D9 and D8. Pendant 1 was made from the upper canine of a raccoon dog. At first, the root of the tooth was thinned by planing; then small oval-shaped depressions with uneven edges were scraped out from both sides of the tooth. Further, the ancient artisan tried to drill a hole in the recesses, but did not complete this operation. Pendant 2 was made from the upper canine of a feline. The root of the tooth was thinned; after that, a round hole was drilled in it from both sides. The upper part of the pendant is damaged: a small fragment of the drilled bone is missing.

Pendants 3 and 4 were found in layer 3, sq. G8 and F6. Pendant 3 was made from the upper canine of a deer. The root of the tooth was thinned; then a round hole was made in it from both sides. Pendant 4 was made from the upper canine of an unidentified predatory animal. It was drilled from both sides. The hole is oval; the inner surface of its walls is uneven. The lower part of the pendant is missing (Xiaogushan…, 2009: 147–148). Holes in samples 2 and 3 were made through perforation technology. Sample 4, after preparation of the surface, was drilled from both sides. Sample 1 was perforated from both sides until the depressions appeared.

The matter of whether the teeth surfaces were painted remains controversial. In a 1985 report that first presented the collection of pendants, there is no information concerning pigment on the teeth (Zhang Zhenhong et al., 1985). Later, Gu Yucai pointed out traces of red paint in the hole of pendant 3 (1994: 300). In the concluding publication of the results of the studies at the site, it is emphasized that the researchers "could not see the red paint" on the pendants made of teeth (Xiaogushan…, 2009: 151).

Half of the decorated disc was found in layer 3 in the center of the cave, sq. G6 (Huang Weiwen et al., 1986: 263). The item is made from the bone of an unidentified animal species. Its diameter is ca 25 mm, thickness is ca 2 mm. The item is polished on both sides; the edges are polished to a shine. The surface of the ivory-white



Pendants made from animal teeth (*1–4*), a decorated bone disc (*5*) found in Xiaogushan Cave (Xiaogushan…, 2009: 147, fig. 5.1).

disc is slightly convex. The opposite side is slightly concave, painted with red pigment. Short radial lines are cut with a sharp tool along one of the edges. The lines vary in depth and length and show the red pigment inside them. In the center of the disc, there is a hole 2.2 mm in diameter; the hole's edges have traces of red paint (Xiaogushan…, 2009: 148).

It was noted above that the stratigraphic sequence of the site is a matter of debate. The ornaments and bone tools were found in layers 2 and 3; nevertheless, as was noted by Zhang Jia-fu et al., the boundaries of the contact zone between layers 2 and 3 are unclear (Jia-Fu Zhang et al., 2010: 515). The authors argued that the bone artifacts should be dated to the period from 30 to 20 thousand years ago (Ibid.: 523).

Xiaogushan pendants as compared to the oldest personal ornaments from Europe, Siberia, and North China

Western Europe. The earliest pendants from animal teeth include artifacts from Fumane Cave (northern Italy). Bone remains of Neanderthals and anatomically modern humans were found in the cave. The "proto-Aurignacian" deposits, dated to ca 42 ka BP, yielded four incisors of a red deer; their upper parts had grooves for fastening (Broglio et al., 2006: 3). Sequencing of the genome extracted from a human tooth showed that the man inhabiting the cave ca 41–40 ka BP belonged to *Homo sapiens*; the "proto-Aurignacian" layers of the cave are associated exactly with this species of *Homo* (Benazzi et al., 2015).

The set of personal ornaments from Isturitz (France) contains more than 200 drilled shells, teeth, and stone pendants. Layer 4d yielding part of the ornaments belongs to the "archaic Aurignacian" ("proto-Aurignacian"), with an age more than 37 ka (White, 2015: 147).

Pendants of perforated animal teeth and shells (*Rhynchonella*) were found in Grotte du Renne Cave (France). Their age of 45–32 ka BP and their attribution to the anatomically modern humans or Neanderthals are the subject of heated debate (Vanhaeren, Julien, 2011; Caron et al., 2011; Zilhão, 2012**;** Prévost et al., 2021**).**

Central Europe. The set of Aurignacian ornaments, including 22 drilled teeth of animals (beaver, elk, etc.), was found in Mladech Cave (Moravia, Czech Republic). Some of them were recovered from burials with osteological materials of the anatomically modern humans dated to 31.5–30.68 ka BP (Oliva, 2017: 77–79). Most of the bone remains of the early inhabitants of Mladech Cave were defined as those of *H. sapiens*, but some male skulls showed archaic features close to Neanderthaloid. The ongoing discussion focuses on the issue of contacts between *H. sapiens* and Neanderthals.

Decorated discs from Brno II burial site (Czech Republic) belong to the Gravettian; they are dated to 23,680 ± 200 ka BP (Ibid.: 104).

Southeastern Europe. Mousterian artifacts from Bacho Kiro Cave (Bulgaria), inhabited by the Neanderthals, are dated by ^{14}C to a period prior to 51 ka BP (Fewlass et al., 2020). During the initial Upper Paleolithic, the cave was inhabited by representatives of *H. sapiens*—the oldest currently known in Europe. One human tooth and bone fragments were dated to 45.82–43.65 cal ka BP (Hublin et al., 2020). Among the Bacho Kiro artifacts of the initial Upper Paleolithic are the artifacts made of bone, including pendants made of animal teeth (cave bear and ungulates); some pendants are drilled and have a grooved (fluted) surface.

Eastern Europe. The collection of the Spitsyn (Kostenki-Spitsyn) culture includes early ornaments made from animal teeth (primarily polar fox) and shells. The earliest dates of the Spitsyn culture were derived from a horizon located below the "horizon in volcanic ash"; they date back to 42–36 ka BP (44–40 cal ka BP).The artifacts of this culture (layer II, Kostenki-17) include 37 pendants made from the canines and incisors of the polar fox, as well as a small series of pendants made from belemnites, corals, and calcareous worm-pipes. The initial Upper Paleolithic collection includes finds from layer IVw at Kostenki-14; among these, there is a series of ornaments made from mollusk shells (Sinitsyn, 2016: 322). Pendants made from animal teeth have been recorded at the Early Upper Paleolithic sites in the Russian Plain (Ibid.: 326–327).

Ornaments from drilled animal teeth and bone discs were found at Sungir and other sites in the Russian Plain dating back to the early (43–29 ka BP) and the next stage of the Upper Paleolithic (Zhitenev, 2007). Ornaments made from shells of the "Aurignacian" period were found at Suren I in the Crimea (Sinitsyn, 2016: 329).

The Urals. The Zaozerye site in the Middle Urals, on the border of Europe and Asia, yielded two drilled mother-of-pearl pendants from shells of the freshwater mollusk *Unio*, blanks of a similar pendant and a bead, and a bone fragment of a pendant with two drilled holes. The Zaozerye site is attributed to the initial Upper Paleolithic, with a date of 41 ka BP (Pavlov, 2009: 16).

Siberia. The earliest set of personal ornaments in the region was discovered in Denisova Cave, Altai, in the early 2000s. It includes pendants with biconical holes or cut hanging grooves, made from the teeth of fox, bison, and deer (Derevianko, Shunkov, 2004). In the course of excavations in the cave, items from mammoth tusk, soft stone, ostrich eggshell, teeth of marten, cave hyena, cave bear, and others were also found (Shunkov et al., 2016). According to direct ^{14}C dating, the earliest of these artifacts—ornaments from the teeth of red deer (*Cervus elaphus*) and elk (*Alces alces*)—were made ca 45 cal ka BP; together with bone points-borers, the complex of early artifacts is dated to 49–43 cal ka BP (Douka et al., 2019).

The article addressing the study of the assemblage of ornaments from Denisova Cave (Shunkov et al., 2020) highlights the importance of these finds for understanding the process of development of modern behavior. The ornaments from Denisova Cave refer to the Initial and Early Upper Paleolithic. Pendants with holes from animal teeth and perforated flat bone plaques found in the Main, East and South Chambers, and in the Entrance zone, were dated to 50–34 cal ka BP; according to the results of direct dating, some items date back to ca 45 cal ka BP. The collection includes some of the oldest items in Eurasia and the earliest in North and Central Asia, representing symbolic behavior. It is possible that they were produced by the Denisovans, whose traces in the cave are stratigraphically and chronologically closest to the place where the ornaments were found. The authors of that study suppose that the issue of the origins of the ornaments can be solved after investigating the archaeological and anthropological materials of the cave. The researchers believe that in East Asia the earliest

ornaments similar to Denisova artifacts have been found in the caves of Shandingdong, Shuidongou 2, and Ma'anshan (Ibid.). This is also true of the finds from Xiaogushan Cave, Shuidongou 7–9, and Zhiyu.

In Altai, Upper Paleolithic bone pendants were reported from the Maloyalomanskaya, Ust-Kanskaya, and Strashnaya cave sites, and at the Kara-Bom open-air site. Drilled pendants made from teeth (2 spec.) and a radius (1 spec.) of animals, as well as a flat pebble with traces of ocher paint from Kara-Bom, are dated to 48–46 cal ka BP (Derevianko, Rybin, 2003). The collection of stone and bone artifacts from Strashnaya Cave includes a perforated tooth of a red deer, a bone pendant, and bone needles aged ca 44 ka BP, which were found in the horizon with the Denisova technocomplex. In the same layer, in the younger horizon dating to ca 20 ka BP, other ornaments were found (Krivoshapkin et al., 2018).

Beyond the Altai, in Siberia and Mongolia, pendants made from animal teeth and other materials, as well as discs and beads, have been found at several sites of the Initial and Early Upper Paleolithic. The concluding results of their study and modern interpretations are presented in the articles by L.V. Lbova (2018, 2021).

In the Far Northeast of Eurasia, there is the site of Yanskaya (28 ka BP), which has a collection of personal ornaments, including pendants in the form of bone discs and perforated teeth of animals (the latter prevail) (Pitulko, Nikolsky, 2014).

In Transbaikalia, several sites with ornaments are known: Podzvonkovaya, Khotyk, Kamenka (over 40 ka BP), Varvarina Gora (35–28 ka BP), and Tolbaga (34–25 ka BP) (Lbova, 2021: Tab. 1). Notably, among them, only Varvaryna Gora yielded a pendant that was made from animal tooth. In Transbaikalia, pendants were made mainly from stone or ostrich eggshell. The latter are especially widespread. At Podzvonkovaya, one such item was situated in the Lower Complex (49,486–45,547 cal BP), and the rest in the Eastern Complex (45–37 cal ka BP) and Southeastern Complex (44–37 cal ka BP) (Tashak, Antonova, 2019).

East Asia, northern China. In northern China, the largest number of ornaments was found at Shandingdong and in the Zhoukoudian Upper Cave (Beijing). The stratigraphic position and dates of the layers where these items were found have been recurrently specified and corrected. After the latest correction of the stratigraphic position using the accelerator mass spectrometry technique, the following dates were derived from 11 samples of animal bones: ornaments from animal bones 39.8–34.3 cal ka BP; the youngest dates of the site layers 35.1–33.5 cal ka BP. The morphology of the artifacts and the technology of their manufacture correspond to the Early Upper Paleolithic. Li Feng and co-authors associate the emergence of the Upper Paleolithic traditions in northern China with the migration of *Homo sapiens* populations from Siberia to Northern Eurasia (Li et al., 2018). According to A.P. Derevianko, the laminar technique of stone-knapping used in tool manufacturing at Shandingdong originated in southern Siberia, and gradually spread over the adjacent regions (2011: 116).

The Shandindong archaeological materials contain 125 pendants made from animal teeth: badger 60 specimens, fox 29, deer 17, raccoon 9, yellow ferret 2, tiger 1, small carnivorous animals 5 specimens; the animal species has not been identified for 2 pendants. Holes were made in the root of the tooth with a narrow sharp tool by scraping from both sides inward until penetration into the cavity of the tooth. In some specimens, holes were made by scraping and "chipping out" small bone particles. Several holes show signs of wear. Red pigment (hematite) was traced on the surface of some of the teeth-pendants. In the Shandingdong collection of the artifacts with hanging holes, there are drilled tubular animal bones, sea shells, stone beads, and pebbles (Jia Lanpo, 1951: 64–71).

Li Feng and co-authors developed the idea of correlation of the origin of the Shandindong culture with the migration of *H. sapiens* from Siberia, and noted the similarity of the Shandindong ornaments with Kara-Bom pendants and other early items of this type from Altai (Li et al., 2018). Notably, the inhabitants of Denisova Cave and Shandindong used a similar technique for making holes in the teeth-pendants (Shunkov et al., 2017: 261; Shunkov et al., 2020: 53, fig. 5).

Southwards from Shandingdong, the Shuidongou archaeological complex is located; it consists of 12 sites (localities), of which 1, 5, 7–9, and 12 have been excavated. At localities 2, 7–9, and 12, numerous pendants and flat beads were found. Ornaments with holes are made from ostrich eggshell (they prevail) and freshwater mollusk-shells. Most of the artifacts were located near the hearth (Wang et al., 2009). The Shuidongou sites were left by the anatomically modern humans; these are attributed to the Early Upper Paleolithic and associated with the spread of the laminar industry from Siberia and Mongolia (Derevianko, 2011: 121–128). The recent AMS- and OSL-dates were obtained for the layers with ornaments. Shuidongou 2 (in layers 2 and 3, a fragment of a bone needle and more than 70 shell ornaments were found): the age of layer 2 is 30,996–29,441 cal BP, layer 3 is 32,665–30,695 cal BP;

Shuidongou 7 (blade tools and two shell beads similar to those from Shuidongou 2 were found): dated by two samples to 34,364–33,667 and 28,342–27,763 cal BP; Shuidongou 8: dated by a piece of shell bead to 31,280–30,853 cal BP (Li et al., 2019).

The absence of pendants made of animal teeth, the use of ostrich eggshell as the main material, the shape of the beads, the laminar industries, and the tool kit make Shuidongou close to the earlier Transbaikalia sites. The similarity is also supported by other evidence of symbolic activity. The Shuidongou 1 collection contains an engraved siliceous limestone tablet aged ca 30 ka BP (Peng et al., 2012). In a number of features it is similar to the older engraved tablets from the Lower and Southeastern complexes of the Podzvonkovaya site (Tashak, Antonova, 2019). These facts provide the reason to believe that the parallels in the traditions of Shuidongou and western sites are a consequence of the west-to-east migrations of human groups and the innovations they brought.

The Zhiyu site dating to 30 ka BP is situated between Shuidongou and Shandingdong. At this site, in the context of the formation of modern behavior, "especially noteworthy is a fragment of a rounded pendant made of graphite tablet", which resembles pendants from Shandingdong (Derevianko, 2011: 121).

Discussion

The earliest sites with personal ornaments make up a chain that stretches over Eurasia from west to east from Western Europe to China, and from south to north from the Middle East to the Far North. In East Asia, Xiaogushan is the most northeastern Paleolithic site with ornaments. In Asia, to the east of it, similar artifacts were found at the Yana site, located further north. In Northeast China, Xiaogushan is the only currently known Paleolithic site with ornaments.

The Xiaogushan tools and technologies are typologically close to the industries of Shuidongou, Zhiyu, and Shandingdong in northern China. Xiaogushan is one of these Upper Paleolithic sites. The similarity is explained by the spread of the laminar technology to the northeast from the older centers of northern China, of which Shandingdong is the closest to Xiaogushan; the convergence of this technology with the local flake complex; and the gradual development of an industry combining flake- and blade-based techniques of stone reduction. The emergence in Northeast China of the laminar reduction technique, production of tools from bones, and ornaments could have been the result of both contacts between local groups and the migration process. The community of Xiaogushan Cave dwellers was the first known in Northeast China to develop an Upper Paleolithic culture, formed on the basis of the working skills and symbolic behavior typical of the Early Upper Paleolithic.

Some researchers assume that the artifacts from Shandingdong and Xiaogushan layer 2 correspond to the same chronological period (Jia-Fu Zhang et al., 2010: 523). Most likely, Shandingdong was an earlier center of the Upper Paleolithic industry than Xiaogushan. Judging by the available Xiaogushan dates and the regional dynamics of the Middle to Upper Paleolithic transition, the formation of the Xiaogushan Upper Paleolithic tradition should be attributed to the period ca 30 ka BP.

The topic of *Homo* species who potentially created or practiced modern behavior is still a matter of debate for many regions of Eurasia (Prévost et al., 2021). The signs of modern behavior presented at the Xiaogushan site and within the borders of Northeast China evidence *Homo sapiens*.

In terms of raw materials, morphology, semantics, and functions, Xiaogushan ornaments correspond to the general Paleolithic tradition of manufacture and use of personal ornamentation items. However, within the boundaries of East Asia and China, these show a certain local originality. The Xiaogushan ornament collection lacks items made from ostrich eggshell, stone, or mollusk shell, typical of the Chinese sites of Shuidongou, Zhiyu, and Shandingdong, as well as of nearby sites in Transbaikalia. The Xiaogushan ornament collection is closer to the Shandingdong pendant collection, dominated by pendants from animal teeth. Xiaogushan pendants from teeth differ from Shandingdong items in the absence of pigment, as well as in the technical features of their manufacture.

In the general collection of Chinese Paleolithic ornaments, pendants made of animal teeth are quantitatively inferior to other types of personal ornaments. At the sites of northern China of the final Upper Paleolithic (Shizitan, Hutouliang), pendants from animal teeth have not been found (Gai Pei, Wei Qi, 1977: 287–300; Song Yanhua, Shi Jinming, 2013: 54–55). In terms of raw material and manufacturing technique, ornaments from these sites are close to those of the earlier period in Transbaikalia.

The Xiaogushan collection includes two jade items: a large flake and a point (10.77 × 4.5 × 2.08 cm), found in layer 3. The material was taken from the rock outcrops near the cave. The point shows traces of use and rejuvenation. According to Fu Renyi and

Zhou Xiaojing, the jade point (although it was used as a tool), along with ornaments, may indicate the emergence of aesthetic ideas among the inhabitants of the camp, who appreciated the beauty of the stone. There is no direct connection between the Xiaogushan jades and the Neolithic cultures of Xinglongwa and Hongshan, in which jade products played an important role; but it is important that as early as the Paleolithic in Northeast China, there appeared signs of a special attitude towards jade; later, a remarkable "jade culture" emerged on this basis in the region (Fu Renyi, Zhou Xiaojing, 2010). The aesthetic perception of the color and shape of the stone, and the objectification of such a value attitude in special practices of stone use, are undoubtedly two of the manifestations of symbolic behavior. In the Altai, in the Denisova collection, this special attitude reveals itself as quite early in skillfully manufactured stone decorations; in Northeast China, it was formed later, possibly during the spread of the Upper Paleolithic innovations from the adjacent territories.

It is known that in ancient China, sharp items made of jade served not only as art pieces, but also as objects for religious purposes (ritual knives, axes, etc.). It cannot be ruled out that this tradition originated in the Paleolithic.

Xiaogushan is not the only site on the Liaodong Peninsula showing the first signs of modern behavior. In the vicinity of the cave, there are Yufoshan, Cuoshishan, Zhongxinbu, and other sites with cup-marks. Cup-marks are widespread in Eurasia and North America; one part of the artifacts with such marks has been attributed to the Upper Paleolithic, the other to the Lower Paleolithic and even Mousterian (La Ferrassie). Liaodong bone ornaments and cup-marks both represent the early forms of symbolic behavior of the population of the region.

Paleolithic pendants served not only as items of personal ornamentation and symbols of social status, but also as objects associated with early forms of religion. This topic deserves a special discussion.

Conclusions

Xiaogushan is the easternmost site of the early tradition of the use of symbolic pendant objects in East Asia. Its materials mark the spatial and chronological boundaries of the distribution of modern behavior during the Middle to Upper Paleolithic transition period. These are the important markers of the spread of Upper Paleolithic innovations from the centers to the periphery. The Xiaogushan collection of pendants confirms general trends and reveals local features in the evolution of symbolic behavior in Eastern Eurasia.

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Multidisciplinary Study of Burnt Deposits at Surungur, Fergana Valley, Southern Kyrgyzstan

Burnt deposits are an important source of information on ancient lifestyles, providing the possibility of reconstructing the size, intensity of use, and functions of fireplaces at prehistoric settlements, and to assess fuel sources. We outline the results of a multidisciplinary study of fireplaces and their contexts at Surungur—a stratified site in the Fergana Valley, in southern Kyrgyzstan. Sixteen samples from ash lenses and intermediate deposits were studied by rock-magnetism, gas chromatography mass spectrometry (GC-MS), and X-ray fluorescence (XRF). The rock-magnetic analysis suggests that the origin of all samples from ash lenses was anthropogenic. Types of fuel were reconstructed. At the initial stage (Early Holocene), the encompassing deposits likely resulted from short-term occupation, and fuel consisted of wood and grass/dung. In the Middle Holocene, occupation became more long-term, as evidenced by maximal heating temperatures and high concentration of fireplaces. During the Late Holocene, habitation intensity on the platform under the stone ledge remained the same, but heating was less intense. Wood and grass/dung were used as fuel at all stages, suggesting that wood was available in the region throughout the Holocene.

Keywords: *Fergana valley, archaeological site, fireplace, X-ray fluorescence (XRF), gas chromatography mass spectrometry (GC-MS), rock-magnetism.*

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Introduction

Traces of fire use are an important archaeological source. Their analysis makes it possible to reconstruct specific aspects of everyday life and adaptive strategies used by the people of the past. The use of a multidisciplinary approach provides the opportunity to establish the features of hearths, such as the area of the fire-spot, center of the hearth, temperature threshold, and type of fuel used for keeping a fire, as well as to reveal thermally altered surfaces and artifacts (Nesterova, 2019). Physical and chemical methods are important components of geoarchaeological studies, proven to be highly effective and helpful (March, 1996).

The rock-magnetic method has been used in the studies of thermally altered objects from archaeological sites (Carrancho et al., 2009; Jrad et al., 2014). It is based on the idea that nonmagnetic or weakly magnetic minerals often transform into stronger magnetic phases in the course of mineralogical transformations resulting from heat exposure (Aldeias et al., 2016). Ashes are deposits with increased values of rock-magnetic parameters. Examining rock-magnetic features of sediments in conjunction with the method of experimental modeling of fireplaces makes it possible to establish the temperatures of previous heat exposures in the underlying substrate (Carrancho, Villalaín, 2011; Lagunilla et al., 2019), and fuel type from the magnetic properties of the ash (Peters, Church, Mitchell, 2001; Peters et al., 2002).

In the last ten years, methods of gas chromatography mass spectrometry (GC-MS) and X-ray fluorescence analysis (XRF) have been used as tools for studying pyrogenic objects at archaeological sites (Braadbaart et al., 2017). The GC-MS method of analysis establishes the chemical composition of organic substances and materials through the chromatographic separation of complex mixtures, with subsequent mass spectrometric detection. Identifying the ratio of organic compounds (alkanes, alcohols, sterols) serving as biomarkers of plant residues in pyrogenic samples makes it possible to suggest the type of fuel used for making the fire (Han, Calvin, 1969). The XRF method establishes the inorganic composition of deposits and archaeological materials for reconstructing the conditions of their emergence, the dynamics of the environment, and the correlation of horizons.

This article describes the study of complex burnt deposits at the stratified site of Surungur, carried out to establish their genesis (natural fires, controlled burning, fireplaces), as well as the types of fuel that were used by the humans during their habitation period at the site.

Materials

In 2017, the members of the Russian-Kyrgyz archaeological expedition in the Fergana Valley in Southern Kyrgyzstan discovered the multilayered Surungur site (Fig. 1). The study of the site gives some insights into the cultural dynamics and processes of human settlement in the Fergana Valley during the Holocene (Shnaider et al., 2021).

The Surungur site, located under a rock shelter made of limestone boulders, was studied in 2018–2019 (Olenchenko et al., 2019; Shnaider et al., 2021). Excavations were carried out over an area of 0.8 × 1.5 m, to a depth of 2.7 m.

The site has three main layers (the description is provided from top to bottom along the section) (Fig. 2). Layer 1 (1 m thick) is silty loams; broken debris from the roof of the shelter (limestone) is absent. Eight large

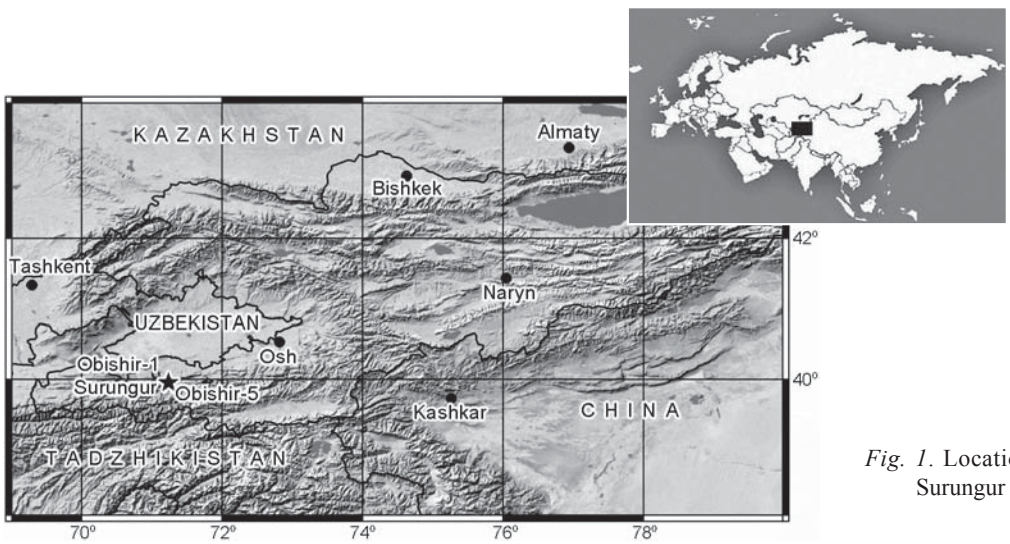

Fig. 1. Location of the Surungur site.

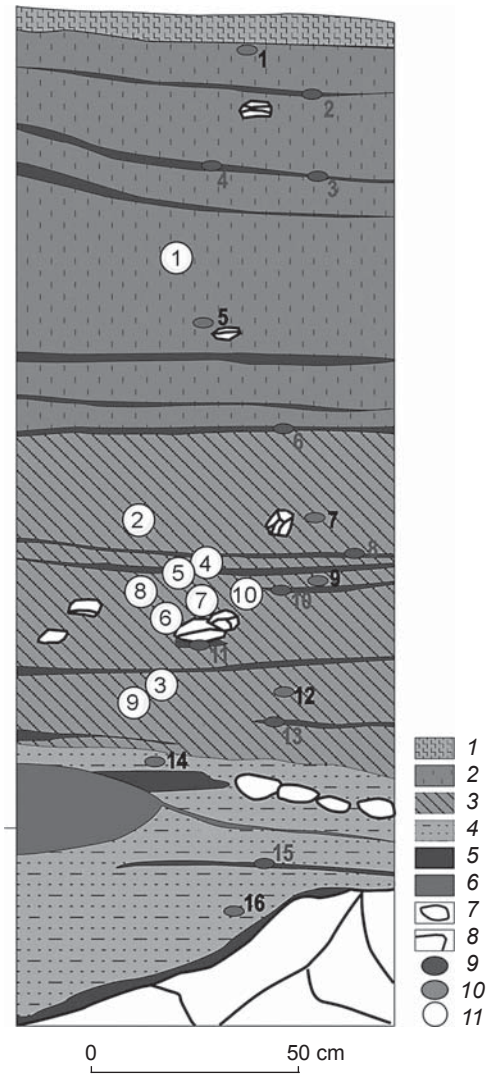

Fig. 2. Stratigraphic profile of the site.
1 – concrete; *2* – layer 1; *3* – layer 2; *4* – layer 3; *5* – ash-containing interlayer; *6* – interlayer of burnt sandy loam; *7* – debris; *8* – large stones on bedrock surface; *9* – place of sampling from ash horizons; *10* – place of sampling from inter-ash layers; *11* – place of sampling for absolute dating.

calcined spots were found, along with small fragments of burnt bones and pottery from the Chust culture of the Bronze Age. The boundary with the underlying layer was indistinct; it was identified from changes in density and the amount of debris. Layer 2 (from 0.6 to 0.8 m thick) was gray-brown silty loams; limestone debris was found in the middle part of the layer. Six calcined spots were discovered, along with numerous lithic artifacts and animal bones, including those showing traces of processing. The boundary with the underlying layer was also indistinct; it was identified by changes in the density and color of the deposits. Layer 3 (from 0.25 to 0.7 m thick) was brown silty loam; limestone debris occurred in small quantities. Three calcined spots were found, including a thick layer of burnt clay whose genesis is a subject of discussion and requires further field research; burnt pebbles lay nearby. The results of trace analysis have revealed that earlier the pebbles were a part of the lining on the hearth and could have been displaced by post-depositional processes. Scarce bone fragments were found in that layer. The rocky surface lay below.

First time, the platform under the stone ledge was inhabited in the Early Holocene. Indirect evidence on the presence of gramineous plants and long-term habitation of herbivores under the stone ledge was found in the sediments of the Middle Holocene. Osteological evidence from this period is dominated by the bones of the Ovicarpines. According to scholars, the industry of the site belongs to the Hissar Neolithic culture, which had not been found previously in the region (Shnaider et al., 2021).

During the works, 17 ash-bearing interlayers (burnt deposits) were identified: six in layer 1, eight in layer 2, and three in layer 3. Their thickness ranged from 1 to 7 cm; length ranged from 40 cm to 1 m. Individual large fragments of charcoal were found along the section. For laboratory studies, samples 2–4, 6, 8, 10, 11, 13, and 15 were taken from the central areas of nine distinct ash horizons in all three cultural layers (Fig. 2). These were taken from the central, thickest part of ash layers in the stratigraphic section of the site. In the layers without visible traces of thermal impact, areas with the highest values of magnetic susceptibility were identified using a KT-5 kappameter, and samples were taken from them. For establishing the degree of ash contamination in the cultural deposits of the site, samples 1, 5, 7, 9, 12, 14, and 16 were taken from the inter-ash layers (Fig. 2). Ten samples were taken for absolute dating: one from layer 1 and nine from layer 2.

Methods

Absolute dating

Radiocarbon analysis was conducted in the Accelerator Mass Spectrometry Center for Collective Use at Novosibirsk State University – Novosibirsk Scientific Center (AMS Golden Valley). Four bone fragments (GV-02123, GV-02797, GV-02798, and GV-02799), three soil samples (GV-02124, GV-02589, and GV-02590), and three samples consisting of a mixture of soil and charcoal (GV-02588, GV-02800, and GV-02801) have been analyzed. The bone fragments were very poorly preserved and probably burnt, with collagen content of no more than 1 %. Collagen could

be extracted only from samples GV-02123 and GV-02798; humus was also extracted from GV-02123; only humus was extracted from GV-02797; and humus and charcoal were extracted from GV-02799. Humus was extracted from soil samples GV-02124, GV-02589, and GV-02590, and humus and charcoal were extracted from samples of the mixture GV-02588, GV-02800, and GV-02801. Each material—collagen, charcoal, and humus—was dated separately.

Samples were prepared in the Isotope Research Laboratory at the Institute of Archaeology and Ethnography SB RAS, using the standard methodology (Brock et al., 2010; Brock, Higham, Bronk, 2010). Carbonization of the obtained samples of each material was carried out using an absorption-catalytic unit (Lysikov et al., 2018); radiocarbon content was established using a unique research unit "Accelerator Mass Spectrometer of the Institute of Nuclear Physics of the Siberian Branch of the Russian Academy of Sciences" (Parkhomchuk, Rastigeev, 2011).

Rock-magnetic analysis

The following magnetic parameters have been established for the samples under study: magnetic susceptibility at room temperature at various frequencies (χFD), temperature dependence of magnetic susceptibility ($\kappa(t)$), anhysteretic remanent magnetization (ARM), saturation isothermal remanent magnetization (SIRM), hysteresis parameters, and parameter quantifying the contribution of magnetic minerals of different coercivity (S-ratio). That set of measurements was carried out in the Laboratory of the Main Geomagnetic Field and Petromagnetism at the Institute of Physics of the Earth RAS according to the standard methodology (Evans, Heller, 2003), under conditions similar to those adopted in the study of fires on loess substrate (Kulakova et al., 2021). Measurements were done in 3–4 duplicates, with subsequent averaging. The scatter of duplicate values was insignificant, and corresponded to normal distribution of the random variable.

Gas chromatography mass spectrometry method

Samples by volume 2–3 g were taken for analysis. Their extraction was carried out using a mixture of dichloromethane-methanol in a ratio of 9:1 (the volume of 5 ml), with the addition of an internal standard (1 mg of biphenyl) in sealed vials at the temperature of 80 °C for three hours. After cooling, the solution was filtered and solvent was purged with dry nitrogen to the volume of 100 μl.

The prepared samples were analyzed using a GC-MS-system Agilent 7000B (made in the USA) based on three quadrupoles. For separating the substances contained in the samples, an HP-5ms capillary column (30 m × 0.25 mm × 0.25 μm) was used. The analysis was performed under the following conditions: the oven temperature program from 130 to 310 °C at a rate of 11 °C/min; inlet temperature 310 °C, split 5:1; carrier gas (helium) flow rate 1.2 ml/min. Mass spectrometer was used in scanning mode in the mass range of 40–500 m/z; ionization energy 70 eV; the ionization source temperature 250 °C.

Quantitative analysis was carried out according to the internal standard (biphenyl). Sensitivity coefficients of biphenyl to n-alkanes and alcohols were established by analyzing a mixture of biphenyl, docosane, and dodecanol standards.

X-ray fluorescence analysis

All samples from the Surungur site were mixed and averaged by the quartering method. Each selected sample (0.250 g) was ground for several minutes in an agate mortar, after which a sample of diluent (polyethylene), chemically pure and transparent in the X-ray range and weighing 0.750 g, was added to it. The mixture, weighing 1 g, was thoroughly mixed again until it became homogeneous, after which a tablet was formed of it using an Atlas T25 (Speciac) automatic press under a load of 21 tons.

The composition of the tablet was established using an ARL Perform'X X-ray fluorescence spectrometer (Thermo Scientific) with the Rh-anode tube. The content of elements was calculated using the UniQuant software.

Since the samples were a mixture of host rock and ash, the content of the identified components in the surrounding soil had to be taken into account for reliably obtaining the chemical composition of the combustion products. Sample 14, which was a pure material of the host rock, was used as reference. The ratio of the main components (Al and Si) calculated for it was applied to further analysis of the chemical composition of the ash.

Results

Absolute dating

The results of radiocarbon dating of three types of samples—bone collagen, charcoal, and humus—indicate that people settled at the site during the Holocene period (Fig. 3). There is a linear correlation between the age and depth where the samples occurred, which suggests a fairly uniform sedimentation in the region under study over the last 7000–8000 years. A date from bone and humus was obtained for layer 1; it indicates that the middle part of the layer emerged ca 3000–3500 BP. For layer 2, a series of dates was obtained that fit the chronological range of 7900–5900 BP (Fig. 3). Pieces of charcoal (samples GV-02800 and GV-02588), located in the section in close proximity

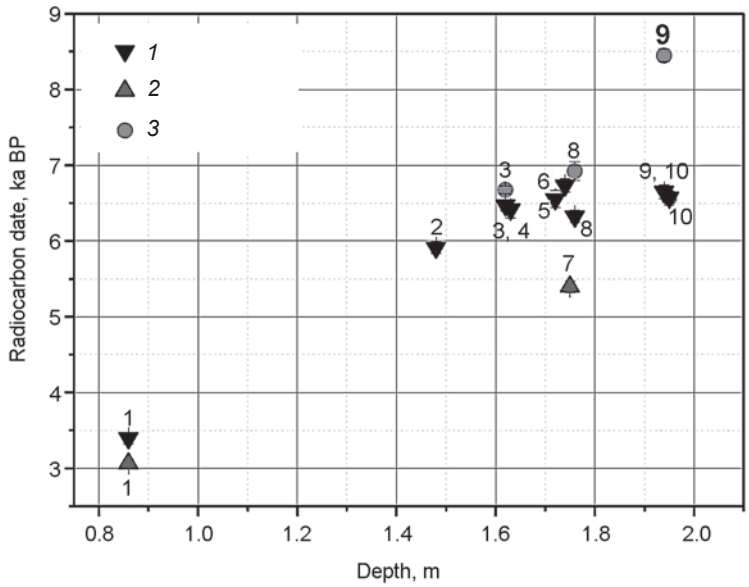

Fig. 3. Graph of the dependence of dates on the depth of samples.
1 – humus; *2* – collagen; *3* – charcoal.

to each other, reveal a large difference in age of ca 1800 years, which can be explained by the fires that happened at that time and involved ancient sites, and mixing of soil layers during the period of intense habitation at the site.

Rock-magnetic analysis

As opposed to the pyrogenic objects of natural origin, the objects of anthropogenic origin are distinguished by higher temperatures resulting in increased concentrations of magnetite (Kulakova et al., 2021; Jrad et al., 2014). The rock-magnetic method was used for studying sixteen samples from the section of the Surungur site (Table 1). Three of the samples taken from the inter-ashy layers—1, 14, and 16—have revealed similar magnetic properties corresponding to the lowest values of rock-magnetic parameters. Temperature curves of magnetic susceptibility in these samples show the greatest differences in the initial and final values of magnetic susceptibility after the cycle of heating/cooling reaching 700 °C (Fig. 4). The cooling curve was significantly higher than the heating curve, indicating predominant formation of magnetite during the temperature impact (according to the Curie point). The values of rock-magnetic parameters and behavior of the thermal curves indicate that samples 1, 14, and 16 did not experience significant heating effect in the past and do not contain ash; therefore, they can be considered to be host rocks. As opposed to other samples, these samples were characterized by the lowest values of the S-ratio$_{100mT}$ (0.79–0.86); this suggests a relatively higher content of hematite/goethite relative to magnetite/maghemite, and may reflect the initial ratio of the magnetic minerals in host rocks. In appearance, sample 14 stands out among the others by its reddish tint, which may be associated with higher concentration of goethite.

The remaining thirteen samples corresponded to the values of magnetic susceptibility from 1.37 to 5.2×10^{-6} m^3/kg; values of frequency dependence of magnetic susceptibility ranged from 12.0 to 49.3$\times$ $\times10^{-8}$ m^3/kg; the SIRM values ranged from 12.3 to 35.7 mAm^2/kg, and the ARM values from 0.11 to 0.39 mAm^2/kg. This indicates the increased concentration of magnetic minerals. According to the hysteresis data, magnetite was the main magnetic mineral in these samples. The presence of hematite and goethite was more typical of the composition of samples 5, 9, and 12 from inter-ash layers. The increased concentration of magnetite/maghemite is associated with the presence of either a thermally altered substrate or ash.

Relative ash content was estimated from the difference between the initial values of magnetic susceptibility of the samples under consideration and host rocks on the temperature curves (Fig. 4). If the initial values of magnetic susceptibility on the thermal curves corresponded to those of the host rocks, the sample most likely did not contain ash. The relative ash content in the rest of the samples was conventionally identified as low (the increase in magnetic susceptibility up to 2 times), significant (2–3 times higher), or high (more than 4 times higher).

Gas chromatography mass spectrometry analysis

The analysis has revealed the traces of C_{20}-C_{33} n-alkanes, and C_{20}-ol, C_{22}-ol, C_{24}-ol, and C_{26}-ol even

Table 1. **Petromagnetic values of the samples from the Surungur site**

Sample	χ, × 10^{-6} m^3/kg	$\chi_{FD,}$ × 10^{-8} m^3/kg	SIRM, mA m^2/kg	ARM, mA m^2/kg	S-ratio	
					100 mTl	300 mTl
SR-1	0.97	8.1	8.3	0.09	0.81	0.96
SR-2	2.95	27.9	22.2	0.24	0.93	0.99
SR-3	1.80	16.4	15.1	0.16	0.92	0.99
SR-4	1.37	12.0	12.3	0.11	0.89	0.98
SR-5	2.53	26.2	16.2	0.18	0.84	0.99
SR-6	3.06	26.2	26.6	0.29	0.90	0.99
SR-7	5.20	49.3	35.7	0.39	0.94	0.98
SR-8	2.71	25.4	21.7	0.23	0.90	0.99
SR-9	1.40	12.2	12.4	0.12	0.89	0.99
SR-10	2.98	27.0	23.5	0.27	0.92	0.99
SR-11	3.87	36.9	28.4	0.31	0.93	1.00
SR-12	2.73	24.7	21.6	0.22	0.91	1.00
SR-13	2.46	24.2	17.8	0.22	0.89	0.98
SR-14	1.06	9.0	8.8	0.09	0.79	0.92
SR-15	3.31	31.6	24.1	0.28	0.90	0.99
SR-16	0.99	9.0	8.9	0.10	0.86	0.98

alcohols in the samples. Bacteria, algae, and plants are the source of high molecular weight of alkanes and alcohols (Han, Calvin, 1969). The typical features of higher plants include a significant predominance of odd over even n-alkanes, as well as the presence of even alcohols and the complete absence of odd alcohols.

For quantitative estimation of predominance degree of odd n-alkanes over even n-alkanes and thus for classification of sediments according to the presence of higher plant residues in them, it was proposed to use the OEP index, which takes into account C_{26}–C_{33}, that is, the main hydrocarbons that are a part of plant epicuticular waxes (Zech et al., 2009). The ratio between n-alkanes C_{27}, C_{29}, and C_{31} for different life-forms of plants does not coincide. It has been suggested that n-alkanes C_{27} and C_{29} dominate in most modern trees and shrubs, while n-alkanes C_{31} and C_{33} dominate in grasses (Ibid.). The $C_{31}/(C_{29} + C_{31})$ ratio is used for numerical characterization of such dependences (Bush, McInerney, 2013). As for alcohols, they can be considered an additional trait to n-alkanes, corresponding to higher plants.

The analysis has revealed significant differences between the samples in the content of alcohols and n-alkanes (Table 2). Their highest content was in samples 1, 2, 4, 7–9, and 11. In contrast, sample 15 had a very low content of alkanes (0.01 mg/kg), which was an order of magnitude lower than the values in other samples. Although the total content does not provide the necessary information, it is important to mention that samples 1 and 2, which contained the largest amount of alkanes, were taken relatively close to the surface, where grasses grow. Therefore, upon further consideration, we believe that any conclusions about plant-remains from these two samples should be drawn with extra caution.

The OEP-index for samples 5, 7, 9, and 16 was less than 1, which indicates the absence of higher plant-residues in these samples and the microorganism origin of the observed biomarkers. These samples do not belong to ash interlayers; therefore, they are not to be considered while assessing the type of fuel used. As far as the index $C_{31}/(C_{29} + C_{31})$ is concerned, samples 1, 2, and 8 showed values over 0.6; consequently, the observed biomarkers were most likely of herbal origin. Samples 1 and 2 were probably contaminated by grasses from the surface, and only sample 8 can be attributed to the remains of grass.

The $C_{31}/(C_{29} + C_{31})$ index for the remaining samples (3, 4, 6, and 10–15) was close to 0.5. This indicated the mixed origin and use of mixed fuels with some

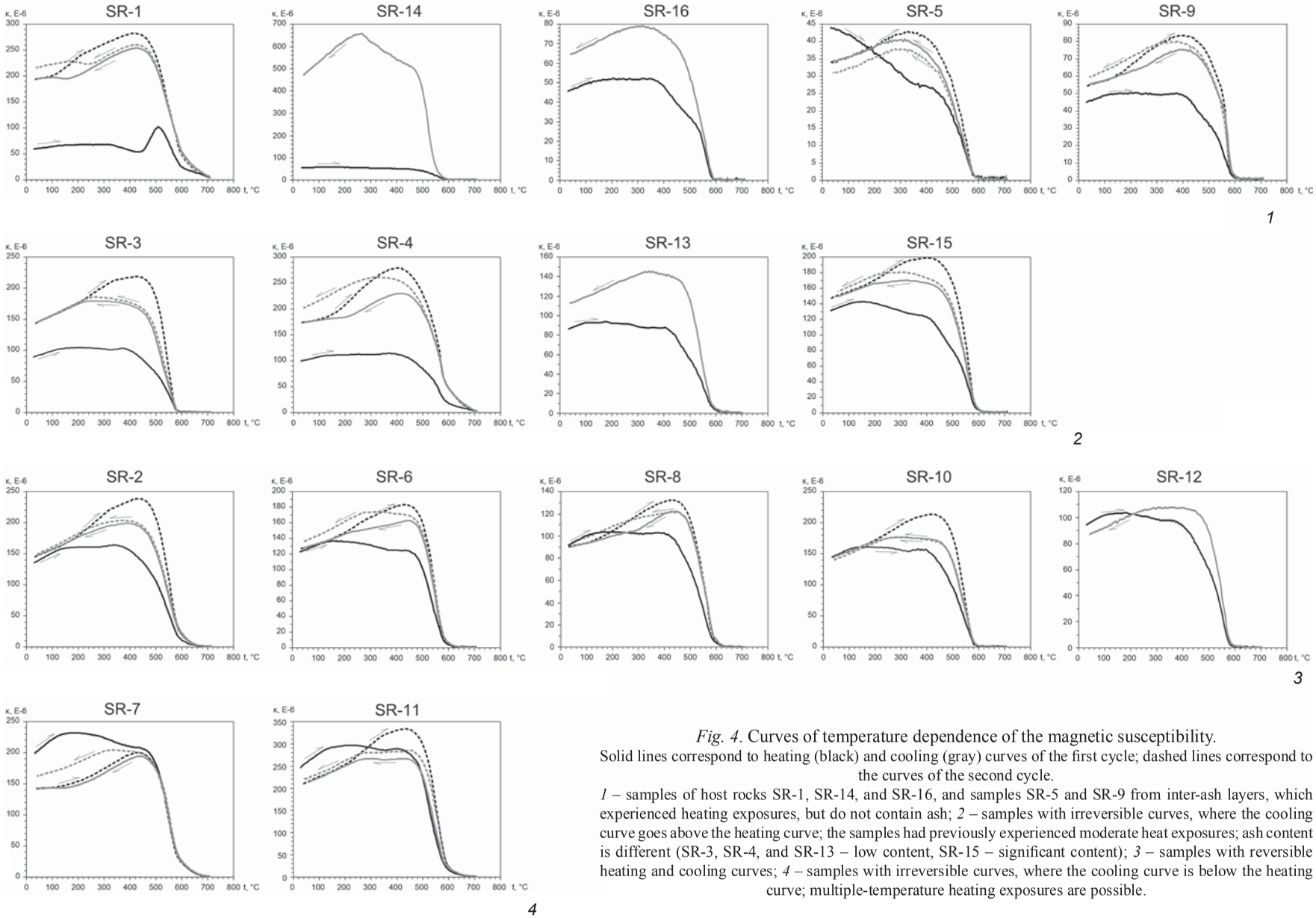

Fig. 4. Curves of temperature dependence of the magnetic susceptibility.

Solid lines correspond to heating (black) and cooling (gray) curves of the first cycle; dashed lines correspond to the curves of the second cycle.

1 – samples of host rocks SR-1, SR-14, and SR-16, and samples SR-5 and SR-9 from inter-ash layers, which experienced heating exposures, but do not contain ash; *2* – samples with irreversible curves, where the cooling curve goes above the heating curve; the samples had previously experienced moderate heat exposures; ash content is different (SR-3, SR-4, and SR-13 – low content, SR-15 – significant content); *3* – samples with reversible heating and cooling curves; *4* – samples with irreversible curves, where the cooling curve is below the heating curve; multiple-temperature heating exposures are possible.

Table 2. **The total content of n-alkanes and high molecular weight alcohols, as well as generalized indices in the samples from the Surungur site**

Sample	Alkane content, mg/kg	Alcohols content, mg/kg	$C_{31}/(C_{29} + C_{31})$	CPI	OEP
SR-1	6.57	0.28	0.61	7.135	8.822
SR-2	1.68	0.14	0.834	5.413	6.966
SR-3	0.04	0	0.479	2.377	3.637
SR-4	0.89	0.14	0.501	1.081	1.45
SR-5	0.1	0.09	0.408	0.916	0.913
SR-6	0.03	0.01	0.476	1.678	2.442
SR-7	1.81	0.33	0.281	0.809	0.659
SR-8	0.88	0.09	0.613	1.26	1.565
SR-9	0.6	0.77	0.225	0.832	0.526
SR-10	0.16	0.02	0.531	4.166	5.599
SR-11	0.67	0.09	0.425	1.613	1.893
SR-12	0.07	0.01	0.509	3.776	4.229
SR-13	0.06	0	0.525	1.683	2.327
SR-14	0.08	0.03	0.557	1.483	1.71
SR-15	0.01	0	0.483	1.404	1.696
SR-16	0.23	0.29	0.447	0.999	0.969

prevalence of wood content for samples 3, 6, 11, and 15 ($C_{31}/(C_{29} + C_{31})$ – index less than 0.5).

X-ray fluorescence analysis

The compounds of silicon, calcium, phosphorus, and potassium can be considered to be the most pronounced markers of the type of fuel among inorganic components available for analysis (Table 3). As a rule, large content of silicon, as well as increased content of potassium and phosphorus, in ash suggests the predominant use of grass or dung as fuel. High content of calcium is typical for combustion products of wood species. Silicon was chosen as a marker, since the actual calcium content of samples might have been strongly influenced by the surrounding limestone rocks. Since the analysis of potassium and phosphorus did not reveal any regularities, which can be explained by uncertainty of the contribution of the host rock, these elements were not used for assessing the fuel type in this study.

Discussion

Rock-magnetic analysis

For interpreting the samples, with the exception of host samples 1, 14, and 16, a graph of the dependence of magnetic susceptibility (χ) on anhysteretic remanent magnetization ARM was made (Fig. 5). Since both parameters were concentration-dependent, we can speak of an increased concentration of magnetic minerals (represented mainly by fine-grained magnetite) from sample 4 to sample 7 (Fig. 5).

Samples 2–5 (layer 1) show lower concentrations of magnetic grains as compared to samples from layer 2 (6–13) and the ash interlayer from layer 3 (15) (Fig. 5). An analysis of the thermomagnetic curves (see Fig. 4) allows the conclusion to be drawn that sample 5 (from the inter-ash space) doesn't contain ash, but experienced high-temperature heat exposures at an earlier time. The magnetic susceptibility of samples 3 and 4 continued to grow during the cycle of heating up to 700 °C and subsequent cooling. Accordingly, it can be concluded that the heat exposure of the substrate (possibly up to 400 °C) was moderate, and that a small amount of ash is present in the samples. Sample 2 shows reversibility of the heating and cooling curves, which suggests previous high-temperature heat exposures (600–650 °C); this sample probably contains a significant amount of ash. The unequal heat exposure of samples 2–4 can be associated with combustion of different types of fuel on them (Aldeias, 2017)

Table 3. **The content of the main inorganic components in the samples from the Surungur site, established by the XRF method (without taking into account the composition of the reference sample), wt%**

Sample	Na	Mg	Al	Si	P	S	Cl	K	Ca	Ti	Mn	Fe	Zn
SR-1	0.47	3.2	5.41	15.32	0.63	0.64	0.08	2.49	26.77	0.42	0.13	4.13	0.25
SR-2	0.37	4.87	4.62	18.86	1.17	0.21	–	2.65	21.3	0.32	0.12	3.37	0.17
SR-3	0.15	1.54	1.5	4.49	0.47	0.07	–	0.74	30.42	0.57	–	1.06	0.99
SR-4	0.5	3.45	4.79	14.44	1.89	0.19	0.08	2.31	28.62	0.34	0.11	3.28	0.13
SR-5	0.25	6.83	3.5	17.46	1.71	0.18	0.08	3.22	20.31	0.3	0.13	3.15	1.71
SR-6	0.23	5.26	2.8	10.09	0.83	0.1	0.07	2.32	17.99	0.2	0.1	2.02	0.89
SR-7	0.47	5.95	3.62	13.88	1.63	0.15	0.11	3.24	28.23	0.28	0.14	2.94	0.09
SR-8	0.4	5.52	3.26	12.47	1.11	0.11	–	2.8	31.95	0.33	0.27	3.3	0.36
SR-9	–	6.09	3.24	12.65	1.04	0.11	0.07	3.2	26.25	0.37	0.19	4.42	4.52
SR-10	0.07	5.72	3.59	12.96	1.05	0.09	–	2.79	28.91	0.42	0.16	3.76	2.15
SR-11	0.43	5.83	3.66	13.79	1.67	0.09	–	2.71	29.01	0.29	0.13	2.91	0.13
SR-12	0.26	4.62	2.59	9.24	0.9	0.06	–	2.12	19.76	0.21	0.1	2.47	0.53
SR-13	–	5.76	3.93	13.71	0.85	0.12	–	2.74	26.64	0.37	0.16	3.86	3.27
SR-14	–	3.33	6.19	14.79	0.22	–	–	3.18	11.87	0.46	0.1	4.61	2.56
SR-15	–	3	3.17	10.47	0.84	0.1	–	2.27	19.48	0.28	0.12	2.73	2.25
SR-16	–	3.09	3.16	11.25	0.58	0.1	–	1.85	19.17	0.27	0.1	2.87	2.02

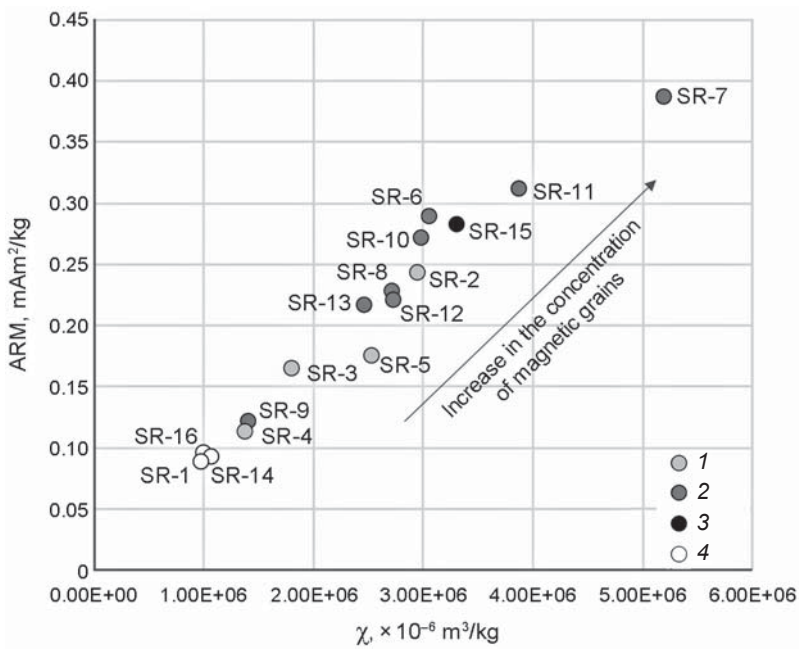

Fig. 5. Graph of dependence of magnetic susceptibility χ on anhysteretic remanent magnetization ARM.
1 – layer 1; *2* – layer 2; *3* – layer 3; *4* – host rocks without traces of previous heating and ash.

or with the location of the substrate at the periphery or in the center of the combustion area (Carrancho, Villalaín, 2011).

Samples 6–13 from cultural layer 2 manifest the highest concentrations of magnetic minerals (see Fig. 5). Sample 9 from the inter-ash space doesn't contain ash, but experienced moderate heat exposures (up to 500–600 °C) (see Fig. 4). Sample 13 contains a small amount of ash, but its magnetic susceptibility temperature curves are irreversible; most likely, it belonged to the peripheral area of the fireplace (probable instances of heat exposure up to 400–450 °C). Samples 6, 8, 10, and 12 exhibit a similarity in the behavior of the temperature curves and show their reversibility, which indicates previous heat exposures to more than 650–700 °C. The ash content in these samples is different: it is significant in samples 6 and 10, and low in samples 8 and 12. Samples 7 and 11, which correspond to the highest values of magnetic susceptibility and remanent magnetization, show decreased value of magnetic susceptibility when studying its temperature dependence. This is associated with high-temperature transformations (Maki, Homburg, Brosowske, 2006) and testifies to repeated fires made by ancient people in the same place. According to rock-magnetic data, these samples contain the largest amount of ash. Notably, the GC-MS-analysis has not revealed the remains of higher plants in sample 7, which can be explained by their complete burnout.

Sample 15 from the ash interlayer of cultural layer 3 shows high values of rock-magnetic parameters (see Fig. 5), but a slight excess of the cooling curve over heating curve on the temperature curves of magnetic susceptibility (see Fig. 4). Most likely, the sample is a thermally altered substrate from the area close to the central part of the fireplace (possible previous heat exposures up to 600 °C), with significant ash content.

Chemical analyses

According to the results of the GC-MS-analysis, most of the samples contain even alcohols and odd n-alkanes—markers of higher plants, with the exception of samples 5, 7, 9, and 16, which don't contain plant biomarkers.

Samples 1, 2, and 8 include mainly grass-residues; only in sample 8 can they be associated with human activity and type of fuel used.

Samples 3, 4, 6, and 10–15 show a mixed composition (grasses and wood). People probably used grasses and wood equally (recorded by the predominance of wood in samples 3, 6, 11, and 15).

The XRF analysis has shown that samples contain combustion products: mainly of grasses in 2, 7, 8, 10, and 13, and mainly of wood in 3, 6, 12, and 15 (Table 4).

Table 4. **Calculated silicon content in the ash of the samples from the Surungur site and the supposed type of fuel, according to the data obtained from the GC-MS and XRF analyses**

Sample	Si content in ash, wt%	Supposed type of fuel	
		According to the GC-MS data	According to the XRF data
SR-2	7.82	Predominantly straw/dung	Predominantly straw/dung
SR-3	0.91	Predominantly wood	Predominantly wood
SR-4	2.99	Mixed type	"
SR-5	9.10	No plant remains	Predominantly straw/dung
SR-6	3.4	Predominantly wood	Mixed type
SR-7	5.23	No plant remains	"
SR-8	4.68	Predominantly straw/dung	"
SR-9	4.91	No plant remains	"
SR-10	4.38	Predominantly straw/dung	"
SR-11	5.04	The same. Possible contamination with debris	"
SR-12	3.05	Predominantly wood	"
SR-13	4.32	Predominantly straw/dung	"
SR-15	2.9	Predominantly wood	"

Note: "Mixed" type of fuel means equal content of combustion products of wood/shrubs and grasses/animal dung.

The data obtained from the GC-MS and XRF analyses, as revealed by their comparison, are in good agreement with each other, with the exception of sample 11. Sample 11 is most likely contaminated, since it was taken in a place adjacent to the zone of debris (see Fig. 2).

Comparison of the results of rock-magnetic and chemical analyses has shown that the samples with high ash content yielded traces of exposure to high temperatures (Table 5). Consequently, there were long-term and non-isolated acts of burning plant material. In this case, the chemical composition indicates mainly the use of a mixed type of fuel, but the temperature of the heat does not depend on the type of fuel. Ash layers in cultural layers 1 and 2 contain mainly the remains of burning grasses and/or animal dung, as well as wood. In layer 3, the fuel for the pyrogenic object was wood, and, to a lesser extent, grasses.

Conclusions

During the field study of site deposits, ash horizons alternating with loam deposits have been found. Radiocarbon analysis of archaeological evidence (bones and charcoal) has revealed that humans settled at this site in the Early Holocene.

According to the rock-magnetic parameters (magnetic susceptibility, frequency magnetic susceptibility, ARM, and SIRM) and the data on the paleotemperature heat exposures of samples 1–13, cultural layers 1 and 2 were subjected to high temperatures for a long time; the highest and multiple heat exposures (above 650–700 °C) were found in the samples from the deposits of cultural horizon 2. Using the GC-MS and XRF methods, it has been established that the source of long-term high-temperature exposures during this period could have been woody species of deciduous trees, grasses, shrubs, and dung. Sample 1 from the roof of layer 1 was not exposed to direct fire, since it was not contaminated by combustion products. The soil corresponding to samples 5 (layer 1) and 9 (layer 2) had been subjected to significant temperature effects in the past, but was not contaminated with ash.

Cultural layer 3 differs in its composition (features) from the overlying layers. Only three ash-containing interlayers have been found in it; the enclosing soil was not contaminated with ash (samples 14 and 16). This can be explained by short-term habitation of humans under the stone ledge, since ash from the fireplaces should have been mixed with the soil under prolonged anthropogenic impact. One pyrogenic object (sample 15) from the middle of the layer was examined. According

Table 5. **Results of studying the samples from the Surungur site**

Sample	Prolonged heat exposures of soil, t, °C	Ash content	Type of fuel according to the GC-MS and XRF data
SR-1	–	–	–
SR-2	600–650	Significant	Mixed
SR-3	Up to 400	Not too high	
SR-4	Up to 400	"	More wood
SR-5	> 600	–	–
SR-6	> 700	Significant	More wood
SR-7	Multiple > 700	Very high	More straw/dung
SR-8	> 700	Not too high	
SR-9	500–600	–	–
SR-10	> 700	Significant	More straw/dung
SR-11	Multiple > 700	Very high	
SR-12	> 700	Not too high	More wood
SR-13	400–450	"	More straw/dung
SR-14	–	–	–
SR-15	Up to 600	Significant	More wood
SR-16	–	–	–

to rock-magnetic data, the deposits in this area were exposed to high temperatures (up to 600 °C): they contain a significant amount of ash, which points to the anthropogenic origin of the ash layer. According to the results of the GC-MS and XRD analyses, people used mainly wood and, to a lesser extent, grasses.

On the basis of the data of multidisciplinary study, it is possible to have an idea of the stages of human settlement at the Surungur site. During the formation of layer 3, people lived under the rock shelter several times, using wood and grasses as fuel. The time when layer 2 was formed corresponds to the stage of the most active and constant stay of people on the platform under the stone ledge. This is evidenced by the maximum values of heat effect on the deposits and extremely high ash-content in the cultural layer. During this period, the inhabitants of the site used mainly grasses and/or animal dung and wood as fuel. The accumulations of layer 1 probably reveal short-term events of human habitation in the platform under the stone ledge; heat effects on the deposits were not as significant. Grass/animal dung and wood were used as fuel. This study makes it possible to conclude that woody vegetation was available in the area of the site during the period of human habitation there.

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Handles of Early Iron Age Cauldrons from Southwestern Siberia

Handles of Early Iron Age bronze cauldrons from southwestern Siberia are described with reference to their ritual meaning. Typological features, such as knobs, arcuate, or square shape, are relevant for dating. Two chronological groups are established: the Tagar (second half of the 1st millennium BC) and Xiongnu-Xianbei (late 1st millennium BC to early 1st millennium AD). The interpretation of handles depends on the context. At settlements (Turunovka-4) and in certain hoards (First Dzhirim) of the Late Bronze Age, they can belong to foundry scrap. However, handles occur in long-term ritual sites such as Aidashenskaya Cave, suggesting a different interpretation. Indeed, at Eastern European forest-steppe sites of the Xiongnu era, handles of cauldrons had been intentionally buried, most often near water sources, where the summer camps of nomadic herders were situated. A similar situation is observed in southwestern Siberia, from the Baraba forest-steppe to the Middle Yenisei valley.

Keywords: *Early Iron Age, southwestern Siberia, metal cauldrons, rituals, cauldron handles, early nomads.*

Introduction

Fragments of any complex metal products represent a category of artifacts, the interpretation of which allows us to consider a whole range of problems, including technological design features, and the ritual and semantic meaning of these products. These items include cast metal cauldrons widespread in the 1st millennium BC to the early 1st millennium AD on the territory of several landscape zones of Eurasia. Structurally, they consist of three parts: a pedestal, a body, and handles. Each of these parts was formed separately and, before casting, they were assembled into one product. The destruction of metal cauldrons during their various uses (domestic and ritual) most often occurred precisely on these parts (handles, fragments of the body and the pedestal). There are known attempts to repair cauldrons with a broken handle (Fig. 1). In the hoards of the Early Iron Age (First Dzhirim, Fourth Uibat, Prigorsk, Idrinskoye) on the Middle Yenisei (Borodovsky, Oborin, 2018: 89, fig. 2, *2–6*), the fragments of handles, bodies, and pedestals of metal cauldrons have quite often been found. However, fragments of cauldron handles made of non-ferrous metal from the Late Bronze Age constitute a special category of such finds. They occur in housing, burial, ritual, and production complexes, as well as among accidental finds, from the Ob-Irtysh interfluve to the Middle Yenisei. This article is devoted to the interpretation of such items in southwestern Siberia of the Early Iron Age.

Results of research

The handles of metal cauldrons of the Early Iron Age from the territory of the southern part of Western Siberia are classified according to the preservation of the original structural interface with the edge of the cauldron's body. Among the finds, there are the walls of cauldrons with

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Fig. 1. Metal cauldron with a missing handle (outskirts of the city of Kansk, Krasnoyarsk Territory).

a handle and separate handles. In the first case, there is variability in the degree of destruction of the entire vessel. Some of the found fragments are quite large; for example, a find from the bank of the Kan River (Fig. 2, *2*); and others are small fragments of the rims: from Turunovka-4 (Fig. 2, *1*) (Molodin, 1985: 165; Stepnaya polosa…, 1992: 471, tab. 121, *15*), the First Dzhirim hoard (Fig. 3, *4*, *5*) (Borodovsky, Oborin, 2018: 89, fig. 2, *2–6)* and Aidashenskaya Cave (Fig. 4). The separate handles of cauldrons are represented by the finds from Voznesenka, Podsopki (see Fig. 3, *1, 2*), and by a specimen from the funds of the Minusinsk Museum of Local Lore (see Fig. 3, *3*). The handles with nail-shaped protrusions (see Fig. 3, *1*, *2*) correspond to the type of destruction of the cauldron from the vicinity of Kansk (see Fig. 1). The interpretation of such finds can have several options. A number of scholars believe that there are several ways, levels, and types of interpretation in archaeology (Garden, 1983: 166; Klein, 1991: 316). According to J.-C. Gardin, the literature often presents simple interpretive constructions consisting of an identification of coincidences and possible cultural influences (1983: 153). With this approach, interpretation is a logical paraphrase establishing similarities between archaeological sites scattered in space and time. Compiling a list of such paraphrases leads to the identification of a number of "consistent patterns" in interpretations (Ibid.: 154). When studying accidentally found handles of the Early Iron Age metal cauldrons, this procedure is extremely important for clarifying the historical and cultural context, which allows one to attempt the reconstruction of the meanings contained in them.

The level of interpretation also includes descriptions of artifacts and their assemblages, revealing their meaning and functions (Klein, 1991: 316), since the purpose of an item or part of it can often be associated with certain ritual activities. In this regard, attention should be paid to the interpretation of the placement in the ground of some significant parts (handles) of metal cauldrons. In particular, according to one point of view, the deliberate burial of fragments of Hunnic cauldrons with handles near water sources is a reflection of certain rituals (Mänchen-Helfen, 2014: 323). According to the hypothesis of Y.I. Spasskaya, ancient nomads, going over to their summer camps in the spring, performed the ritual of "leaving the

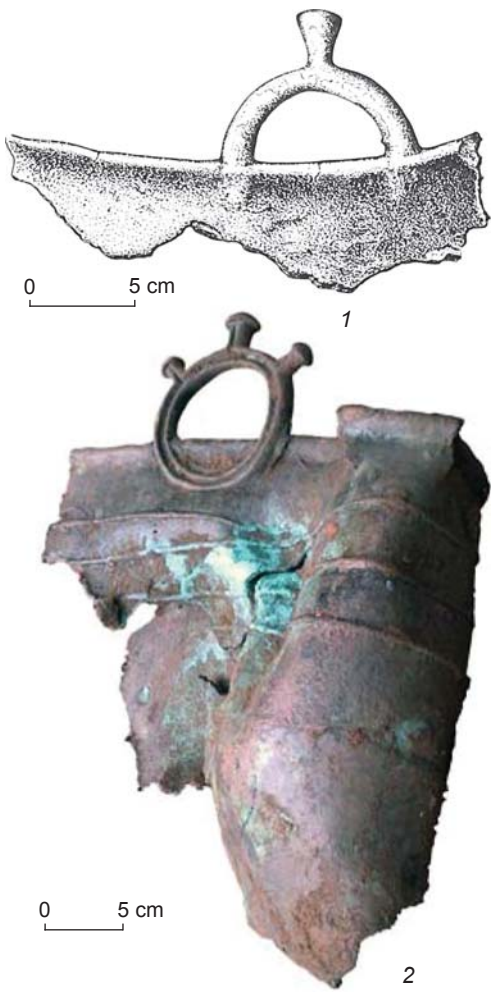

Fig. 2. Fragments of cauldron walls with handles.
1 – Turunovka-4 (Baraba forest-steppe); *2* – bank of the Kan River, 3 km north-west of the village of Terskoye (Kansky District of the Krasnoyarsk Territory).

Fig. 3. Handles of metal cauldrons of the Early Iron Age from southwestern Siberia.
1 – Voznesenka (Middle Yenisei, Krasnoyarsk Territory); *2* – Podsopki (Middle Yenisei, Krasnoyarsk Territory); *3* – Minusinsk Museum of Local Lore (MKM, A OF-9702/1); *4*, *5* – First Dzhirim hoard (Middle Yenisei, Krasnoyarsk Territory).

Fig. 4. Finds from Aidashenskaya Cave (Kemerovo Region).

goods" by the water (one cauldron or a series of them), and having returned back in the fall, they used them again (see (Mänchen-Helfen, 2014: 323; Dzhumabekova, Bazarbaeva, 2017: 114)). The analysis of location of the sites where Early Iron Age cauldrons were discovered as accidental finds in the valley of the Middle Yenisei and its tributaries (Fig. 5) really demonstrates these sites' connection with water sources (rivers, streams, and lakes).

In turn, the cases of finding fragments of metal cauldrons are interpreted as a ritual "killing" of products during the ceremony (Krasilnikov, 2019: 270). However, this contradicts the pragmatic meaning of the ritual of "leaving the goods". Nevertheless, the facts of the possible ritual destruction of metal cauldrons were also recorded in burial complexes of the Scythian-Sarmatian period. For example, on the left bank of the Don River, in a burial near the village of Novaya Chigla (Talovsky District, Voronezh Region), a heavily damaged bronze cauldron was found. Its body was thoroughly dented and torn apart. It lay at the southeastern wall of the grave pit, while broken vertical handles with three knobs lay at the northeastern one. The pedestal was absent (Berezutsky, 2017: Fig. 3, *7*, p. 22). In the Upper Ob region of the Early Iron Age, signs of such ritual destruction of a cauldron are evidently present in burial 1, mound 5 at Novotroitskoye-2 (Shulga, Umansky, Mogilnikov,

Fig. 5. Location of the places of discovery of metal cauldrons of the Early Iron Age as accidental finds on the Middle Yenisei.

1 – near the village of Askiz, Askizsky District of the Republic of Khakassia; *2* – near the village of Stantsiya Kamyshta of the same district; *3* – near the village of Orositelny, Ust-Abakansky District of the Republic of Khakassia; *4* – near the village of Bolshaya Tes, Novoselovsky District, Krasnoyarsk Territory; *5*, *6* – near the village of Drokino, Emelyanovsky District, Krasnoyarsk Territory; *7–11* – near the village of Terskoye, Kansky District, Krasnoyarsk Territory; *12*, *13* – the village of Tashtyp, Tashtypsky District, Republic of Khakassia (MKM, No. 10108, GE, No. 1123.36); *14* – the village of Matkechik, Beisky District, Republic of Khakassia (KNKM, unnumb.); *15–17* – the village of Sabinskoye of the same district (Otchet…, 1893: 23) (MKM, No. 10076, 10098); *18*, *19* – Sayanogorsk, Republic of Khakassia (MKM, No. 10117, 10105); *20* – the village of Ochury, Altaisky District, Republic of Khakassia (MKM, No. 10074); *21* – the village of Kaptyrevo, Shushensky District, Krasnoyarsk Territory (MKM, No. 6659); *22–24* – the village of Salba, Ermakovsky District, Krasnoyarsk Territory (Tallgren, 1917) (MKM, unnumb., 10069); *25* – the village of Kazantsevo, Shushensky District, Krasnoyarsk Territory (MKM, No. 10068); *26* – the village of Nizhnyaya Koya of the same district (MKM, No. 10065); *27* – the village of Sredny Kuzhebar, Karatuzsky District, Krasnoyarsk Territory (MKM, No. 10141); *28*, *29* – the village of Izykh, Altaisky District, Republic of Khakassia (MKM, No. 10085, 10109); *30–32* – the village of Krivaya, Minusinsky District, Krasnoyarsk Territory (MKM, No. 10062, 10119, 10071); *33* – the village of Soldatovo of the same district (MKM, No. 10095); *34* – the village of Tigritskoye of the same district (MKM, No. 12845); *35* – Abakan, Republic of Khakassia (MKM, No. 10092); *36*, *37* – the village of Kuragino, Kuraginsky District, Krasnoyarsk Territory (MKM, No. 10059, 10096); *38*, *39* – the village of Bragino of the same district (MKM, No. 10087, 10075); *40* – the village of Tagashet of the same district (MKM, No. 10084); *41* – the village of Borodino, Bogradsky District, Republic of Khakassia (Tallgren, 1917: Tab. XII); *42*, *43* – the village of Bolshaya Salba, Idrinsky District, Krasnoyarsk Territory (MKM, No. 10093, 10061); *44* – the village of Bolshoy Telek of the same district (MKM, No. 10086); *45*, *46* – the village of Knyshi of the same district (MKM, No. 10066, 10072).

2009: 80). It should also be noted that the character of the breaking of the handle of this cauldron is similar to the find from the Sargat settlement of Turunovka-4 (see Fig. 2, *1*). In the southwestern Siberia, the ritual purpose of broken-off handles of metal cauldrons is indirectly confirmed by their presence in Aidashenskaya Cave (see Fig. 4) (Molodin, Bobrov, Ravnushkin, 1980: 48–50, 158, tab. XIV, *1–3*).

The size of the handles is also quite informative in relation to the ritual use of the cauldrons, because it is related to the total volume and mass of the vessel. Some of the handles are small in size, and clearly correspond to small metal cauldrons of the Early Iron Age (see Fig. 2, *2*). Such vessels were hardly adapted for everyday cooking of meat (Demidenko, 2008: 58, 59). However, they played the same role as large cauldrons. Possibly, the contents of the small cauldron could be qualitatively different (Ermolenko, 1998: 114). Perhaps it was a fermented milk or narcotic drink (Berezutsky, 2017: 24).

A fragment of the wall of a cauldron from the First Dzhirim hoard is very curious. It has a relief sign in the form of three vertical lines, the end of one of which is bent (see Fig. 3, *5*; 6). According to the translator S.L. Savosin, if the image of this sign is rotated 180° (Fig. 6, *2*), then

it will look like the hieroglyph 川 (Fig. 6, *3*) – *chuan*, usually meaning 'river' (as, for example, in the name of Sichuan Province 四川 'four rivers'). It is important to emphasize that this hieroglyph is not one of the family hieroglyphs indicating the identity of the master. It can only be associated with the place of manufacture of the product. This hieroglyph also has other meanings: 'way', as well as 'cook', which is consistent with the direct purpose of the cauldron.

The inversion of the hieroglyphic image could be due to the technological features of the production of the cauldron. Before it was cast, a mold was made from clay, determining the internal volume of the body. Further, after drying, it was covered with a layer of wax equal to the thickness of the wall of the future cauldron. Then, everything was coated with clay, the wax was melted, and bronze was poured. Each part of the cauldron (body, pedestal, and handles) was made separately and could be turned over in different directions. Probably, in the course of such manipulations, the hieroglyph was applied in such a way that it got turned upside down on the finished product.

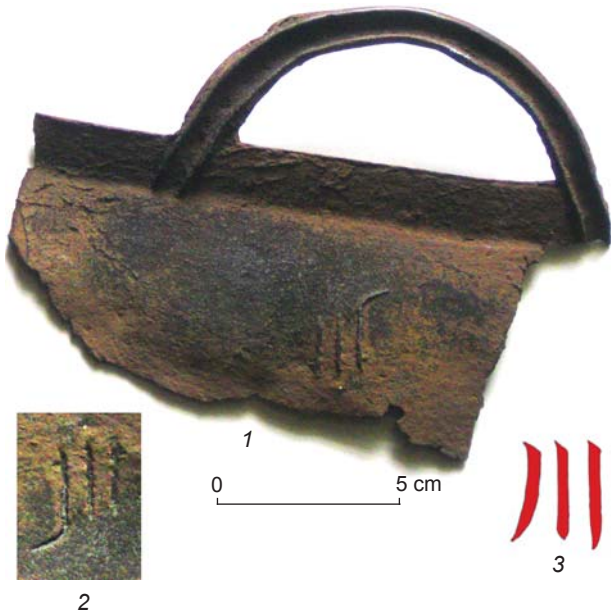

Fig. 6. A fragment of a cauldron with a handle from the First Dzhirim hoard.
1 – wall with a sign; *2* – image of the sign; *3* – hieroglyph 川 *chuan* – 'river'.

Conclusion

The handles of metal cauldrons of the Early Iron Age from southwestern Siberia are presented in several versions: with a fragment of the body wall (Turunovka-4, a find from near Kansk, Idrinskoye and First Dzhirim hoards, Aidashenskaya Cave), with a part of the rim (Voznesenka, Podsopki), and a handle alone (an item from the Minusinsk Museum, the First Dzhirim hoard). Regarding the latter variety, it should be noted that such handles are usually discovered among accidental finds from the Middle Yenisei (cauldron from the Ninya River, near the village of Kamyshta).

The cartography of the handles of metal cauldrons of the Early Iron Age in southwestern Siberia reveals specificity of localization of such finds. First, they are concentrated mainly on the periphery of the area of the main production of metal cauldrons of the Tagar time and places of their accidental discovery in the valley of the Middle Yenisei and adjacent territories (Voznesenka, Podsopki, and the vicinity of Kansk). Second, only some of these finds (a fragment of a wall with a handle from the Kan River) are associated with waterways, where whole cauldrons (five near the village of Terskoye) and the accompanying hoards (First and Third Terskoye hoards) were found (Borodovsky, Oborin, 2021). Possibly, the cauldrons' handles that were found near waterbodies have ritual significance and symbolize the whole product. Third, the handles of metal cauldrons in the production hoards of the Early Iron Age on the Middle Yenisei show a completely different topography. These sites (the First Dzhirim, Idrinskoye hoards) are usually located far from water sources—on elevated areas of the terrain. Fourth, the finds under consideration are fragments of imported products from adjacent or more distant territories. This is typical both for the Baraba (Turunovka-4) and Mariinsk-Achinsk (Aidashenskaya Cave) forest-steppe, and for the Middle Yenisei valley (a fragment of the cauldron from the First Dzhirim hoard, which wall contains a 川 sign, possibly related to a certain Chinese hieroglyph associated with water element).

The morphology of fragments of metal cauldrons with handles reflects almost all the typological and chronological diversity of such products for the entire period of their existence in the Early Iron Age. It should also be noted that among the finds under consideration both "Tagar" bronze culture (Turunovka-4, Aidashenskaya Cave, Bereznyaki, Podsopki, and a find near Kansk), and "Hunnic" bronze culture (First Dzhirim hoard) are represented. This fact may point both to the long existence of the tradition of ritual burial of handles from metal cauldrons and to the later use of early metal cauldrons before they were damaged owing to natural wear and tear or deliberate breakdown.

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The Pazyryk Style

This study demonstrates that certain similarities in the domestic artifacts, clothing, and weapons in the Pazyryk burials of the Altai, those in the oases of Xinjiang (Subashi, Yanghai, Jumbulak Kum, Wupu, Keriya, etc.), and those in the piedmont of the southern Altai Mountains, do not evidence a single culture. Such parallels in basic items are caused only by spatial proximity and contacts. Personal ornaments, decoration of utensils, weapons, and horse harness, and signs such as tattoos are more reliable cultural indicators. Every member of the Pazyryk society, regardless of age, was marked by a set of outward signs, distinguishing him or her from the neighbors. This set included tattoos, and also ornaments worn on the clothing, headgear and belt, and decorating the horse. The elaborate Pazyryk traditions of woodcarving enabled everyone to have equally meaningful ornaments, which, like the artistic tattoos, made him or her recognizable. The term "Pazyryk style" is proposed. Being the most exact cultural indicator, it extends to all elements of culture, uniting the Pazyryk people despite the fact that their lifestyle, subsistence, etc., were identical to those of their neighbors.

Keywords: *Pazyryk culture, Early Iron Age, Xinjiang cultures, clothing, tattoo, ornaments, Pazyryk style.*

Introduction

The question of whether there was a cultural affinity between the people of the Pazyryk culture and the contemporaneous population of the Xinjiang oases (the latter known from the materials of the burial grounds of Subashi, Shanpula, Yanghai, Jumbulak Kum, and a number of burial complexes that have been investigated in recent years in the Altai District of the Xinjiang Uygur Autonomous Region) is relevant and directly related to the identification of the southern border of the distribution area of this archaeological culture. Over the past decades, the distribution area of the Pazyryk sites has expanded thanks to the research carried out by Z. Samashev and H.-P. Francfort in Eastern Kazakhstan (Samashev, Francfort, 1999; Samashev et al., 2000) and V.I. Molodin, G. Parzinger, D. Tseveendorj in Mongolia (Molodin, Parzinger, Tseveendorj, 2012). Samashev was right to correlate the Berel cemetery with the local group of Pazyryk people who roamed in this region and established a necropolis with burials of people of various statuses—from the highest-ranking in mound 1, middle-ranking nobles in mound 11, to commoners (2011: 206–207). Research in the Mongolian Altai (northwest of Mongolia) has shown that quite few burial sites belonged to this community, whose main winter pastures and burial sites were located on the Ukok plateau (Molodin, Parzinger, Tseveendorj, 2012)*. It can be assumed that

*In this part of the Mongolian Altai, no large or medium-sized mounds have been discovered; small and poor mounds form small cemeteries, for example Olon-Kuren-Gol-6 and -10. 200 km southwards of these sites, a Joint French-Mongolian Expedition to the Baga-Turgen-Gol-6 cemetery studied the

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the southern border of the Pazyryk culture's distribution area runs along the Ukok highlands, although certain elements of this culture (often mistaken for the culture itself) are more widespread—for example, on the so-called Pazyryk monuments in Xinjiang. In recent years, owing to intense excavations by Chinese colleagues, information has appeared on the discovery and study of sites in the regions immediately adjacent to the Russian Altai—in particular, to the Ukok plateau, famous for the Pazyryk cemeteries (Polosmak, 1994, 2001). Many of the burial mounds containing remains of people and horses are unconditionally attributed by Chinese colleagues to the Pazyryk culture, probably because of the proximity of the distribution area of the latter (Mu, 2020). The paper entitled "Monuments of the Pazyryk culture in Xinjiang" presents a review of these sites, but the author is not so definite in assessing the cultural affiliation of the sites; he admits that the sites in question "may be attributed to the Pazyryk culture" (Ibid.: 138), and recognizes the differences between the sites he describes and the classic sites of the Pazyryk culture (Ibid.: 144). Russian researchers D.P. Shulga and P.I. Shulga (2017) are more accurate in their identification of Pazyryk burial complexes in the Altai District of the Xinjiang Uygur Autonomous Region. They considered the whole complex of features that would allow the attribution of the burials to the terminal stage of the Pazyryk culture. This approach led to the conclusion that the sites that have only one feature similar to the Pazyryk are in fact *not* Pazyryk. These researchers believe that such sites can be attributed to the Pazyryk culture only with certain reservations; they consider not only "classic" burials to be "Pazyryk" burials, but also all those ever recorded in the chains of the Pazyryk burial mounds in the Altai (their occurrences in these chains have not yet found an unambiguous explanation). These include the so-called Kara-Koba burials in stone boxes without horses; burials with western, southern, and southwestern orientation of the deceased; burials with horse bodies placed on the ceiling, rather than inside the burial chamber; burial mounds, in which there could be up to four deceased in one grave pit (such a feature has not been recorded in the Pazyryk graves); as well as burials of the so-called Korgantas type, with numerous skulls of domestic animals. Furthermore, it has been stated that some graves in Xinjiang contained sub-buried persons, which was atypical of the Pazyryk culture. D.P. Shulga and P.I. Shulga explain this deviation from the "Pazyryk standard" by local specifics; they argue that the rite itself is "intermediate in nature" (Ibid.: 25–27). The comparisons showed that the Xinjiang burial complexes from the indicated region show more distinctions than similarities with the "classic" Pazyryk burials. Most likely, in Northern Xinjiang (on the border with Russia and Kazakhstan), there was a cultural formation (and probably more than one) that had nothing in common with the Pazyryk culture. In our opinion, identification of the Pazyryk sites should primarily take into account the "frozen" graves providing the most complete evidence of the culture, since if we judge only by the surviving things made of inorganic materials, then cultural parallels and cultural unity can be found in a far wider area*. From our point of view, the burial mounds discovered in Northern Xinjiang, in Dzungaria, between the Tian Shan and Altai, are not related to the Pazyryk culture in its classic (and most correct) understanding. According to the complex of features identified by D.P. Shulga and P.I. Shulga, these sites probably belong to another cultural formation, the main features of which have been described in sufficient detail (Shulga D.P., Shulga P.I., 2017: 25–27). The occurrence of such burials in the Pazyryk cemeteries can be associated with the penetration of the tribes from the eastern part of the southern face of the Altai Ridge into the Altai mountain pastures, and not vice versa. The Pazyryk people who wintered in Ukok most likely knew about the crossings through the Kanas and Betsu-Kanas passes, which one could use to get to the eastern part of the southern face of the Altai Ridge; but this does not mean that they used this opportunity. Whether this was necessary, is not yet obvious. In our opinion, a similar situation developed in antiquity in the regions adjacent to the Chikhachev Ridge, which separates the Altai Mountains and Tuva; nowadays, these areas are connected by an automobile road running through the Buguzun Pass at an altitude of 2068 m. On the Altai side of the ridge, the Pazyryk cemeteries of Uzuntal I, III, V, and VI in the vicinity to the village of Kokorya are known (Savinov, 1978, 1986, 1993; and others), while on the other side of the ridge no sites from this culture have been discovered. In 1994, the joint expedition headed by Vl.A. Semenov searched for the Pazyryk-type mounds in the Mongun-Taiginsky

similar poor burials of the Chandmani culture, showing quite few features that find parallels in the Pazyryk culture and the Sagly culture of Tuva (Turbat et al., 2007).

*Notably, neither the remains of deceased in the Northern Xinjiang cemeteries that are considered Pazyryk, nor the mummies of people buried in the cemeteries of Subashi, Wupu, Shanpula, etc. contained traces of artificial mummification, which was one of the important features of the burial rite of the Pazyryk people, recorded not only in "royal" graves, but also in ordinary burials of the Ukok (Polosmak, 1996, 2000; 2001: 238–256). In the female burials of Xinjiang, no remains of headdress-wigs, typical of Pazyryk women, were found, these being usually represented by a large black spot under the skull (Kubarev, 1991: 37); the discovery of an intact "frozen" female burial in the Ukok made it possible to establish that the spots are the remains of a wig, and to reconstruct it (Polosmak et al., 1997; Polosmak, 2001: 143–153).

District; but such sites were not found. The excavations of a large mound at the Kholash cemetery in 1995 did not give the desired result either. On the basis of the results of the expedition works, Semenov came to a fair conclusion that in the Scythian period this district was populated mainly by representatives of the so-called culture of inventory-less burials (Semenov, 1997: 7–9, 35). Being close in all respects to the Altai mountain valleys, this high-altitude territory, which today is a cattle-breeding zone, was not inhabited by the Pazyryk people; they did not nomadize there, they had no need to leave the Altai, which was and remains the "cattle-breeding paradise" (Radlov, 1989: 144–145)*.

The purpose of this paper is to show that separate elements of the Pazyryk culture in the burial rite and grave goods at the Northern Xinjiang sites cannot be considered as evidence of the spread of this culture in this region. The identification of mounds as Pazyryk burials on the basis of isolated similar elements alone tends to diffuse cultural identity: if we go in this direction, then we can expect that all sites that bear at least a remote resemblance to the original will be called Pazyryk. Chinese colleagues find "traces" of the Pazyryk culture also in territories located at a considerable distance from the Altai Mountains—in the Hami and Ili regions (Mu, 2020: 143). Traces there may be, but not the culture.

Cultural affinity or territorial proximity?

The diversity of the Pazyryk population was first established by methods of physical anthropology in the early 21st century (Barkova, Gokhman, 2001)**. Nowadays, this conclusion is confirmed by the data from paleogenetic analysis (Pilipenko, Molodin, Romanenko, 2012; Pilipenko, Trapezov, Polosmak, 2015). In this case, the anthropological and genetic features of the buried cannot be considered a solid ground for attributing particular burial complexes to the Pazyryk culture. Such criteria are still the commonality of the territory, funeral rites, material culture, and art objects.

A single territory (the Altai Mountains) and the lifestyle of cattle-breeders and hunters united various people; they developed their own unique style that characterizes the Pazyryk culture. The Pazyryk people maintained a certain style, which manifested itself in everything: from clothing to decoration of horse harness and dwellings*. An important part of their image was a tattoo; this indelible mark confirmed affiliation of these people to a particular society.

The discovery in the Xinjiang oases of burial complexes with goods made from organic materials allows us to see what the main external difference between the cultures was, and to understand what is denoted under the Pazyryk style. As it turned out, people living in different climatic zones, differing in lifestyle and subsistence strategies, had the same set of clothing items and largely similar household items. The closeness can be traced between wooden scoops, mugs, and table-dishes. However, similar wooden items existed also in other regions and cultures. Such items have been recorded in Early Scythian complexes; for example, in burial 5, mound Arzhan-2 in Tuva, a wooden scoop with the tip of the handle shaped like a horse's hoof was found (Chugunov, Parzinger, Nagler, 2017: 406, pl. 68), as in the scoop from the 2nd Pazyryk mound, and in other similar items from ordinary mounds (Rudenko, 1953: Pl. XXI; Kubarev, 1987: 49). Similar items were also used in later periods: table-dishes and other wooden utensils were found in burials at the Kokel necropolis dating back to the period from the late 1st millennium BC to early 1st millennium AD (Veinstein, Dyakonova, 1966: 187, pl. X). Many goods in this category have survived till the ethnographic present, since they are universal forms convenient in everyday life. Among the utensils from the burials of Xinjiang, there are isolated items similar to the Pazyryk horn vessels (Fig. 1), and ceramic items similar in shape to the Pazyryk samples. In the graves of the Xinjiang dwellers, there occur the same stirring-sticks as in the female burial of mound 1 at the Ak-Alakha-3 cemetery, which may suggest that people of these regions drank the same milk (?) beverage (Fig. 2). wooden stiffening-frames on bow-cases, simple in their shape, are identical, which may indicate their similar structure and shape. Some Xinjiang samples bear carved ornaments that have nothing in common with the Pazyryk motifs (Fig. 3).

*Currently, the population of the Altai Republic is approx. 221,000 people. And all those who continue to maintain a traditional cattle-breeding economy cover the need for forage at the expense of winter and summer pastures. During the Pazyryk period, the population here was much smaller, and there were enough places for grazing livestock and nomadizing for everyone.

**That article, on the basis of anthropological materials from the large Pazyryk mounds and the Shibe mound, has shown the anthropological diversity of the Pazyryk elite. However, the authors' arguments in favor of significant difference between the occupants of the "royal" burial mounds and the main part of the Pazyryk population (Barkova, Gokhman, 2001: 89) currently appear to be incorrect. In recent years, anthropological materials from ordinary Pazyryk burials of the Altai have been studied. Research data, mainly by T.A. Chikisheva, have shown that the anthropological composition of the elite reflected all the diversity of the Pazyryk population, which was formed from the same sources (Chikisheva, 1996, 1997, 2003).

*We can speak about dwellings, since the burial chambers of the Pazyryk people imitated dwelling-houses, and sometimes they were real log cabins.

Fig. 1. Vessels from the Pazyryk burial complexes in the Altai (*1*, *4*) and Xinjiang (*2*, *3*, *5*).
Horn vessels: *1* – mound 1 at Ak-Alakha-3; *4* – mound 1 at Verkh-Kaldzhin-2 (excavations by V.I. Molodin); *5* – burial 92 at Yanghai (Sintszyan…, 2019: Vol. III, p. 303, fig. 1]; ceramic vessels: *2* – Hongshawan, northern part of the Silk Road, Manas District of the Changji Hui Autonomous Prefecture (The ancient culture…, 2008: 308, *1*); *3* – burial at Jumbulak Kum (Debaine-Francfort, Francfort, 2001: 209, fig. 99).

Fig. 2. Wooden stirring-sticks from mound 1 at Ak-Alakha-3 in the Altai (*1*) and Yanghai in Xinjiang (*2–4*) (Sintszyan…, 2019: Vol. III, p. 172, fig. 1–3, fig. 5; p. 307).

Sets of clothes of the residents of Xinjiang oases and the Pazyryk people* are similar in color (red, white, and black; more rarely blue and yellow) and in categories of clothes (fur coats, shirts, pants, and skirts). Women wore skirts made of narrow multi-colored stripes of woolen fabric sewn together horizontally (Fig. 4), long-sleeve shirts trimmed at the seams with red laces and braids (Fig. 5), and belts-cords woven from woolen threads. Some Xinjiang burials also yielded long felt and leather stockings similar to the Pazyryk ones (Fig. 6). Men wore similarly-cut woolen trousers: two legs joined by a rectangular piece of fabric. Of course, such apparel of a very simple cut could appear in various places independently (Fig. 7). This cannot be said of outerwear—fur coats. For the Pazyryk people, each fur coat was a unique product, a real work of tailor's art, which showed a combination of various furs (from sheepskin to sable), dyed fur decorations, horsehair tassels, and leather appliqués. In addition, these fur coats were unusual in cut: at the back, they had a long separately sewn detail—a kind of a tail. For the inhabitants of the Xinjiang oases, outerwear was a very simple functional thing; it can be called a sheepskin coat (Fig. 8).

The above examples show that the funeral garments of human mummies from both regions are similar. Often, not only the style, cut, and color, but also the trimmings coincide. As is known from historical examples, such similarities were difficult to achieve even when these were urgently needed. For example, in the Middle Ages, when vassals who lived at a considerable distance from the castle of their lord needed to join his retinue in clothes of certain colors and styles, they received fabrics and instructions for sewing dresses in advance. Then it was possible to achieve a very approximate similarity; but even this was perceived by contemporaries as identity. The striking similarity between the clothes of the inhabitants of the Xinjiang oases and the Pazyryk people may be the result of contacts.

It would be difficult at first glance to find the distinctions between the population that left the Ak-

*We learned about the sets of clothes of Pazyryk men and women during the study of intact burials at the Ukok; some graves revealed human remains *in situ*: the mummies of a man and a woman had surviving clothes (Polosmak, Barkova, 2005; Polosmak et al., 2006). Excavations of the "royal" Pazyryk burial mounds provided very little reliable information about the clothing of the Pazyryk people; human mummies in two of the five Large Pazyryk mounds did not have clothes, since these had been looted. As it turned out later, the recovered unidentified scraps of textile were fragments of skirts and trousers: their identification became possible after the discovery of the Ukok burials. There were no traces of clothing on the buried in the Katanda burial mound. The well-known Katanda coat and caftan were found tied in a knot on a wooden ceiling; apparently, the looters planned to take them away.

Fig. 3. Stiffening wooden frames on the bow-cases from the Pazyryk burial complexes in the Altai (*1*, *2*) and Xinjiang (*3–5*).
1 – mound 1 at Ak-Alakha-1; *2* – mound 1 at Verkh-Kaldzhin-2 (excavations by V.I. Molodin); *3–5* – Yanghai burials (Sintszyan…, 2019: Vol. I, p. 169, fig. 1; vol. III, p. 293, fig. 4, 5).

Fig. 4. Skirts from the Pazyryk burial complexes in the Altai (*1*, *3*) and Xinjiang burials (*2*, *4–8*).
1 – woolen skirt with a belt-cord and its pattern, mound 1 at Ak-Alakha-3; *2*, *6*, *7* – fragments of woolen skirts, Shanpula cemetery (Bunker, 2001: 25, pic. 15; fig. 63, 64, 93); *3* – fragment of a woolen skirt, the 2nd Pazyryk mound; *4* – reconstruction of a woolen skirt based on the remains from a burial at Jumbulak Kum (the Keriya River basin in the southern part of the ancient Silk Road (Desrosiers, 2001b: 193); *5*, *8* – fragments of woolen skirts from Yanghai cemetery (Sintszyan…, 2019: Vol. III, p. 269, fig. 4, 5).

Fig. 5. Shirts from the Pazyryk burial complexes in the Altai (*1*) and Xinjiang (*2–4*).
1 – silk shirt and its cutting-pattern, mound 1 at Ak-Alakha-3; *2* – fragment of a shirt and its reconstruction, Yanghai (Sintszyan…, 2019: Vol. III, p. 276, fig. 2, 3); *3* – woolen shirt, Shanpula II (Bunker, 2001: 34, fig. 35); *4* – fragment of a woolen shirt and its reconstruction, burial at Jumbulak Kum (Desrosiers, 2001d: 196–197).

Fig. 6. Boots-stockings from the Pazyryk burial complexes in the Altai (*1*, *2*) and Xinjiang burials (*3*, *4*).
1 – men's felt stockings, mound 3 at Verkh-Kaldzhin-2 (excavations by V.I. Molodin); *2* – men's felt stockings, mound Olon-Kuren-Gol-6; *3* – leather stockings, Yanghai (Sintszyan…, 2019: Vol. III, p. 220, fig. 6); *4* – a felt stocking, Jumbulak Kum (Desrosiers, Francfort, 2001: 164).

Fig. 7. Pants from the Pazyryk burial complexes in the Altai (*1*, *4*) and Xinjiang (*2*, *3*, *5*).
1 – woolen pants, burial 1 at Ak-Alakha-1; *2*, *3* – pants and their cutting-pattern, Yanghai (Sintszyan…, 2019: Vol. II, p. 928; vol. III, p. 270, fig. 5; p. 272, fig. 2); *4* – woolen pants and their cutting-pattern, mound 1 at Verkh-Kaldzhin-2 (excavations by V.I. Molodin); *5* – fragment of woolen pants and their cutting-pattern, burial at Jumbulak Kum (Desrosiers, 2001c: 195).

Fig. 8. Men's fur coats from the Pazyryk burial complexes in the Altai (*1*) and Xinjiang (*2–4*).
1 – mound 3 at Verkh-Kaldzhin-2 (excavations by V.I. Molodin); *2* – burial at Wupu (Hami ancient civilization, 1997: 24, fig. 49).

Fig. 9. Men's headgear- and belt-decorations from the Pazyryk burial complexes in the Altai (*1–6*) and Xinjiang (*7–9*).
1–4, *6* – men's headgear decorations, mound 1 at Ak-Alakha-1; *5* – wooden belt-plates, mound 1 at Ak-Alakha-1; *7* – bronze decoration of men's headgear, burial at Jumbulak Kum (Francfort, Lacoudre, 2001: 205–206, fig. 92); *8* – headgear decoration, burial in Keriya oases (The ancient culture…, 2008: 33, fig. 5); *9* – men's mummy wearing headgear, Keriya (Ibid.: 32, fig. 3).

Alakha kurgans and the inhabitants of the Xinjiang oases if the former did not have ornaments that, in our opinion, it would be more correct to call identification marks*.

It is clear that the similarity of the basic outfit is not yet a sign of affinity of cultures. Perhaps this is evidence of closeness, but territorial in this case. The uniform cut of top- and bottom-wear, headgear, and footwear is, as was observed in the process of studying the folk outfit of Central Asia and Kazakhstan, a region-specific feature, but not an ethnic differentiating feature, and does not even indicate common roots in the culture of the peoples of the region (Lobacheva, 1989: 35; 2001: 70–71, 92). Only details can serve as culturally differentiating indicators.

*In this case, by ornaments we understand not only the items worn over the clothes or decorations of the clothes themselves, but everything that the word "art" implies in relation to a particular culture, including tattoos.

Given the general similarity of the items of men's and women's clothing, the outfits of the inhabitants of the Xinjiang oases and the Pazyryk people (we can compare only these, since they are in approximately the same state of preservation; so, this is an equivalent comparison) show certain distinctions that are determined by ornaments. The men's Pazyryk outfit was decorated with wooden figurines of horses with ibex horns and deer figurines on a headgear, a torque bearing images of predators, and belt-decorating plates with carved animal figures (Fig. 9). In an outfit of the Pazyryk women, ornaments were a figurine of a lying deer decorating a wig, the so-called aigrette, a metal hairpin with a deer-shaped pommel, carved plait decorations, images of birds, torques and diadems bearing images of animals (Fig. 10)—everything that is missing in the outfits of Xinjiang residents, including a wig-hairstyle.

The Pazyryk style implies not only the style of personal ornaments, but also everything that surrounded people—decorations of household utensils, horse harness, coffins, felt items, and weapons. One of the main distinguishing features of the Pazyryk culture is a tattoo. Tattoos on bodies were the feature that united all Pazyryk people, their indelible marks indicating a relationship stronger than blood; these were the signs distinguishing between kin and strangers in this and the other world. Differences in the number of signs, location of images, and compositions emphasized the individuality of each person. The history of a person was "recorded" on his or her own body; but the images and signs, like the letters of one alphabet, were the same for everyone. Throughout a person's life, other signs and images would be added to his or her body. Tattoos differed in details, depending on the sex, status, and age of people (Barkova, Pankova, 2005). The tattoos reproduced the same images of the animals, birds, fish, imaginary creatures, and signs that were carved from wood or made of felt and leather (Fig. 11). If the tattoo of a man from

Fig. 10. Women's headgear and personal ornaments from the Pazyryk burial complexes in the Altai (*1–3*, *5–9*) and Xinjiang (*4*).
1–3 – felt caps, the 2nd Pazyryk mound (*3* – reconstruction by D.V. Pozdnyakov); *4* – felt headgear on women's mummy, Subashi (Desrosiers, 2001a: 155, fig. 12); *5–8* – wooden decorations, mound 1 at Ak-Alakha-3; *9* – headgear with decorations (reconstruction), mound 1 at Ak-Alakha-3.

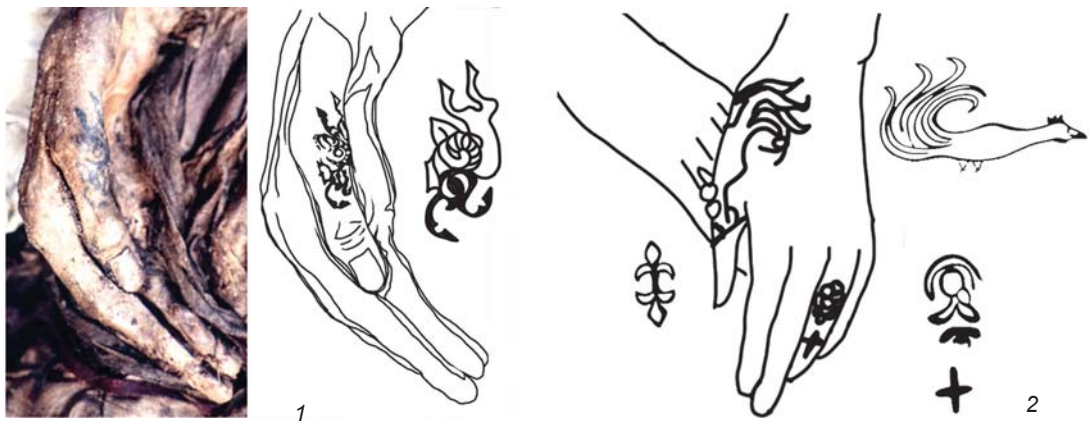

Fig. 11. Tattoos on the Pazyryk mummies of the Altai.
1 – on hands and fingers of a woman, mound 1 at Ak-Alakha-3; *2* – on fingers of a woman, the 5th Pazyryk mound.

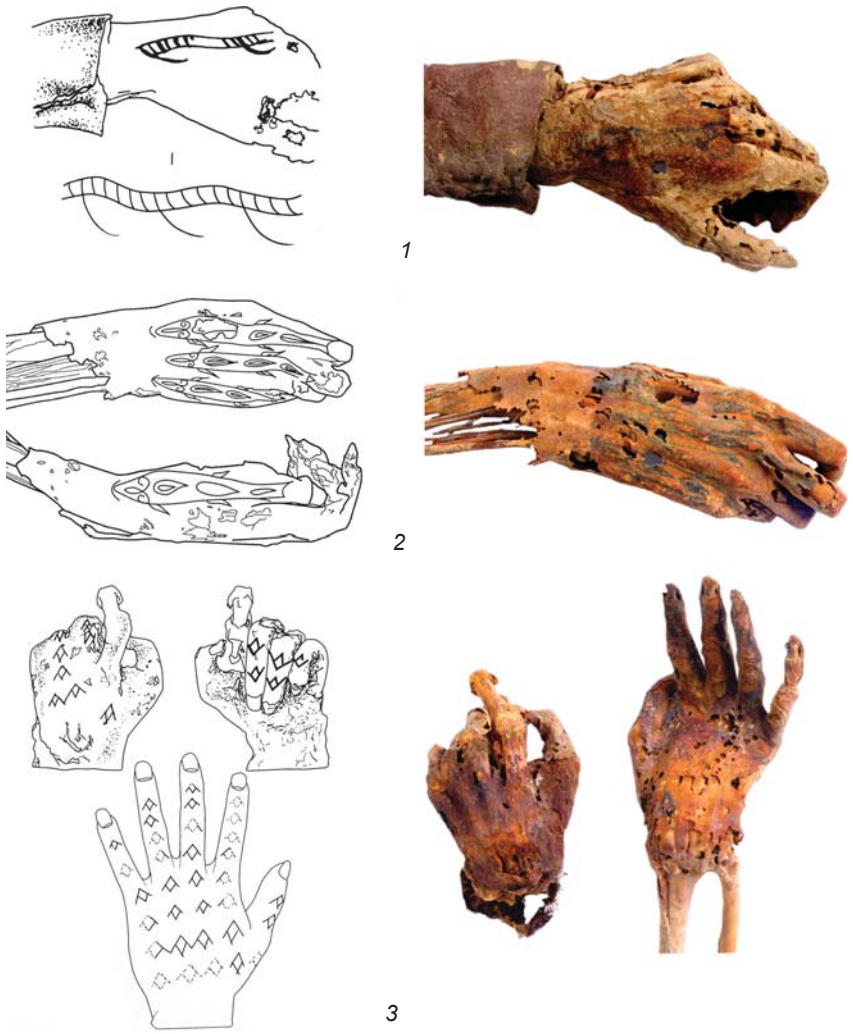

Fig. 12. Tattoos on hands of the mummies of Xinjiang. Yanghai cemetery (Sintszyan…, 2019: Vol. I, fig. 1, *2*, *9*; vol. III, p. 211, fig. 1, *5*).

the 2nd Pazyryk mound is interpreted as "zodiacal" (Marsadolov, 2021), then the whole art of the Pazyryk culture should be considered in the same way; but is the author of this hypothesis ready to ascribe zodiacal meaning to the entire Pazyryk bestiary? Even though on the hand of a woman from the 5th Pazyryk mound a composition is depicted that we have not seen before, this is not the reason to consider the buried a representative of another culture (Azbelev, 2017). Today, we only have information about a small number of Pazyryk people with tattoos, although we know for sure that all representatives of this culture had tattoos. And, as all the previous experience has shown, conclusions based on small amount of data are premature.

Quite different signs are reproduced on the rear sides of the hands and fingers of the inhabitants of the Xinjiang oases. In execution and composition, these images are absolutely dissimilar to those found among the Pazyryk people. It has already been noted that on the bodies of the Pazyryk people, tattoo-images of animals, birds, and fish traditional for their culture were reproduced with great skill. Tattoos on the hands of Xinjiang mummies* are simple in execution and consist of one repeated sign (these are, as a rule, geometric figures; in one case, stylized fish images) (Fig. 12). The tattoos on hands peeking out from under the sleeves of shirts and fur coats provided much more information about a person than his/her physical type. It is unlikely that the meaning of these images will ever become understandable to us, but one of the purposes of tattoos is quite transparent—to designate a person's membership of a certain community.

*It is possible that their bodies also bore tattoos, but there is no information about this.

The Pazyryk people were a multi-component and multi-ethnic entity. So, what united them and distinguished from the surrounding cultures and peoples? Their habitat, subsistence, and lifestyle were identical to those of their neighbors in the Sayan Mountains, Transbaikalia, and the Mongolian steppes and mountains. It was not these basic components that determined the originality of the Pazyryk culture, but its unique cultural baggage and historical background. On this foundation, the Pazyryk people created their own conception of the world, reflected in their style, by which we mean the unity of all components of the culture—body-tattoos, decorations of clothes and horse harness, appliqué decorations on felt items and household utensils, their hairstyles, and their mummification techniques, etc., which distinguished the Pazyryk people from others.

Conclusions

The question arises as to whether the wooden items—figurines of animals, birds, and fantastic creatures*, the main features of the "Pazyryk style"—were manufactured for everyday wear. Many experts doubt this. But since none of the Pazyryk burials yielded metal (gold) analogs of at least one wooden item from this set of ornaments, it is quite likely that all these things, beautifully made of cedar, served their owners not only during the funeral, but also in everyday life**. These items could have been reproduced many times. Most likely, they were used as everyday ornaments, lightweight and comfortable to wear. They could be lost, broken, repaired, or produced again in any quantity***. A low-ranking member of society could have ornaments as fine as a high-ranking one; everything depended only on the skill of the carver. Ordinary burials often contained wooden ornaments made with exceptional skill and talent (Kubarev, 1991: 116, fig. 29; p. 122, fig. 32; 1992: 96, fig. 28; p. 105, fig. 33; and others). All the members of society, including children, had such much-significant figurines; they served as identification marks for the Pazyryk people, and determined their style. Notably, both in the ordinary and in "royal" mounds, these items were coated most often with gold foil, less often with tin foil. The golden sheen is characteristic of items of the Pazyryk culture; but at the same time, full-weight gold jewelry was absent in the burials, and this fact cannot be the result of looting. In our opinion, the Pazyryk culture was not wasteful: in order to add golden luster to the product, the Pazyryk people used gold foil. Almost weightless, it was used everywhere and in large quantities, equalizing all members of the society*.

Any culture is determined not by the number and wealth of imported items, but by the people who practiced this culture. The view of the world developed by the Pazyryk people disappeared along with them. The only way to recreate this view is through interpretation of the images they have created. We do not know why the creators of this peculiar art valued them, but we are trying to understand it, relying on mythology, folklore, and epics. We can read any "text" consisting of images of animals, birds, fish, imaginary creatures, and it seems that we have found a clue to unraveling this language. But is it one? Unfortunately, we create the mythology of the Pazyryk people ourselves. With regard to the Pazyryk culture, this became clear after the publication of the work of D.V. Cheremisin "The Art of the Animal Style in the Burial Complexes of the Ordinary Population of the Pazyryk Culture" (2008), in which the author perfectly applied a research approach to the pictorial corpus of the animal style as a source containing a certain "mythological text" conveyed in the language of images. Both the approach itself and the author's hypothesis, according to which "the motifs of images in the animal style manifested in the ensembles of ritual attributes are determined by myth and represent the language of the burial complex, which proclaimed the ideologemes common to the society", do not give rise to any objections (Ibid.: 5). However, the analysis of the images themselves showed that each of them is ambivalent, and the place that this or that character will take in the picture of the world of the Pazyryk people depends only on the erudition and will of the author of the concept. But the images of animals, birds, and fish may reflect concepts unknown to us, not related to their natural animal essence.

Leaving aside the semantics of images of the Pazyryk art, we would like to focus on the style, which is obvious. In contrast, the semantics will always serve as a stumbling-block, owing to our lack of knowledge in this area. This lack gives rise to many interpretations and to

*This also refers to horse harness decorations.

**S.I. Rudenko always insisted on this. He wrote: "The study of the now numerous saddles and bridles in the Pazyryk and other burial mounds showed that in the graves we found real household items, some of which were in use for a long time and were repeatedly repaired" (1960: 239).

***Regardless of the status of the buried person, repaired things were found in their graves. For example, in mound 1 at the Ak-Alakha-3 cemetery, in which a noblewoman was buried, a cracked wooden mug, sewn with a leather cord, and a wooden dish repaired in the same way were discovered; in many graves, darned clothing was found.

*A gold earring, silver buckles with a scene of a lion torturing a fallow deer from the 2nd Pazyryk mound, and precious woolen fabrics and a carpet from the 5th Pazyryk mound could have been part of the loot from the Achaemenid treasuries during the Macedonian expansion. In this period, the jewels of the Ancient East were moved over huge distances and, together with the invaders, ended up in Central Asia (Litvinsky, Pichikyan, 1993: 88).

the reduction of all images and compositions to a single conception (upper, middle, and lower realms, and scenes of torment, symbolizing the cycle of life-death). The style does not explain anything, but the Pazyryk culture is singled out and exists both literarily (in scientific works) and in reality, thanks to this particular style. Pieces of applied art of the Pazyryk people have become their identification mark. The totality of customs of one nation is always marked by some style (Levi-Strauss, 1984: 78). Style is a visualization of culture (Fig. 13). It would not be an exaggeration to say that we would immediately recognize a Pazyryk person, but why? Because the appearance of any of them—a man or a woman, young or old, noble or ordinary—is stylistically consistent; they all are alike in their main characteristic, despite the differences in status. Why is style so important? Comparison of the Pazyryk culture with the culture of the Xinjiang oases population has clearly shown that certain

Fig. 13. Pazyryk people. Visualization of the Pazyryk style.
Reconstructions by D.V. Pozdnyakov.

categories of things reveal an unconditional similarity and suggest the kinship of cultures and people; but when the concept of style is introduced, it becomes obvious that we face completely different people with different cultural traditions. Images of animals, birds, and fish, both real and fantastic, repeated in original combinations and ornamental compositions on everything—from dishes (handle of a wooden vessel from mound 1 of the Ak-Alakha-3 cemetery, leather applications on clay and leather vessels, etc.) to the ornaments and decorations of people, horses, coffins, felt items, clothes, tattoos on the bodies of men and women—make the Pazyryk people members of one society, unique and recognizable in every feature.

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Burial of a Hunnic Period Noblewoman at Karakabak, Mangystau, Kazakhstan

This study continues a series of publications describing the findings of excavations at the Karakabak cemetery on the Mangyshlak Peninsula, dating to the Hunnic period. Burial 11 was that of a girl dressed in an outfit imitating a royal vestment. The reconstructed headdress consisted of a cape decorated with round, gold plaques and a diadem-type headband of red cloth with mask-shaped plaques. The central forehead plaque is a replica of Hellenistic gorgoneia. Similar masks were found in the Volga basin and the Northern Black Sea region. Temporal mask-plaques, carved of wood and covered with gold foil, have no parallels but follow the archaic Scythian tradition. Belt and shoe buckles were not attached to belts and were not used in everyday life. In terms of style and technique, the gold casing with an embossed geometric design on a wooden base belongs to a series of artifacts of the so-called Shipovo horizon. The buckle frames are shaped as stylized birds of prey with spread wings. The forehead plaque and details of the shoe straps are paralleled by those from Altynkazgan. The Karakabak artifacts are unique for the Aral-Caspian region, providing yet another indication of close cultural ties with the Hunnic world. All details of the outfit were likely manufactured at a nearby workshop (the Karakabak settlement) in the second half of the 5th or first half of the 6th century for the burial of a nomadic noblewoman.

Keywords: *Mangystau, Karakabak, Hunnic artifacts, Shipovo horizon, outfit, diadem.*

Introduction

In 2019, the Russian-Kazakh expedition excavated a burial ground of the Hunnic period near the settlement of Karakabak in Tupkaragansky District of the Mangystau Region, the Republic of Kazakhstan (Fig. 1). Twelve structures were explored (Fig. 2), of which seven contained burials. The results of studying burials 1–3 and 10 have been partially described (Astafyev, Bogdanov, 2020a, b). The variety of the evidence, its ambiguity, and most importantly its uniqueness for the entire Aral-Caspian region have fostered gradual publication of the excavation in the form of a series of articles. This publication describes burial 11 at the Karakabak-10 cemetery located on the western side of the canyon of the same name.

Fig. 1. Location of the Karakabak-10 cemetery.

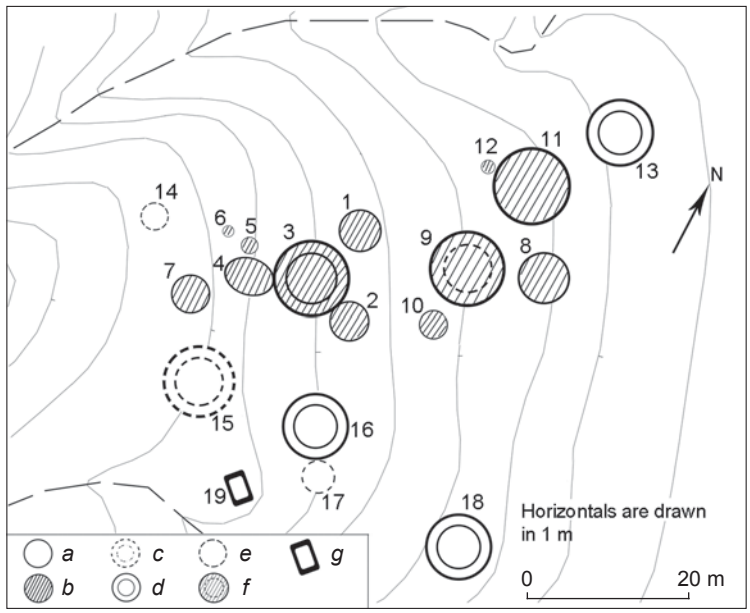


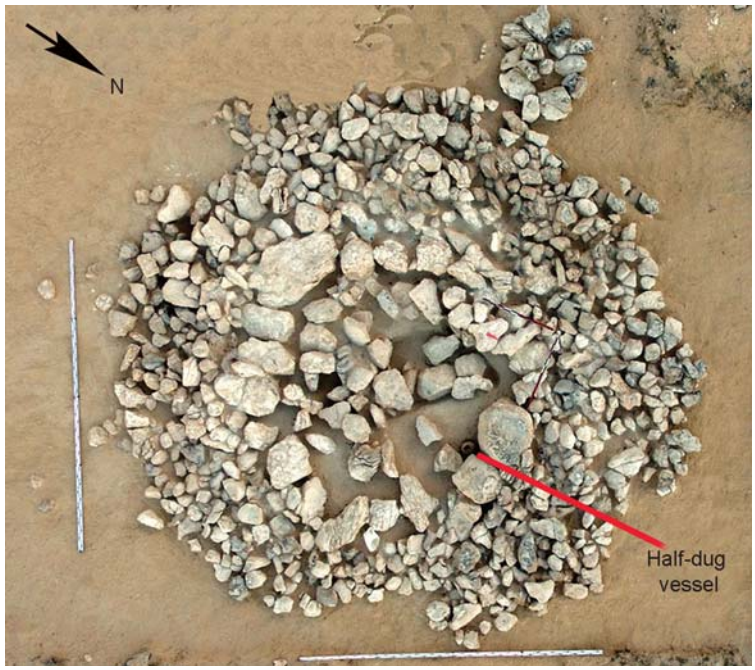
Fig. 2. Topographic plan of the cemetery.
a – embankment, burial mound; *b* – objects explored; *c* – stone placement (?) with depression in the center; *d* – ring-shaped stone placement; *e* – stone placement of amorphous outline; *f* – burial mounds with depression in the center; *g* – burial structure from the ethnographic time.

Burial complex and ritual

Burial 11 was located on a slope with height difference reaching 0.5 m over a length of 6.5 m. It appeared as a mound-like stone placement 6 m in diameter (Fig. 3). Pieces of limestone and flint lay on the ancient surface in one or two layers. The main mass of stone was concentrated in the southern sector and consisted of rocks removed in the course of grave robbing. In the center of the structure was clearly visible the circular placement of large blocks in one row, 4.2 m in diameter. A hand-molded vessel with broken neck, half-dug into the ground, was inside them, in the northern sector, near one of the blocks. The slightly concave bottom of the vessel was broken when the vessel was already in the ground. An empty hole, 0.25 m in diameter and 0.15 m in depth, was located 0.3 m to the east of it.

After removing the stone ring, the boundaries of the grave pit, partly destroyed by the robbers' pit, were identified. Initially, the grave pit had an elongated shape with an expansion in the southern sector and was oriented along the NNE-SSW line. The probable overall size of the pit was 1.8 × 0.95 m, with an average depth of 1.9 m relative to the level of the ancient surface. The northwestern sector was destroyed by the 1.6 × 0.9 cm shaft, which cut through the filling of the grave pit and

Fig. 3. Ground structure above burial 11.



roof of the burial chamber, which had a niche. The remains of stone placement in the burial chamber were found near the western wall of the burial pit, at the level of the bottom (Fig. 4). Slabs installed vertically (at an angle) were set in three rows. The inner and second row stood at the bottom of the burial chamber; the third row was installed on the bottom of the grave pit, which marked exactly a step 16–27 cm high. The height of the burial chamber vault can be reconstructed from the height of the burial, which was 0.6 m. Judging by the consistency of soil and typical features of the collapsed vault, the burial chamber was not filled with soil after the burial. Ribs, vertebrae, and bone fragments of human arms and hands were found in the robbers' pit close to the bottom of the grave pit. The gold casing of a wooden belt buckle and "spindle whorl" made of the wall of a hand-molded vessel were also found there.

On the bottom of the burial chamber (2.6 × 0.7 to 1.0 m), the remains of a disturbed human skeleton were discovered. The bones of the legs and feet, right hand, as well as left forearm and hand, survived in anatomical order. The deceased girl was buried in an extended supine position (arms stretched along the body; legs lying freely), with her head to the north (Fig. 5). In the area of the head, remains of the headdress were found *in situ* (Fig. 5, 6) in the form of local accumulations of forty small stamped plaques (Fig. 7, *1*) and two mask-plaques with fragments of reddish silk fabric (Fig. 7, *2*, *6–9*). A gold earring (Fig. 7, *5*) and mask-plaque (Fig. 7, *8*) were found in disturbed state in the head area, but 10–20 cm above the bottom of the grave. The location of the non-preserved skull was marked by a gold earring (see Fig. 6; 7, *4*) *in situ* (similar to the earring

Fig. 4. View of the grave pit and partition (filling) made of chalk slabs.

Fig. 5. Skeletal remains and grave goods on the bottom of the grave pit.

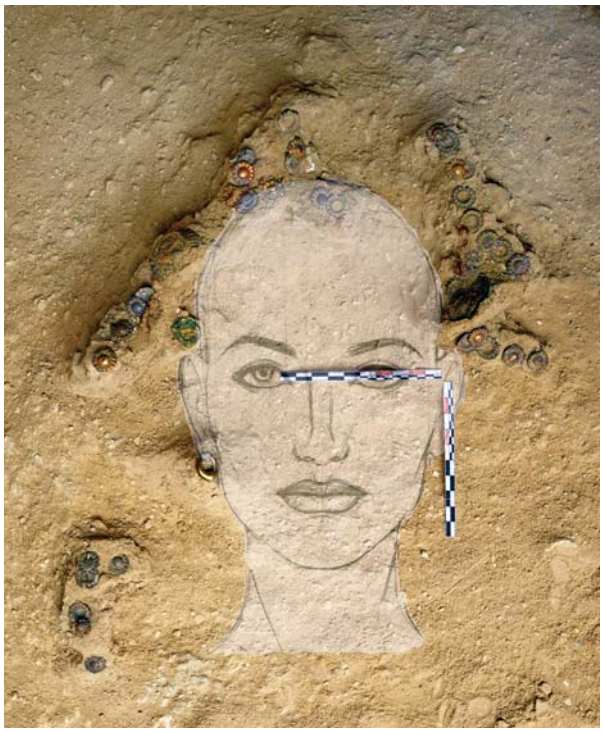


Fig. 6. Location of gold plaques *in situ* in the area of the head of the buried female.

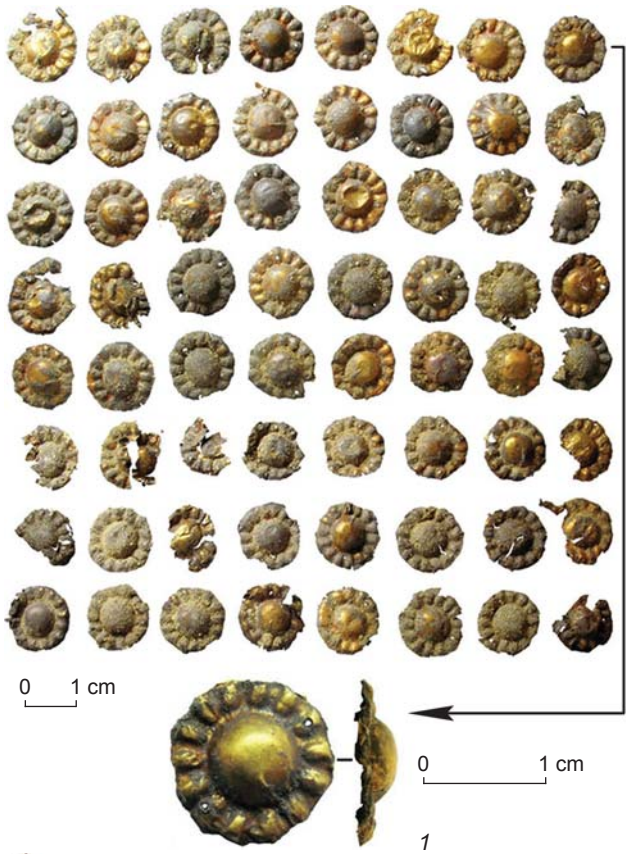


Fig. 7. Elements of the headdress.
1 – gold sewn-on plaques; *2* – fragments of cloth; *3* – laminar pendant; *4*, *5* – earrings; *6*, *7* — casings of mask-plaques; *8*, *9* – base of the ornaments; *10* – forehead plaque.
1, *3*–*7*, *10* – gold; *8*, *9* – wood.

Fig. 8. Reconstruction of the headdress.

found in the robbers' pit) and two mask-plaques in the area of the temporal bones (see Fig. 6; 7, *6–9*). Small plaques *in situ* lay in a semicircle within the area of the cranial vault (see Fig. 6). Judging by their location, they were originally sewn onto thin fabric in two rows, with a probable interval of 12–13 mm in a checkerboard pattern. The plaques could have been located in this way only if the thin fabric slipped off the head. Originally, they must have been sewn along the edge. A drop-shaped pendant plate was found below the right mask-plaque (see Fig. 6; 7, *3*); it was displaced. All the evidence has made it possible to reconstruct the headdress (Fig. 8).

Elements of two shoe straps (Fig. 9) have survived in the area of the ankles. The gold embossed casing of a wooden buckle (small fragments of the base with relief have survived) (Fig. 10, *2*, *3*) was at one end of each strap; a laminar tip was at the other end (Fig. 10, *4*, *5*). The buckles faced in opposite directions from each other. A fragment of a wicker item made of plant fibers has survived (Fig. 11, *5*) between the shin bones, under half of a bronze mirror (Fig. 11, *3*). A tip of a dart (or double-edged knife?) (Fig. 11, *4*) and "spindle whorl" made of the wall of a vessel manufactured on a potter's wheel (Fig. 11, *2*) lay nearby, under a scattering of beads (Fig. 11, *7–10*).

The data obtained during the excavations suggest that the burial complex was disturbed with the purpose of removing the head of the buried girl, since the rest of the bones have survived in some way or other (*in situ* or in the robbers' pit), and the gold items were left behind.

Description of the grave goods

The round plaques (64 spec.) were made of gold foil by embossing on a base (see Fig. 7, *1*). Their diameter is 12–14 mm. The relief decoration represents a raised hemisphere framed by convex oval-petals around the perimeter.

The small mask-plaques (2 spec.) have the shape of oval medallions. Their carved wooden bases were lined with thin gold foil with the embossed images of a human face framed by ascending "rays" (see

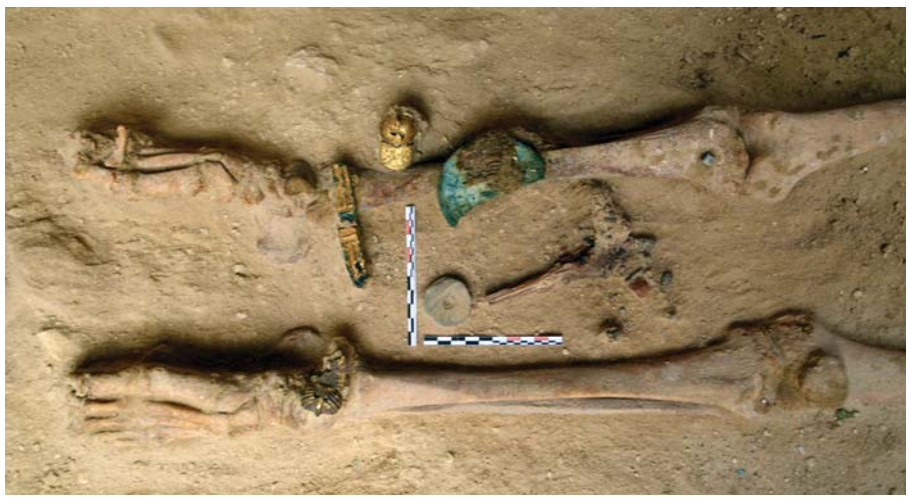


Fig. 9. Bones of legs and feet with remains of shoe straps and accompanying goods.

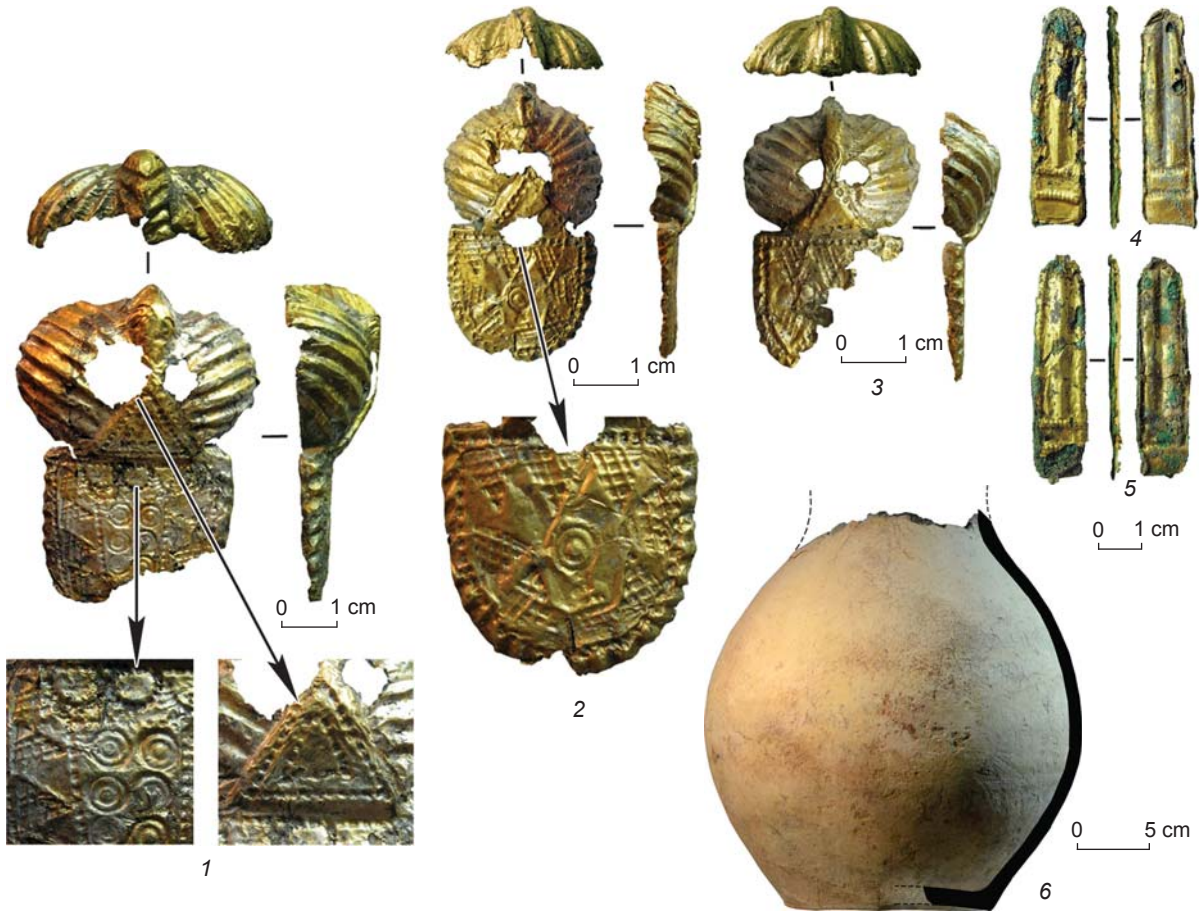


Fig. 10. Finds from the burial.
1 – belt buckle casing; *2*, *3* – shoe buckle casings; *4*, *5* – tips of shoe straps; *6* – vessel.
1–3 – gold; *4*, *5* – copper and gold foil; *6* – clay.

Fig. 11. Finds from the burial.
1 – "spindle whorl" from the wall of a hand-molded vessel; *2* – "spindle whorl" from the wall of a vessel made on a potter's wheel; *3* – mirror fragment; *4* – knife(?) / dart tip(?); *5* – fragment of a wicker item; *6–10* – beads.
1, *2* – clay; *3* – bronze; *4* – iron; *5* – plant fibers; *6* – stone; *7–10* – glass.

Fig. 7, *6–9*). There are two types of mask-plaques "with closed eyes": conventionally, "male" and "female" types (on the headdress, they were located on the left and right sides, respectively). The "male" face of Caucasoid outline was carved in half-relief on an inverted teardrop shape. The eyebrows are slightly curved and sloping; the base of the closed upper eyelid is straight and oblique; the nose is straight; the mouth is small with an enlarged lower lip. There are four holes along the edges of the medallion (top, bottom, and sides). The size of the foil casing is 34 × 25 × 7 mm. The "feminine" face in a heart-shaped outline has obvious Mongoloid features. The eyebrows are arched; the base of the closed upper eyelid is curved and almost horizontal; the nose is long, with wide nostrils; the mouth is elongated, with large lips. One fifth of the medallion has been lost. The size of the foil casing is 42 × 23 × 9 mm.

The large mask-plaque is a copper disc 58 mm in diameter, lined with gold foil with punch-matrix embossing (see Fig. 7, *8*). A face of the Mongoloid type with slanting eyes, wide protruding cheekbones, large nose, and narrow elongated lips was depicted in relief. The chin is bifurcated. The mouth is half-open, with four strongly protruding canines. The mask-plaque is outlined with embossing in the form of a strongly entwined cord.

A laminar drop-shaped pendant-imitation was made by punch-matrix stamping from a copper sheet with a slightly bent edge (see Fig. 7, *3*). The item has an unpierced eyelet. Its size is 25 × 16 mm. The outer surface of the pendant is gilded. The relief band with cord decoration imitates a frame with stone insert.

The solid gold ring-shaped earrings (2 spec.) measure 18 × 16 and 17 × 15 mm. The ends of the rods, closed into a ring with thickening in the middle part in the form of a ring-shaped ridge 6 mm in diameter, were strongly narrowed (see Fig. 7, *4*, *5*).

Fragments of thin reddish fabric remaining from the headdress (see Fig. 7, *2*) make it possible to suggest the method of its manufacturing, namely, the principle of plain weave, where the warp thread is much thinner than the weft thread.

Foil casing on a wooden base forms an imitation of a belt buckle with oval frame, prong, and flat quadrangular shield (see Fig. 10, *1*). Its overall size is 61 × 45 × 18 mm. The frame with fixed prong is decorated with relief embossing depicting a bird of prey with half-lowered, spread wings and spread tail. The curved end of the prong constitutes the "bird's head". Its other end (the "bird's tail") is decorated in the technique of point embossing in the form of two triangles inscribed one into the other. The field of the shield is decorated with triangles of false granulation and figures of concentric circles. The edges of the shield are beveled and decorated with slanting notches. Foil on both sides of the prong is damaged.

Foil casing on wooden bases (2 spec.) form an imitation of shoe buckles (see Fig. 10, *2*, *3*). These items are similar in type and ornamentation to the belt buckle, only with smaller size: 42/44 × 25/27 × 9 mm. The foil is of poor degree of preservation; there are losses.

The tips of shoe straps (2 spec.) are elongated copper plates with one slightly narrowed and rounded end, lined with gold foil on both sides (see Fig. 10, *4*, *5*). Their size is 43 × 13 mm. A wide band runs along the center of the plates along the entire length; it is bounded at the straight end by two transverse corrugated thin bands. The fastening elements are absent.

The half of the bronze mirror has a ridge along the edge and flattened protrusion-loop in the center (see Fig. 11, *3*). The diameter is 82 mm. The mirror is decorated with relief ornamentation in the form of a ring divided into many sectors by radial rays.

A dart tip (or double-edged knife?) has a short, diamond-shaped, double-sided blade (54 × 28 mm) and long, tapering tang (70 × 13 mm). Remains of decay from the wooden handle (see Fig. 11, *4*) have survived on the tang with overlap on the blade.

One of two bagel-shaped ceramic "spindle whorls" (2 spec.) was made from the wall of a hand-molded vessel (see Fig. 11, *1*). Its diameter is 46 mm; its thickness is 13 mm; the diameter of the hole is 8 mm. The other "spindle whorl" was made from the wall of a gray clay vessel made on a potter's wheel (see Fig. 11, *2*). Its diameter is 39 mm; its thickness is 8 mm; the diameter of the hole is 7 mm.

There are several varieties of highly patinated glass beads and tubular beads: cuboid with convex and concave end faces, 9 × 8 × 8 mm (see Fig. 11, *7*); drop-shaped with longitudinal hole, 11 mm long and 8 mm in diameter (see Fig. 11, *8*); round-flattened with a diameter of 3.0–4.5 mm (see Fig. 11, *10*). One tubular bead is spiral, 6 mm long and 4 mm in diameter (see Fig. 11, *9*); the rest have the shape of undivided columns (intact and fragments); their length is 5–16 mm and diameter is 3 mm.

A spherical bead made of a red translucent stone (carnelian?) is 17 mm in diameter (see Fig. 11, *6*). One third has been chipped off.

Interpretation of the evidence

Material evidence from the Karakabak burials does not contradict the opinion that most of the Late Sarmatian specific aspects of funeral rituals survived in the Hunnic period over the vast territory of the Eurasian steppes, including the Aral-Caspian region (Astafyev, Bogdanov, 2020a: 84). These include the presence of ring-shaped stone placement at the burial ground, burial under an individual embankment in a grave with a niche in the western wall, setting of stone slabs, burial of a human in an extended supine position with the head to the north, presence of "spindle whorls" made of pottery walls, and fragment of a mirror with radial-ray decoration among the female accessories. Absence of funeral food in the grave and a ceramic vessel buried near the ground structure (moreover, to the north of it!) (see Fig. 10, *6*), with a pit nearby, can be viewed as markers of the Hunnic period. This aspect of the burial rite, associated with the "offering" (of liquid), is a phenomenon of the same order as rituals observed in stone structures of Altynkazgan (see (Astafyev, Bogdanov, 2018a: 355–361)). There are also striking similarities not only in the shapes of the vessels, but also in many types of grave goods. For example, the large mask-plaque and elements of shoe straps (shapes of buckles and prongs) found in the burial under consideration have parallels in "hoard" No. 3 from enclosure No. 158 (Astafyev, Bogdanov, 2018b: Fig. 6, *10–14*). Analysis of these items confirms our earlier assumption that personal ornaments for the nomadic elite could have been made in Karakabak by artisan-jewelers (Astafyev, Bogdanov, 2020a: 87) who worked equally well both with casting and chasing. In this sense, burial 11 does not stand out from the general picture obtained during the excavations at the Karakabak-10 cemetery; namely, it can be dated from the second half of the 5th to early 6th century and it belongs to the Alanian-Sarmatian nomadic elite closely associated with the Karakabak artisanal and trading center. However, there is one very important point: unlike other burials examined at the cemetery, we do not see the influence of the "Pontic fashion" in the outfit of the buried girl. Moreover, all its elements are imitations of real things*. These were commissioned for a specific event (burial of a deceased person).

The first point that may be observed is the absence of clear chronological indicators. We have already written about Karakabak golden ring-shaped earrings and their parallels (Astafyev, Bogdanov, 2020b: 188). Disc-shaped "spindle whorls" made of the walls of ceramic vessels, and mirrors with radial-ray ornamentation and a protrusion-loop in the center appear over the same vast area (types IX and X according to the classification by A.M. Khazanov (1963: 67–69, Fig. 4) or "of the Berezovka–Anke-2 type" in the terminology of A.V. Mastykova (2009: Fig. 91, 92)). A wide range of parallels to the laminar pendant with imitation of a frame only emphasizes the popularity of such ornaments both in the nomadic environment and among the sedentary population of the Hunnic and post-Hunnic times. Belt tips in the form of an elongated plate with ribbed bands and casing of gold foil (and without it) appear among the evidence from sites in Hungary, the North Caucasus, Crimea, the Volga region, and the Urals (Werner, 1956: Taf. 64, *11–14*; Zasetskaya, 1994: Pl. 1, *9*; 17, *16*; 22, *1*; 26, *1*; Gabuev, 2014: Fig. 66, *6*; Kurgan s "usami"…, 1999: Fig. 23; Bisembaev, 2020: Fig. 1, *15*). However, belt and shoe buckles from Karakabak burial 11 do not typologically fit the available classifications of Hunnic antiquities (V.B. Kovalevskaya (1979: 15–48), A.K. Ambroz (1989: 63–81), I.P. Zasetskaya (1994: 77–99), A.V. Komar (2000: 23–32), etc.). It is necessary to keep in mind that these are imitations (gold casings on wooden bases) that have never occurred before. Techniques for decorating shields and the ornamentation of concentric circles, triangles and pseudo-granulation are typical of the Hunnic and post-Hunnic periods. These ornamental motifs appear on the casing of a sword sheath from the Volnikovsky "hoard" (Volnikovskiy "klad"…, 2014: 88–90). Moreover, the composition on the shield of the Karakabak belt plate repeats the layout of inlaid elements on the shield of the sword belt buckle (Ibid.: 36–37), only made less carefully. One gets the impression that the artisan who made the Karakabak artifacts saw some original samples and imitated them using the methods he knew. The parallel of the Karakabak samples with belt buckles from burials near the village of Shipovo (the Volga region) (Zasetskaya, 1994: 90–91, pl. 40, *3*; 42, *6*; fig. 19, *c*), catacomb 10 near the Lermontov Rock (Runich, 1976: Fig. 3, *9*), and catacomb 40 in Mokraya Balka (Afanasyev, Runich, 2001: Fig. 58, *7*) (North Caucasus) is very interesting, especially if we take into account the discovery of shoe buckles of the "Shipovo type" in burial 2 of Karakabak-10 (Astafyev, Bogdanov, 2020a: Fig. 4, *3*). The most interesting detail

*It is important that most of the gold and silver objects found in Altynkazgan as a part of the "hoard"-offerings were also made specifically for the ritual and were not used in regular, everyday life.

is the presence of grooved band-notches on the frames, extremely reminiscent of the stylized decoration of Karakabak buckles in the form of bird wings. Such frames have been found only among the evidence of the sites from the Shipovo horizon (Mastykova, 2009: 60–61) or group C5 (Komar, 2000: 35–36). This brings us to a number of questions. The most important question is what is their derivative in this case? Do they derive from the Mangyshlak finds, which seems to be logical given the location of the region far from the main production centers and routes of movement of the Hunnic hordes, or vice versa?

Analysis of the burial outfit from Karakabak burial 11 may provide some clarity. According to Mastykova, "the prototype of a prestigious headdress with gold appliqués should be sought for in the antiquities of the Hellenized population of the Late Antique centers in the Northern Black Sea region" (2014: 137). Since the principle of decorating clothes with sewn-on plaques was not widespread in Europe in the Hunnic period, it is not surprising that headdresses decorated in this manner were absent in European reconstructions of nomadic outfits (Ibid.: Fig. 119–125). Meanwhile, round plaques with a hemisphere in their center widely appear in the evidence of the 4th–6th centuries from the Bosporus (Aibabin, Khairedinova, 1997: Fig. 13, *1*; Taina zolotoy maski…, 2009: 39, cat. No. 25, 26; Ermolin, 2009: Fig. 3, *8*) and North Caucasus (Gabuev, 2005: 40, cat. No. 82) to the Southern Urals and Cis-Urals (Botalov, 2013: 212; Bisembaev, 2020: Fig. 13). However, first of all, with the exception of the headdress of the woman from burial mound 22 at the Soleny Dol cemetery (Botalov, 2013: 232), they adorned the collar of the dress and/or sleeves. Second of all, the edges of the plaques were decorated with pseudo-granulation—dots and not "petals", as is the case with the Karakabak artifacts. The latter consideration makes it possible to speak about the "solar nature" of the representation and see parallels in the Sarmatian and even Scythian evidence. We will discuss this further later. The most surprising detail in the headdress of the Karakabak girl is the headband with mask-plaques (see Fig. 8). Here, we face a paradoxical situation. Dozens of pages in monographs and articles by various scholars analyze buckles (prongs, frames), fibulae, and other everyday items, with fierce debates about their typology and chronology. Yet, the phenomenon of the emergence of "Hunnic" mask-plaques in the steppe was mentioned only in the context of decoration of the horse harness, although this assumption is speculative owing to plundering and heterogeneity of the complexes. Anthropomorphic images embossed on gold plates (placed on a copper base plate) are chronologically indicative precisely of the Hunnic antiquities (Ancient Intercisa, Hungary) (Ambroz, 1989: Fig. 30, *12*). Surprisingly, their main location is the Volga region (burial mounds 17 and 18 near the town of Pokrovsk, the destroyed burial in Pokrovsk-Voskhod, burial mound 4 near the village of Vladimirskoye), the Northern Black Sea region (burial VII near Novogrigorievka), and North Caucasus (Upper Rutkha) (Bona, 1991: 28, fig. 9), and the burial on the territory of Ufa (Tukaev street) (Ambroz, 1989: Fig. 34, *5*) with the extreme eastern point at Mangyshlak (Altynkazgan, Karakabak). Taking into account the conventionality in drawing the crumpled gold foil of casings by contemporary artists, we can only conclude that there is a variability of images. The similarity with the Mangyshlak masks can be observed only in design ("cord" ornamentation along the edge) and technology (copper disc on rivets at the base). O. Maenchen-Helfen assumed the Iranian origin of some Hunnic masks with a beard, based on the observation that according to Ammianus Marcellinus (XXXI. 2), large beards are not typical for the Huns; they are common among the Scythians and Sarmatians (1973: 281–284). According to A.K. Ambroz, "the emergence of masks on the harness among the nomads can be associated with the influence of Rome or Iran" (1989: 73). Citing the opinion of C. von Carnap-Bornheim that the Volga masks derived from the Late Roman and Germanic models, M.M. Kazansky quite rightly pointed to the inexplicable remoteness of the majority of the finds from the borders of the Roman-German world (2020: 100). What can be found in the West?

1. A group of brooches with glass, inserted masks from the Sarmatian complexes of the 3rd–4th centuries in Pannonia (Grumeza, 2014). The artifacts made in this specific tradition were discovered two centuries later in the North Caucasus (Kharbas-1, Kamunty, and two accidental finds) (Sadykov, Kurganov, 2016: Fig. 18, p. 219).

2. Small-sized cast masks on gold ornaments from the time of the Great Migration from Germany, Italy, and Scandinavia, made in the Roman technique of jewelry art (see (Balint, 2016: Fig. 1, 3, 7, 34)).

3. Various kinds of images of divine faces, portraits of Roman emperors on gold sewn-on plaques, coins, phalerae, etc., going back to the traditions of Antiquity and made in Roman and Byzantine production centers.

A huge number of such items circulated among the elite of the Barbarians, where each ruler could feel his involvement with the supreme deities. A good example

of this is the bronze plate that adorned a wooden bucket from Giberville (France), which was dated to the 4th century. "Represented from left to right: the profile of a Roman emperor (Valentinian?)—an imitation of a coin, followed by a hunting scene, which ends with the figure of the standing Emperor striking the enemy—probably also an imitation of a coin, followed by the frontal image of a face—an exact parallel to the masks of the Hunnic period" (Ishtvanovich, Kulchar, 1998: Fig. 5). The Altynkazgan phalera and headdress from Karakabak burial 11 is even closer to the Antique (Scythian) models than to the Late Roman models in terms of its pictorial features. An example is gold sewn-on plaques from the Deev Kurgan (Northern Black Sea region) (Alekseev, 2012: 238–239) or various images of gorgoneions (including those with fangs) from Scythian burial mounds (Rusyaeva, 2002: Fig. 1, *4*; 2). Especially indicative are images of gorgons from Vani (Georgia), which are deprived of decorative "effects", broad-faced, with stylized hair, open mouth, and gathered brows conveying negative emotions (Avaliani, 2012: Ill. 1). In terms of their pictorial canon, they use the same visual language as masks from the Volga region and Northern Black Sea region.

It seems that the reason for local crude production and popularity of masks in the eastern periphery of the "Hunnic" world was not their role as "military signs" "symbolizing severed heads of the enemies", which was inherent among the Huns, as, for example, E. Ishtvanovich and V. Kulchar believed (1998: 9)*.

In 274 AD, the Emperor Aurelian carried out a religious reform aimed at reaching ideological unity of the Roman Empire: the cult of Sol Invictus Imperii Romani was combined with the cult of Mithra (Kulikova, 2020: 13). The sun officially began to be worshiped as one of the main deities. This "Hellenized cult", which underwent transformation in Asia Minor, had only a distant relation to the Iranian Mithra, but nevertheless, according to R. Zuevsky, in the 3rd–4th centuries it reached stunning proportions spreading from Spain to Germany, and from Britain to the eastern and North African provinces of the Roman Empire (2009: 28). Thus, the Aral-Caspian region appeared to be the area of both Western and Eastern (the cult of Mithra under the Sassanids) religious and philosophical influences. A new element emerged in the pictorial canons: a radiant crown around the head of the deity (and the king). An example is the image on the two-sided relief from Rome (Ibid.) or bas-relief depicting Artashir II and Mithra (Lukonin, 1969: Fig. 19). Gold is tied with the sun, which is tied with the ruler. The artisan could have tried to represent precisely such a "radiant crown" around the head on the masks from the Karakabak burial (see Fig. 7, *6–9*). And "hair" on the masks from the Volga region and North Caucasus was shown in such distinctive, wide, upward bands in relief precisely for this reason.

Thus, we can state that the headband with masks from burial 11 at the Karakabak cemetery was the imitation of a diadem—a sign of royal dignity. "Simplified" forms of such diadem headbands with a round forehead plaque can be seen in the portraits of Roman and Byzantine emperors (see (Zasetskaya, 2011: 48, ill. 20)), and sometimes they have two more additional plaques on the temples. Speaking about the geographically closest parallels, we can mention the headband decorated with sewn-on hemispherical plaques from the Late Sarmatian hoard found at the shore of Lake Batyr (Eastern Caspian region) (Skalon, 1961: Fig. 4, *4–6*). However, while according to its stylistic and technological canons the Karakabak forehead plaque is undoubtedly an imitation of the Late Roman (Hellenistic) models, the temporal mask-plaques from the headdress, made in high relief with the rendering of facial features, oddly enough, are closer to Pazyryk counterparts (see (Rudenko, 1953: Pl. XLIII, LXXX, 6, 7)). We should keep in mind that the artisan who made the Mangyshlak plaques had sufficient skills in woodworking. However, the Caspian semi-desert region does not have an abundance of forests, and more traditional casting and toreutics were applied. A foreign woman could have been buried in Karakabak burial 11, and this explains such radical difference between her outfit and grave goods of clothing complexes from other burials at that cemetery. As for the anthropomorphic images, their division ("male" and "female", "father" and "mother", "Mongoloid" and "Caucasoid") is rather arbitrary and unsubstantiated. A well-grounded interpretation is difficult, since in this case the dichotomy of left and right is not associated

*This theory is open to objection. For example, a mask-plaque and not a severed head is depicted on the horse harness on the Sasanian dish from Kulagysh (Ishtvanovich, Kulchar, 1998: Fig. 7). B. Brentjes is of the opinion that the belt plate with a severed head hanging from a horse from the Orlat burial ground represents "Central Asian Huns", but this opinion is currently rejected by scholars (for more details, see (Litvinsky, 2002: 189–191)). As far as the testimony of Ammianus Marcellinus (XXXI.2) "about the Alans proudly decorating their war horses with scalps of the enemy" (Ishtvanovich, Kulchar, 1998: 9) is concerned, it speaks not about heads either. Again, the Altynkazgan mask-plaque was placed on the horse's forehead, while the Karakabak mask-plaque identical to it was placed on the girl's forehead. This indicates a very different semantic content of these images.

with any ethnic differentiation. The stereotypes known from archaeology and ethnography do not work, because the use of mirror images on items was typical of the majority of traditional outfits (headdresses). Only the image of closed eyes in the context of the funeral ritual and display of some (possibly!) ethnic component in the faces may (if more similar finds come to light) reveal a different, more detailed level of interpretation in the future.

Conclusions

The analysis of the burial complex and grave goods in this article has made it possible to formulate several important points.

1. Burial 11 of the Karakabak-10 cemetery is dated to the second half of the 5th to early 6th century and belongs to a nomadic noblewoman.

2. Specific aspects of funeral rite are typical of the Late Sarmatian circle of sites, while the grave goods show some features typical of the post-Hunnic, "Shipovo horizon".

3. The identical nature of the Karakabak and Altynkazgan finds may be explained by an artisanal center in the settlement of Karakabak (for more details, see (Astafyev, Bogdanov, 2019)) located nearby.

4. Belt buckles, shoe buckles, and elements of headdress were made specifically for the ritual and were not used in everyday life.

5. The outfit of the girl from burial 11 is not associated with the "Pontic fashion", whose influence can be observed in the evidence of other burials explored at Karakabak. On the one hand, the headdress (cape with sewn gold plaques and diadem headband with anthropomorphic images) was an imitation of royal vestment reproducing Late Roman (Hellenistic) models. In this sense, the statement of S.A. Yatsenko, who asserted that "diadems of nomads are not accompanied by the headdress, being an independent element of the outfit" (1986: 14) is incorrect. On the other hand, certain stylistic features of the carved wooden masks point to some Central Asian context. This suggests that a foreign girl who was not of Sarmatian-Alanian origin was buried in burial 11. This assumption will undoubtedly be further corrected after carrying out genetic studies.

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Integrative Geophysical Studies at the Novaya Kurya-1 Cemetery in the Kulunda Steppe

We outline the results of prospection studies at the Novaya Kurya-1 cemetery in the south of Western Siberia, using remote sensing methods such as aerial photography, ground-based magnetometry, high-precision aeromagnetic survey, electromagnetic profiling, and electrotomography. Original techniques were used to construct relative relief maps, and an inversion of data from ground-based magnetic survey at various altitudes was carried out. The first technique reduces the effect of natural relief, and highlights anthropogenic altitudinal anomalies, making the analysis of digital elevation models more efficient. The second technique is helpful for assessing the thickness and depth of anomalous magnetic bodies or horizons, not only providing planigraphic information but enabling us to evaluate two- and three-dimensional geometric properties of the detected objects. As a result of the analyses, at least 14 kurgans were identified at the cemetery, six of which lack salient outward features. Structural details suggest that most of them date to the Early Scythian time (800–400 BC). On the basis of the interpretation of the results of highly efficient prospection analyses using the UAV platform, offering the possibility of surveying a large area (about 25 ha), the boundaries of the site were determined. Several features were detected. To identify these, further studies are needed.

Keywords: *Magnetometry, aeromagnetic survey, aerial photography, electromagnetic profiling, electrotomography, burial mounds.*

Introduction

Geophysical research methods have been used in archaeological practice worldwide for a long time. Geoelectric studies have been used for more than 80 years, and magnetic prospecting has been used for more than 60 years (Korobov, 2016). The experience gained shows that the tasks of the search for, and diagnostics of, the structure of archaeological sites can be successfully resolved with the aid of non-destructive geophysical methods. Currently, geophysical research in archaeology is one of the most dynamically developing areas of interdisciplinary cooperation. This rapid growth is largely due to the continuous development of hardware and software in geophysics providing new opportunities for archaeological studies.

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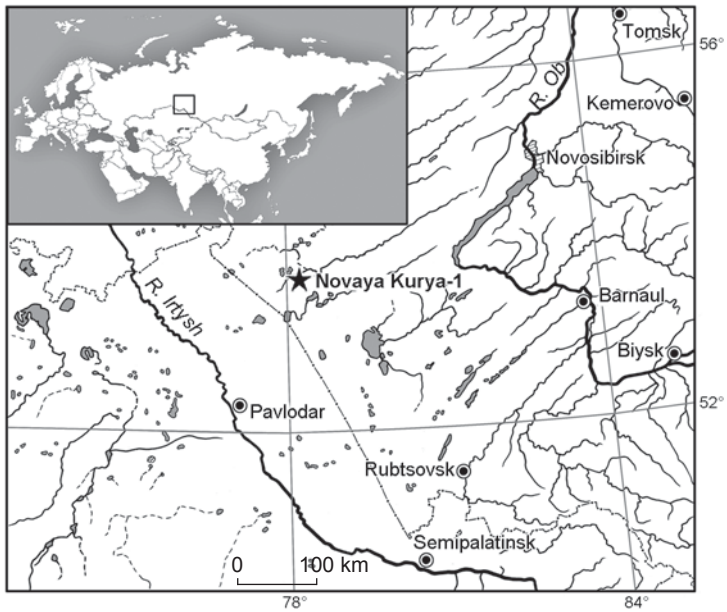

Fig. 1. Location of the site of Novaya Kurya-1.

Another factor of sustainable productive development is the long-term and multipurpose joint research carried out by the specialized institutions. These approaches make it possible to constantly improve the methodology of archaeological and geophysical works by testing new methods, and checking the results of geophysical reconstructions by excavations. The collaboration between the Institute of Archaeology and Ethnography and the Institute of Petroleum Geology and Geophysics (IPGG) SB RAS, lasting for over 20 years, is among the examples of such interaction. Over the years of collaboration, the whole range of methods, including magnetometry, electromagnetic profiling, electrotomography, and ground-penetrating radar, has been used; research has been carried out at various archaeological sites in the steppe and forest-steppe regions of the south of Western Siberia, Altai, Mongolia, Khakassia, the Aral Sea region, and India (Jammu and Kashmir). We were able to disclose fully the advantages of combining different methods, which makes it possible to gain comprehensive information about the subsurface locations of objects, their parameters and structures (see, e.g., (Epov et al., 2012; Epov, Molodin, Manshtein et al., 2016)).

In recent years, new prospects have opened up in the field of archaeogeophysics associated with the development of UAV technologies. Installation of geophysical equipment on unmanned vehicles significantly increases the productivity of work and makes it possible to survey vast areas in a short time. Taking into account the innovative nature of these technologies, for their introduction into archaeological and geophysical research, it is necessary to test them using verification of the findings by traditional geophysical methods. In 2019, such works were carried out at the plowed kurgan cemetery of Novaya Kurya-1, located on the Goryachy Dol range, 3 km to the southwest of the village of Novaya Kurya, in the Karasuksky District of the Novosibirsk Region (north of the Kulunda steppe) (Marchenko et al., 2019) (Fig. 1). The cemetery is composed of eight prominent mounds, 20–35 m in diameter and 0.2–0.8 m high. In the course of works, well-known methods of ground-based magnetic survey, electrotomography, and electromagnetic profiling were supplemented by aeromagnetic survey and aerial photography. In addition to testing the new technologies, the purpose of the integrative geophysical studies was to specify the features of the internal structure of the mounds, to search for artifacts in the spaces between mounds, and to identify the boundaries of the site.

Technique and methods of geophysical research

Ground-based magnetic survey. Magnetometry is one of the most widely used geophysical methods in archaeology, because under favorable conditions, this method makes it possible to derive an actual map of the site. To conduct a ground-based magnetic survey of the Novaya Kurya-1 cemetery, a system of grids of 30 × 30 m was established. Since the research tasks included the search for small objects, in order to improve the quality of works, all study areas were scanned with a metal detector

in low sensitivity mode, to remove from the tilled layer only the large modern iron items (which produce big gradients of magnetic anomalies and interfere with the recognition of archaeological objects).

The geomagnetic field induction module was recorded with the aid of a cesium magnetometer-gradiometer G-858G (Geometrics, USA) using the vertical gradient method. The sensors were located at altitudes of 40 and 115 cm from the ground. The operator moved along the parallel profiles at a speed of ca 4 km/h, which at a survey frequency of 10 Hz made it possible to take measurements every 10–12 cm. The distance between the arbitrary profiles was 1 m. The total area of magnetic mapping was 23,550 m^2. Data were processed using the Surfer program (Golden Software, USA); after that, maps of the vertical gradient of the module of the magnetic induction vector were constructed.

The parameters derived through survey along the profiles passing through centers of the identified archaeological objects were estimated by means of numerical modeling (Evmenov et al., 2020). For this, the data on the anomalous magnetic field derived at two levels of ground-based survey (40 and 115 cm high) were correlated with the results of additional measurements at altitudes of 175 and 250 cm above the ground. When constructing maps and plots of the anomalous field, the data of the variation proton station MV-07M (Geomer, Kazakhstan) were used to exclude the effect of external geomagnetic variations.

Aeromagnetic survey and aerial photography. Aeromagnetic surveying in mineral prospecting has been used for a long time and produced good results. Foreign (Geometrics, GEM, Scintrex, Bartington) and domestic (Geoscan) firms produce serial equipment for mounting on the platform of an unmanned aerial vehicle (UAV) (Balkov, Karin, Pozdnyakova, Dyadkov, 2020). However, this method has been rarely used in archaeological projects (Epov, Molodin, Pozdnyakova et al., 2016; Tishkin et al., 2017; Goglev, 2018; Firsov et al., 2018; Tataurova et al., 2018; Schmidt, Becken, Schmalzl, 2020). Therefore, researches aimed at determining the capabilities of the method for studying various types of archaeological sites remain highly relevant.

Aeromagnetic survey of Novaya Kurya-1 was carried out using the Geoscan 401 Geophysics complex (Geoscan, Russia). Measurements were performed through a high-precision quantum magnetometer of an original design. An industrial quadcopter with the function of flying along a stated route was used as a carrier. The advantage of this complex is that both aeromagnetic and aerial photography can be performed using a single carrier (Goglev, 2018).

The total aeromagnetic survey area was ca 10 ha (500 × 200 m); the total length of the profiles was ca 100 km. The device moved along the profiles at a speed of ca 5 m/s, which at a survey frequency of 10 Hz made it possible to take measurements every 0.5–12 cm. The average height of the survey was ca 5 m, the distance between the profiles was ca 1 m. On the basis of the results of data processing carried out by the specialists of the IPGG SB RAS (Balkov et al., 2019), maps of distribution of the module of the anomalous magnetic field induction vector were constructed, taking into account external geomagnetic variations.

In contrast to aeromagnetic survey, aerial photography is increasingly often used in archaeological studies. The resulting orthophotomaps and digital elevation models have a high degree of resolution and in some cases provide quite sufficient information about archaeological objects, as the geophysical methods do (Vavulin et al., 2021). The total area of aerial photography at Novaya Kurya-1, performed using the Geoscan 401 Geophysics complex, amounted to almost 25 ha (700 × 350 m). Data processing was carried out using an original approach to constructing maps of relative heights, which reduces the effect of natural relief and highlights anthropogenic altitudinal anomalies (Balkov, Karin, Pozdnyakova et al., 2020).

Measurements of the magnetic susceptibility of soils. To increase the reliability of interpretation of the results of the magnetic survey at Novaya Kurya-1, the magnetic susceptibility of soils and underlying rocks was assessed. Measurements were performed using magnetic susceptibility meters MP-01 (Kazgeofizpribor, Kazakhstan) and SM-30 (ZHinstruments, Czech Republic). Average values for soils were $60–80 \cdot 10^{-5}$ SI, for underlying rocks $20–35 \cdot 10^{-5}$ SI. The noted contrast ($30 \cdot 10^{-5}$ SI) is sufficient for distinct anomalies to be generated over archaeological objects provided that there are significant amounts of soil in their fillings (Pozdnyakova, 2020).

Electrotomography. The resistivity method in electrotomography makes it possible to study the structure of archaeological objects with the presence of resistivity contrast with the host environment (Balkov et al., 2012). In the course of the research, the modern Russian device Skala-64K15 (OOO Electrometry Design Bureau, Russia) was used, which shows high performance through the use of 15 parallel measuring channels. At Novaya Kurya-1, six profiles were measured. The distance between the electrodes along each profile was 0.5 m. Profile 5 (80 m long) ran through the center of visible mounds 3 and 4. Other profiles (31.5 m long) were intended for distinguishing the features of the invisible objects detected by magnetic survey.

Electromagnetic profiling. The EMC equipment developed at IPGG SB RAS is a multifrequency three-coil induction sonde, with the function of compensation of the transmitting-coil primary field with two opposing receiving coils (Manshtein, Panin, Tikunov, 2008). The

measured signals are processed by transformation into apparent resistances, and the results are presented in the form of maps of distribution of apparent resistivity values. This method was used to duplicate all the electrotomography profiles and to perform frequency-sounding on two areas measuring 14 × 16 and 6 × 10 m. The distance between the measurements along the profiles was 0.5 m, between the profiles 1 m. The test areas, like the profiles, were established relying on the ground-based magnetic survey data.

Study results

Ground-based magnetic survey. The generated map (Fig. 2) clearly shows the small intense anomalies of magnetic field gradient, with an amplitude of more than 30 nT, associated with iron items. Against the general rather calm magnetic background (up to 1 nT), traces of plowing are well recorded in the form of alternating positive and negative linear anomalies in the magnetic field, reaching the values of 9 and –3 nT, minus the

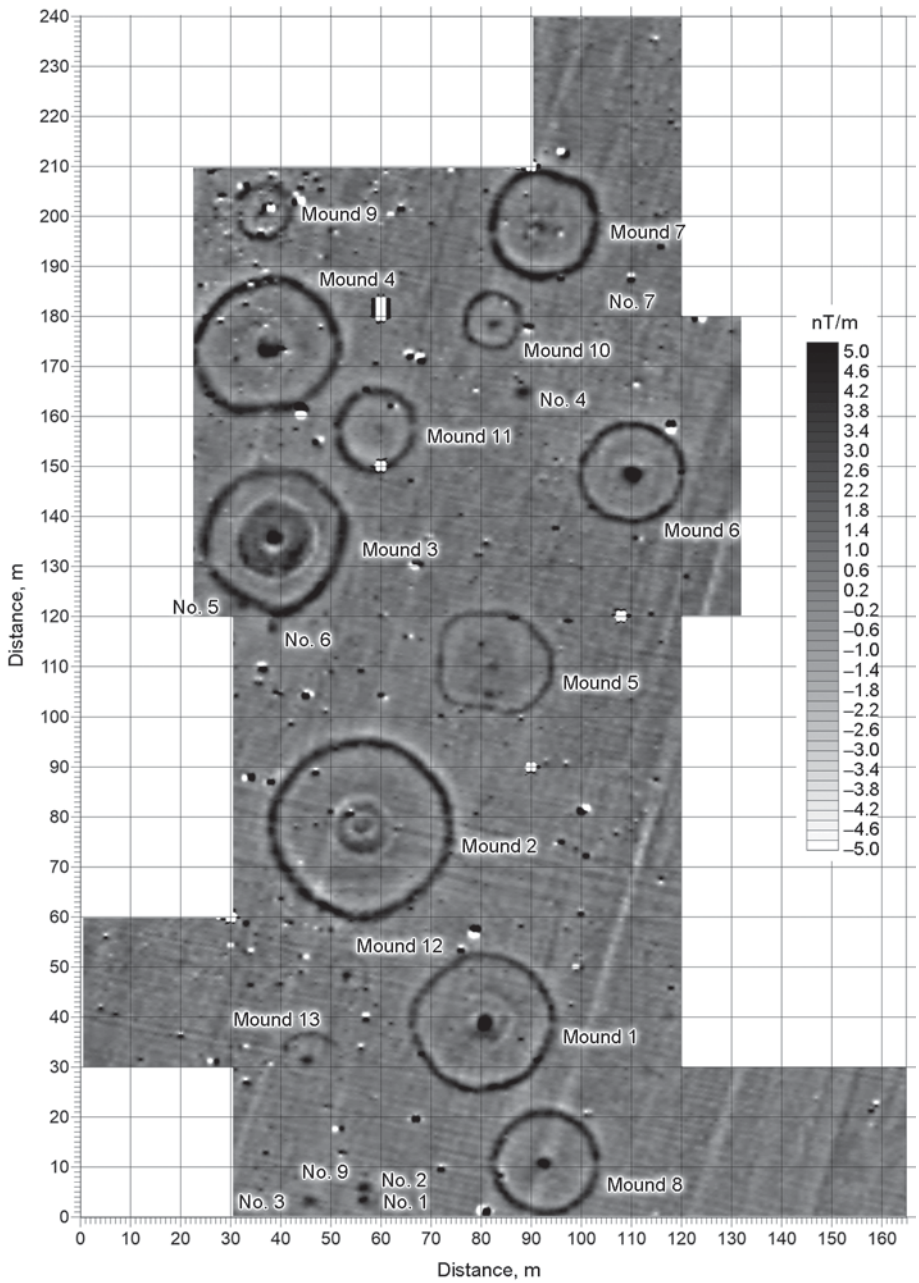

Fig. 2. Gradient distribution of the magnetic field (module of the magnetic induction vector) according to the ground-based magnetic survey results.

signal from iron items. The low values suggest that the emergence of positive anomalies was associated with a local increase in the thickness of the humic layer. This is also confirmed by the results of measurements of the magnetic susceptibility of the soils.

All prominent structures are well traced by positive anomalies; with most of them being characterized by a common set of features. Ring-shaped ditches with passages along the W-E line are clearly recognizable. The amplitudes of the associated anomalies reach 5 nT. The outer perimeter of the ditches correlates well with the visible borders of the mounds. In the center of almost all mounds, rounded anomalies 8–14 m in diameter are distinguished, apparently reflecting the structural features of the mounds. Some of them are characterized by increased values up to 4 nT (mounds 2 and 3). The magnetic parameters of the rest of the area bounded by the ditch are close to the background ones. In the center of the mounds, anomalies with an amplitude up to 9 nT are clearly recorded, which may be due to penetrations by looters. In the space between the prominent structures, small mounds 8–9 to 17 m in diameter (mounds 9–13) with similar configuration were identified. The common features indicate that all these objects represent a one-time burial ground.

Among the visually recorded structures, only mound 5 demonstrated a markedly different organization of the internal structure. Excavation findings (Marchenko et al., 2019) and radiocarbon dating of horse bones from burial 1 (1029 ± 21 BP, MAMS-46646) suggest its attribution to the Late Early Middle Ages, corresponding to the period of the Kimek-Kipchak union in the regional history (Kishkurno, Marchenko, Grishin, 2020). The comparison of archaeological and geophysical data showed that the objects of mound 5 were well recognizable on the maps, owing to the presence of a significant amount of humic soil in their fillings.

In the space between mounds, several positive anomalies with amplitudes of 4–5 nT were recorded, which can be confidently associated with burials or pits. Three of them were located near mound 8 (objects No. 1–3), and one between mounds 6 and 10 (object No. 4). Noteworthy also are two similar anomalies at the southern edge of the ditch of mound 3 (objects No. 5 and 6). The amplitudes of the rest of the anomalies hardly differ from the background values. Among these, only one structure, located between mounds 6 and 7 (object No. 7), is identified with the greatest probability. Its shape is close to an oval; it is oriented along the SW-NE line, and is ca 7 × 11 m in size.

Aeromagnetic survey and aerial photography. The generated maps (Fig. 3, *b*; 4) clearly show local ring-shaped structures with an amplitude up to 10 nT, corresponding to mounds 1–4 and 6–11, distinguished against the background of regional changes in the magnetic field (up to 20 nT). The research method shows a high degree of correlation with the results of ground-based magnetic survey and a high degree of detail. It was possible to record anomalies associated with ditches, looting pits, and structural differences in the mounds. The anomalies produced by objects No. 1, 2, and 4 are quite distinct (see Fig. 2; 3, *b*). Other objects were not identified, owing to the insignificant contrast of their fillings with the host environment.

An analysis of the complete aeromagnetic survey map (see Fig. 4) suggests that outside the area of the archaeological site there are no magnetic anomalies produced by mounds. However, noteworthy are point positive anomalies 50–100 m north of the boundary of the ground-based survey area. These can be tentatively interpreted as archaeological objects.

On the basis of the aerial photography results, a digital elevation model was built. The map of absolute heights (Fig. 5, *a*) clearly shows all the mounds prominent in the relief. Additionally, a map of relative heights for the area in which the mounds were concentrated was constructed (Fig. 5, *b*), which supplemented significantly the information rendered from the magnetic surveys. At the location of mound 11 and objects No. 1–3 (see Fig. 2; 5, *b*) it was possible to identify the remains of plowed mounds ca 15 and 25 m in diameter. In addition, 50 m to the north of the boundary of the ground-based survey area, the presence of another mound (object No. 8) can be assumed.

Electrical survey. The results of the electrical survey, which was based on the ground-based magnetic survey data (see Fig. 3, *a*), have shown fairly good contrast in resistivity between the archaeological objects and the host environment. Taking into account previously available information, it can be assumed that the upper level of the section, up to 0.5 m deep, is a layer of chernozem soil (resistance range is 130 Ohm·m and above). Below it, up to a depth of 2 m, there are loamy soils (resistance range is 130–150 Ohm·m); further below there is probably a layer of clays saturated with water to various degrees (resistance range is 130–200 Ohm·m).

The results of the electrical survey at the plow-destroyed mound 10 have shown that the greatest contrast appeared in the phase of the signal recorded by the EMC equipment. The map generated from the data of electromagnetic profiling (Fig. 6, *a*) represents the outlines of the ditch, but not as clearly as on the magnetogram (Fig. 6, *b*). The anomaly in the center of the mound does not have a simply oval shape (as on a magnetic map), but consists of three parts, probably associated with three separate disturbances of the upper layer. In the geoelectric section, according to the electrotomography data (Fig. 6, *c*), high resistivity anomalies are recorded in the areas of the ditch intersection and in the center of the mound. The center

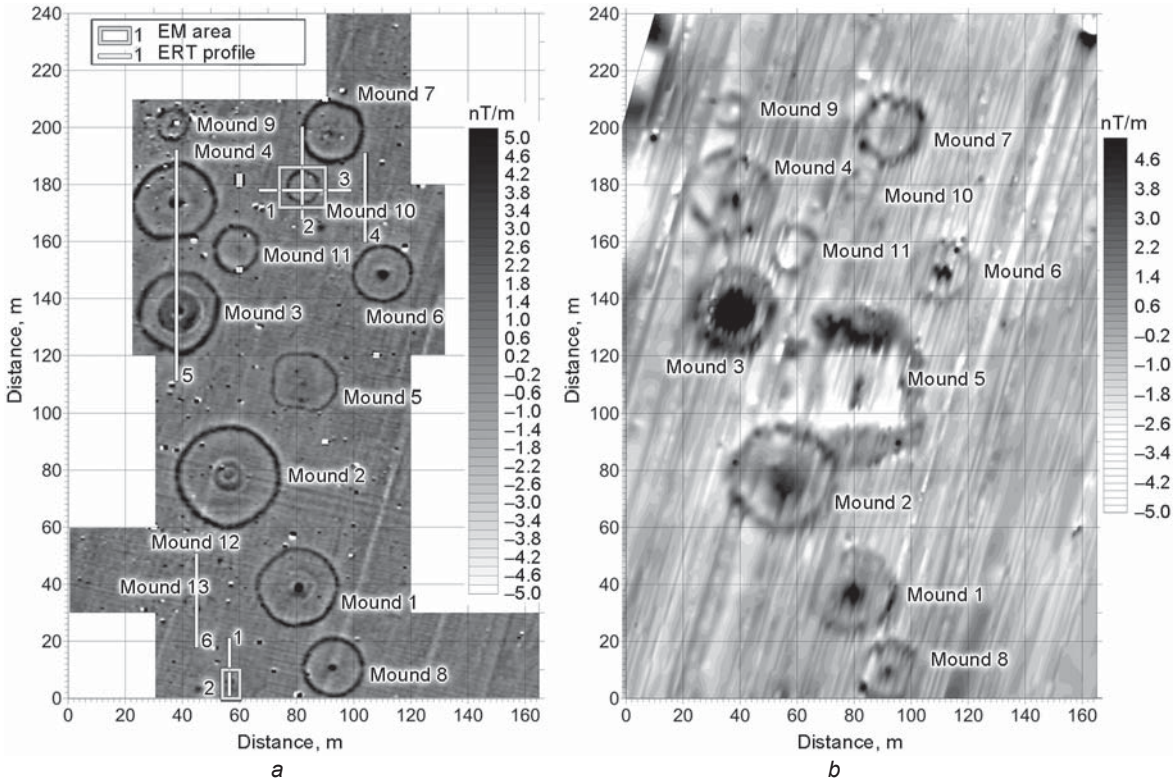

Fig. 3. Results of the integrative studies at Novaya Kurya-1. *a* – scheme of the electrical survey observations by electromagnetic profiling and electrotomography methods on the ground-based magnetic survey map; *b* – fragment of the map of distribution of the anomalous magnetic field (module of the magnetic induction vector) according to the UAV survey results.

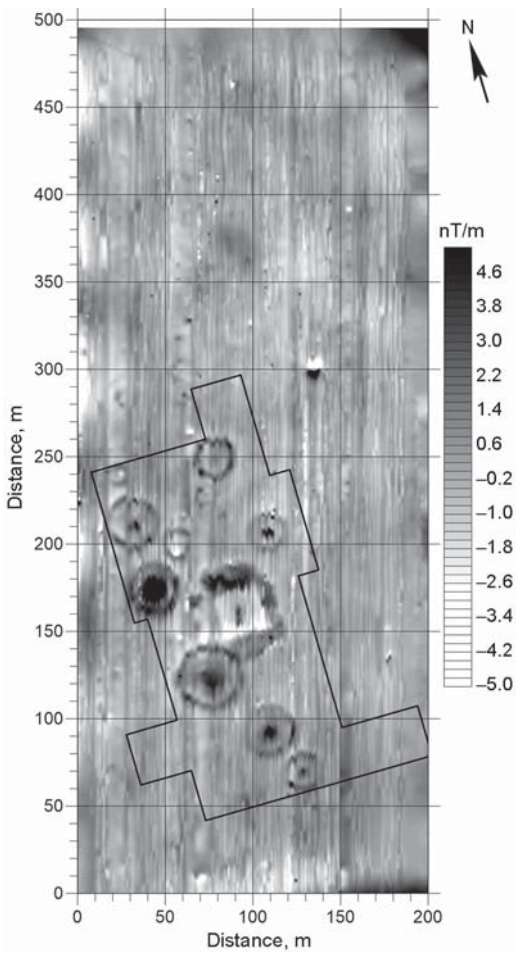

Fig. 4. Gradient distribution of the magnetic field (module of the magnetic induction vector) according to the UAV survey results.

of the mound is characterized by three local resistivity peaks from 200 to 300 Ohm·m. These anomalies are similar in shape to the central anomaly on the electromagnetic profiling map (4.5 m long, up to 0.7 m deep). The ditch surrounding the mound is associated with vertical high-resistance (up to 500 Ohm·m) disturbances of the conductive layer, 2.5 m long in plan view and 0.9 m deep. Similar values were also obtained for mound 13, the southern part of which had been significantly disturbed by soil-tilling (see Fig. 2; 3, *a*).

Fig. 7 shows the results of the inversion of the electrotomography and varying-altitude magnetometry data of prominent mounds 3 and 4, in the form of two-dimensional sections. The geoelectric section (Fig. 7, *b*) shows high resistivity anomalies (200–500 Ohm·m) ca 5 m wide and not exceeding 1.5 m deep at all four points of ditch intersection. The mounds are made up of high-resistivity soils (200–400 Ohm·m) with a thickness of less

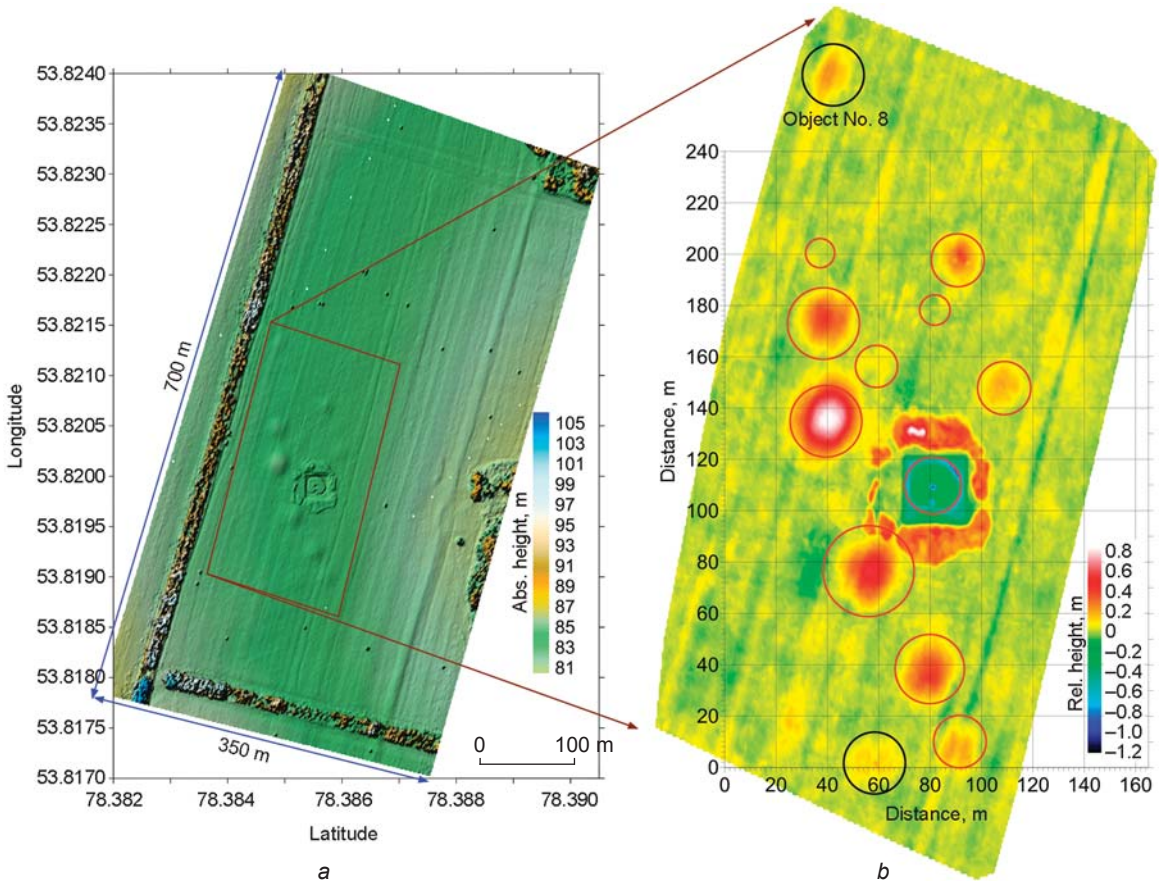

Fig. 5. Digital elevation model of Novaya Kurya-1 according to the aerial photography results.
a – map of absolute heights; *b* – map of relative heights (plowed burial mounds identified through aerial photography are marked with black color).

than 1 m. In the central part of mound 4, the upper layer is deeper, up to 0.7 m. The section constructed according to the results of magnetic survey at various altitudes (Fig. 7, *c*) shows that the depths of the ditches correlate quite well with the electrotomography data, and that the number of central anomalies is higher than in the geoelectric profile, which may be associated with overestimation of their thickness due to the use of a two-dimensional approach to inversion of a 3D local body.

Objects No. 1 and 2 (see Fig. 2; 3, *a*) correspond to the resistivity anomalies, which are 1.0 and 2.5 m wide respectively, and 1.5 and 1.0 m deep. Nearby, another object (No. 9), ca 1 m wide and 1.8 m deep, was identified by the electrical survey. Anomalies from objects No. 1 and 9 look atypical as compared to the rest. They are clearly vertically structured because of the deepening of the upper layer of high resistance into the underlying layers. Since the third underlying layer is close to the upper one in terms of resistivity, it is difficult to determine accurately the lower boundary of these objects. It was not possible to obtain additional information on object No. 7. This is consistent with magnetic survey data, according to which this object likely has a small depth.

Characteristics of the Novaya Kurya-1 kurgan cemetery based on the data of the integrative geophysical studies

On the basis of visual inspection, eight mounds were identified at Novaya Kurya-1. The consequences of long-term soil-tilling did not allow us to determine their arrangement or to assess the layout and boundaries of the cemetery. The results of the present study make it possible to characterize this site at a markedly different level.

The most significant amount of information was gathered using ground-based methods of magnetic and electrical survey. On the basis of all the data, it was established that all prominent mounds (except for mound 5) constitute a single complex. The most peculiar elements of their structure are rounded objects with diameters of 8–10 to 14 m in the center of the

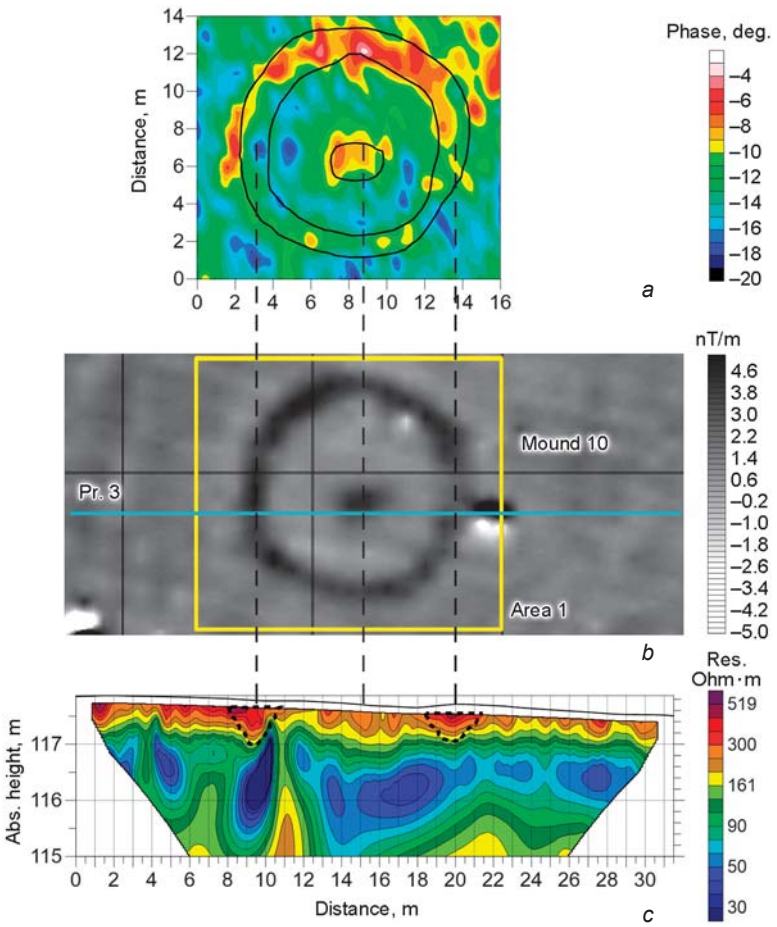

Fig. 6. Results of the electrical survey works at mound 10.
a – phase distribution of differential signal according to the data of electromagnetic profiling carried out using EMC equipment at a frequency of 5 KHz; *b* – fragment of the map of the magnetic field gradient; *c* – geoelectric section according to the data obtained by electrotomography using Skala-64K15 equipment.

barrows. They showed up well on magnetic maps, but were not recorded by electrical survey. Thus, in terms of resistivity, these objects do not differ from the rest of the mound, but are characterized by significant differences in magnetic properties. An analysis of the data on the anomalous magnetic field derived from the ground survey at two altitudes showed that the amplitudes of the associated anomalies differ quite significantly: from close to background values up to 8–12 nT for mounds 2 and 3. The increased values are comparable to those for ditches, which, according to the electrical survey data, are filled with soil erosion products. Considering the above, these objects most likely are structures made of soil, where humic material is present in varying concentrations. Apparently they were erected directly above the burial platform, after which barrows were constructed. No pits significantly deepened into the mainland, which can be associated with burials, have been recorded under the mounds.

In addition to the prominent mounds 1–4 and 6–8, the cemetery

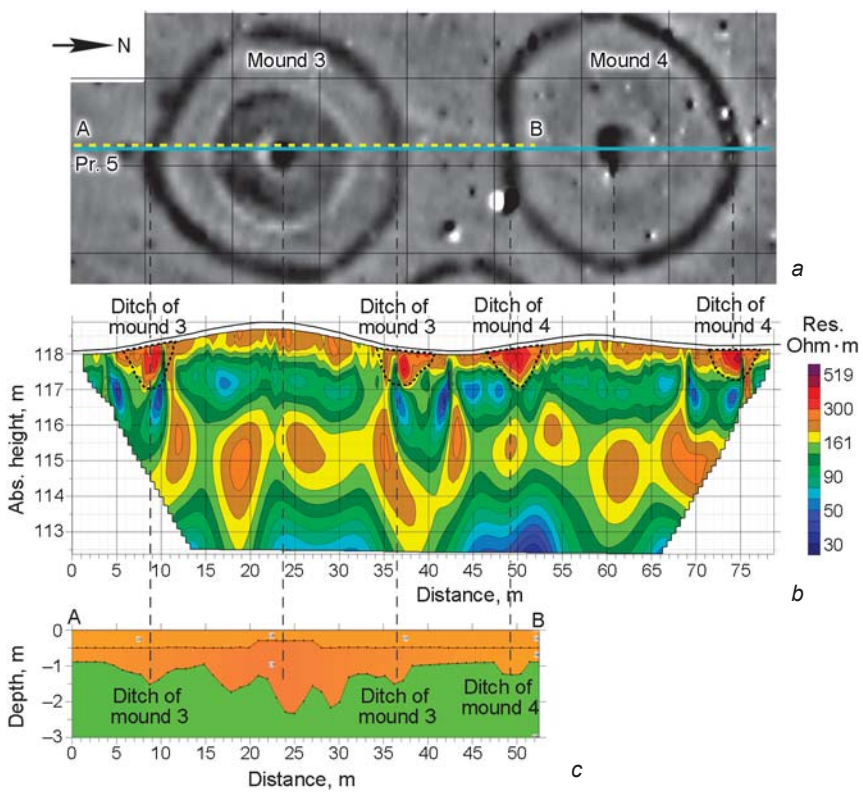

Fig. 7. Results of the integrative studies at mounds 3 and 4.
a – fragment of the map of the magnetic field gradient; *b* – geoelectric section according to the data obtained by electrotomography using Skala-64K15 equipment; *c* – section generated by the inverse modeling of the layered ground according to the results of magnetic survey at various altitudes.

apparently includes mounds 9–11. These had been completely destroyed through plowing because of their small sizes (11–17 m in diameter). The analysis of the digital elevation model made it possible to identify the remains of mound 11.

Other archaeological features identified in the space between mounds likely belong to the same complex. However, this cannot be stated unambiguously. Magnetic anomalies at the southern edge of mound 3 (objects No. 5 and 6), which is characterized by specific features, can be preliminarily interpreted as associated ritual structures. Mounds 12 and 13, 8 and 12 m in diameter, respectively, were identified owing to the detected remains of shallow ditches. The elevation recorded above objects No. 1–3 and 9, according to the map of relative heights, is most likely the remains of two small burial mounds. The anomaly between mounds 6 and 10 (object No. 4) shows similar characteristics. The interpretation of the oval structure identified between mounds 6 and 7 (object No. 7) is the most difficult. The structure contains very little magnetic material and is apparently very slightly deepened into the virgin land. The data from the digital elevation model suggest the presence of a heavily plowed mound, which allows us to interpret this object tentatively as a burial complex.

According to the results of the integrative geophysical studies, most of the identified objects can be confidently attributed to the Early Scythian time. Taking into account the revealed specificity of the mounds' construction and the location of the site (Northern Kulunda), it is highly probable that it belonged to the Tasmola historical and cultural community (the 8th to 5th centuries BC). It is generally assumed that the distribution area of the Tasmola culture included the regions of Central (Tasmola culture) and Northern (Ulybay-Tasmola culture) Kazakhstan and Southern Trans-Urals (Bobrovka-Tasmola culture) (Tairov, 2017: 20; Beisenov, 2017). Recently, sites of the Tasmola culture have been reported in the Novosibirsk Region (Avtushkova, Plakhuta, 2020). Tasmola burial mounds were built over separate burials. There are also burials made on the daylight surface or in shallow pits. A characteristic feature is a dome-shaped structure above the grave, which could have been built of sod and soil blocks (rolls). From above, it was covered with soil taken from the adjacent territory. The mounds are often surrounded by a double-ring fence made of stones or ditches: one ring at the mound's base, the other at a distance of 2–5 m from it. In this regard, it is interesting to note that along the edge of the central structures in mounds 1–3, anomalies close to negative values are clearly recorded. These can be tentatively interpreted as internal ditches.

The aeromagnetic survey and aerial photography make it possible to establish the boundaries of the cemetery. Since large mounds are well distinguished on the generated maps, it can be concluded that outside the boundaries of the site, there are no more such structures. Another mound (object No. 9) can be possibly identified on the map of relative heights, but this assumption needs to be verified. Comparison of magnetic survey data shows that small archaeological objects (burial mounds, pits) are not always detected by aeromagnetic mapping. The main reason is their low contrast with the host environment, as well as a significant measurement height. Taking this into account, the presence of such objects outside the ground survey area cannot be ruled out. It is advisable to plan further ground-based geophysical works. According to the aeromagnetic survey data, the most promising is the expansion of the study area in the northern direction.

Conclusions

The results of the archaeological and geophysical works at the Novaya Kurya-1 cemetery clearly demonstrated the advantages of an integrated approach to research. The high efficiency of ground-based magnetic survey was confirmed, as well as the expediency of planning a network of electrical survey observations based on magnetic maps. This approach will optimize the works associated with identifying the layout of the monument, and determining the spatial parameters and structures of individual objects. The verification of the results of magnetic surveys at various altitudes using geoelectric methods proved to be a promising method for further development. This will expand the possibilities of magnetic prospecting for the remote determination of the layout, features, and spatial parameters of archaeological structures.

The studies have proved the high efficiency and prospects of using the aeromagnetic survey method for the study of burial mounds. Its application significantly increases the productivity of magnetic survey; however, identification of small low-contrast archaeological objects in relation to the host environment is often problematic. The technical accuracy of the instruments installed on the UAV is not inferior to the characteristics of the equipment for ground-based survey, but in order to achieve the precision required for archaeological works, it is necessary to use differential GPS-receivers. In this case, the spatial measurement accuracy will approach the sub-decimeter accuracy, which will increase the precision of the images of observed anomalies. Nevertheless, even at the current stage of its development, the aeromagnetic survey method makes it possible to successfully detect and identify the mounds and determine their general structure. The broad usage of this method can significantly change the situation with the study and protection of the burial mounds

damaged by soil-tilling, which are the largest category of archaeological sites in Eurasian steppes.

The combined use of aeromagnetic survey and aerial photography produces very good results. Both methods are highly productive, and rapidly provide diverse information about a site. The construction of maps of relative heights makes it possible to detect heavily destroyed mounds that cannot be distinguished visually or by using geophysical methods. On the basis of the experience gained, we would recommend the use of aeromagnetic surveying and aerial photography at the initial stage of research, which will optimize the ground-based geophysical works. This is very important in the study of burial mounds, especially those destroyed by soil-tilling, since they occupy vast areas.

The derived results determine good research prospects for Novaya Kurya-1, both as a platform for further methodological works and as an archaeological site. Even small targeted test excavations can significantly supplement our understanding of the history of the region in the Early Scythian time; in particular, they will provide new information on the eastern border of the area of distribution of the Tasmola historical and ethnic community.

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Reconstructed Paleodiets and Subsistence Strategies of the Central Ciscaucasian Population (1000 BC to 1000 AD), Based on Collagen Isotope Analysis of Bone Samples from the Kichmalka II Burial Ground

Settlement and economy patterns of the Iron Age and early medieval population of the Central North Caucasus evidence complex cultural processes in the region. The ecological approach including the evaluation of carbon and nitrogen isotopes in the local biota opens up new prospects in the study of environments, climate, anthropogenic effect, land use, and nutrition. We analyze the isotopic composition of collagen in 19 human and 11 animal bone samples from Kichmalka II—a cemetery successively used by the Koban people, those of the Sarmatian stage, and Alans. The isotopic composition of the Alanian sample indicates a heavy predominance of plants with the C3-type photosynthesis in the diet of humans and animals. People who lived during the Koban and Sarmatian stages consumed also C4-plants, such as common millet (Panicum miliaceum), suggesting the rise of the trophic step for carbon ($\Delta\delta^{13}C_{human\text{-}animal}$). Statistically significant differences in the isotopic composition of carbon were found within the Koban population, apparently evidencing two dietary models. The $\Delta\delta^{15}N_{human\text{-}animal}$ values fall within the trophic step, mirroring a focus on meat and dairy products in the diet of all groups. Comparison with respective data on the Klin-Yar III cemetery revealed differences in isotopic signatures in the diet of both humans and domestic animals during the Koban period. The possible reason is climatic change in the Iron Age and the variable share of millet in the diet of the Koban people. The low proportion of $\delta^{15}N$ (below 4 ‰) in the bone collagen of goat, sheep, and horse of the Alanian period may attest to vertical transhumance.

Keywords: *Carbon and nitrogen isotopic composition, North Caucasus, Koban culture, Sarmatian period, Alans, trophic relations.*

Introduction

The isotopic composition of the biological remains of people, animals, and plants captures the circumstances of their lives, and this is why analysis of these parameters has become so widespread in archaeological science. This study intended to clarify the traditions of nutrition and subsistence strategies among the population living in the foothills of the North Caucasus in the 1st millennium BC to the 1st millennium AD. The

data on the isotopic composition of carbon and nitrogen in collagen of humans and animals bone tissue from the burials in the Kichmalka II cemetery, as well as data obtained from the study of plant materials from the dung of modern small ruminants, were used. As is known, the reconstructions of human and animal diets are based on the general regularity of the isotopic composition (nitrogen and carbon) dynamics (fractionation) in trophic chains of ecosystems: it naturally changes while moving from one level to another (Ambrose, 1993). The reliability of the reconstruction depends on the validity of our knowledge about the size of the trophic step (Dobrovolskaya et al., 2020). It is also important to mention that both general isotopic features of ecosystems and sizes of trophic steps within these systems cannot be expressed in uniform values. Therefore, each study of isotopic composition of biological evidence from archaeological sites combines general features of an ancient ecosystem with individual bioarchaeological reconstructions.

Since ancient times, the population that lived in the foothills of the North Caucasus practiced diversified agriculture, combining animal husbandry and land cultivation (Kaloev, 1981: 7–32). However, information about agricultural activities in individual communities is quite general and often lacks specific content. For example, for a long time, there was an idea that the main occupation of the carriers of the Koban culture was livestock-breeding, while agriculture played an auxiliary role (Kozenkova, 1989: 65; Markovin, Munchaev, 2003: 166–168). The economic activities of the Alanian population in the late period of its history in the North Caucasus are known in better detail. The main activity of the Alans during this period was previously considered to be agriculture combined with transhumance (Kuznetsov, 1971: 47–147).

In recent years, evidence of land cultivation and animal husbandry by the population of the Kislovodsk Basin over a long period—from the early 1st millennium BC to late 1st millennium AD—has been studied in better detail. Soil and archaeological studies of agricultural lands of various forms (terraces, arable land plots, areas with boundary walls), as well as research on stone enclosures for livestock, which have survived in the mountains, have made it possible to clarify the practices of intense land cultivation among the Koban people (Borisov, Korobov, 2013: 182–195), as well as complexity of economy among the Alanian tribes, where in addition to agriculture, transhumance played an important role (Korobov, 2017: 199–227; Korobov et al., 2018). These studies were supported by the analysis of osteological evidence from the early medieval settlements of the 1st millennium AD and macro-remains of cultivated cereals from settlements and agricultural lands in their vicinity (Korobov, 2017: 202–204, 214–215; Sergeev, 2021).

Studying subsistence strategies and nutrition of populations living in different historical periods in the region, using the methods of isotope biogeochemistry, is a special research field. An article by T. Higham and his colleagues (2010) elucidated the reasons for a significant reservoir effect discovered in dating bone remains from the Klin-Yar III cemetery, in the Kislovodsk Basin. As a research tool, the authors used the values of trophic steps in ecosystems, applying the data on archaeological sites and modern materials. The same year, the results of analyzing isotopic composition of carbon and nitrogen in the collagen of human bone tissue from the Chalcolithic and Bronze Age burials in the North Caucasus were published (Hollund et al., 2010). That article discussed the role of the local environment that could significantly affect the specific features of collagen in local inhabitants (both humans and animals). The results of large-scale isotope studies were published by the international team that studied the diets and lifestyles of some population groups in various periods of the Bronze Age in the North Caucasus (Knipper et al., 2018, 2020). Among other things, this comprehensive study confirmed a significant influence from local ecosystems on the values of both isotopic ratios and trophic steps in these systems.

Our hypothesis is that the traditions of the carriers of the Koban culture, groups of the Sarmatian period, and Alans were also manifested in the features of sophisticated non-specialized economy. This can be established from the data on the isotopic composition of bone tissue collagen in humans and animals from burials.

Materials

This study is based on the material evidence from the Kichmalka II burial ground explored in 2006–2010 by the expedition from the State Hermitage Museum, under the leadership of E.E. Vasilyeva (Vasilyeva, 2009, 2010, 2012; Vasilyeva, Akhmedov, 2015). Bone samples were taken from burials of the Koban culture (7th to early 5th centuries BC), Sarmatian period (1st to 2nd centuries AD), and the Early Middle Ages (late 5th to early 6th centuries AD). The cemetery is located in the foothills of the Central North Caucasus (Zolsky District of the Kabardino-Balkarian Republic), at a height somewhat exceeding 1000 m (Fig. 1).

The analysis involved thirty two samples: eight belonged to skeletal remains of males (an individual from burial 24 was represented by two samples—spongy and compact bone tissue, which made it possible to assess the stability of isotopic composition of collagen in tissues with different rates of bone remodeling); ten samples belonged to females (an individual from burial 28 was also represented by two samples); three samples belonged

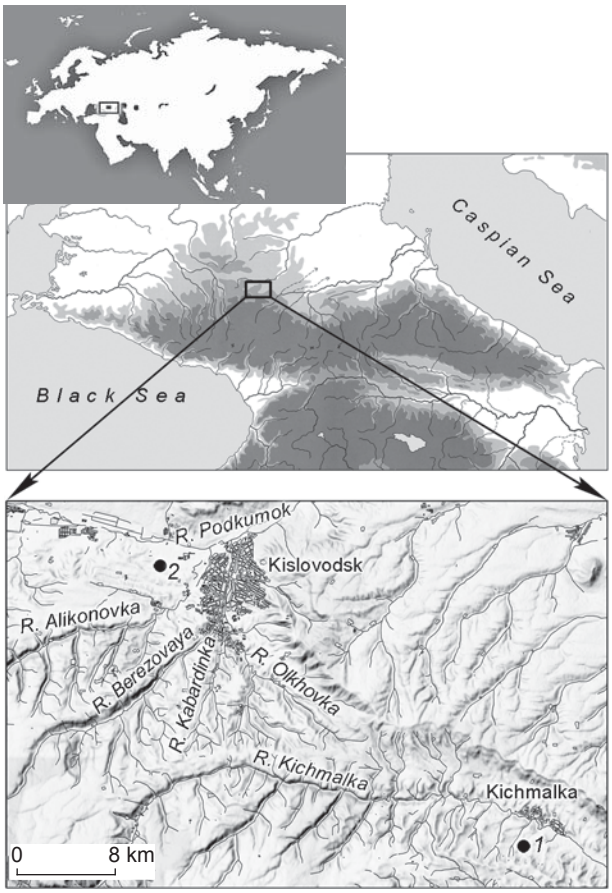

Fig. 1. Location of the Kichmalka II (*1*) and Klin-Yar III (*2*) cemeteries in the North Caucasus.

to children 5–7 years of age and ca 12 years of age; five samples were taken from sheep/goat bones, four from horse bones, and two from small burrowing animals not associated with ancient times (Tables 1, 2). In addition, data on four modern samples of sheep dung collected at various heights was obtained—on the Bermamyt Plateau (Karachay-Cherkessia Republic) and in the vicinity of Kislovodsk (Table 3). For analyzes, average samples were taken from five to seven pellets.

Methods

Samples were prepared in the Laboratory of Contextual Anthropology at the Institute of Archaeology of the Russian Academy of Sciences. Fragments of bone tissue were washed in distilled water and brought to constant weight. Dry fragments were placed in 1M hydrochloric acid in a ratio of at least 1 g per 50 ml, and were left at a temperature of +3 °C until complete demineralization. Then, the samples were repeatedly washed with distilled water until they reached pH = 7. At the next stage, the samples were placed in 0.1M alkali solution for 24 hours, after which they were washed again. Then, the samples were placed in a solution of hydrochloric acid with pH = 2.5 (10 ml) and transferred to a thermostat where collagen dissolved at a temperature of +65 °C. The liquid was centrifuged for collagen purification. The solution was evaporated in a thermostat at +40 °C. The sample weight for the analysis was ca 400 μg. Collagen preservation was assessed by the C/N ratio (2.9–3.6) (DeNiro, 1985) and by the content of carbon (from 30 to 47 %) and nitrogen (from 11.0 to 17.3 %) in a sample (Ambrose, 1993; Van Klinken, 1999).

Samples of modern manure were treated with hot 5 % HCl solution and washed through a sieve (0.25 mm) for removing mineral grains and large plant residues, in order to average the material as best as possible. Then, the samples were repeatedly washed with distilled water and dried. Thus, the results obtained reflected the content of stable isotopes of carbon and nitrogen directly in the averaged sample of plant residues. The analyzed sample weight was ca 1500 μg.

The isotopic composition of the samples was established using a mass spectrometer (Thermo Finnigan Delta V Plus, Center for Collective Use at the Institute of Ecology and Evolution of the Russian Academy of Sciences, Moscow). For statistical comparison of the samples, the Mann-Whitney *U*-test was used, since the distribution of the parameters was abnormal.

For establishing the contribution of plant and animal foods to human diet, one needs to assess the difference between the isotopic data of the person and the cultivated plants and animals that he could have eaten. Trophic step is the difference between the isotopic signatures ($\Delta\delta^{13}C$ and $\Delta\delta^{15}N$) of producers (plants)/ the first order consumers (herbivores), and the first order (herbivores) and the second order (predators) consumers. The $\delta^{13}C$ and $\delta^{15}N$ values in bone collagen increase with each trophic level by 0–2 ‰ (Bocherens, Drucker, 2003) and 3–5 ‰ (even up to 6 ‰, in humans) (Ambrose, 1993; O'Connell et al., 2012), respectively. One may estimate the contribution of a specific component to the human diet from how much $\Delta\delta^{13}C_{human\text{-}animal}$ and $\Delta\delta^{15}N_{human\text{-}animal}$ differ from the value of the trophic step. Low values of the indicators most often point to an insignificant share of meat and dairy products, consumed by humans. Values exceeding the trophic step may indicate other food sources (Ambrose, 1993; O'Brien, 2015).

The lack of isotopic data on the plant food of ancient and medieval humans in the region under consideration limits our opportunities for reconstructing their diet. Therefore, we can only proceed from the generally accepted assumptions about the isotopic signals of plants belonging to the C3- and C4-type of photosynthesis. The $\delta^{13}C$ value of –18 ‰ marks the beginning of consuming C4-type plants (Pearson et al., 2007).

Table 1. **Individual values of $\delta^{13}C$ and $\delta^{15}N$ in the samples of bone collagen taken from the persons buried at the Kichmalka II burial ground**

Year of excavations	Number of burial/ skeleton	Sex	Age	$\delta^{13}C$	$\delta^{15}N$	%C	%N	C/N atom.
Koban culture								
2007	3	Male	Over 40	–16.84	10.28	43.3	15.2	3.3
2008	8	"	30–39	–17.66	8.78	41.9	15.4	3.2
2008	10	Female	20–25	–18.26	10.07	41.9	15.3	3.2
2009	20	Male	Over 50	–18.16	10.23	42.6	15.7	3.2
2009	21	Female (?)	10–12	–18.66	10.11	44.7	15.9	3.3
2009	24 (a)	Male	Over 45	–18.61	9.62	43.3	15.0	3.4
2009	24 (b)	"	Over 45	–18.78	9.77	43.5	14.9	3.4
2009	25	Female	Around 20	–16.68	9.42	41.8	15.1	3.2
2009	26	"	Over 50	–17.91	10.43	44.7	15.7	3.3
2009	23	?	5–7	–16.97	9.39	36.3	12.3	3.4
2010	30	Male (?)	Around 12	–17.32	9.85	41.4	14.2	3.4
Sarmatian period								
2010	29/1	Male	Over 50	–17.92	9.32	42.0	15.2	3.2
2010	29/2	Female	Over 60	–18.07	8.72	42.2	15.3	3.2
2009	22	"	Around 20	–17.91	9.26	42.4	15.1	3.3
2010	31	"	30–49	–16.03	10.88	43.7	15.5	3.3
Alanian culture								
2010	28 (a)	"	40–49	–18.16	9.45	38.7	13.9	3.3
2010	28 (b)	"	40–49	–17.73	9.42	44.0	15.3	3.3
2010	33/1	Male	17–20	–18.30	9.15	42.4	15.7	3.2
2010	33/2	Female	16–18	–18.86	9.99	42.6	15.6	3.2
2010	34/1	Male	20–25	–18.04	11.18	43.6	15.8	3.2
2010	34/2	Female	30–39	–18.10	9.63	42.6	15.2	3.3

While making comparison with modern isotope data, one needs to keep in mind the changes in the isotopic composition of the atmosphere, which has become enriched by ancient carbon with low $\delta^{13}C$ values in the industrial and postindustrial periods (the Suess effect). The $\delta^{13}C$ value of atmospheric CO_2 recovered from the bubbles in ice-core decreased from –6 ‰ ca 11 ka BP (Indermühle et al., 1999) to ca –8 ‰ today (White, Vaughn, Michel, 2015). This 2 ‰ shift must be taken into account when interpreting the carbon isotopic composition of archaeological samples.

Results

Carbon. The individual variability of carbon isotope ratios in human bone collagen varied from –18.86 to –16.03 ‰ (see Table 1). The $\delta^{13}C$ values for the buried persons of the Koban and Sarmatian periods varied within a fairly wide ranges from –18.78 to –16.68 ‰ and from –18.07 to –16.03 ‰, respectively. The carriers of the Alanian culture showed a slight variability of this indicator (from –18.86 to –17.73 ‰).

The $\delta^{13}C$ values in herbivorous domestic animals varied from –20.84 to –19.77 ‰ (see Table 2). Horse

Table 2. **Individual values of $\delta^{13}C$ and $\delta^{15}N$ in the samples of bone collagen taken from animals buried at the Kichmalka II burial ground**

Year of excavations	Place of discovery	Animal	$\delta^{13}C$	$\delta^{15}N$	%C	%N	C/N atom.	Cultural attribution of the burial
2010	Burial 34	Burrowing animal	–23.80	5.36	47.7	12.9	4.3	Alanian
2010	Burial 34, destr. part	Small ruminants	–19.95	3.73	40.1	14.4	3.3	"
2010	Burial 33	"	–19.91	3.80	41.7	15.1	3.2	"
2010	Next to burial 31	Horse	–20.34	5.52	46.2	15.1	3.6	Sarmatian
2010	Burial 29	Small ruminants	–19.77	4.75	42.4	15.3	3.2	"
2009	Next to burial 24	Horse	–20.46	4.67	41.9	14.4	3.4	Koban
2009	"	"	–20.84	4.90	42.9	15.2	3.3	"
2009	Burial 24	Small ruminants	–20.37	5.57	41.2	15.0	3.2	"
2007	Burial 3	Horse	–20.68	5.22	41.2	14.8	3.2	"
2009	Burial 24	Burrowing animal	–18.73	7.09	39.5	13.3	3.5	"
2010	Burial 32	Small ruminants	–20.01	5.79	32.1	11.2	3.4	"

Table 3. **Values of $\delta^{13}C$ и $\delta^{15}N$ in the samples of modern manure of small ruminants**

Height above sea level, m	$\delta^{13}C$	$\delta^{15}N$	%C	%N	C/N atom.
2048	–28.68	2.54	43.29	2.36	21.40
2123	–28.35	2.45	43.10	1.89	26.61
2217	–28.66	2.69	42.87	2.33	21.48
940	–27.91	4.44	42.81	2.37	21.05

and sheep/goat collagen demonstrated the uniformity of carbon isotopic composition (from –20.84 to –20.34 ‰ and from –20.37 to –19.77 ‰, respectively).

Nitrogen. The $\delta^{15}N$ values in human collagen varied within 8.72–11.18 ‰. Individual variability of this indicator was the smallest among the Koban people (8.78–10.43 ‰). The ranges for the Alans (9.15–11.18 ‰) and people of the Sarmatian period (8.72–10.88 ‰) were wider (see Table 1). The groups were not statistically different.

The isotopic ratios of nitrogen in collagen of herbivorous domestic animals varied from 3.73 to 5.79 ‰. The range of $\delta^{15}N$ values in horses was 4.67–5.52 ‰. For small ruminants of the Koban period, this indicator was 5.57–5.79 ‰. The content of the ^{15}N isotope in the collagen of sheep/goat bones of the Alanian period was minimal and did not exceed 4 ‰ (see Table 2).

Individual variability of isotopic parameters was not associated with sex and age. No significant differences have been found.

The $\delta^{13}C$ value of plant residues from modern dung varied from –27.91 to –28.68 ‰, and $\delta^{15}N$ from 2.45 to 4.44 ‰ (see Table 3).

Discussion

Wide variation of $\delta^{13}C$ and $\delta^{15}N$ in the collagen of bone tissue of the Koban people testified to individual diversity of food consumption. The $\delta^{13}C$ variability was 2.1 ‰. Two data clouds can be distinguished (Fig. 2): group 1 (burials 3, 8, 23, 25, and 30) significantly differed from group 2 (burials 10, 20, 21, 24, and 26) in high $\delta^{13}C$ values (> –17.7 ‰, $p = 0.006$). They were variable in $\delta^{15}N$, but they did not differ statistically ($p > 0.05$). Accordingly, the nutrition of each group was based on different plant components. A conventional boundary around 18 ‰ of $\delta^{13}C$ can be drawn between the groups. This makes it possible to consider consumption of C4-plants as a basis of these differences.

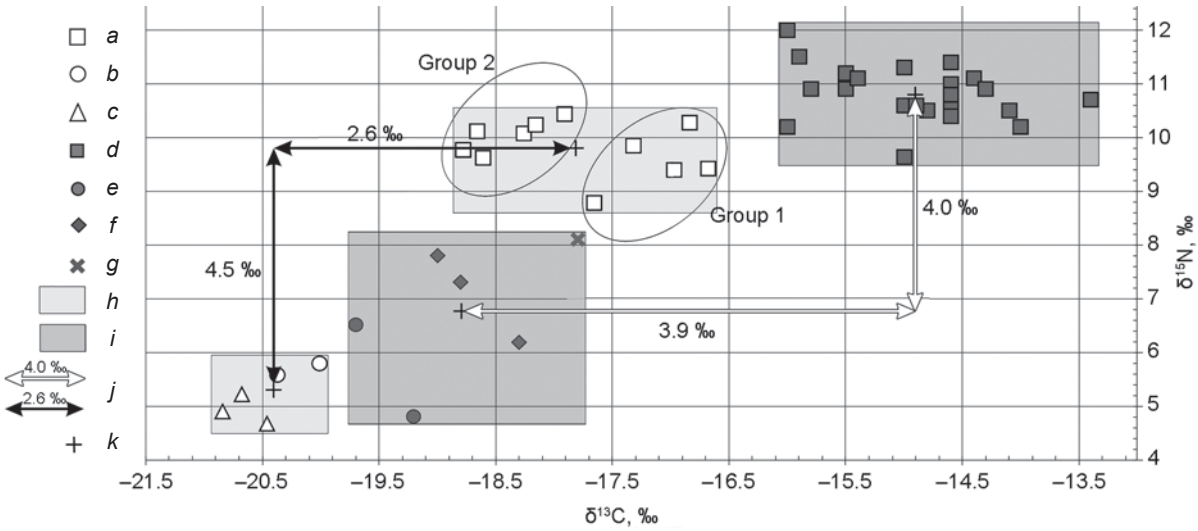

Fig. 2. Individual $\delta^{13}C$ and $\delta^{15}N$ values for the samples of bone collagen from humans and animals of the Koban period at Kichmalka II and Klin-Yar III.

a–c – Kichmalka II: *a* – human, *b* – small ruminants, *c* – horse; *d–g* – Klin-Yar III: *d* – human, *e* – small ruminants, *f* – cattle, *g* – pig; *h*, *i* – area of isotope signals of bone collagen from Kichmalka II and Klin-Yar III, respectively; *j* – trophic step; *k* – average value.

The difference between the average $\delta^{13}C$ values of individuals from group 1 and herbivores was over 2 ‰, and $\Delta\delta^{15}N_{human\text{-}animal}$ was less than 5 ‰. Thus, the former difference was larger than the trophic step, and the latter difference was within the trophic step (Fig. 2). For some individuals (group 2, $\Delta\delta^{13}C_{human\text{-}animal}$ and $\Delta\delta^{15}N_{human\text{-}animal}$), we can reconstruct a diet based on C3-plants and meat products in sufficient quantities. As opposed to the second group, the composition of food among the first group could have included more foods of plant origin with high content of ^{13}C isotope. According to archaeobotanical data, millet (*Panicum miliaceum*) was a cultivated C4-plant in the Koban period in the Kislovodsk Basin, in the immediate vicinity of which the Kichmalka II site is located (Reinhold, Korobov, Belinskij, 2017: 242; Sergeev, 2021: Tab. 8). It can be assumed that there were two food models, and not a single model, in the same culture.

There was a significant similarity between the groups of the Sarmatian and Alanian periods ($p > 0.05$): among the main part of the people, values $\delta^{13}C$ and $\delta^{15}N$ varied in less than 1 ‰. One sample among the human samples of the Sarmatian period was distinguished by higher values of $\delta^{13}C$ and $\delta^{15}N$. Unfortunately, only two isotope signals of domestic animals (sheep/goat and horse) of that period are available. As in the case of the Koban people, $\Delta\delta^{13}C_{human\text{-}animal}$ was over 2 ‰, and $\Delta\delta^{15}N_{human\text{-}animal}$ was less than 5 ‰ (Fig. 3). The data obtained indicate that people of the Sarmatian period consumed mainly C3-plants and a sufficient amount of meat and/or milk from animals that fed on this type of plant. The diet of some individuals could have contained a certain share of C4-plants (burial 31).

As opposed to the two periods mentioned above, the difference between the average $\delta^{13}C$ values in bone collagen of humans and animals of the Alanian period did not exceed the trophic step (Fig. 4). The $\delta^{13}C$ values of almost all the samples (with the exception of one, from burial 28 (b)) indicated a diet based on C3-plants. The data obtained do not contradict the results of archaeobotanical studies in the Alanian settlements of the 5th–8th centuries AD located in the areas of the Kislovodsk Basin adjacent to the Kichmalka II site. Wheat dominated in the regional archaeobotanical complex of the time (65 %), while the share of millet was only 9 % (Sergeev, 2021). One may conclude the dominance of C3-plants in the diet of the Alanian population of the 5th–8th centuries AD.

Another distinctive feature of the early medieval samples was greater difference between the average $\delta^{15}N$ values of humans and animals, reaching 6 ‰, and staying within the trophic step (O'Connell et al., 2012). Notably, sheep/goat bones from the Alanian burials showed the lowest nitrogen ratio (less than 4 ‰). Unfortunately, we do not have enough isotopic data for domestic animals. However, it should be taken into account that settlement material evidence from the Kislovodsk Basin reveals the presence of bones not only of small ruminants, but also of cattle, horses, and pigs as food remains in numerous surveyed settlements of the 5th–8th centuries (Korobov, 2017: 202–203). Therefore, it is safe to say that the 6 ‰ difference was caused by the lack of isotopic data. Thus, the Alanian group turned out to be the most compact in terms of the variability of food sources.

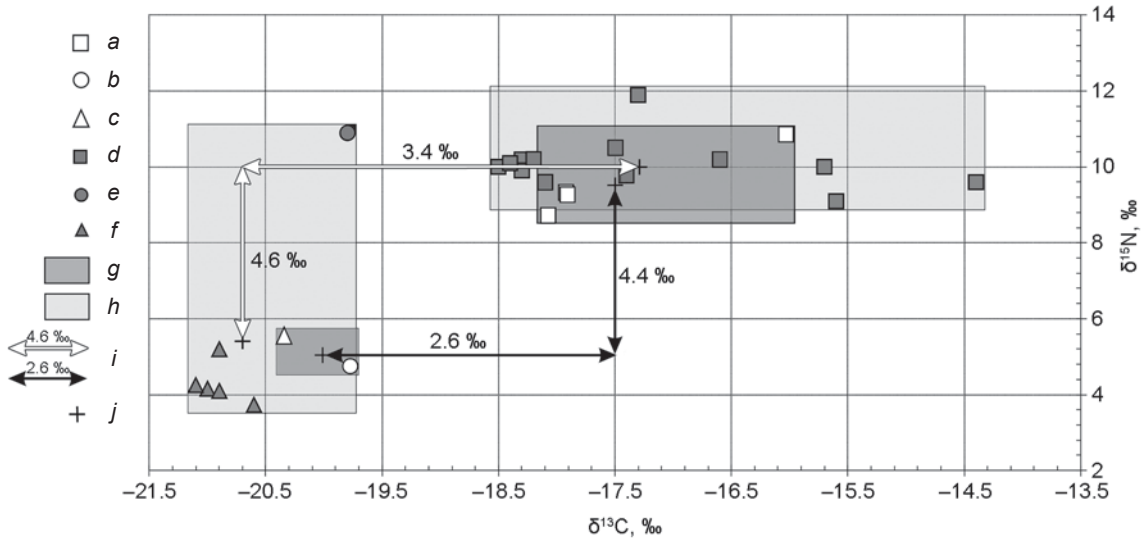

Fig. 3. Individual $\delta^{13}C$ and $\delta^{15}N$ values for the samples of bone collagen from humans and animals of the Sarmatian period from Kichmalka II and Klin-Yar III.

a–c – Kichmalka II: *a* – human, *b* – small ruminants, *c* – horse; *d–f* – Klin-Yar III: *d* – human, *e* – small ruminants, *f* – horse; *g*, *h* – area of isotope signals of bone collagen from Kichmalka II and Klin-Yar III, respectively; *i* – trophic step; *j* – average value.

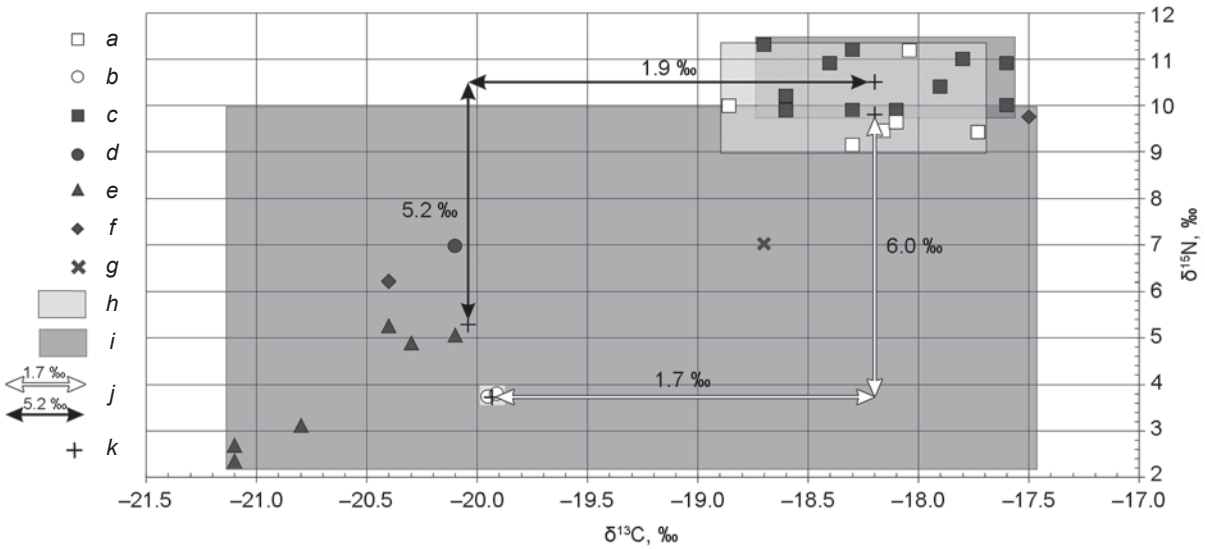

Fig. 4. Individual $\delta^{13}C$ and $\delta^{15}N$ values for the samples of bone collagen from humans and animals of the Alanian period from Kichmalka II and Klin-Yar III.

a, *b* – Kichmalka II: *a* – human, *b* – small ruminants; *c–g* – Klin-Yar III: *c* – human, *d* – small ruminants, *e* – horse, *f* – cattle, *g* – pig; *h*, *i* – area of isotopic signals of bone collagen from Kichmalka II and Klin-Yar III, respectively; *j* – trophic step; *k* – average value.

Research into the isotopic composition of collagen in human and animal bones at the sites of the North Caucasus is at the early stage, which is limited by accumulation of data and attempts to interpret them. This is not an easy task in the conditions of diverse landscapes. For reconstructing the human diet, one needs to take into account a large set of isotopic signals from various sources. In this regard, it is important to compare our results with those published earlier. Comparative evidence was the data on isotopic composition of bone collagen in humans and animals from the Klin-Yar III burial ground in the Kislovodsk Basin (Higham et al., 2010). This site is located at an altitude of 800 m above sea level, at a distance of about 25 km from Kichmalka II (see Fig. 1). Burials of three cultural and chronological periods were also presented at Klin-Yar III. However, unlike Kichmalka II, osteological evidence related to the Koban culture was

dated to the earlier time—the 10th–7th centuries BC (Belinskij, Dudarev, 2015: 386–397).

The arrangement of individual data on the diagram of $\delta^{13}C/\delta^{15}N$ ratio makes it possible to assess the features of each of the cultural and chronological groups from two burial sites (see Fig. 2–4). The individuals from the Koban burials at Kichmalka II and Klin-Yar III significantly differed from each other both in $\delta^{15}N$ ($p = 0.000028$) and $\delta^{13}C$ ($p = 0.000003$) values. The ranges of individual $\delta^{13}C$ values of these two groups did not even overlap (see Fig. 2). People of the Sarmatian period buried at the Kichmalka II and Klin-Yar III cemeteries showed approximately the same values ($p > 0.05$) and wide range of variability of the carbon isotopic composition (from –18.4 to –15.7 ‰). The isotopic values of Alans from the burials at both sites were similar in carbon composition ($p > 0.05$). However, the $\delta^{15}N$ values for the individuals from Klin-Yar III were statistically higher ($p = 0.035$).

The differences in isotopic parameters of humans and animals of the Koban period from the two burial grounds were quite clear, which might had resulted from different landscape and climatic conditions in the vicinity of the sites (Marshall, Brooks, Lajtha, 2007) and/or difference in nutrition (Ambrose, 1993). However, Kichmalka II and Klin-Yar III are located close to each other, in similar landscapes; therefore, the differences in isotopic composition were not associated with habitation conditions. This conclusion is also supported by the fact that such differences were not observed in other groups. There are no reliable climatic reconstructions for the area under discussion in the 10th–5th centuries BC. However, the synchronicity of the dynamics of glaciers in the North Caucasus and the Alps in the last millennium (Solomina et al., 2016) makes it possible to consider climatic changes in the region using international research. According to the studies of glaciers and lake levels in the Alps (Holzhauser, Magny, Zumbuühl, 2005; Ivy-Ochs et al., 2009; Wirth et al., 2013), the second half of the 1st millennium BC was distinguished by cold and humid conditions. However, the degree of humidity in the north and the south of the Alps was different, owing to the shift of the position of the westerly storm tracks (Westerlies) to the south at that time. It cannot be stated definitively, but can be assumed that in the end of the period under consideration (the time of the burial of the Koban persons at the Kichmalka II burial ground), the amount of precipitation in the region could have increased, as also in the south of the Alps (Wirth et al., 2013). With the increasing moisture content, $\delta^{13}C$ and $\delta^{15}N$ in C3-plants decreased (Marshall, Brooks, Lajtha, 2007). Therefore, the isotopic signals of bone collagen of humans and animals of the Koban period from Kichmalka II should show lower values of these indicators, which can be observed in Fig. 2. An indirect argument in favor of this assumption is the termination of the existence of Koban settlements in the Kislovodsk Basin in the mid 1st millennium BC owing to catastrophic changes in agricultural landscapes resulting from climate humidification (Borisov, Korobov, 2013: 191–195).

Individual variability within both groups of the Koban people (from Kichmalka II and Klin-Yar III) in terms of $\delta^{13}C$ was great, which suggests different plant food resources. The difference between the average $\delta^{13}C$ values of humans and domestic animals from Klin-Yar III was two times greater than the trophic step. The published data on the content of carbon isotopes in the collagen of human bones from other Bronze Age sites in the North Caucasus (Knipper et al., 2020: Tab. 3) show that the average value of $\delta^{13}C$ in the Koban people from Kichmalka II (–17.8 ‰) was close to the data from the literature (–18.4 to –19.4 ‰), while those from Klin-Yar III were much higher (–14.3 ‰). The latter indicates a higher proportion of millet in the human diet. Thus, the differences in isotopic signatures of individuals from the Koban burials at both sites are associated with different climatic conditions and food preferences among some groups of people.

The average $\delta^{13}C$ value in those buried at the Klin-Yar III cemetery in the Sarmatian period was more than 3 ‰ higher than the average ^{13}C isotope content in herbivores of the same period (see Fig. 3). Such a trophic step as the one from Kichmalka II may indicate the presence of plants of C4-type photosynthesis in the diet of individual persons. The difference between the average $\delta^{15}N$ values of humans and animals was within the trophic step. Noteworthy is the isotopic signal of small ruminants ($\delta^{15}N = 10.9$ ‰), anomalous for this region (see Fig. 3). Such high content of a heavy nitrogen isotope may indicate the arrival of the animals from more arid steppe region (Schulting, Richards, 2016; Shishlina, Sevastyanov, Kuznetsova, 2018). Since $\Delta\delta^{15}N_{human\text{-}animal}$ was within the trophic step, it can be concluded that the role of moved livestock (that is moved from other region) in the nutrition of people of the Sarmatian time was small.

The values of individuals from the Alanian burials at both cemeteries testify to the similarity of plant food sources. The average $\delta^{13}C$ value in bone collagen of the Alans from Klin-Yar III was over 18 ‰. As at the Kichmalka II site, $\Delta\delta^{13}C_{human\text{-}animal}$ (1.9 ‰) did not exceed the trophic step (see Fig. 4), and $\Delta\delta^{15}N_{human\text{-}animal}$ was over 5 ‰ (5.2 ‰). The difference in the human diet of the Alanian period from Kichmalka II and Klin-Yar III was the higher content of a heavy nitrogen isotope at the latter site (by 0.8 ‰). It is difficult to establish the reason for these differences because of the limited amount of data on isotopic signature of domestic animals, especially those from Kichmalka II. This could have resulted from greater

availability of food resources of animal origin among the Alans from Klin-Yar III.

The higher $\delta^{15}N$ values in humans may be associated with their social status (Knipper et al., 2015). According to scholars, the persons buried in the Sarmatian and Alanian periods came from the same site of elite burials at the Klin-Yar III cemetery (Belinskij, Härke, 2018: 32–34). In this regard, it can be assumed that variety of livestock and availability of meat and dairy products testify to the high social status of the buried. These assumptions require further research.

According to the results of isotope analysis, the average $\delta^{13}C$ value was –28.4 ‰ in modern dung (see Table 3), and was –20.26 and –20.02 ‰ in bone collagen of domestic animals (isotopic signatures of the moved livestock with a high content of heavy nitrogen isotope were not taken into account) from the Kichmalka II and Klin-Yar III sites, respectively. The difference between the isotopic signatures of plants and herbivore collagen ($\Delta\delta^{13}C_{plant\text{-}animal}$) was 5 ‰ (Ambrose, 1993). In our case, taking into account the Suess effect, the trophic step was larger, reaching about 6 ‰.

The difference of about 2 ‰ between the droppings collected at the heights of ca 2000 and 900 m above sea level can be observed. There are not enough samples to draw definitive conclusions, but this does not contradict the literature data on the decreased content of heavy nitrogen isotope in plants with height (Huber et al., 2007). Low $\delta^{15}N$ values of small ruminants of the Alanian period from Kichmalka II (3.73–3.8 ‰) and horses of the same period from Klin-Yar III (2.36–3.12 ‰) (see Fig. 4) may be associated with vertical transhumance, that is, seasonal grazing of these animals in alpine meadows, the vegetation of which contained nitrogen enriched with isotope ^{14}N (Makarov et al., 2020: Tab. 3).

The assumption of the existence of transhumance is also supported by archaeological evidence. Comprehensive studies of stone enclosures for livestock at the heights of 2100–2200 m above sea level south of the Kislovodsk Basin, carried out by the Kislovodsk Expedition of the Institute of Archaeology of the Russian Academy of Sciences, have made it possible to date these structures to the Early Middle Ages and Late Bronze–Early Iron Age (Korobov et al., 2018). The absence of collagen samples from animals of the Koban period enriched in a light isotope of nitrogen at both sites might have been caused by insufficient amount of analyzed evidence.

Conclusions

The study of the isotopic composition of collagen in bone tissue of humans and animals from the Kichmalka II burial ground has made it possible to establish the features of food sources and resource zones among the carriers of the Koban culture, people of the Sarmatian period, and Alans. Because of small number of the studied groups of individuals, we can indicate only the most significant differences between food resources used by the representatives of different periods. People of the Koban and Sarmatian periods used C3- and C4-plants for food. Judging by the $\delta^{13}C$ values, people of the Early Middle Ages and their animals were included in trophic relations based primarily on C3-plants.

Comparison of our data with the previously published results related to osteological evidence from the Klin-Yar III cemetery has confirmed the important role of millet in the economy and nutrition of the Koban people. Differences between the isotopic parameters of the Kobans buried at these two cemeteries might have been caused by the discrepancy in the chronology of their formation. The Koban burials at Kichmalka II belong to the 7th to early 5th centuries BC—the time of increased moistening.

Data on the isotopic composition of modern dung collected at various heights has made it possible to link low $\delta^{15}N$ values of the early medieval small ruminants (Kichmalka II) and horses (Klin-Yar III) with transhumance among the Alans.

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Archaeological Evidence of Migration from the Southern Taiga of Western Siberia to the Urals in the Early Middle Ages: The Vodennikovo-1 Cemetery

We describe 15 burials at the Vodennikovo-1 group of mounds in the northern Kurgan Region, on the Middle Iset River, relevant to migration processes during the Early Middle Ages. On the basis of numerous parallels from contemporaneous sites in the Urals and Western Siberia, the cemetery is dated to the late 7th and 8th centuries. Most of single and collective burials are inhumations in rectangular pits with a northwestern orientation, with vessels, decorated by carved or pricked designs, placed near the heads. These features, typical of the Early Medieval Bakalskaya culture of the Tobol and Ishim basins, are also observed at the Pereyma and Ust-Suerskoye-1 cemeteries in the same area. However, there are innovations such as inlet burials, those in blocks of solid wood and plank coffins, western orientation of the deceased, and placing vessels next to the burial pits. These features attest to a different tradition, evidenced by cemeteries of the Potchevash culture in the Tobol and Ishim basins (Okunevo III, Likhacheva, and Vikulovskoye). Also, Potchevash and Bakalskaya vessels co-occur at Vodennikovo-1, and some of them (jugs with comb and grooved designs) are typologically syncretic. To date, this is the westernmost cemetery of the Potchevash culture, suggestive of a migration of part of the southern taiga population from the Ishim and Tobol area to the Urals.

Keywords: *Forest-steppe, Trans-Urals, Early Middle Ages, Bakalskaya culture, Potchevash culture, burial complexes.*

Introduction

In the late 6th–8th centuries AD, the historical and cultural situation in Western Siberia changed significantly. The main factor causing changes was the Turkic expansion into the valleys of the Tobol, Irtysh, and Ob Rivers (Troitskaya, Novikov, 1998: 85–86; Chindina, 1991: 129; Mogilnikov, 1987: 234; Klyashtorny, Savinov, 2005: 86–87). The extensive economy and military policy of the nomadic states forced a part of the local population to search for new habitation areas. One of the directions was to move beyond the Urals.

Scholars have repeatedly raised the question of the participation of Siberian migrants in the emergence of the Kushnarenkovo-Kara-Yakupovo culture (Matveeva G.I., 2007; Gening, 1972: 270–272; Ivanov V.A., 1999: 68–71; Mazhitov, 1981: 27–28) of the southern Urals, while taking notice of the Potchevash and Bakalskaya cultures, and the sites of the "Molchanovo" type of Western Siberia. The main arguments for the migration hypothesis were some common features in types of burials, as well as pottery shape and ornamentation technique. However, the sporadic nature of such similarity did not make it possible to establish the time of migration and mechanism

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of interaction between the groups of the Early Medieval population in Western Siberia during the migration process.

The evidence from the Vodennikovo-1 cemetery reflects one of the stages in migration by the carriers of the Potchevash culture of the Ishim-Irtysh region to the Urals, and demonstrates the result of their interaction with the Bakalskaya people.

Sources

The Vodennikovo-1 cemetery is located in the Kurgan Region, on the bed-rock terrace of the right bank of the Iset River, at its confluence with the Miass River. The site was discovered by M.P. Vokhmentsev, and was studied by E.A. Tretyakov in 2019 and N.P. Matveeva in 2020. The cemetery consists of 54 burial mounds 0.3–0.9 m high and 5–10 m in diameter, arranged in dense chains at a distance of 3–10 m from each other. Two periods of its functioning have been recorded: the Early Iron Age and the Middle Ages. The medieval evidence will be discussed in this article. Eight burial mounds, containing from one to four burials, both individual and collective, including inlet burials (Tables 1, 2)* have been examined.

Burial 2, an inlet child burial, contained no surviving remains; it was made in a rectangular wooden box set at the edge of the mound fringe. The box was 17 cm high; it was made of half logs 6–7 cm wide; the lid consisted of longitudinally laid boards 1.5–2.0 cm thick; the bottom was covered with wide sheets of birch bark. A bowl was placed in the southwestern corner of the box (Fig. 1, *13*), and in its central part a thigh bone of large cattle was found. A small pot was located 0.3 m south of the burial (Fig. 1, *12*). From the wall of the box, a sample for radiocarbon analysis was taken, which gave a chronological range of the 7th–8th centuries. The bowl, with talcum powder in the clay composition, was decorated with imprints of a comb stamp along the rim. The round-bottomed pot was undecorated; it had an everted rim and straight neck, and was very similar to the Bakalskaya pottery from burial 60 of the 8th–9th centuries from the Khripunovskoye burial ground (Kostomarova, 2007: Fig. 1, *2*) and from the habitation layer of the 4th–8th centuries at the Kolovskoye fortified settlement (Matveeva N.P., 2016: Fig. 82, *2*). Thus, burial 2 can be dated to the 7th–8th centuries.

Burial 3 was plundered; the remains have not survived. A vessel was found in the western part (Fig. 1, *10*); tubular bone and joints of an animal were discovered in the eastern part of the grave pit. This low, round-bottomed pot, with straight edge slightly sloping inward and neck slanting inward, was decorated with slanting comb imprints and two cord lines along the side; a belt of "pearls" and alternating belts of slanting comb imprints and cord lines are located along the neck, with stamped rhombuses along the shoulder. The vessel finds its parallels in the evidence of the Karanayevo burial ground of the 9th–11th centuries in the southern Urals (Kazakov, 1992: Fig. 100, *1*). A similar ornamental composition appears on the pottery from burial 28 at the Bolshiye Tigany cemetery of the late 8th to 9th centuries (Khalikova, Khalikov, 2018: Pl. XXII, *23*), except that the grooves were carved in the latter case, and consisted of cord imprints in the former case.

Burial 4 did not contain any finds.

Burial 5 was completely plundered.

Burial 6 contained an adult molar* and four ribs of an animal in the filling of its western part. Bands of wood decay up to 0.65 m long were found along the walls. Long human leg bones survived from the buried person. Fragments of an iron knife (Fig. 1, *4*) and bead (Fig. 1, *8*) were discovered near the southern wall; a crushed vessel (Fig. 1, *9*) and buckle were found in the middle. Knives with straight backs widely occur in the inventory of medieval burials in Western Siberia (Viktorova, 2008: 51–55; Matveeva N.P., 2016: 171). The ovoid, light brown, translucent glass bead (Fig. 1, *8*) of type IIIA2, according to the classification of E.V. Goldina, finds parallels among the evidence from the Nevolino and Sukhoy Log cemeteries (Goldina E.V., 2010: 29–30). The vessel, a round-bottomed pot (Fig. 1, *9*) with straight neck, was decorated in the Bakalskaya style with a comb along the rim, and a band of pits and horizontal rows of slanting short comb imprints along the neck. The iron, shieldless trapezoidal buckle (Fig. 1, *7*), with a movable prong that did not protrude beyond the edge, finds parallels in the evidence from the Starokhalilovo burial ground of the 9th–10th centuries (burial 15, kurgan 6), the Karanaevo burial ground of the 9th–11th centuries (burial 4, kurgan 7) (Mazhitov, 1981: 102, Fig. 55, *16*; p. 115, fig. 61, *3*), and the Verkh-Sainskoye burial ground of the 6th–9th centuries (burials 19 and 61) (Goldina R.D., Perevozchikova, Goldina E.V., 2018: Pl. 146, *10*; 179, *2*) in the Cis-Urals. Buckles from the Nevolino cemetery of the 7th–9th centuries are somewhat larger in size (Goldina R.D., 2012: Pl. 76, *1*; 86, *5*; 156, *3*). Based on the parallels, kurgan 20 can be dated to the 8th–9th centuries.

Burial 7 was dug up; the long bones of an adult human skeleton were found.

Burial 8 contained skeletal remains of a 25–35 year old female, with leg bones *in situ*. An iron knife, which crumbled when removed, lay near the right thighbone

*The numbering of burials is sequential, according to the order of excavations over the entire burial ground.

*Hereafter, the identifications were made by the anthropologist A.V. Sleptsova, to whom we express our sincere gratitude.

Table 1. **Features of the examined burial mounds**

No.	Size, m	Height, m	Numbers of burials	Objects on the area under the mound
6	10 × 9	0.4	2	Pot, 0.3 m south of burial 2
7	12 × 11	0.9	9, 10	Calcined spot, pot with slanting imprints of comb stamp, and animal bones near the western border of the mound
8	7 × 4	0.25	3–5	–
20	6 × 7	0.3	6	The jaw of a foal, and vessel decorated with horizontal rows of slanting short imprints of comb stamp under the western fringe
21	6 × 7	0.3	18	Vessel with comb patterns, band of pits, and horizontal cord imprints; carcass of a small ruminant on the cover
29	7 × 7	0.4	7, 8	Accumulation of fragments remaining from five ceramic vessels 0.5 m from burial 8
31	8 × 9	0.5	12	Two jugs with comb patterns, and animal bones under the northwestern fringe
33	8 × 9	0.4	13, 15–17	Accumulations of broken pottery, animal bones, and intact vessels near burials 13, 16, 17; bowl outside the mound on the southeast

Table 2. **Description of burials**

No.	Shape	Place in the burial mound	Size, m	Depth from the sterile soil, m	Orientation
2	Rectangular	Inlet	1.02 × 0.73	–	NW-SE
3	"	Peripheral	2.00 × 0.85	0.35	W-E
4	"	Central	2.9 × 1.2	0.65	"
5	"	Peripheral	1.86 × 0.72	0.25	"
6	"	Central	2.5 × 0.84	0.70–0.66	"
7	"	"	2.46 × 0.93	0.6	NW-SE
8	"	Peripheral	2.5 × 0.8	0.23–0.24	"
9	"	Inlet	2.0 × 0.6	–	"
10	?	"	2.15 × 0.65	0.25	W-E
12	Trapezoid	Central	4.40 × 2.75	0.45	NW-SE
13	Rectangular	Peripheral	1.90 × 0.95	0.3	"
15	"	"	1.9 × 1.1	0.2	NNW-SSE
16	"	"	1.20 × 0.63	0.2	NW-SE
17	Oval	Central	3.8 × 2.8	0.5	W-E
18	Rectangular	"	2.45 × 0.80	0.68	NW-SE

of the buried woman. Pottery from the area under the mound consisted of small pots and cauldron-like vessels (Fig. 1, *14*, *15*) typical of the Bakalskaya culture; their distinctive features were notches along the edge, a carved "herringbone" pattern, and a band of pits. Similar vessels have been found at the Ust-Tersyuk fortified settlement of the 4th–9th centuries (Rafikova, Matveeva, Berlina, 2008: Fig. 17), Kolovskoye fortified settlement of the 4th–8th centuries (Matveeva, Berlina, Rafikova, 2008: Fig. 113, *3*), Bolshoye Bakalskoye fortified settlement of the 3rd–8th centuries (Botalov et al., 2008: Fig. 4, *10*, *13*), and others. A small jug with a comb zigzag along the rim and cord lines along the neck (Fig. 2, *12*) was found in the mound of kurgan 29. Its parallels appear in the evidence

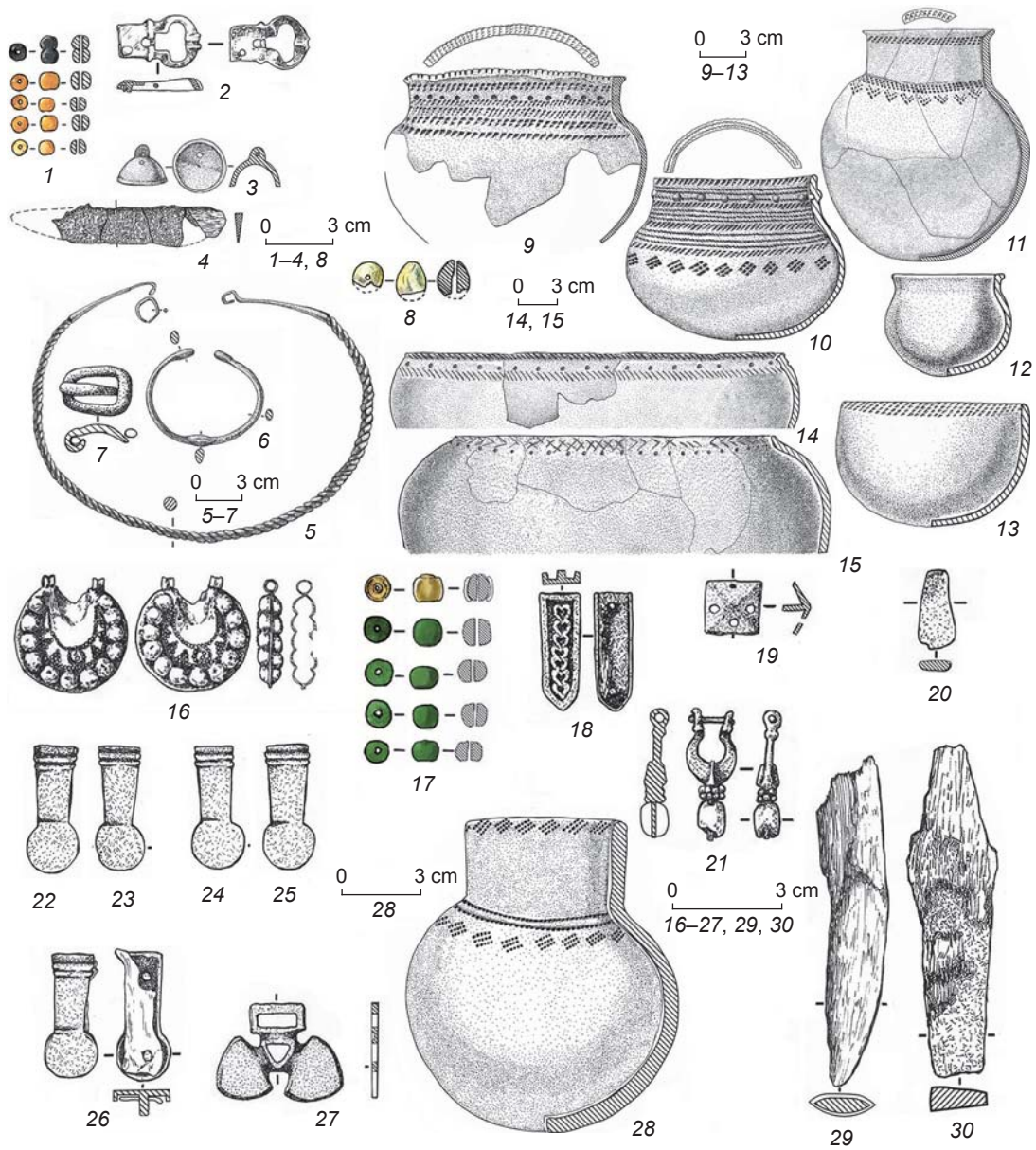

Fig. 1. Items from the burials.

1, *8*, *17* – beads; *2*, *7* – buckles; *3* – half of a round, small bell; *4*, *29*, *30* – knives; *5* – torque; *6* – bracelet; *9–15*, *28* – vessels; *16* – kolt; *18* – belt tip; *19*, *22–26* – cover plates; *20* – chisel; *21* – earring; *27* – belt dispenser.

1, *3*, *5*, *6* – burial 9; *2* – burial 10; *4*, *7–9* – burial 6; *10* – burial 3; *11* – kurgan 7; *12*, *13* – burial 2; *14*, *15* – kurgan 29; *16*, *17* – burial 18; *18–20*, *27* – burial 12; *21* – burial 16; *22–26*, *28*, *30* – burial 13; *29* – burial 17.

1, *8*, *17* – glass; *2*, *3*, *5*, *6*, *18*, *19*, *21–27* – bronze; *4*, *7*, *20*, *29*, *30* – iron; *9–15*, *28* – clay; *16* – gold.

from the Manyak burial ground of the 7th–8th centuries in the southern Urals (Mazhitov, 1977: Pl. XXVIII, *1*). Thus, kurgan 29 can be dated to the 7th–8th centuries.

Burial 9 was found at the level of the sterile soil. The remains of a female 35–45 years of age, buried in the extended supine position, with head to the northwest, were discovered in a block of solid wood about 0.25 m high, with a cover of poles and birch bark tightly placed in the longitudinal direction. A torque and beads were found under the lower jaw; a bracelet was on the bones of the right wrist, and half of a small, round bell lay next to it. The bracelet, made of a bronze rod, had bulges at the ends and in the center (see Fig. 1, *6*). A similar adornment from the Nevolino necropolis dates back to the 7th century (Goldina R.D., 2012: Pl. 172, *16*). Bracelets of this type are known from the evidence of the Pereyma (Chernetsov, 1957: Pl. XIII, *1*), Likhacheva (Gening, Zdanovich, 1987: Fig. 3, *11*), and Okunevo III (Mogilnikov, Konikov, 1983: Fig. 9, *10*) cemeteries. The twisted bronze torque with conical ends (see Fig. 1, *5*) was similar to the adornments

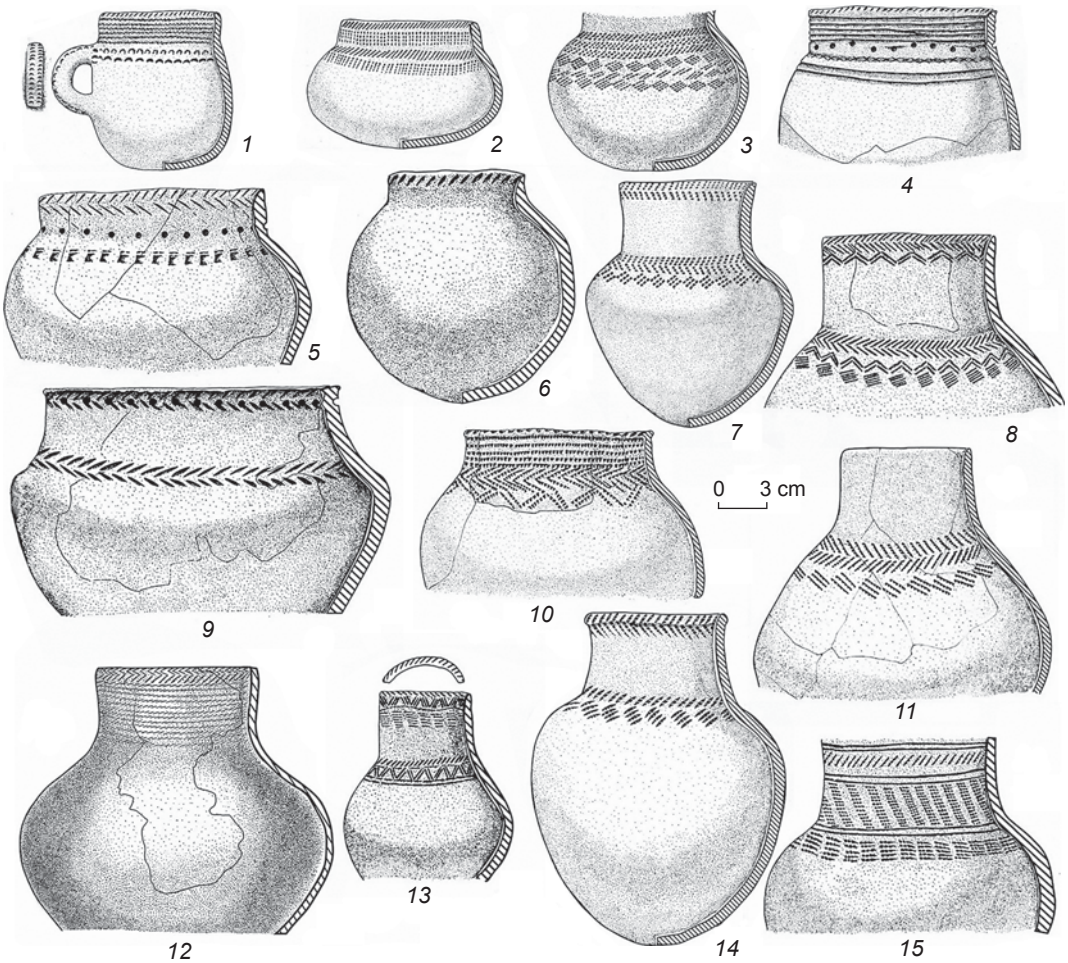

Fig. 2. Pottery complex of the Vodennikovo-1 cemetery.
1–4 – burial 12; *5*, *6*, *8*, *9*, *11*, *13*, *15* – mound of kurgan 33; *7*, *14* – mound of kurgan 31; *10* – burial 17; *12* – mound of kurgan 29.

of this type in the inventory complexes of the 8th century at the Nevolino necropolis (Goldina R.D., 2012: Pl. 212, *13*). The glass beads were barrel-shaped; one was double and opaque black; four were gilded (see Fig. 1, *1*). They belong to types IA51, IB21, and date to the late 7th–8th centuries (Goldina E.V., 2010: Fig. 20, 21, p. 57). The cast, bronze half of a small bell with an eyelet for hanging (see Fig. 1, *3*) finds parallels in the clothing complexes of the late 7th–8th centuries at the Nevolino (Goldina R.D., 2012: Pl. 172, *4–7*, *10*), Manyak, and Lagerevo (Mazhitov, 1981: Fig. 6, *13*; 7, *13*, *14*; 11, *11*, *12*) cemeteries, and in the inventory of the 8th century burial at the Polom I site (Ivanov A.G., 1997: Fig. 18, *15*). Thus, burial 9 can be dated to the late 7th–8th centuries.

Burial 10 was plundered. The femur bones of an adult, whose sex could not be established, were preserved *in situ*. A bronze buckle with immovable rectangular shield, lyre-shaped frame, and pin for attaching to the belt (see Fig. 1, *2*) were found near the right bone. Similar items are known from the Nevolino, Agafonovo, and Polom complexes of the 7th–8th centuries (Goldina R.D., 2012: Pl. 206, *29*, pl. 223, *7*; Ivanov A.G., 1997: Fig. 18, *15*), which makes it possible to consider this burial to be contemporaneous with the previous one. Such buckles have been found at the Manyak (Mazhitov, 1981: Fig. 3, *1*), Okunevo III (Mogilnikov, Konikov, 1983: fig. 2, *1*, 4, *4*, 9, *18*), and Likhacheva (Gening, Zdanovich, 1987: Fig. 2, *16*) cemeteries.

A round-bottomed pot from the area of kurgan 7 had a straight neck and everted rim; it was decorated with slanting comb imprints and double zigzag (see Fig. 1, *11*). All these features are typical of the Bakalskaya pottery (Matveeva N.P., 2016: Fig. 81).

Burial 12 was a collective burial of four people placed in a row across the grave. Individual 1 (*senilis* age, gender undetermined) occupied an extreme position at the narrow end of the pit. This person was laid on his back with head to the northeast. A mug with a handle (see Fig. 2, *1*) and low pot (see Fig. 2, *2*) were near the skull, which showed traces of artificial deformation. Remains of leather and a belt tip were found in the belt area. A fractured skull and femur have survived from individual 2 (*adultus*

age, gender undetermined) at the wide end of the pit. Two vessels (one undecorated and one with a comb-like ornamentation), and leg bones of an ungulate animal lay nearby. Fragments of the skull of individual 3 (*maturus* age, gender unknown) were also found there. A part of the postcranial skeleton and skull bones of individual 4 (*maturus* male) lay in the middle of the grave. The skull was artificially deformed; in addition, it showed traces of traumatic injury (a cut?). A pot with a comb-like pattern (see Fig. 2, *3*), iron item similar to a chisel blade (see Fig. 1, *20*), animal bones, and onlay plaque with holes were also in that area. A pot with carved decoration was placed at the head of individual 4 (see Fig. 2, *4*), and a belt dispenser was found nearby.

Two jugs with ovoid bodies and concave necks, decorated with horizontal comb "herringbone" and rhombuses (see Fig. 2, *7*, *14*), were discovered in the mound of kurgan 31. They show parallels to the complex of the Pereyma burial ground of the 7th–8th centuries (Matveeva N.P., 2016: Fig. 77, *2*, *5*). Pottery from burial 12 was heterogeneous, including: the round-bottomed pot with three bands of slanting comb imprints and three rows of rhombuses (Fig. 2, *3*); the cylindrical cup with handle decorated with notches along the rim; six rows of short, slanting comb (pseudo-cord) imprints and a band of "horseshoes" and angle-like signs below (see Fig. 2, *1*); the low, round-bottomed pot with comb imprints (see Fig. 2, *2*); the vessel with rounded bottom and straight neck, decorated with notches along the rim, multi-row horizontal carved grooves, a band of pits and grid (see Fig. 2, *4*), as well as an undecorated pot. It can be stated that these vessels were syncretic and combined the Bakalskaya patterns and Potchevash manufacturing technique.

The bronze belt dispenser with rectangular loop and two heart-shaped lobes (see Fig. 1, *27*) finds parallels in the evidence from the Kushnarenkovo burial ground of the 6th–7th centuries in the southern Urals (Gavritukhin, 1996: Fig. 4, *79*). A bronze tip of elongated trapezoidal shape with pins for fastening to the belt (see Fig. 1, *18*), decorated with a chain of heart-shaped links and band along the edge, was similar to the items of the same type of the 7th–8th centuries from Nevolino (Goldina R.D., 2012: Pl. 184, *11–14*). The dating of bronze square tetrahedral belt cover plates, with holes in the middle of each facet and pin for fastening to the belt, fits the same chronological framework (see Fig. 1, *19*). They are known from the evidence found at the Manyak cemetery of the 8th century (Mazhitov, 1981: Fig. 7, *32*) and Ust-Suerskoye-1 cemetery of the 7th–8th centuries (Maslyuzhenko, Shilov, Khavrin, 2011: Fig. 6, *18*). Thus, kurgan 31 can be dated to the 7th–8th centuries.

All four burials of kurgan 33 were completed before its mound was made (Fig. 3). Commemorative meals were performed at the site of the graves several times. Two Bakalskaya vessels associated with burial 13 were located 1.5 m west of it (see Fig. 2, *9*). One small pot stood at the head of burial 16 on the outside (see Fig. 2, *6*). Ten vessels are associated with burial 17 and are located 1.5 m west of it. One group contained three broken jugs. Three small Bakalskaya pots (see Fig. 2, *5*) and a cup, along with three Potchevash jugs (see Fig. 2, *8*, *13*, *15*), constituted another accumulation of pottery. A crushed bowl was found under the southeastern fringe of the burial mound; fragments of necks and walls of vessels with comb patterns, as well as animal bones, were discovered under the northwestern fringe, 15–20 cm deeper than the above-mentioned broken pottery. After the commemoration meal, they were probably placed into pits that are now not visible. The fact that some of the vessels appear in broken form, and some intact, speaks for the different time of commemorative activities near the graves.

Eight vessels from the area under the mound included round-bottomed pots and jars with pits under the rim, comb imprints or notches in the form of a grid and "herringbone" pattern. The decoration was sparse; the clay was mixed with chamotte. This pottery has broad parallels in both burial and habitation complexes of the Bakalskaya culture of the 4th–8th centuries in the Tobol-Ishim region (Rafikova, Matveeva, Berlina, 2008: Fig. 14–17; Matveeva, Berlina, Rafikova, 2008: Fig. 113–118; Botalov et al., 2008: Fig. 4–7). Six thin-walled jugs with narrow, high, straight necks and spherical bodies, decoration of rhombuses, "herringbone", and double zigzag, made by tracing and thin comb (see Fig. 2, *8*, *11*), are similar to the Pereyma pottery of the 7th–8th centuries. One jug (see Fig. 2, *15*), according to

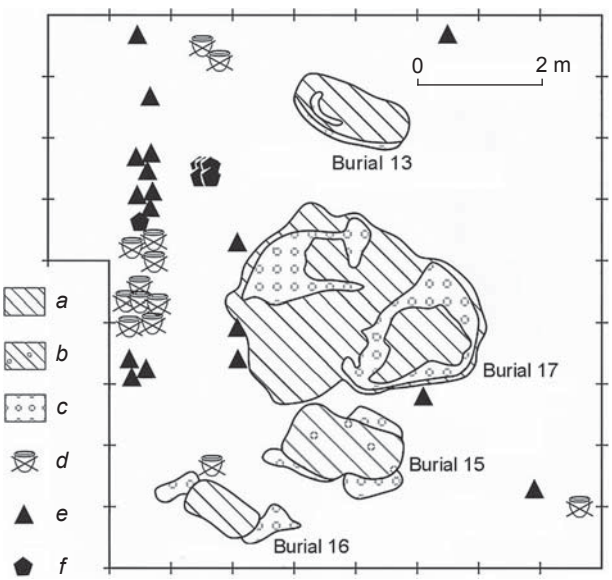

Fig. 3. Plan of the structures under the mound of kurgan 33.
a – dark gray filling; *b* – dark gray mixed filling; *c* – discharged loam; *d* – collapsed vessel; *e* – faunal remains; *f* – pottery fragments.

its ornamental pattern, belongs to the typical Potchevash tradition (Ilyushina, 2009: Fig. 3, *4*, 4, *8*).

Burial 13 was a cenotaph, since the bones of the skeleton were missing, while the things were found in their usual places. Five belt cover plates were discovered in the middle of the pit; a short iron knife with traces of wood on the tang (see Fig. 1, *30*) was nearby. A small jug with a high, straight neck and rounded body (see Fig. 1, *28*), bands of horizontal comb imprints and rhombuses, similar to a Pereyma vessel (Matveeva N.P., 2016: Fig. 77, *5*), stood in the southeastern end of the burial. Trapezoidal bronze belt cover plates with rounded ends and two pins for fastening them to the belt (see Fig. 1, *22–26*) are similar to those of the Ust-Suerskoye items (Maslyuzhenko, Shilov, Khavrin, 2011: Fig. 6, *17*, *19*, *20*), which makes it possible to date this burial to the 7th–8th centuries.

Burial 15 was plundered. Only fragments of the long bones of an individual at the age of *adultus-senilis* (the gender is unknown) have survived.

Burial 16 contained the remains of a 3- to 4-year-old child buried in the extended supine position with head to the northwest. A bronze gilded lyre-shaped earring with granulation and pendant-bead (see Fig. 1, *21*) was discovered near the right temporal bone. The earring was dated to the 7th–8th centuries on the basis of parallels to the evidence from the Kudyrge cemetery in the Eastern Altai (Kenk, 1982: Abb. 14, *22*).

Burial 17 was plundered; the bottom of the pit was dug up; things and bones of the skeleton were moved. They belonged to an individual 35–45 years of age (the sex is undetermined). Only an iron knife (see Fig. 1, *29*) and pottery fragments (see Fig. 2, *10*) have survived. Judging by the combination of pottery with the Potchevash fine-combed decoration and Bakalskaya pottery (a pot with cornice and horizontal bands of combs, and a bowl with pits under the rim and line of notches), this burial was contemporaneous with the three burials described above. Thus, kurgan 33 can be dated to the 7th–8th centuries.

Burial 18 contained leg bones of an *adultus-senilis* male. A temple adornment and five glass beads lying next to it were found at the head end of the grave. A two-piece gold kolt with two loops for attaching the unpreserved bow was decorated with "pearls" along the edge and pyramids of granulation in the center (see Fig. 1, *16*). Close parallels appear in the complex of the 7th century at the Kudyrge cemetery in the Eastern Altai (Gavrilova, 1965: Pl. IX, *3*, *4*). Similar adornments are known from the evidence of the sites of the 7th century in the Caucasus and the Carpathian Basin (Balogh, 2016). The dating of four green and brown opaque barrel-shaped beads (see Fig. 1, *17*) belonging to type IA47 (Goldina E.V., 2010: Fig. 31) to the 7th–8th centuries agrees with this. Thus, kurgan 21 can be dated to the 7th–8th centuries.

Discussion

The inventory described above makes it possible to attribute the complex of Early Medieval burials at the Vodennikovo-1 cemetery from the second half of the 7th to the 8th century. The radiocarbon date of burial 2, obtained from the wood of the coffin by I.Y. Ovchinnikov at the Institute of Geology and Mineralogy of the SB RAS, indicates the intervals of 660–769 (68.3 % probability) and 641–880 (94.5 % probability). Thus, the Vodennikovo-1 cemetery fills the gap in the material evidence from the eastern slope of the Urals, which existed for the second half of the 7th–8th centuries.

The results of studying fifteen burials demonstrate innovations in the funeral rite of the Bakalskaya culture. We consider the following features to be traditional for the forest-steppe population of Western Siberia: inhumations under low kurgans in narrow shallow pits oriented along the NW-SE line, collective burials, vessels in graves, as well as remains of the funeral feast in the mound in the form of animal bones and utensils (Matveeva N.P., 2016: 210). New features are burials in blocks of solid wood, western orientation of some of the deceased, inlet burials, joint occurrence of the Bakalskaya and Potchevash pottery in the same commemorative complexes (as for example kurgan 33), appearance of syncretic forms of pottery, as well as the stamped and grooved design (see Fig. 2). Parallels to some features of items from Vodennikovo-1 can be found in the above-mentioned contemporaneous necropolises of the Trans-Urals. For example, multi-cultural pottery was placed near the graves in Pereyma; western orientation and blocks of solid wood have been observed at Khripunovskoye and Ust-Suerskoye-1. However, the above innovations were traditional features of the burials of the Potchevash culture, known from the cemeteries of Likhacheva, Okunevo III, and Vikulovskoye, where parallels to the vessels with grooved and fine-combed ornamentation have also been found (Fig. 4). Interestingly, recent mixing of the multicultural population on the Iset River is reflected in placement of vessels of the same type in groups at the graves.

Previously, the movements of the southern taiga population groups from the Irtysh region in the 6th–8th centuries to the Baraba forest-steppe (Molodin, Solovyev, 2004: 5–6) and to the steppe of North Kazakhstan along the Irtysh River (Arslanova, 1983: Fig. 1; Smagulov, 2006: 91) was mentioned in the literature. Evidence from Vodennikovo-1 suggests another migration route of the carriers of the Potchevash culture, namely, to the Urals, along the northern border of the forest-steppe. As a result of interaction with the Bakalskaya groups, the syncretic "Kushnarenkovo" pottery of jug-like forms

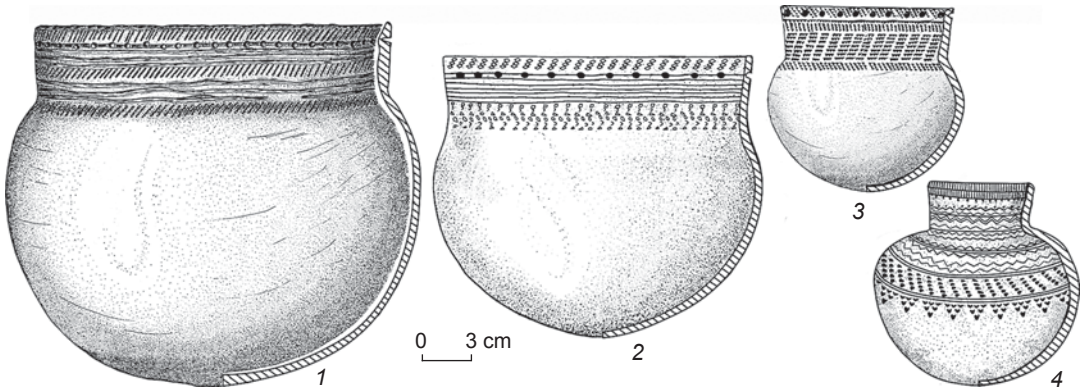

Fig. 4. Pottery from the Potchevash burial grounds.
1 – Okunevo III; *2* – Vikulovskoye; *3* – Likhacheva; *4* – Bobrovka.

with carved, grooved, and fine-combed ornamentation (Zelenkov, 2019), whose origin is associated with imitation of prestigious pottery from Central Asia (Matveeva N.P., 2019: 51–52), emerged in that region. The components of these cultural traditions with the participation of the Turkic-speaking nomads determined the appearance of the Kara-Yakupovo complexes, which does not contradict the ideas about the cultural genesis of the population living in the southern Urals in the Early Middle Ages (Ivanov V.A., 1999: 66).

Conclusions

The Early Medieval evidence from the Vodennikovo-1 cemetery demonstrates innovations in the funeral rite of the Bakalskaya culture and indicates a cultural wave from the southern taiga of the Irtysh region in the late 7th–8th centuries. Migration of the groups of the Potchevash population to the west and east from their original area is reflected in syncretism of cultural entities throughout the entire forest-steppe of Western Siberia, northern Kazakhstan, and the southern Urals. It can be stated that finally it has been possible to obtain more reliable evidence showing the influence of the Potchevash people on cultural genesis in the Urals and Trans-Urals, and their contacts with the nomads of Kazakhstan. This evidence complements and develops the proofs provided by V.F. Gening, G.I. Matveeva, F.K. Arslanova, N.A. Mazhitov, and V.A. Mogilnikov. It is encouraging to find traces of interaction between the Potchevash and Bakalskaya populations as very likely speakers of the Selkup and Ugric languages, which influenced the vocabulary of the Magyars, formed in the zone of their settlement. As is known, the Magyar vocabulary includes relatively many words of the Samoyed linguistic group, which could have been borrowed only in the Trans-Urals (Khelimsky, 1982: 123–125). The reason for the latitudinal migration in the west of Western Siberia was probably the advance of the Kimaks and Kipchaks in the 8th century. Information about this has appeared in several sources. Further development of this hypothesis requires additional arguments, including those based on anthropological and genetic data.

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Hephthalite Coin from an Early Medieval Burial at Gorny-10, Northern Altai

We describe a silver coin found in one of the burials at Gorny-10 cemetery in northern Altai, excavated by expeditions from the Altai State University in 2000–2003. The coin was discovered in a destroyed burial of children (No. 46) along with other informative artifacts, which are rather uncommon in such burials. Judging by horse harness and ornaments, the assemblage falls in the interval from the late 6th to early 8th century AD. The coin is an imitation of the drachm of the Sasanian shah Pērōz I to classify as type or emission 287, according to R. Göbl, that is one of the most common types of Hephthalite coins. The elemental concentration of the specimen has a high content of silver and no gold. The specimen has no analogs in North or Central Asia. It could have been brought to the forest-steppe Altai by Türks, who conquered the Hephthalite Empire in the first decades of the late 6th century AD.

Keywords: *Coins, imitation, Hephthalites, northern Altai, Early Middle Ages, chronology.*

Introduction

Samples of Central Asian coins occur extremely rare in the archaeological sites of North and Central Asia of the Early Middle Ages. Such finds are evidence of a variety of direct and indirect contacts between the populations of these regions in the west, which is reflected somewhat fragmentarily in the material culture of the nomads of the study period. In addition, coins (like many other items of import) are used as important chronological markers, and are often reasonably regarded as a "prestigious" element in the set of artifacts, demonstrating the status of the owner. Therefore, each new such find of Central Asian origin attracts much attention from specialists, both archaeologists and historians, who reconstruct the ethnocultural and social processes, as well as from numismatists, who study the specifics of distribution of these types of artifacts and the peculiarities of their use by the local population.

This article introduces a Central Asian coin, unique to North and Central Asia, found during excavations at Gorny-10 necropolis from the period of Türkic Qaghanates. Taking into account the great importance of the context of the discovery of the item, we present a general cultural and chronological interpretation of the entire complex, in which this find was discovered.

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A detailed analysis of the coin, including numismatic characteristics, elemental composition, and a clarification of the range of analogs, became the basis for preliminary reconstruction of the history of the periphery of the nomadic empire in the period of the Türkic Qaghanates.

Excavation results

Gorny-10 cemetery is located on the promontory of the right bank of the Isha River, 1.3 km west-northwest of the mouth of the Karaguzh River, 0.6 km north-west of the village Gorny of Krasnogorsky District, Altai Territory (Fig. 1, 2). In 2000–2003, expeditions of the Altai State University and the Research and Production Center "Naslediye", under the leadership of M.T. Abdulganeev and N.F. Stepanova, excavated 75 burials in the area of the cemetery. For various reasons, the results of the studies of the site have so far been published only in part (Abdulganeev, 2001; Stepanova, Abdulganeev, 2003; Seregin, Abdulganeev, Stepanova, 2019; Seregin, Stepanova, 2020; and others). Meanwhile, the striking materials of the Gorny-10 necropolis are important for studying both particular aspects of the history of the population that left this evidence, and the processes that took place in the southwestern Siberia at the beginning of the Early Middle Ages. Of particular importance in this regard are individual exemplary objects, to which the burial belongs.

Grave 46, investigated in 2001, is located in the northeastern part of excavation No. 3, where the southern group of objects of the Gorny-10 necropolis is situated. The burial was traced from a depth of 0.5 m. The southeastern part of the grave was destroyed by a modern pit. The dimensions of the preserved part are 0.7 × 0.85 m. The grave had an oval-elongated shape and was oriented with its long axis along the ESE-WNW line. The bottom was registered at a depth of 0.65 m from the modern surface. In the filling of the grave, at different levels and without a certain order, there were two child's teeth, a fragment of a tubular bone, an iron stirrup and a bit, two paste beads, three bronze pendants (including an openwork style pendant), two bronze and one silver coins (Fig. 3).

Fig. 1. Location of the Gorny-10 site.

Thus, the published archaeological complex appears to be a destroyed children's burial with accompanying

Fig. 2. View of Gorny-10 (*photo by M.T. Abdulganeev*).

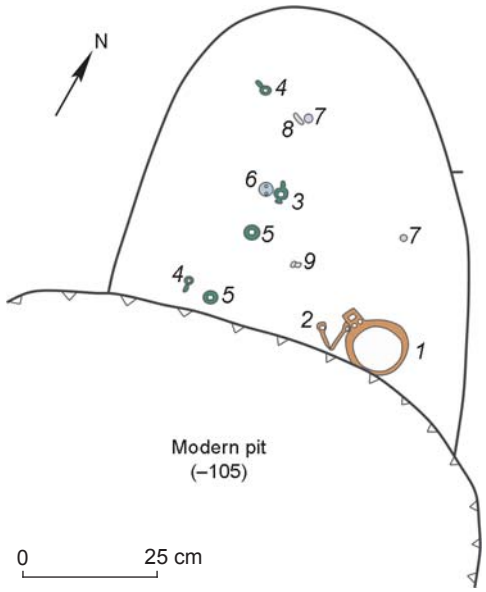

Fig. 3. Plan of grave 46 of the Gorny-10 cemetery.
1 – iron stirrup; *2* – iron bits; *3*, *4* – bronze pendants; *5* – bronze coin; *6* – silver coin; *7* – bead; *8* – a fragment of a human bone; *9* – human teeth.

grave goods, which are quite rare for burials of this age group and informative both in terms of dating the whole object and in terms of analysis and interpretation of individual finds.

Analysis of grave goods

The accompanying goods of the children's burial include items of horse harness and ornaments (the coins, apparently, can be classified as the latter). Despite the absence of an animal, iron stirrups and bits were found in grave 46. The tradition of placing individual elements of horse equipment in single burials is quite rarely recorded in the Odintsovo complexes of the forest-steppe Altai. Somewhat more often, this practice is observed in the monuments of the early medieval Türks of the Altai-Sayan region (Seregin, 2013: 104). In particular, it is known from the materials of the Kudyrge complex, which demonstrates general similarity with the burials of the Gorny-10 necropolis (Gavrilova, 1965: 22–23, pl. VIII, IX).

The iron stirrup (Fig. 4, *1*) is identified as a flat plate stirrup. The characteristic features of this specimen, which determine the time of its production, are a narrow (2.0 cm) flat footboard and a broad unarticulated plate without a neck. The opening formed by the arches has a rounded shape. Rare features of the stirrup include the presence of two additional holes in the plate, in addition to the rectangular opening for the stirrup strap. Similar variants of the plate design were observed in two items: that from mound 1 of the Kurai VI complex in Altai (Evtyukhova, Kiselev, 1941: Fig. 26), dating back to the 7th century AD, and that from the burial of the Shahidon cemetery in Tajikistan (Solovyev, 2018: Fig. 4, *4*), which is tentatively dated to the late 7th to early 8th century AD. Judging by the morphological characteristics of the stirrup from grave 46 at Gorny-10, it could have been manufactured in the late 6th to 7th centuries AD.

Iron bits have smooth shafts of links, a hook connection, and single-ring ends (Fig. 4, *2*). According to S.V. Neverov (1992: 150–151), who carried out a detailed analysis of a significant amount of materials, hook bits existed on the territory of Southern Siberia throughout the entire 1st millennium AD; and similar finds from the early medieval assemblages of the region demonstrate the continuation of the development of local forms of artifacts of the Xiongnu-Xianbei period. In general, such bits were widespread, and are not indicative in terms of dating.

The outfit ornaments include two bronze pendants (Fig. 4, *4*, *5*). Similar items, showing some variability of design, were found both in the complexes of the Odintsovo culture of the forest-steppe Altai (Abdulganeev, 2001: Fig. 1, *11*, *12*; Savinov, Novikov, Roslyakov, 2008: Pl. XI, 6), and in the sites of adjacent territories—in the Altai Mountains, Tomsk and Novosibirsk regions of the Ob valley, Kemerovo Region, etc. (Gavrilova, 1965: Pl. XX, 18–26; Chindina, 1977: Fig. 11, *6*; Belikova, Pletneva, 1983: Fig. 79, *12*; Troitskaya, Novikov, 1998: Fig. 16, *48*, *52–53*; Ilyushin, 1999: Fig. 16, *15*, *18*; 25, *13*, *14*; 27, *20*). These finds have been discovered in the sites

Fig. 4. Items of horse harness and outfit ornaments from grave 46 (*1*, *2* – iron; *3–5* – bronze).

dating from the late 6th to early 8th century AD. Unique is the bronze heart-shaped flat pendant (Fig. 4, *3*), the analogs of which are not known to us.

The most striking element of the goods from grave 46 of Gorny-10 are coins. Judging by the available materials, these items served as ornaments of the outfits of population of the forest-steppe Altai and adjacent territories. There are two Chinese coins (fig. 5) of the *wŭ zhū* 五銖 type. Such finds are already known in a number of early medieval complexes of North Asia (Masumoto, 2001; Kuznetsov, 2007; and others). According to their distinctive typological characteristics, the specimens from the burial under consideration date from the period of the Sui Dynasty (581–618) (Peng Xinwei, 1994: 194–196, 201, fig. 6). To the analysis of an extensive collection of Chinese coins from the Gorny-10 necropolis a special publication will be devoted. In this article, we will dwell in detail on the silver coin, which is unique not only for the sites of the southwestern Siberia, but also for the complexes of North and Central Asia as a whole.

Fig. 5. Chinese bronze coins from grave 46.

Fig. 6. Silver coin from the grave 46.

Integrated characteristics of the coin

The coin from grave 46 (Fig. 6) has a diameter of 22.5–24.0 mm and a mass of 3.18 g. The obverse and reverse dies rotation is 3 h. On the opposite margins of the specimen, there are two holes, obviously intended for hanging the item.

The coin can be identified as a type (or emission) 287 according to the classification by R. Göbl (1967: Bd. I, S. 197, 198–199; Bd. II, S. 90–91, 149; Bd. III, Taf. 78, 79). This is one of the most common groups of coins associate with of the so-called "Iranian Huns", the beginning of the production of which was associated with the Hephthalite state. Such items are imitations of the drachms of the Sasanian shah Pērōz I (457–484), with the "third crown" or with "the third crown type" (according to R. Göbl). There are four "pellets" in the obverse margin; to the right of the winged crown, there is a Bactrian inscription *ηβ* [ēb] (some specimens show *ηβο* [ēbo] and even presumably *ηβοδ* [ēbod]), which is considered as abbreviation of *ηβοδαλο* [ēbodalo], i.e. the name of the Hephthalites; sometimes it is also found to the left of the winged crown, a *tamgha* of the type S 2 (according to R. Göbl). On the reverse, to the left of the image of the fire altar, there is a sign resembling Pahl. /m/ (*mēm*) 𐭬, which is interpreted differently: the ligature of /m/ and /p/, initially denoting *MLK 'pylwcy* (although this suggestion is problematic syntactically), or as an equivalent of the ideogram *MLK'*, i.e. Aramaic *malkā*, reflected the Middle Persian *šāh* 'ruler, king' (Curtis, 1999: 305; Schindel, 2004: 294; Alram, 2008: 255–256; Alram, Pfisterer, 2010: 28; Heidemann, 2015: 332; Rezakhani, 2017: 138, notes 29, 30). To the right of the altar, there is the Bactrian inscription βαχλο [bahlo], i.e. Balkh are place of coinage.

The issue of the original drachms, which became the prototype for the imitation under consideration, refers to the period of the reign of Pērōz I after his defeat by the Hephthalites and his return from captivity, which happened, according to the revision of the date, in 474 (Schindel, 2004: 390–392, 395–399; Alram, 2008: 255; Alram, Pfisterer, 2010: 22–23). Apparently, it was these drachms that used to be paid as a tribute to the Hephthalites (Alram, Pfisterer, 2010: 27, 31; Heidemann, 2015: 331–332; Rezakhani, 2017: 137–138). Pērōz I was killed in the next campaign in 484. The circulation of his original drachms outside the Sasanian Empire continued also in the subsequent period. The creation of the imitative coins of type 287 started in that period; it is only debated whether the coinage began after 474 or after the death of Pērōz I (Heidemann, 2015: 333–334). The later date of the imitative coinage may be limited by the decline of the Hephthalite Empire (the 560s AD); however, the circulation of such imitative coins in Central Asia and adjacent regions continued for quite a

long time. Coins of type 287 were found in Afghanistan (Kabul and Ghazni), southern regions of Uzbekistan and Tajikistan, as well as in the Chinese province Shanxi (Vainberg, 1972: 138–139; Alram, 2008: 253–258, 265–266, pl. 2–30; Alram, Pfisterer, 2010: 27–32; Baratowa, Schindel, 2012: 43–45; Heidemann, 2015: 331, 332, 337). As far as we know, in the closed archaeological sites studied in Central and North Asia, such items have not previously been found.

Coins of type 287 are distinguished into several variants (types or subtypes) (Alram, 2008: 255; Alram, Pfisterer, 2010: 27–33; Baratowa, Schindel, 2012: 43–44; Heidemann, 2015: 331, 340). Unfortunately, the specimen of imitative coin from Gorny-10 is deformed, so the preservation of the images necessary for identifying its typological features is insufficient (especially on the obverse). Remains of inscriptions are visible in the appropriate places, but their paleographic features are unclear. It can be assumed that there are three dots on the obverse between the winged crown and the rim of the coin, but at the same time it can be supposed that this is part of the image. Thus, it is impossible to determine exactly to which variant the specimen under consideration should be attributed. There are no traces of countermarks on the coin.

In the R. Göbl's catalog, along with a such imitative coin of 4.21 g, there are samples weighing from 2.77–2.78 to 3.39 g, i.e. 2.96 g on average (1967: Vol. II, p. 42). In present time, they are known the numerous specimens having a weight from 3.84 to 4.24 g that are close to the Sasanian protoypes. It is likely that the its earliest series differs from the subsequent ones in clearly engraved images and inscriptions, and also in a slightly higher average weight (Alram, 2008: 256; Heidemann, 2015: 334)*. However, there is no reliable correlation between the paleographic features of the coin legends and iconographic characteristics, on the one hand, and the data on the weight of the coins attributed to any distinguished variants, on the other. Silver coins of type 287 attested in the catalog published by L.S. Baratova and N. Schindel, have a mass from 2.76 to 3.10 g (2012: No. 446–448)**. All of them refer to variant 2 (according to M. Alram). Billon coins of type 287 have a lower weight, that is mostly from 2.05 to 2.50 g, excluding the heaviest sample of 2.90 g (Ibid.: No. 450, 532–541)***. Since these specimens are corrupted, their typological attribution is difficult.

Taking into account the importance of studying the alloy composition for the full description of the coin, an X-ray fluorescence analysis of the specimen from Gorny-10 was carried out, using an INNOV-X SYSTEMS ALPHA series ™ spectrometer (model Alpha-2000, USA), complete with a portable laptop and a test bench. The following results were obtained (%):

	Ag	Cu	Pb	Fe
Obverse	97.20	1.90	0.74	0.16
Reverse	97.01	2.18	0.69	0.12

The analysis result shows that the coin is silver, with rather insignificant impurities of other elements (copper, lead, iron). The silver content of 97 % brings the specimen analyzed closer to the Sasanian prototypes, elemental composition of which, however, differs in the presence of gold.

Unfortunately, the known data on the composition of the alloys of other imitative coins of type 287 are rather fragmentary. Analysis of the metal of two such coins from Panjikent and two ones from Afrasiyab showed that they were made of silver (about 80 %), with the impurity of copper (Smirnova, 1963: 37, 51, 168–170, tab. 1)*. In another work of O.I. Smirnova it was noted: "The analysis of the composition of metal from which the Sogdian coins of early issues of the Warahran type** and the Hephthalite coins of the Peroz type were made, found that both types were minted from an alloy of silver with copper, with a silver content in an alloy of about 80 %, which brings the coins of both groups closer in time" (1970: 158). The elemental composition of the coins of type 287 contained lead and iron (sometimes in very small amounts), bismuth and gold (obviously, as trace elements), as well as zinc and tin, the addition of which may be due to the desire to improve the properties of the metal (Smirnova, 1963: 168). The data obtained during the study of a specimen from Gorny-10 seriously differ from the results of the analysis of the samples studied by Smirnova: with a comparable mass, they differ not only in the percentage of silver, but also in the elemental composition in general.

According to the available data, the silver content in the Sasanian drachm was at the level of 85–90 %, during Khūsrō II period approx. 95 %, and being still less with his successors (Bacharach, Gordus, 1972: 282–283). According to E.V. Rtveladze, two original Sasanian coins of Pērōz I, with a diameter of 1.8 to

*This is more than the weight of regular Pērōz coins according to M. Alram, based on the data on modal weight of such drachms of Pērōz in 4.10–4.14 g. (see (Schindel, 2004: 106, pl. 35, p. 112–113)).

**Coin No. 445 should to be identified as of type 287a (according to B.I. Vainberg).

***Coins No. 449, 451 should be classified as type 287a (Heidemann, 2015: 335, note 31), therefore we did not take them into account.

*It should be noted that the results by O.I. Smirnova were criticized E.A. Davidovich (1979: 108, 116, note 19).

**These are the so-called *Bukhār Khudāh* silver coins, which copied the drachms of the Sasanian shah Bahrām V (420–438).

2.0 cm (cut off?), weighing 2.8–2.9 g, found on the territory of Chaghanian (Budrach site), "were minted from an alloy of silver and copper with an addition of lead and gold, with a significant silver content" (1987a: 121). According to A.N. Aleshin, one of such drachms, with a mass of 3.82 g, contained 94.37 % silver, 0.50 % gold, and 5.13 % copper (2016: 12–13, 14). According to the results obtained by a group of Iranian scholars, the absence of sulfur in the elemental composition of the coins allows us to conclude that they were minted from silver obtained not from sulfide, but from cerussite ores. In some drachms, gold was present as a trace element. The coins of Pērōz I (analyzed were the drachms with a crown of the "first" and "second" types) were made from metals mined in two different mines, one of which also gave material for the drachms of Kawādh I during his first reign (488–496), the other for coins of Khūsrō I Anūshirvān (531–579). The presence of iron in Sasanian coins is irregular; therefore, it should probably be considered as a surface contaminations (Sodaei, Masjedi Khak, Khazaie, 2013).

As a comparative material, it is advisable to draw on the results of the analysis of imitations of Pērōz I drachms from Central Asia, belonging to other types (or emissions, according to R. Göbl). They can be obtained from a few publications (Rtveladze, 1987a: 122, 124–127; 1987b: 305, 308; Baratowa, Schindel, 2012: 50; Aleshin, 2016). Coins of type 289 (which is a further degradation of type 287) from Guftan (and, probably, Termez), Kobadian, show the same alloy composition (silver and copper in different proportions, zinc and lead), which is also observed in coins of type 295 from Chaghanian, which are imitations of the drachms of Khūsrō I. For all of them, there is a general tendency towards a reduction of the percentage of silver (which is reflected in the practice of cutting off the original drachms of Khūsrō I and, probably, making of imitations of them, also of a lesser mass (Rtveladze, 1987a: 122, 127; 1987b: 305)). At the same time, coins of type 295 from Chaghanian are characterized by the variability of the alloy composition, which consists in the presence/absence of gold, which negatively correlates with the presence/absence of lead. In this case, the elemental concentration in both cases can be determined by the material used for remelting of coins, i.e. the composition of the alloys of the original Sasanian drachms being a raw material.

The outstanding feature of the coin from the Gorny-10 cemetery is also the absence of gold in it. In this case, they can be offered are two explanations. If the imitation was created with the use of material of the Sasanian drachm, then the latter should not contain gold. Another explanation assumes some other source of raw material for the production of the imitative coin.

The presence of an insignificant admixture of gold in Sasanian drachms, as well as in other items made of silver (Bacharach, Gordus, 1972: 282; Gordus, 1995: 615), is traditionally considered necessary. In this case, gold is attributed as a trace element, the content of which depends on the source of the raw material (Meyers, Van Zelst, Sayre, 1973; Sodaei, Masjedi Khak, Khazaie, 2013: 214)*. This source is supposed to have been cerussite ores. Subsequently, they were also used by the 'Umayyads, as evidenced by the results of the analysis of silver dirhams issued in Iran (Jozi, Khak, Nosrati, 2019: 70–74). At the same time, there is evidence of the existence of Sasanian drachms without any admixture of gold. As an example, one can point to the coins of Hormozd IV (578–590), which demonstrate a very high fineness of silver and contain small amounts of copper, lead, and sometimes iron and zinc (Akbarzadegh, Schindel, 2017: 16, tab. VII, No. 286, 295, 298). Owing to the insufficient amount of data, we shall limit ourselves only to raising the question of using in the making of the imitative coin of type 287 analyzed the raw materials from silver-polymetallic deposits characterized by the absence of gold.

The weight of the coin from Gorny-10 can be considered an indirect chronological feature. This characteristic, which noticeably distinguishes it from the known heavier analogs, indicates that the analyzed specimen belonged to the series of such imitations that were not the earliest.

Conclusions

Despite the fact that the considered children's burial at the Gorny-10 cemetery was destroyed, the surviving materials are very informative. First of all, attention should be paid to the social aspect. The alleged status of the deceased, apparently due to a rather high position of his family, was reflected in the presence of items of horse harness and ornaments, including rare coins. It is possible that the latter were a kind of amulets. A similar composition of grave goods is recorded in several "rich" early medieval children's burials that were investigated in adjacent territories (Troitskaya, 1989: 65–67; Troitskaya, Borodovsky, 1990; Borodovsky, 2018).

Analysis of the grave goods makes it possible to date the burial under consideration within the period from the late 6th to early 8th century AD, possibly to the 7th century. The cultural attribution of both this burial and the entire Gorny-10 cemetery is less unambiguous. In the literature, despite the fragmentary nature of the published materials on the site, various points of view are presented. V.V. Gorbunov believes that the Gorny-10

*It was suggested that the technology of separating gold from silver was not known to the artisans of that time (Gordus, 1972).

necropolis should be considered among the monuments of the Odintsovo culture (2003: 40). According to A.A. Kazakov, this complex refers either to the final stage of the Odintsovo, or to the initial period of the Basandaika culture (Kazakov, Kazakova, 2016: 241). A special point of view was introduced by G.V. Kubarev, who considers this necropolis among the monuments of the Kudyrge type (Zubova, Kubarev, 2015: 86).

In our opinion, the amount of available information about the sites of the Early Middle Ages on the territory of the forest-steppe Altai is still insufficient to make definite conclusions. Preliminarily, it seems feasible to consider contemporaneous archaeological sites of the late 6th to early 8th century AD (Savinov, Novikov, Roslyakov, 2008: 30–32; Gorbunov, Tishkin, Frolov, 2017; Fribus et al., 2018: 44–47, fig. 1) as the evidence of the existence of a special group of the population with complex historical destinies, reflecting the turbulent processes of the end of the Migration Period and the period of Türkic Qaghanates. Judging by the availability of coins of various origins, this population had direct or indirect contacts in various directions. The silver coin found in grave 46 at Gorny-10 is an imitation of the drachms of the Sasanian shah Pērōz I. This find refers to one of the most common types of coins issued in the territory under rule of Hephthalites. The specimen is characterized by a high silver content (97 %) and the absence of gold in the alloy, which distinguishes it from other imitations of Sasanian coins, associated with the "Iranian Huns".

The high purity of silver in this case, it seems, does not allow us to explain the reduced mass of the coin by any crisis in the economy of the society where it functioned. The fact, rather, makes it possible to assume, already by the time of the invasion of the Türks on the territory of the Hephthalites, the existence, among the coins of type 287, along with the "heavy" samples, of another group of coins, differing in weight parameters from the Sasanian prototypes. This conclusion is supported by the absence of any countermarks on the coin.

Considering the uniqueness of the find, which has no parallels in the archaeological complexes of North and Central Asia, it is difficult to explain the fact that this coin appeared in the territory of the forest-steppe Altai. It cannot be ruled out that this was due to the conquest of the Hephthalite territories by Türks in 558–568 AD (for detailed discussion of the chronology, see (Felföldi, 2002, 2005)) and subsequent contacts with Türks of the population that left the Gorny-10 necropolis and other contemporaneous sites. Further expansion of information about the monuments of the period of Türkic Qaghanates in the southwestern Siberia will make it possible to more accurately reconstruct complex processes on the periphery of nomadic empires during this time.

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Kainar: A Late 18th to Early 20th Century Ritual and Housing Complex in the Northern Ustyurt

This is the first description of a key Kazakh recent permanent settlement at Donyztau, in the northern Ustyurt. Such sites, evidencing major historical processes during the transition of nomadic pastoralists to a semi-sedentary lifestyle (mid-19th to early 20th century), are known as "ritual and housing complexes" (RHC). Kainar, a highly representative site, is viewed as a socio-cultural phenomenon and an integral architectural and landscape ensemble. The excavation history of RHCs in the Donyztau area and their evolution are discussed, and the role of ascetics such as Doszhan-Ishan Kashakuly is described. We highlight separate parts of the complex (the settlement and cemetery) and their elements. The architecture of the RHC is reconstructed with regard to structure, function, and continuity with the landscape. The layout of the site as a whole and of the madrasah with its typical elements are compared with those of similar sites in Central Asia and Kazakhstan. A reconstruction of the complex is proposed and the function of public halls is interpreted. The role of the cemetery and of its parts in the structure of the RHC is evaluated; the evolution of its spatial organization is traced. Types of memorial complexes are listed in terms of harmony with the landscape, archaic beliefs, architecture, and style, specifically stone carving. The historical and cultural significance of Kainar as a source of knowledge about the transition to a semi-sedentary way of life and the Islamization of the steppe is discussed.

Keywords: *Northern Ustyurt, ritual and housing complexes, nomads, semi-sedentism, Doszhan-Ishan Kashakuly, madrasah.*

Introduction

One of the forms of shifting to a semi-nomadic and semi-sedentary lifestyle among the nomadic Kazakhs of the Aral-Caspian region in the 19th century was the emergence of stationary settlements of a new type, which included necropolises (cemeteries), mosques, and madrasahs, as well as permanent dwellings. In scholarship, they have received the name "ritual and housing complexes" (RHC). The main area where these settlements appeared was the northern Ustyurt (Donyztau). A number of important natural and historical conditions in this region, such as the opportunity for the development of haymaking and land cultivation, presence of ecological niche-shelters in the form of large ravines along the *chink* cliffs of the plateau, abundance of building stone, etc., played a key role in the context of general historical prerequisites. After existing for almost a hundred years, during the collectivization in the 1930s, RHCs (over thirty in number) were abandoned, but have miraculously survived as monuments of the past culture, and today these constitute a kind of "architectural and archaeological reserve". Study of them sheds new light on: the culture and social history of nomadic cattle breeders who lived in the Aral-Caspian Sea area

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in the Modern Age; specific aspects of the transition of steppe inhabitants to a semi-sedentary lifestyle; the history of popular architecture and the stone-cutting art of the Kazakhs; and the spread of the Islamic religion as an ideology in the nomadic environment. This article analyzes the most typical site—the Kainar ritual and housing complex.

The first information about Kainar appeared in the "Atlas of the Orenburg Land" of 1869, where the complex was marked as "The House of the Ishan" (Atlas…, 1869: Fol. XII-3). In 1892, the site was mentioned in a report of the scientific expedition to the Ustyurt by geomorphologist S.N. Nikitin (1893: 78). In 1904, geobotanist V.A. Dubyansky (1904) worked in the Donyztau area and took photographs of individual ritual and housing complexes. We also find an important mention of that site in a memorial song (*zhoqtau*) on the death of Doszhan-Ishan Kashakuly (1896), the founder of the settlement, by the Kazakh poet Kerderi Ábubákir (1993: 148–149). In 1962, the Kainar complex was studied by the Guryev (Emba) Expedition from the Institute of History, Archaeology, and Ethnography of the Academy of Sciences of the Kazakh SSR (headed by K.A. Argynbayev), when ethnographic evidence was collected along with primary documentation of the site (see (Argynbayev, 1987: 113)). In the same period, the Kainar necropolis was examined by the geographer S.V. Viktorov (1971) from the point of view of applied science, for statistical calculation of clan symbols. Targeted study of the Kainar RHC was carried out by the West Kazakhstan Integrated Ethno-Archaeological Expedition headed by S.E. Azhigali in 1987, 2005, and 2007. In the last field season, a complete comprehensive survey of the site was conducted, including instrumental survey, detailed photographic recording, architectural measurements, study of epigraphy, and panoramic photography from a hang glider (R. Sala, J.-M. Deom).

History of emergence of the Kainar RHC

The Kainar ritual and housing complex is located in the western part of the Northern *chink* cliff of the Ustyurt (Donyztau), in the present-day Atyrau Region (in its southeastern corner), 61.5 km south of the nearest village of Diyar (Baiganinsky District of the Aktobe Region). The name of the site is associated with attributes of the area, where springs (Kazakh 'qainar') were located. The site is located on the northern branch of the large Tasastau ravine (*sai*) (Fig. 1), in a relatively low area covered with hills. There is a channel of a stream overgrown with greenery to the southeast of it, and a high-water well is available 1 km to the north.

The initial emergence of the site was obviously associated with a small family cemetery that was used there in the second half of the 18th to early

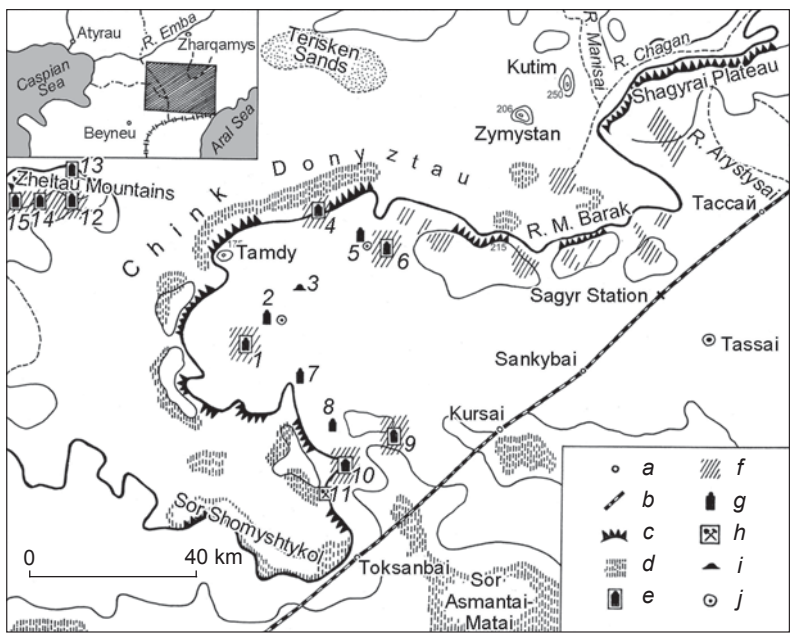

Fig. 1. Location of ritual and housing complexes in the northern Ustyurt, Kainar complex, and the adjacent monuments.

1 – Kainar; *2* – Tasastau; *3* – Kyzyluiyk; *4* – Bespai; *5* – Tushshchy-airryk; *6* – Ashchy-ayryk; *7* – Aksaimola; *8* – Okim-Kiik; *9* – Tolebai; *10* – Sultan-akyn; *11* – Toksanbai; *12* – Sherligul; *13* – Egindybulak; *14* – Sholabai; *15* – Kolbai.

a – settlement, railway station; *b* – railway; *c* – edge of the Ustyurt, *chink* cliffs; *d* – *sor*, salt lake; *e* – RHC; *f* – area of RHC; *g* – necropolis, cemetery; *h* – old settlement; *i* – burial mound; *j* – well.

19th centuries, next to which later, in the 1840s, a permanent settlement with a mosque (madrasah) appeared. Its founder was a representative of the Muslim clergy from the Shomyshty-Tabyn Kazakh clan (subclan of Karakoily, unit of Konyr) named Doszhan (Dostmukhammed*) Kashakuly (1812–1896)**. The biographical information about Doszhan-Ishan, who is also popularly known as Doshcheke or Doseke, is rather fragmentary and sometimes contradictory. He was born into a religious family: his father Kashak was a mullah, who apparently gave his son a primary education (reading and writing in Arabic, etc.). It should be mentioned that the family belonged to the group of nomadic Kazakhs of the Aral-Caspian Sea region (the large clans of Adai, Tabyn, and Shekty), which had long been under the strong political, cultural, and ideological influence of the Khiva Khanate, whose border until the mid 19th century passed to the north of the Ustyurt. The area on the lower reaches of the Amu Darya River, where in some harsh years the local Kazakhs, primarily the Tabyns, migrated, was known among them as Beskala ('five towns') and was considered to be the center of Islamic religion and religious education (as also was the neighboring Bukhara).

It seems that Dosmukhambet Kashakuly received a serious religious education in the madrasah of Khiva, which is also confirmed by his subsequent title of "Ishan"***, typical of the Muslim-Sufi tradition of Central Asia. This is also indicated by the architecture of ritual complexes and mosques, which he later created in Kainar and on Shiylisu using Central Asian architectural traditions and construction techniques, such as domed vaults (including specific barrel vaults), structures under the domes, etc. According to the memorial song of Kerderi Ábubákir, Doszhan's *pir* (mentor) was Oldan (*ishan*) (1993: 148). However, there is information on his training in the madrasah of Orenburg, namely in the Tatar settlement of Kargaly (Salqynuly, 2006: 17–18), which seems to be insufficiently well-confirmed. For such an early period (late 1820s–1830s), it was more natural for a person from the Ustyurt to receive religious education in Khiva (or Bukhara). Obviously, since that time, Doszhan Kashakuly already began his religious and educational activities among the nomadic population (teaching children Arabic letters and other subjects in aul *mektebahs*, etc.) and acquired a certain status, as evidenced by his personal seal dated to 1832/33. At the same time, he studied at the madrasah, which he might have graduated during this decade.

The next important stage in the life of Doszhan-Ishan was construction of a mosque and arrangement of a settlement in the Kainar area in the northern Ustyurt. According to the memorial song of Kerderi Ábubákir, this happened "some time around 1850" (1993: 148). The ethnographer Argynbayev, who visited the site and conducted surveys in 1962, also tended to agree with the early dating of this event and suggested that the mosque was erected there in the first half of the 19th century (1987: 113). The available data (including specific features of grave structures at the necropolis) indicate the construction of the settlement and mosque in the period from the second half of the 1840s to the early 1850s. By that time, Doszhan Kashakuly had already become a serious religious figure and spiritual enlightener, whose main task was to spread Islam and religious education among nomadic cattle breeders in the southern part of the area inhabited by the Kazakhs of the Junior Zhuz. Apparently, he undertook the construction of the mosque and organization of the madrasah in Kainar after his Hajj to Mecca, which was vaguely mentioned by some of our informants, for example, by Taganov Ashykgali (born 1903, settlement of Kosshagyl in the Guryev Region; record of 1989). Ashykgali suggested that he went on his early pilgrimage together with another well-known religious figure Nurpeke-Ishan (see also (Adzhigaliev, 1994: 58, nt. 15))*. It is believed that Doszhan-Ishan fulfilled only three Hajjes; two of them were later, in the 1870s.

The idea of spreading Islam over a vast area determined the choice of a place for the settlement at the junction of nomadic routes used by the main inhabitants of the Ustyurt and Mangystau—the Tabyn and Adai Kazakhs, not far from the area of spring floods of the steppe rivers Shagan and Manisai, with the opportunity for haymaking twice a year. Natural conditions and a stable economic infrastructure fostered the best conditions for the life-support of a new permanent settlement, including the semi-stable keeping of livestock. Moreover, Doszhan

*The full form of his name appeared on the personal seal of the Ishan, which was found during the work of the West Kazakhstan Integrated Ethno-Archaeological Expedition in 2019. In the popular tradition, this name is usually used as Dosmukhambet.

**We recorded these dates in 1979 in the Temirsky District of the Aktobe Region, where the Ishan's grave is located, "according to the words of aksakal Zhumagali Akbalin" (age 85) (information of R. Akhmetova, Head of the Department of Culture). Another version of the years of his life (1815–1890) is based on the epitaph on the memorial stele (*kulpytas*) at his grave. Notably, this is a late monument, the dates of which seem to be somewhat "approximated".

****Ishan* was originally the title of the leaders of Sufi brotherhoods and heads of communities.

*Some sources mention his fulfilling the Hajj already when he was 17 (according to the second version of Doszhan Kashakuly's years of life), that is, in 1832, which can probably be linked to the date on his seal: AH 1248 – 1832/33. However, the reasons for establishing this particular time of his pilgrimage are not entirely clear (see (Khabibullin, (s.a.)).

Kashakuly organized artificial irrigation of a small area of land in the spring zone for cultivating millet, melon, and woody and shrub plants, intending to use agricultural products for the needs of the madrasah and possibly for sale/exchange. Judging by the developed structure of the settlement and large cemetery, the ritual complex functioned quite intensively. The settlement was closely integrated into the economic and cultural life of nomadic cattle breeders, who visited it in the spring and autumn, provided the residents with cattle and fuel, left their children for schooling, and performed the needed rituals at the necropolis (for more details, see (Adzhigaliev, 1994: 58–59)).

Various economic activities (where cattle breeding played the main role) went hand in hand with religious education. The training lasted from three to thirteen years and was carried out using well-known Central Asian textbooks on the Arabic language, Muslim law, religious philosophy, logics, doctrine, metaphysics, and other branches of knowledge. Students were taught not only the basic rules of community life, but also good manners and the culture of public speaking, that is, everything that could later be useful in life. Doszhan-Ishan lived in Kainar for about twenty years, teaching the children of nomads Arabic reading and writing, and giving a more in-depth training to students and followers at the madrasah. The Kainar graduates constituted an entire assemblage of Islamic clergy, who were well-known in Western Kazakhstan, including Ishans, Akhuns, Kazhys, and Khalfes (clergy who reached different levels of training in the four-stage system). Many of them later settled in the Donyztausky District and linked their lives and activities with similar permanent settlements, the number of which increased significantly in the second half of the 19th century.

After imposition of the "Provisional Regulations on Administration in the Steppe Regions…" by the Tsarist government in 1868, which, among other things, limited the activities of the Muslim clergy, Doszhan Kashakuly was forced to move to the north (closer to the Orenburg colonial administration), to the upper reaches of the Oyil River. In this region, he established another ritual and housing complex later named Ishan-ata (to the south of the present-day village of Shubarkudyk). This fact undoubtedly testifies to the great influence and authority of the Ishan among the Kazakhs of the Aral-Caspian Sea region, primarily in the vast area south of the Emba River. Obviously, in his Donyztau period, Doszhan Kashakuly acquired the honorary title of "Khazret" (*qazyret*)—a high-ranking clergyman and Muslim authority (on a regional scale)—from the clergy and population. Of particular interest for our study is his ideal model of education in the conditions of the long-lasting archaic traditions, in the desert steppe. Doszhan-Ishan offered an alternative to mobile and illegal religious "schools" of the lower level (*mektebs*), located in dugouts and yurts. This alternative was a self-sufficient educational institution providing accommodation, food, and educational literature, the program of which involved not only teaching literacy and the canons of Islam, but also upbringing and personality development.

Architecture of the site and its main structural elements

A comprehensive ground survey of the site, including a topographic survey and analysis of aerial photographs, has proven that Kainar RHC is a unique architectural and landscape ensemble (Fig. 2). The complex has a sub-triangular shape (overall size 300 × 200 m; area of 60,000 m^2); its long side is oriented east–west and consists of two main parts—the settlement and necropolis, adjoining one other (Fig. 3, *A*, *B*). The site also includes a furnished well in its northeastern corner, a spring (*bulaq*) 600 m to the south, and areas southeast of the settlement between the residential area and the floodplain of the ravine.

The settlement is located in a lowland between the necropolis and the road leading to the well; according to the ground plan, it occupies a relatively narrow wedge-shaped area (160 × 100 m) oriented to the NE-SW (Fig. 3, *C*), and includes ruins of numerous (up to thirty) buildings made mostly of blocks of limestone-sandstone. The core of the settlement is the madrasah, representing a group of one-story buildings of various purposes, sizes, and shapes, grouped around a courtyard. Their diversity results from the fact that early examples of madrasahs (*mektebs*) in the south of the Aral-Caspian Sea region were housed in yurts, dugouts, and caves. Therefore, during the initial development of a new Muslim architectural tradition in the Ustyurt, Doszhan Kashakuly had to turn to various sources, primarily Central Asian. This is illustrated, first, by the features of Muslim community life revealed by the Kainar madrasah and known from the neighboring Central Asia in the form of the Sufi *khanaka*, and, second, by the apt definition given by the Russian geologist S.N. Nikitin to a similar complex established by Doszhan-Ishan later (in Shiylisu)—the "Kyrgyz monastery".

A madrasah is a Muslim religious and educational institution, which, according to V.V. Bartold, genetically derived from the *vihara* Buddhist monastery (1966: 112). Historians of architecture define it as a boarding university, architecturally designed in the form of a court-like spatial structure with public premises (vestibule, *darskhana* hall, mosque) in the corners of the main facade, and a student dormitory located around the open courtyard (Mankovskaya, 2014: 221). A similar enclosed structure in Kazakhstan appeared only in the later Kalzhan-Akhuna madrasah (near the town of Kyzylorda, early 20th century) (Svod…, 2007: 304–306), while in madrasahs

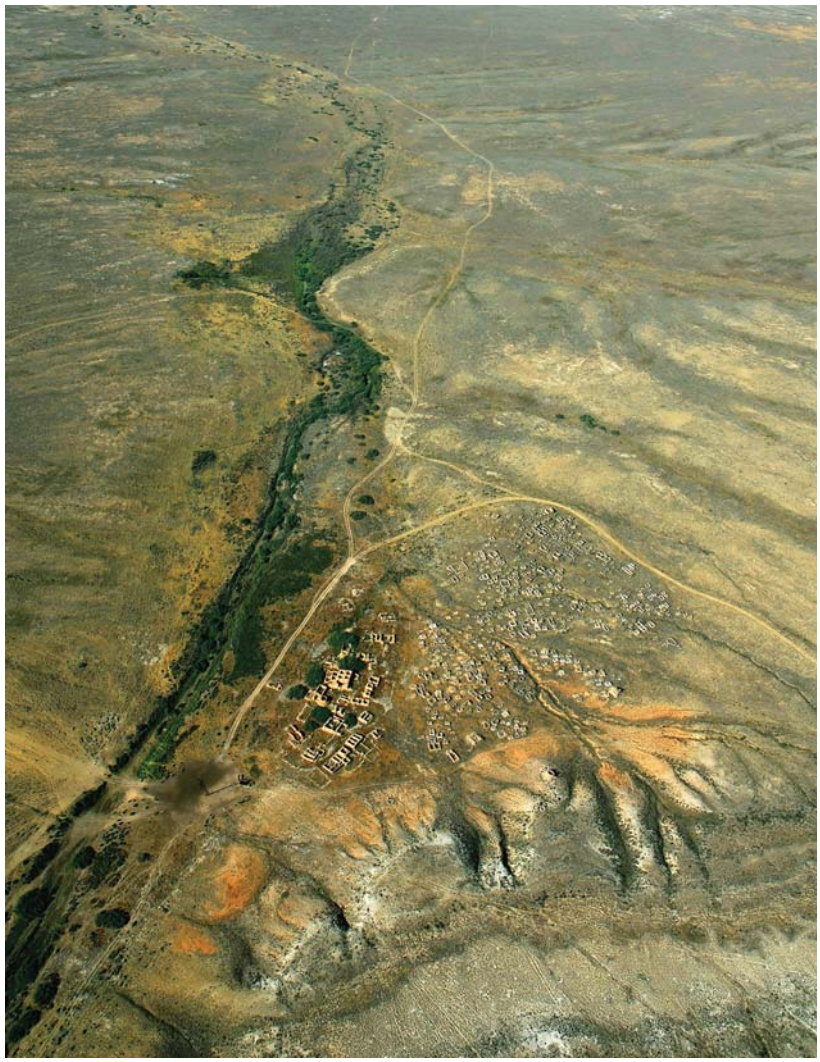

Fig. 2. Kainar RHC: panoramic view of the area from the north-northeast (*photo from a hang glider in 2007 by R. Sala and J.-M. Deom*).

in the southern regions, courtyards were open on one or both sides, and had U- or L-shaped ground plans (Svod…, 1994: 238; Svod…, 2002: 91–92).

There are no strict regulations also in the architecture of Doszhan-Ishan's educational institution. Facing the need for setting up a building complex on a complicated terrain, he erected the madrasah according to the principle of an asymmetric, but spatially balanced composition. The courtyard appeared on an elevated space; it was freely surrounded by free-standing buildings that only marked the boundaries of the site: the southwestern corner was occupied by the mosque complex; the southeastern corner was a yurt-like structure with added spaces; the northeastern and northwestern corners were dormitory buildings.

The individual components of the Kainar madrasah should be described in more detail. Distinctive points of its layout, like in any other madrasah, were public halls and their place in the overall composition. The first group was the mosque complex. It consisted of a relatively large building of sophisticated outline, with walls made of hewn stone on clay mortar without a foundation; the upper part of the walls and dome were made of adobe bricks. The core of the composition was the mosque oriented to the NE-SW (size of 13.2 × 9.2 m, height 4.7 m), which reveals the pattern of Central Asian pillar-and-dome (two pillars and six domes) mosques for regular daily prayer (Fig. 3, *C*, in the center; 4, *a*). For creating a vestibule, two compartments with domes were separated inside by a massive partition; a central pillar with arches resting on it with pendentives in the form of concave triangles, remained in the square of the walls in the prayer hall (Fig. 4, *b*). This carefully plastered and whitewashed space was illuminated by window openings; they flanked the semicircular niche of the *mihrab* on the southwestern wall. Two doorways connected the prayer hall with an

Fig. 3. Planigraphy of the Kainar complex.
A – orthogonal top view (*photograph from a hang glider in 2007*); *B* – situational diagram (*based on the instrumental survey of 2005*): *1* – settlement, *2* – necropolis; *C* – settlement ground plan (*measurements of 2005 and 2007*).
a – surviving wall structures; *b* – conjectured walls and arches; *c* – stone enclosures; *d* – conjectured domed vaults; *e* – green spaces.

entrance room; two more doorways led to side annexes. It seems that there was a utility room to the right of the *mihrab*, and library and classrooms to the left of it.

The second public hall of the madrasah can be interpreted as an auditorium for reading aloud of the Quran. It occupied the southeastern corner and was a round-shaped (with internal diameter of 10 m), tower-like structure in the form of a high sphero-conical red brick dome raised on a massive cylindrical stone base with wide opening of the front entrance from the courtyard (Fig. 4, *c*).

The third hall was one of the premises in a building located to the northeast of the *khujras* (cells), and most likely was intended for collective ritual meals. It is square in plan view, relatively spacious (5.5 × 5.6 m), festive (abundance of window openings and decorative niches, figurative stonework on arches, etc.), and has a massive pillar in the center. Two wide arches rest on the pillar; the other ends of the arches rest on the walls across the premise. The presence of a hearth with chimney inside this pillar makes it possible to discern a religious meaning in it. Parallels can be drawn with the "alouhana" of mountainous Tajikistan, as well as "houses of fire" and *kalyandarkhana* of Khwarazm (Snesarev, 1963: 197–199). In addition, the sacred connection between fire and wood is well known (Snesarev, 1969: 193). We can add another similarity from the Islamic tradition. The surah "Light" (Quran, 24, 35) speaks of the "blessed wood", that is, wood full of spiritual radiations—symbol of the Light of Allah (Koran…, 2003: 383). All this once again confirms that the madrasah of Doszhan-Ishan belonged to an individual unit of the Sufis.

The *khujras* intended as dwellings for students and teachers surrounded the courtyard to the north and east; some of them were located to the west of the mosque. These buildings corresponded to different stages and

Fig. 4. Architecture of the Kainar complex.
a – general view of the mosque from the south; *b* – interior view of the prayer hall; *c* – general view of the madrasah public hall; *d* – necropolis (central part). *Photographs of 2005*.

forms of the transition from nomadic to sedentary life: semi-dugouts were interspersed with adobe and yurt-like structures, possibly also with felt yurts. Remains of more permanent residential buildings, often with fenced plots, have survived in the northeastern part of the settlement; they might have belonged to the head and teachers of the school.

The second part of the Kainar RHC was the ensemble of the necropolis located on its western side, which appears to be almost as successful in its compositional structure as the settlement. This is the largest memorial complex of the Ustyurt. Its artistic totality comprised structures of various types and times of the second half (or the end) of the 18th to early 20th centuries, manifesting the features of their periods of construction (Fig. 4, *d*). There are about a thousand monuments (including composite structures) over the burials of the deceased from the Kazakh clans of Tabyn, Adai, Shekty, etc. Large monumental structures are interspersed with smaller varieties; almost all of them were made of local sandstone-limestone. Many structures above the graves have turned into shapeless ruins, lopsided, weathered, corroded by salt, and showing traces of patina. Nevertheless, they exemplify the entire spectrum of monuments of memorial architecture in the Mangystau-Ustyurt region and genesis of their forms.

About half of the sites are representative; they are distinguished by a variety of types and richness of artistic decoration carved in stone (over fifty monumental structures and five hundred small forms); the rest are archaic varieties, such as grave mounds, stone placing, stone enclosures, small crude steles, box-like structures, etc. Large monuments—tombs of the heads of clan units and wealthy steppe inhabitants—at the Kainar necropolis are represented by single mausoleums and predominantly by *saganatama*, architectural enclosures. Only three mausoleums have been identified; one of them is in a semi-ruined state and in fact represents a giant enclosure-"mausoleum". Two other structures, which have retained the features of domed buildings, are located in the northern part of the necropolis. One of them was built on a hill in a separate section of the cemetery (*qaýym*). A detailed examination of another site on the lowland—the memorial to Kozhym Zhankutuly from the *zhalpaqtil* unit of the Shomyshty-Tabyn clan*—shows that this was a typical version of the centric tiled mausoleum of the Mangystau-Ustyurt type of the 1870s–1880s, consisting of a low base with three-layered walls (with external facing) and small simple dome in the corbel vault technique.

The *saganatamas* belong to the last third of the 19th–early 20th centuries. The dominant type was transverse-axial (east–west), not very large and designed for one burial (for more details, see (Azhigali, 2002: 306)). Many structures of this type show typical signs of professional architecture: individualization of form, careful preliminary processing of wall and decorative material (sawn blocks and slabs), very careful structural design, and additional decorative processing (facing, carving, painting, etc.). Yet, archaic features typical of the memorial architecture of the Donyztau region, such as rough texture of stone material, large-sized decoration, etc., are also evident in the general appearance of these structures. Practically no large family *saganatamas* in the necropolis have been found, as opposed to occasional large family enclosures of the *qorgan* type, built not of sawn stone blocks, but of stone blocks with primary processing.

Small forms of memorial architecture are very diverse in Kainar, with the domination of *kulpytas* steles and tombstones (for more details on the typology of the monuments, see (Ibid.: 319–353)). The *kulpytas* steles are mainly represented by two types: 1) coarse flattened steles of small size (no more than 0.7 m) with an expressive silhouette, pointed or semicircular pommels, and tamgas in the center of the front plane, and 2) artistic *kulpytas* steles—flat and four-sided carved pillars of medium size and taller than the height of a human, often with tiered composition (Fig. 5, *a*). Sites of this type retain the main features of stone-cut steles of the Mangystau-Ustyurt region in their overall composition (body – transitional part – pommel) and external processing (moderate ornamental decoration in flat relief, epitaphs on the western edges with tamgas in the Arabic script, and occasional "drawings"). Notably, the Kainar *kulpytas* structures are generally canonical and standard; there are no particularly outstanding examples (giant monuments, unique carvings, etc.), but there are many well-done and solid steles.

Different varieties of stone structures above the graves include stepped *koitas*, *ushtas*, and *bestas* structures, as well as box-sarcophagi (*sandyktas*), and look more distinctive. Three main groups can be stylistically identified among the widespread *koitas* structures in the Mangystau-Ustyurt region, which typically show division into two main parts—the pedestal and upper "body": classic, including archaic varieties; those on "legs"; and unique gravestones (Fig. 5, *c*). Archaic monuments (for example, the "Turkmenoid" gravestones with arched "bodies") can be dated from the first half to mid 19th century, but the bulk of *koitas* structures at the necropolis belongs to the second half of the 19th century. Undoubtedly some unique items are noteworthy.

The stepped *ushtas* ('three stones') and *bestas* ('five stones') gravestones at the Kainar cemetery are distinguished not only by their number (their largest concentration is in the northern Ustyurt area), but also by their variety, and often by originality of forms and compositions. This stylized type of gravestones in the form of a pyramid with prominent upper bar is quite late (late 19th–early 20th centuries); it occurs not only as individual monument, but also as a single grave structure for two or three burials on a common platform. We should also mention specific functional aspects of such sites: they were found mainly above children's burials, since the structural features of smaller graves made it possible to set up such heavy structures. Original gravestones were not uncommon among stepped gravestones at the necropolis, and included items in which the upper rectangular prism was covered with decoration in flat relief, epitaphs in the Arabic script, unusual outline of the slabs, etc.

Such an distinctive category of small memorial architecture of the Kazakhs as box-sarcophagi *sandyktas* structures ("stone boxes") appeared at the Kainar cemetery to a lesser extent. Two groups can be identified: a small accumulation of archaic monuments with the tamga of the Adai clan in the southern part of the necropolis, which apparently dates back to the second half of the 18th century (possibly, the early 19th century); and several more distinctive artistic *sandyktas* structures of the late 19th–early 20th centuries, scattered throughout the complex, which include some outstanding examples of stone carving architecture. Such is, for example, the *sandyktas* of 1881/82 at the southern edge

*Hereafter, reading of the epitaphs is by S.E. Azhigali.

of the cemetery, forming the base of an interesting composite structure with an upper stepped gravestone, *kulpytas* stele, and two children's gravestones (Fig. 5, *b*). The exclusivity of the site was also emphasized in the epitaph, where the stone cutter Zhalgali Zhantoreuly was mentioned.

In addition to stone cut structures described above, there are many simpler grave monuments at the necropolis: collapsed mounds and stone placements, enclosures of unprocessed or preprocessed stone blocks and slabs, etc. All of them, as a rule, are an integral part of composite structures. The same applies to the categories of stone cut monuments described above (steles, gravestones, sarcophagi), which extremely rarely occur in their "pure" form. Precisely the combination of their types and varieties creates (as in other necropolises of the region) a particular richness of monuments at this unique memorial complex. Composite grave structures constitute the overwhelming majority of objects at the necropolis. Particularly popular are the "clusters" *kulpytas*-tombstone (of the *koitas* type, stepped, or *sandyktas*), *kulpytas*-enclosure, *kulpytas-saganatam*-tombstone, etc. They have some common features, such as longitudinal axis of the structure (excluding mausoleums and large *saganatamas*) with east–west orientation, with a stele installed at the western end, and stylistic variety of the constituent elements.

Undoubtedly, decorative and informational rendering of stone carved monuments, which has received the conventional definition of "text" (or "texture") in scholarship, is also of great interest. These include inscriptions (epitaphs) in the Arabic script, clan signs (tamgas), subject and compositional images ("drawings"), as well as ornamental decoration. Without going into detail concerning the pictorial features of the tombstones, which is a subject for separate research, and referring to the already published studies (see (Azhigali, 2002: 448–495)), we should make only a few points. In particular, the epitaphs (in Kazakh) on the monuments of the necropolis, mainly on the *kulpytas* structures, are of great interest for attribution of the structure, and as historical, social, and philological sources. An example would be the inscription on one of the steles of 1880/81, where it is indicated that the buried person was "Damla Ýrazgali Musauly", that is, a da mullah—highly learned chief mullah. Taking into account the presence of the madrasah, the servants of whom were obviously buried in this cemetery, such information is of great historical and cultural value.

A special subject of research are the tamgas of the necropolis. As was already mentioned, they were studied

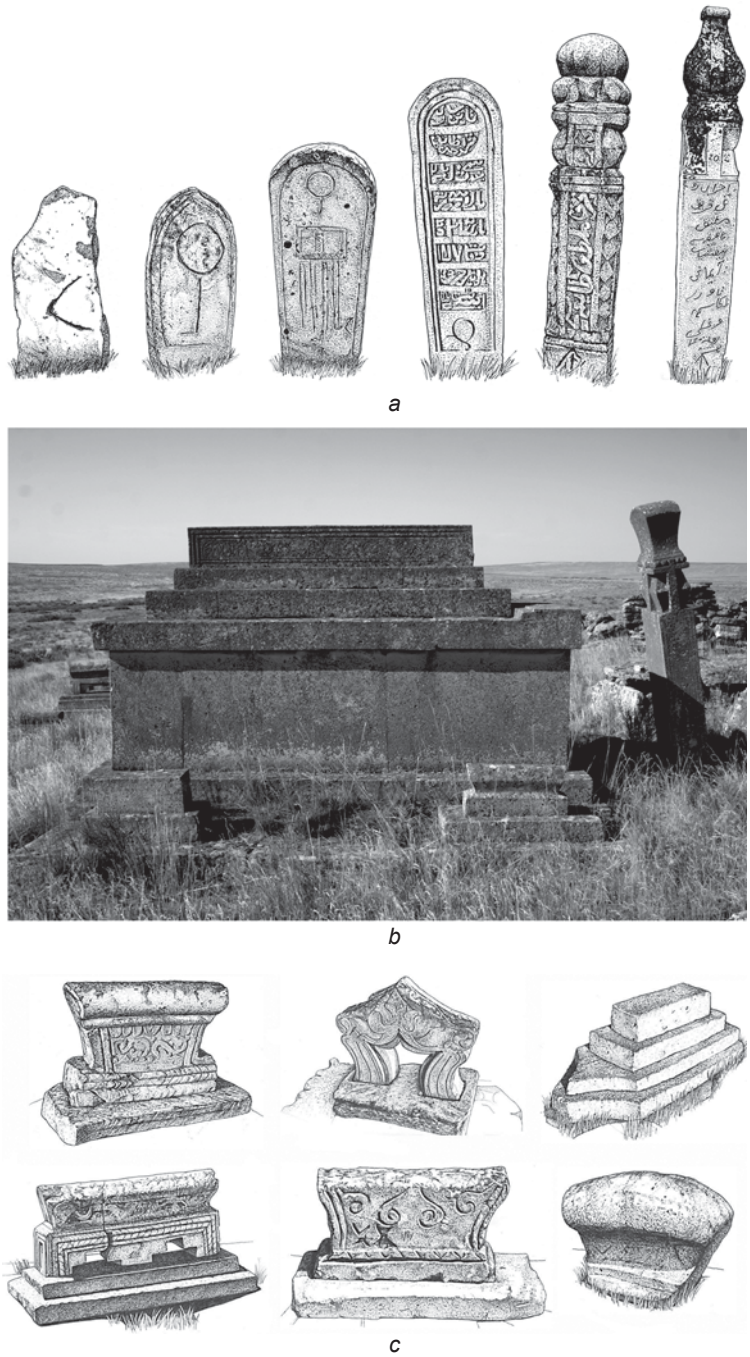

Fig. 5. Small forms of architecture.
a – kulpytas funeral structures, mid 19th–first half of the 20th century; *b – sandyktas* funeral stone boxes, late 19th–early 20th century (*photograph of 2007*); *c* – gravestones (of the *koitas* type, stepped), mid 19th–early 20th centuries.

from the point of view of applied science (for establishing the nomadic routes) by the geographer S.V. Viktorov (see above). The expedition carried out a targeted study of clan symbols at the complex. The prevailing tamgas were of the Shomyshty-Tabyn (in various versions) and Adai clans; there were a number of signs of the Shekty clan, and individual tamgas of the Zhappas and Tarakty-Tabyn clans. Particular clan groups dominated over specific, large areas of the cemetery.

As far as "drawings" and ornamental decoration of the monuments are concerned, they were not as distinctive as decoration appearing in the complexes from the more southern Mangystau-Ustyurt region and some necropolises of the northern Ustyurt zone. The patterns are often standard (plant decoration). The moderate nature of these elements results from both the general unadorned and sparse style of Donyztau tombstones and certainly from the presence of the Islamic religious center and its authoritative servants in Kainar.

The necropolis, located in the immediate vicinity of the settlement, was an integral part of the entire complex. They were traditionally set up on somewhat elevated places; they grew to the left or right in groups depending on the tribal and clan affiliation and terrain, and represented a kind of settlement of the dead—a completely real and at the same time absolutely otherwordly space with graves of the ancestors and objects of mystical and religious worship. The cemetery was also a significant object of the wider cultural space, since it was also used by nomadic cattle breeders living in this part of the Ustyurt. The architectural environment of the necropolis expressed various meanings. The graves of the ancestors symbolized tribal unity and connection of generations, and satisfied the need of the steppe inhabitants for orderly and direct contact with the sacral world. The graves were one of the ways of thickening and spiritualizing the space of the settlement, primarily of the local Islamic educational institution.

Discussion

A hypothetical reconstruction of the Kainar ritual and housing complex, based on the thorough field study, has shown that this type of settlement optimally corresponded to local conditions of terrain, climate, and hydrology. The most important feature of its structure was well-developed differentiation of the site (public-residential, educational, economic, and production areas), which entailed multilayering. The core of the settlement (the madrasah) was surrounded, on the one side, by dwellings, cattle pens, and utility buildings, and on the other side, by the necropolis. The outer layer comprised economically developed territory and included water sources, pastures, protected areas, crops, etc. The zoning does not reveal hierarchy or clear boundaries; these were constituted by natural barriers. All these features fit the understanding of the term "ensemble" in architecture and make it possible to formulate the principles of architectural and spatial organization in the Kainar RHC: structuredness, functionality, ecological compatibility, "open form", and visual localization.

Conclusions

The integrated adaptation of the Muslim religion by the nomads of Western Kazakhstan, who perceived it as the new spiritual basis of their personal and social life, led to material embodiment of the ideas of Islam (monotheism, prayer, pilgrimage; correlation of the axes of burial = monuments with orientation to Mecca) in the forms of the life-supporting environment (mosque, madrasah) and traditional artistic culture (types of monuments, Arabic epigraphy, etc.), taking into account regional social, architectural, and building traditions. The interaction between the new forms of religious architecture and commemorative traditions of the Kazakhs resulted in the creation of a unique ensemble, where the spatial relationships of the educational institution, residential and production areas, placement of religious objects, microclimatic conditions in an extreme external environment provided the necessary level of physiological and psychological comfort.

In other words, the perception of the vast and harsh landscapes of the arid zone became a part of the experience for the nomads; the *chink* cliffs of the Ustyurt entered the system organized through art; from indifferent nature with its eternal beauty the cliffs turned into the material memory of radical transformations in the life of the Kazakhs, origins of their educational religious centers, and the consolidating image of the outstanding man of faith Doszhan-Ishan, who selected the necessary range of cultural codes for implementing the goals he set.

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Tungus-Manchu Traditional Beliefs. Part 2: Zoomorphic Complex

This article describes the zoomorphic complex of Tungus-Manchu beliefs reflected in mythology, ritual practices, shamanism, and decorative and applied arts. Those beliefs are regarded as a coherent whole within the cultural system. The typology of the zoomorphic complex shows that the key figures were the serpent-dragon, the deer, the bear, and the tiger. In traditional worldviews and rituals, they were related to cosmogony, ancestor cult, hunting and fishing rituals, healing, and initiation shamanic complexes. The semantics of animal images depended on their place in the cultural system, religious ritual, and artistic communication. Comparative analysis demonstrates both ethno-cultural specificity and universal archetypal characteristics, as well as connection with ancient regional beliefs. The Tungus-Manchu zoomorphic complex originated within the East Asian traditions, having been influenced by cultures such as the Old Chinese, Korean, and Jurchen.

Keywords: *Zoomorphic complex, beliefs, rituals, folklore, shamanism, Tungus-Manchu peoples, symbolism, semantics of images.*

Introduction

The study of zoomorphic images in cultural systems is of constant interest to contemporary authors. Many books and articles have been written on this topic (Yurchenko, 2002; Bestiariy…, 2019; Ermolova, 1993; Davydov, 2014). This interest is due to the special status that humans attribute to certain animals. Starting from the Paleolithic period, archaic totemic beliefs about the relationship between man and animal have been observed, as well as the role of animals in shamanism, the development of the animal cult, associated cults of ancestors and trade, and zoomorphic images of the gods (Tokarev, 1964: 236–251; Sokolova, 1972: 43–120). In recent decades, an "ontological turn" has taken place in sociology and ethnography, as a result of which it has been proposed to view all objects in the world as having equal value (humans, animals, mythological creatures, spirits, objects, sacred places, etc.) (Sokolovsky, 2016: 105). In this regard, it seems important and relevant to study the semantics of zoomorphic images in different peoples in order to identify their typology and global values.

The aim of this work is to study the typology of the zoomorphic complex of beliefs of the Tungus-Manchu ethnic groups in folklore, rituals, shamanism, and art, in order to identify the symbolism and semantics of zoomorphic images in that cultural system, as well as ethnocultural influences in this complex. The following conceptual approaches have been taken: the systemic approach (analysis of the material, considering the phenomenon of culture in the integrity of interrelated elements); the complex approach (analysis of folklore, beliefs, ritual practice, shamanism, art); the hermeneutic approach (the study of images as cultural texts), and the semantic approach (identification of the symbolism

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and meaning of the images). Comparative historical, systemic, typological, semantic, and iconographic methods were used.

Materials

In the culture of the Tungus-Manchu peoples, the most important of all the zoomorphic images were the serpent-dragon, deer, tiger, and bear. They are found both in beliefs and rituals, as well as in arts and crafts. In literature, images of a tiger and a bear were seen as sacred images among the peoples of the Amur, mainly among the Udege (Startsev, 2017: 84–120), Evenks, and Evens (Vasilevich, 1971; Popova, 1967). The rest of the aspects of their analysis (in art and shamanism) were not considered, or were only briefly touched upon. The image of a deer was examined in the culture of the Evenks, but it has not been studied in a comparative sense, in the folklore and shamanism of all Tungus-Manchu peoples (Ermolova, 1993; Davydov, 2014). In this work, zoomorphic images are studied as a single worldview of these peoples on the basis of folklore, mythology, as well as beliefs, rituals, shamanism, and art.

The image of the serpent-dragon and its symbolism. According to the ancient tradition of the Tungus-Manchu peoples, the serpent-dragon was associated with the cosmos or outer space, and was seen as the embodiment of the master of the universe, the creator of the world: the solar serpent. These ideas were preserved in Evenk, Nanai, Nivkh cultures, as well as in the mythology of the Ainu people. Images of a snake coiled into a spiral, or in the form of an S-shaped sign, were widespread on birch-bark products of the Nanai, Udege, and Nivkh (Shrenk, 1899: Ill. 26).

The Evenks of Transbaikalia and the Upper Amur region have preserved the cosmogonic myth of a frog getting mud from the bottom of the world ocean at the request of a snake. Both of these creatures lived in the water at the beginning of the creation of the world (Mazin, 1984: 19–20). The Manchu Evenks have a myth about two snakes supporting the earth (Shirokogoroff, 1935: 125). In the mythology of the Ainu, two ancestors—the supreme deities of the sky, sun, or thunder (masculine principle), and fire and the family tree (feminine principle)—descended from heaven to earth in the form of snakes and created the terrain (Munro, 1963: 17).

In Nanai mythology, the goddess-progenitor Mameldi created the earth from nine snake-rivers, twisting them, as if knocking down the water (Sem T.Y., 2015: 321). Interestingly, images of nine snakes are present on one of the sacred stones in Sakachi-Alyan. A.P. Okladnikov suggested that these ancient monuments served the Nanai as a model for their myths and beliefs (1971: 150). The Nanai considered the real Mount Devyatka to be the embodiment of the image of the cosmic serpent-dragon. According to the mythology of the Nanai clan of the Samars, who live in the lower reaches of the Amur, on its tributary river, the Kondon, the cosmic serpent-dragon Mudur was the master of the world and the sky; together with the mistress of the earth and the mountain, the turtle Kailasu, he owned the ancestral mountains and was considered their embodiment (Kubanova, 1992: 3; Pereverzeva, 2005). Notably, the East Asian images (from ancient Chinese and Koreans) of the heavenly serpent and the turtle (the embodiment of the earth-mountain) featured similar symbolism (Dzharylgasinova, 1972: 141, 147; Yuan Ke, 1965: 110–111).

The Udege have preserved a folk tale with an initiation theme about the passage of a hero through the body of a snake in order to be reborn with a new quality, or a new birth after an imaginary death (Folklor…, 1998: 325). Apparently, this was a shamanic ritual in order for the hero to acquire new qualities and the ability to communicate with the spirit world.

In the shamanism of the Trans-Baikal Evenks-Orochons, the image of a cosmic snake in the form of a cord of blue fabric stuffed with deer hair, with three heads at one end, was used during healing rituals (REM, col. 8761-19327). The shaman drum of the Orochons of Manchuria depicts three snakes of yellow, red, and black—symbols of the three worlds (Zhongguo shasha…, 2016: 6). Among the Udege, as well as among the Evenks, the image of the serpent-dragon was associated with ideas about the earth. Among the shamanic attributes, they had a belt with pendants in the form of double snakes (REM, col. 1995-2) (Na grani mirov…, 2006: 237; Folklor…, 1998: 295). On the back of the shaman's robe of the great Nanai shaman woman Nene Onenko of the 19th century, a red circle with the rays and scales of a serpent-dragon (a symbol of a cosmic solar serpent) was depicted; inside the circle were two ducks, personifying the myth of the creation of the world, and a tiger, the main patron spirit of shamans, the owner of the souls of animals and people (REM, col. 11406-1) (Na grani mirov…, 2006: 46–47).

In the visual arts of the Tungus-Manchu peoples (Nanai, Negidal, and Ulchi), the concept of a dragon has been preserved, which was necessarily depicted on *sike* wedding gowns. It was believed that this would serve as a talisman against evil spirits, as well as provide a woman with well-being and the bearing of children (Sem Y.A., 1973: 221; Titoreva, 2016: 217). Among the Udege and Nanai, this image was repeated on birch-bark boxes. The utensils often depicted a pair of dragons, probably the first ancestors, which was associated with the ancient Chinese images of anthropomorphic demigods with snake-like bodies and limbs (REM, col. 1870-66, 1995-14) (Sem T.Y., 2020: 60–63, 67).

The image of a dragon-serpent in the perception of the Tungus-Manchu peoples is associated with figures from

the taiga: a bear and a tiger. The children of the supreme deity in the form of the serpent-dragon Mudur Kailasu were the Ado-seveni twins—the taiga and water bears Na Duenteni and Mue Duenteni (Kubanova, 1992: 3; Pereverzeva, 2005). In the shamanic medical system of the Nanai-Samagirs, there was a figure of an arched-shaped snake with the heads of bears or tigers (REM, col. 4795-363). These representations reflect the ancient layer of East Asian belief. Notably, the image of a heavenly rainbow-serpent was known to the ancient Chinese (Vasiliev et al., 2015: 459).

Interestingly, Oroch and Udege shamans made ritual masks decorated with patterns in the form of spirals—symbols of snakes. The great shaman of the Udege put on such a mask during the ritual of a large commemoration or the *uundi* rite (renewal of shamanic power and attracting the forces of the fertility of nature). It was called *hambaba* or "master of the universe" (Sem Y.A., 1993) and was dedicated to the shamanic ancestor of Teunki, who also had the appearance of a tiger (REM, col. 1870-38) (Na grani mirov…, 2006: 181–182). This name goes back to the common Tungus shamanic concept of *tai/teu/tui*. The Evenks call it a shamanic gift or a beginner shaman who has acquired the ability to see spirits (Rychkov, 1923: 115).

The image of a deer with branching antlers. This animal was widely known in the beliefs of the Tungus-Manchu peoples. Among the Evenks, a deer with branching antlers was associated with space and the mythic narrative of hunting in the celestial domain. This image had solar symbolism (Anisimov, 1958: 69–71; Mazin, 1984: 9; Sem L.I., Sem Y.A., 2020: 203–207). The hero of the Evenk myth, shooting at the solar deer, which carries away the sun on its antlers (Mazin, 1984: 9), fits into the image of the great shooter of Mongol-Turkic mythology. The myth of the pursuit of the sun, according to some researchers, goes back to the East Asian tradition and is associated with the idea of a dying and resurrecting deity (Yanshina, 1984: 96). In the mythology of the peoples of East Asia, the theme of the great shooter is also widespread, only it is in the story about the plurality of suns (Shanshina, 2000: 43, 47).

This narrative has been preserved in the ornament of the peripheral Tungus-Manchu ethnic group of the Uilta of Sakhalin. On the bone pommel of a saddle, worn on a sacred deer to transport sacred items, from the photo collection of Y.A. Sem and L.I. Sem, there is an image of a deer with branching antlers next to a goatling, made in a curvilinear Scythian animal style (Sem T.Y., 2015: 202). The animals symbolized the course of the sun and the renewal of nature, the replacement of the old sun (deer) with a new one (goatling). This plot is consistent with the Evens' ideas about the winged deer as the old sun and the Siberian crane as the new sun, on which the shaman flies to the sky to the goddess of the sun tree and back, during the New Year's ritual (Alekseev, 1993: 25–34).

Among the peoples of the Amur, the image of a deer with branching antlers has been preserved in folklore with elements of a heroic epic. A Nanai legend tells of how *mergen* (a sharpshooter and a sage-shaman) travels to heaven for his wife, the daughter of the sun. On the way, he meets in a pristine swamp a deer with antlers reaching up to heaven, a wild boar that has grown with tusks into the ground, and a fish; he frees them from bondage with the elements of heaven and earth, which diverge; and thus, the act of the creation of the world is performed (Sem L.I., Sem Y.A., 2020: 148–152, 203–208). A similar plot was also known to the Udege (Folklor…, 1998: 466–469).

In the shamanic legend of the Manchus, there is a tale about an ancestor named Bukuri Yongson, which means "hero mountain-deer" (Gimm, 1992: 107). In the legend about the Nishan shamaness, the ancestor marries a goddess named Byam Buke—a female moon deer (Kniga…, 1992: 126). That is, both human ancestors are associated with the images of deer. Interestingly, the Nanai depict two deer, the owners of the tree, under the family tree of souls. In the folklore of the Trans-Baikal Evenks, the image of a mountain-deer is associated with the first ancestor Kuladai (Sadko, 1971: 9–13). Among the Yenisei Evenks, the ancestor, the first shaman Gurivul, has his counterpart in a helper spirit in the form of a deer (Vasilevich, 1936: 136–138).

In Evenk shamanism, images of an elk and a deer are widespread. The shaman's outfit symbolized outer space and a bird-deer. Among the amulets of the shamans of the Trans-Baikal Evenks, there are images of winged deer and birds, along with a figure of a double, the ancestor of the shaman (REM, col. 8761-8707/1-3, 8608/1-5) (Sem T.Y., 2017: 191).

The image of a deer is captured on items from the medieval Jurchen monuments of Primorye. The images of a deer with its head turned back are found on bronze and iron belt buckles from the Lazo fortified settlement, as well as on a stone crucible from the Ananievka fortified settlement. This image is associated with shamanism as a symbol of the passage to another world. The image of a deer with branched antlers and its head stretched forward can be found on an oval metal plaque from the Shayga fortified settlement (Shavkunov, 1990: 259, 262, 264). The images of a deer with branched antlers and a solar deer with the sun on its antlers, depicted on ceramics and petroglyphs, date back to the Neolithic era of Manchuria (Alkin, 2007: 102, 107).

Images of a bear and a tiger. These images played an important role in the mythology and cult practices of the Nanai and Ulchi. In Nanai and Ulchi folklore, the bear has the status of a clan totemic ancestor. There were widespread myths about the marriage of a she-bear and a hunter, or a girl and a bear (Burykin, 1996: 66–67). The bear cult among the Tungus-Manchu

peoples dates back to the Neolithic era. Even then, probably, there was a myth about the cohabitation of a woman and an ancestral bear that had totemic sources. This is evidenced by the figurines of women and bears found by archaeologists in places of worship on the lower Amur (Medvedev, 2005).

In the beliefs of the Tungus-Manchu peoples, the bear was a cosmic character of the three worlds of the universe. In Nanai mythology, his image was associated with one of the three suns that simultaneously appeared in the sky (Trusov, 1884: 448–449). Also, the bear was considered the master of the middle world, as well as of the taiga and animals. During the commemoration, the Nanai clan, Kile, set off on a mythical journey into *buli*, the world of the dead, riding a bear (Zolotarev, 1939: 161). In the shamanic medical system of the Ussuri Nanai, the bear Ayami was associated with the element of fire. He was considered the husband of the fertility goddess—the female elk Maidya-mama (REM, col. 11429-7, 8). According to the mythology of the Nanai, Ulchi, and Amur Evenks, the she-bear was the mistress of the land and the underworld; she was a shamanic deity (Kubanova, 1992: 3–19; Varlamova, 1994). Most often, in the Nanai and Ulchi beliefs, the image of a bear personified the owner of the taiga and of the tree of life (Lipskaya, 1932; Sem T.Y., 2003: 163).

In the healing magic of the Ulchi and Nanai, two bears are represented: the taiga bear Na Duenteni and the river bear Mue Duenteni. The first was depicted horizontally, in the usual position of a taiga animal, and the second vertically, sitting on its hind legs (Kubanova, 1992: 4, 13). In the Ulchi complex associated with the bear holiday, the mistress of the taiga is the she-bear *duente*, and the water is marked by two bear cubs, *mue duenteni*. In shamanic medical practice, the images of the *yarga* leopard, the *amba* tiger, and the *duente* bear were considered the most powerful, healing all diseases (Shimkevich, 1896: 40–46; Kubanova, 1992: 13). In the shamanism of the Nanai, Ulchi, and Oroch, an important role was played by two of the shaman's helper spirits that had a zoomorphic appearance—Mangi in the form of a bear, and Buchu in the form of a bird-snake or musk deer (Sem T.Y., 2015: 357).

The concept of a tiger in the Upper and Lower Amur regions also has Neolithic origins. A stylized drawing of a tiger's face is engraved on a sacred stone that depicts a mask with a vegetative-anthropomorphic model of the world (Okladnikov, 1971: 170; Sem T.Y., 2003: 163). In the folklore of the Nanai, there is an understanding of this narrative. N.A. Lipskaya wrote down the Nanai myth about the forefathers Julie and Masi, who, fleeing from the flood-rain, pass into another world through the body of a stone-tiger, entering the mouth of an animal and exiting through its body (Lipsky A.N. and N.A., 1936–1937: Fol. 23–24).

The tiger, like the bear, is associated in the views of the Nanai with the three worlds of the universe. In the myth of the three suns, the luminaries had the appearance of animals: a tiger, a bear, and a snake. The first ancestor Guranta shoots at the extra stars, leaving one in the guise of a tiger (Trusov, 1884: 448–449). In Ulchi mythology, the ancestor Kondoliku, in the form of an elk, becomes the master of the forest *derki dusa* in the guise of a tiger, and the younger sister turns into a solar tiger *dusa siula* and leaves for the sky (Zolotarev, 1939: 170).

Among the Nanai and the Ulchi, the Duse tiger was considered the master of mountains and forest (Kubanova, 1992: 23–30). On the shaman's robe of Nene Onenko, inside a circle symbolizing the solar serpent, the master of the universe, there is an image of a tiger connected with the mountains (Sem T.Y., 2003: 164–165). The tiger depicted on the magic ring of a hunter, with a body sprouting tree leaves, was associated with the owner of the taiga (Sem Y.A., 1992). In addition, in Nanai folklore, the tiger acts as the ancestor of the clan, the assistant to the master of the underworld, Ezhden-Khan. It has the anthropo-zoomorphic appearance of a tiger with the face of an old man with a beard (Sem T.Y., 2015: 532).

Among the Amur Evenks, the tiger was considered the protector of shaman, and the image of the animal's skin was placed on the back of the shaman's outfit (Mazin, 1984: 174). Manchu shamans traced their origin from the ancestors in the form of a tiger, and performed special rituals associated with it (Bulgakova, 2018).

There are different opinions concerning the origin of the cult of the tiger among the peoples of the Amur. A.F. Startsev believes that it was formed under the influence of East Asian traditions (2017: 102). According to S.V. Bereznitsky, the cult is of local origin, since the tiger lived in these places (2003: 215). It is known that members of the Jurchen imperial dynasty had seals with a golden image of a tiger, giving them the right to hereditary ownership of land and property (Sem T.Y., 2013: 141).

Results and discussion

The main zoomorphic characters of the beliefs of the Tungus-Manchu peoples (snake-dragon, deer, bear, and tiger) are reflected in mythology and folklore, ritual practice, shamanism, and art (ritual portable art, embroidery, and ornamental appliqué on clothes and birch bark). Ideas about them occupy a certain, unique place in the system of the sacred culture of these peoples.

The image of the serpent-dragon was widespread in the shamanism of the Evenks, Nanai, Udege, and Manchu. In the Evenk and Nanai traditions, it was

associated with the cosmos, solar symbolism, and the creator of the earth. The image of the serpent-dragon is presented in arts and crafts. The Nanai and Ulchi people embroidered its image on the back of their wedding gowns. It was perceived as a talisman, a benevolent sign. It was also believed that this would ensure the birth of children. On the birch-bark vessels of the Udege, Nanai, and Uilta, the serpent-dragon was often depicted in the form of a spiral or an S-shaped sign. The image of the serpent-dragon in the beliefs of the Tungus-Manchu peoples of the Amur was associated with the images of a bear and a tiger. This was reflected in the shamanic masks of the Udege, the healing sculptures of the Nanai and Negidal, and the idea of the sacred landscape of the Nanai of the Samar clan. The image of the serpent-dragon is widespread in East Asian tradition. This creature is depicted in sculpture, as well as in small portable art of the Jurchens. In the mythology of the ancient Chinese and Koreans, the serpent-dragon is associated with the cult of the ancestors. It was associated with the sky and water, and it was a benevolent symbol.

The image of a deer with branching antlers among the Evenks and Uilta was associated with space, solar symbolism, and the earth and underworld; its antlers were seen as a stairway to heaven. In the mythology and folklore of the Manchu, the first ancestors had the appearance of a man and a deer. The same ideas were preserved among the Nanai and Ulchi in the visual arts (deer under the family tree). In the Evenk myth about space hunting, the deer is associated with the change of day and night, and the arrival of the New Year. In the folklore of the Nanai and Udege people, the mythical image of a cosmic deer with branching antlers reaching up to heaven was introduced into epic legend and fairy tales. Amulets in the shape of a deer/elk are widespread among the Evenks. On the saddle pommel of the sacred deer of the Uilta, there is an image of a cosmic deer in the Scythian animal style next to a goatling, which symbolized the old and young sun. These images are comparable to the characters of the shamanic flight to heaven during the New Year's ritual of the Evend. Notably, the similar images of a deer were found in the Jurchen metal artworks.

The images of a bear and a tiger occupy an important place in the system of beliefs and cults of the Tungus-Manchu peoples, often intertwining. These animals mark the three worlds of the universe: bear (sun, taiga and water, fire and the underworld) and tiger (sun and sky, taiga-mountain, fire and the underworld). The bear was the totemic ancestor of the clan or tribe. There are myths about his marriage to a virgin. There were similar ideas about the tiger as an ancestor. The image of a bear occupied a special place in the healing magic and ritual sculpture. The bear and the tiger were considered strong shamanic patron-spirits among all Tungus-Manchu peoples.

The zoomorphic presented here are images that have been known in the lower Amur region (bear, tiger, deer, serpent-dragon) and in Manchuria (serpent-dragon, deer, tiger) since antiquity. They were partly formed within the East Asian area, as evidenced by the materials of the Jurchen (image of a deer, tiger, serpent-dragon), the ancient Chinese, and ancient Koreans (image of a serpent-dragon, tiger).

Conclusions

The results of the study of the main characters of the zoomorphic complex of beliefs in the culture system of the Tungus-Manchu peoples characterize them as cosmogonic images with a high semiotic status. The perception of each of these characters as universal symbols of culture reflects their characteristics in mythology, shamanism, art, beliefs, and rituals. The images of the serpent-dragon and the deer are more cosmogonic, while the images of the bear and tiger retained a connection with the hunting cult and the cult of ancestors, the middle world; although they were also associated with the three worlds of the universe, especially in shamanism. The formation of these zoomorphic images in the culture system of the Tungus-Manchu peoples was influenced by the traditions of the ancient Chinese and Koreans, as well as the Jurchen.

This studied zoomorphic complex reveals the specifics of religious ideas about the world. Despite the common beliefs of the Tungus-Manchu peoples, each of them developed ethnocultural peculiarities. For example, among the Manchu, the cults of tiger and serpent-dragon prevailed; the image of deer in folklore was associated with the cult of ancestors. Among the peoples of the Amur (Nanai, Ulchi, Udege, Negidal, Uilta, Oroch), the most revered were the bear and the tiger. The image of the deer is presented in the folklore of the Nanai and Ulchi, the art of the Uilta, and the image of the serpent-dragon was preserved among the Nanai and Nivkhs. Among the Evenks and Evens, the cults of the deer and the bear were of the greatest importance. The images of the tiger and the serpent were reflected in folklore, shamanism, and art. Along with this, in the beliefs associated with the zoomorphic complex, universal archetypal symbols are noted (a cosmic deer with branching antlers, a solar serpent, a bear, and a tiger) dating back to the Neolithic period, found on petroglyphs and in ritual sculpture on the Lower Amur and in Manchuria.

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Urbanization of Indigenous Peoples of Siberia and the Far East (20th to Early 21st Centuries)

This article integrates studies relating to the history of urban communities of Siberian and Far Eastern indigenous peoples. A multidisciplinary approach to urbanization processes is used; their stages, rates, causes, and principal characteristics are analyzed. The database consists of our own field findings, published results of sociological studies, and those of All-Union and All-Russian population censuses. Three stages of urbanization affecting indigenous Siberians are described, and their factors and mechanisms are evaluated. The process is characterized by intense migration of indigenous peoples to the towns and cities during the recent period, accompanied by large-scale industrial development, and the transition of aboriginal societies from the traditional to the modern lifestyle. The urbanization, however, has not been completed, because of the underdeveloped urban infrastructure and the fact that many indigenous peoples to the cities had retained their rural traditions. The salient characteristic of the urbanization of indigenous peoples in the macroregion is that it was asynchronous, and that its short intense phase, whereby the indigenous peoples mostly moved to nearby towns and urbanized villages in the 1960s–1970s, did not extend to all indigenous communities. Urbanization was incomplete in terms of both quality and quantity, and the integration of indigenous peoples into the urban space has engendered serious problems. According to the All-Russian population census of 2010, only five indigenous peoples of Siberia and the Far East had completed the urbanization process: Kereks, Mansi, Nivkhs, Uilta and Shors. Currently, most indigenous peoples are medium-urbanized. The lowest level of urbanization is among the Soyots, Siberian Tatars, Telengits, Tofalars, Tubalars, Chelkans, Chulyms, and Tozhu Tuvans. We conclude that urbanization among the indigenous peoples is a long, difficult, and contradictory process, which, in modern Siberia, triggers many ethno-cultural and ethno-social transformations of regional multiethnic communities.

Keywords: *Indigenous peoples, Siberia, Far East, urbanization, migration.*

Introduction

Forty-three indigenous peoples of Siberia and the Far East, with a total of 1.6 million people (1.1 % of the population in Russia), are known in modern Russia; 37 of them are legally classified as indigenous minorities, with a total population not exceeding 50,000 people. A significant part of the peoples of Siberia live in the regions with a very high level (according to the definition and calculations of economists) of urbanization: in Kemerovo Region, Irkutsk Region, Magadan Region, Tyumen Region, Primorsky Territory, Khabarovsk Territory, Kamchatka Territory, and Yamal-Nenets and Khanty-Mansi Autonomous Okrugs (Efimova, 2014: 5). The level of urbanization among the indigenous peoples of Siberia ranges from 0.2 to 100 %. The problem of establishing the ratio between traditional and urban lifestyles, as well as assessment of the role of towns and

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cities in elaborating the strategies for the development of the indigenous peoples in the macroregion, has become a priority in modern regional studies and ethnology.

In the administrative space and academic discourse of Russia, cities and towns are considered settlements with the population ranging from several million to several thousand people, and that are centers of trade, industry, and/or administration (Gorod i derevnya…, 2001: 79–81). Their systematic assessment is a subject of research in a wide circle of humanities and social sciences. Traditionally, urbanization is viewed as a historical process of increasing the role of towns and cities in a society, which involves changes in the development and distribution of productive forces and social infrastructure, organization of settlement, lifestyle and culture, and the spiritual values of the population. In a narrow sense, urbanization is interpreted as growth of towns and cities (especially large) and an increase in the proportion of urban residents in the structure of the regional population (Staroverov, 2010: 538).

Problems of the urban settlements and population began to be studied from the interdisciplinary point of view at the turn of the 19th–20th centuries. In the 20th century, new approaches to historical urbanism, new economic geography, and methods of urbanization indexation were developed; and theories of staged and differential urbanization, etc. were proposed (Efimova, 2014; Isupov, 2018; Kolbina, Naiden, 2013; Stas, 2020; and others).

The problems of urban studies became included into the field of ethnographic research in the second half of the 1960s. Soviet ethnologists studied theoretical and applied aspects of urbanism. The methodology of researching urban communities correlated with the concepts of ethno-social processes, which were established in Soviet science with the participation of Y.V. Bromley, Y.V. Arutyunyan, L.M. Drobizheva, G.V. Starovoitova, and other scholars (Budina, Shmeleva, 1977: 26; Sovremennye etnicheskiye protsessy…, 1977; Stas, 2017).

By the end of the 20th century, in Russia, there had emerged a subfield of the ethnography/anthropology of the city, including several areas such as historical and ethnographic research, study of migration and ethno-demographic processes, identification of trends in social and cultural development, and analysis of urban communities in terms of their group identities (Pivneva, 2017; Stas, 2020; Urbanizatsiya…, 2001).

The topic of urbanization among the indigenous peoples of Siberia and the Far East was actively discussed in Russian ethnography at the turn of the 20th–21st centuries, although interest in it had already arisen in the early 20th century, owing to the processes of modernization of Russian regions, including Siberia. Even at the early period, the indigenous peoples were taken into account as a part of the population structure of Siberian towns and cities, in the studies of their history and specific aspects by I.V. Turchaninov, G.I. Potanin, A.I. Petrov, and other scholars (see, e.g., (Bakhrushin et al., 1929: 717–724)).

Problems of social transformation (including urbanization) among the indigenous peoples of Siberia became one of the priorities in Russian science in the 1950s owing to the industrial development of resources in the macroregion. In 1955, at the Institute of Ethnography of the USSR Academy of Sciences, the laboratory for studying the processes of building socialism among the indigenous minorities of the North was created. By 1960, its employees had prepared about thirty reports on the issues related to the indigenous minorities of the North for the Council of Nationalities of the Supreme Council of the USSR, Commission on the Problems of the North, Council for the Study of Productive Forces at the Presidium of the USSR Academy of Sciences, and other agencies (Dolgikh, 2005: 160).

In 1963, when the Siberian Branch of the USSR Academy of Sciences was founded, a department for the problems of the development of ethnic relations was created at the Joint Scientific Council; and in 1968, a department for integrated research into the problems of the development of the peoples of Siberia was established at the Institute of History, Philology, and Philosophy of the Siberian Branch of the USSR Academy of Sciences. The USSR Academy of Sciences launched a comprehensive program aimed at assessing the social and economic development of the peoples of the North (Programma koordinatsii…, 1987). The content of the program was determined by the objectives of "elaborating the concept for the development of the peoples of the North in the conditions of scientific and technological progress for the future until 2010, establishing the strategy and tactics for managing internationalization processes, designing proposals for planning and regulating social processes" (Nivkhi Sakhalina…, 1988: 17). As a part of implementing this project in 1968–1987, a large-scale survey of the indigenous population of the Amur Region, Yakutia, Chita, Sakhalin, and Kamchatka Regions, and the Baikal-Amur Mainline was carried out (Kultura narodnostey Severa…, 1986; Boiko, 1988; and others). On the basis of the results of these works, conclusions were drawn about the contradictory nature of urbanization among the indigenous peoples: the growth in importance of towns and cities in their lives was accompanied by the exacerbation of social, economic, ethnic, and cultural problems (Kultura narodnostey Severa…, 1986; Boiko, Popkov, 1987; and others).

For comprehensive study of this problem, the Institute of the Problems of Northern Development SB RAS was created in 1985, and the Institute for Humanities Research and Indigenous Studies of the North SB RAS and other structures were established in 1991.

In the 2000s, the growing role of the Arctic and Subarctic in the strategies for the social and economic development of Russia triggered a new round of interest in studying the indigenous population of northern regions. In this context, the problem of urbanization resurfaced as the focus of attention, becoming a part of the projects of the Institute of Anthropology and Ethnology RAS, Institute of Archaeology and Ethnography SB RAS, Peter the Great Museum of Anthropology and Ethnography (Kunstkamera) RAS, etc. The methodology of these studies was designed taking into account not only Russian, but also global experience. In the course of their implementation, a series of publications was prepared, wherein the nature of urbanization among the indigenous inhabitants of Siberia was identified (Perspektivy i riski…, 2014; "Resursnoye proklyatiye"…, 2019; Rossiyskaya Arktika…, 2016; and others).

In the latest works of Russian ethnographers, the urbanization of Siberia and the Far East was analyzed in a broad historical and social context. However, no comprehensive comparative studies aimed at identifying the essence of urbanization processes among various peoples of Siberia and the Far East have been carried out.

The purpose of this study was to establish factors, stages, and rates of urbanization among the indigenous peoples of Siberia and the Far East in the 20th to early 21st centuries, as well as the reasons for, and consequences of, their migration to towns and cities. The research was based on the field materials of V.V. Nikolaev and I.V. Oktyabrskaya, regulatory documents, published results of sociological surveys, data from the All-Russian (1897, 2002, and 2010) and All-Union (1926, 1939, 1959, 1970, 1979, and 1989) population censuses, as well as other sources, including publications with statistical information on urbanization among the indigenous peoples of Siberia and the Far East (Bogoyavlensky, 2012; Nagnibeda, 1917; Stepanov, 2008).

Factors, mechanisms, and stages of urbanization

Historical studies based on a wide range of sources point to some specific aspects of urbanization processes in Siberia. The emergence of towns in this region in the 17th–18th centuries marked the beginning of the first stage of urbanization. In the most general terms, their history was determined by a gradual transformation of military settlements into administrative, trading, and industrial centers with a large share of the rural (peasant) population (Goroda Sibiri…, 1978).

According to the 1897 Census, 327,860 persons lived in the towns and cities of Siberia, comprising 9.2 % of the total population; the largest cities were those of Tomsk (52,210 persons) and Irkutsk (51,473 persons). In the structure of the population in most towns and cities, Russians accounted for 87.9 %; indigenous peoples lived in Ulal (17 % of Altaians), Ust-Abakansk (6.3 % of Khakasses), etc. (Bakhrushin et al., 1929: 705–706, 717).

Evaluation of the social and historical context in terms of the urban studies makes it possible to identify the factors that determined the prospects for the emergence of the category of "urban residents" from the indigenous peoples during this period. These factors include the location of settlements in the areas of their compact residence, the possibility of adapting traditional culture to the emerging urban environment, and a system and intensity of contacts through which future towns generated economic benefits. Urban infrastructure turned into a means of sustaining economic growth, achieving social mobility and the well-being of the population of Siberia. Urban settlements universally shaped the space of social and cultural innovations.

The prerequisites for urbanization among the indigenous peoples of Siberia were the processes of social transformation. In the 18th–19th centuries, the ethnic strata, adapted to existence in the Imperial space, emerged. The practice of administering the Russian state and the proselytism of the Russian Orthodox Church created conditions and resources for the social mobility of the aboriginal population. In the late 19th century, there were the Altai, Kirghiz, Irkutsk, Transbaikal, Kamchatka, Obdorsk, Surgut, Yenisei, and Yakut missions in Siberia, which were intended for preaching the Orthodox faith in aboriginal languages. By the 1860s–1870s, the missions were united into the Orthodox Missionary Society; in 1909, over eight hundred schools (with classes in Russian and aboriginal languages) operated in Russia, and 19,000 children studied with the Society's financial support (Nechaev, 2014: 141; Nikolaev, 2009). Although adoption of Christianity was not universal, it had a certain influence on ethno-cultural and ethno-social processes among the indigenous population. Until the early 20th century, growth in the numbers of urban residents among the indigenous inhabitants of Siberia remained insignificant. The reason was that the management practices of the Siberian territories, which had developed since the late 16th century, primarily assumed the stability of indigenous communities in their traditional ways of life. These included the taxation system (gathering of the *yasak* tax), principles of ethnic and confessional zoning, minimal interference in internal affairs, support for internal self-governance, and protection from external enemies. The Russian state was interested in income from *yasak*; and so it expanded its subordinate lands, and tried to preserve the numbers of the indigenous people, as well as the status of territories as lands for traditional use of natural resources by the taxable indigenous population (Skobelev, 1999).

Until the early 20th century, paternalism, which was stipulated in the Charter on the Management of Non-Russians in 1822, determined predominantly conservative trends of ethnic policy at the local level. Only those individual aboriginal communities were engaged in modernization processes that, owing to historical circumstances, were involved in the development of the administrative, transport, and trading infrastructure of Siberia. By the early 20th century, a significant urban stratum had emerged among the Siberian Tatars, Buryats, and Yakuts (Istoriya Buryatii, 2011: 199–204; Korusenko, Tomilov, 2011: 178–183; Palikova, 2010: 28–40; Petrov, 1990; and others).

The example of Yakutia is especially indicative: its towns developed slowly as administrative, trading, and transportation centers; initially, in their appearance, structure, and social composition, they hardly differed from rural settlements. In 1897, there were five towns in Yakutia; the population of Yakutsk was 6535 persons. In 1926, 10,558 persons, including 3260 Yakuts, lived in this town; 2285 persons, including 231 Yakuts, lived in Olekminsk, and 1334 persons, including 921 Yakuts, lived in Vilyuisk. In total, the number of urban residents in Yakutia in 1926 was 15,698 persons, or 5.7 % of the total population; of these, 32.1 % were Yakuts (Bakhrushin et al., 1929: 723).

With the establishment of the Soviet power in Siberia, the Committee of the North at the Presidium of the All-Russian Central Executive Committee was engaged in solving the problems of indigenous peoples. The Committee of the North existed in 1924–1935, and was focused on "promoting the systematic arrangement of the minorities of the North" (Dekret VTsIK…, (s.a.)). Its organizational and administrative work was based on the Temporary Regulation on Administration of Indigenous Peoples and Tribes of the Northern Borders of the Russian Soviet Federative Socialist Republic, from 1926. The norms stipulated by this legislation determined the Soviet model of paternalism; they also implicitly fostered urbanization through the practices of ethno-political and ethno-territorial zoning, "indigenization" of the administrative apparatus, and adaptation of cultural and educational structures to the conditions of the North (Dobrova-Yadrintseva et al., 1931: 865–872).

Growth in the number of urban residents among the indigenous peoples during this period was triggered by changes in the status of settlements in the course of establishing ethnic administrative structures, such as the Buryat-Mongol Autonomous Okrug in 1921, Yakut Autonomous Soviet Socialist Republic in 1922, Oirat Autonomous Okrug in 1922, Gorno-Shor Ethnic District in 1926, the Khakass Autonomous Okrug in 1930, Ostyak-Vogul Ethnic District in 1930, etc. The layer of indigenous peoples—Buryats, Yakuts, Altaians, Khakasses, Shors, etc.—increased in the capital towns of these autonomies, the status of which changed over time.

Some of the historic towns became industrial centers. The Soviet state policy of modernization led to the emergence of industrial towns and urban-type settlements in Siberian and Far Eastern regions, which attracted the indigenous population with new working and living conditions. People fled to towns and cities from fear of hunger, dispossession, and persecutions (Boiko, Popkov, 1987: 95).

The situation in the Kuznetsk Territory was typical of this period. That region had been actively developed since the 17th century; then, within the boundaries of the Teleuts and Shors dispersal area, new settlements appeared, including those of the urban type, such as Kuznetsk Sibirsky (since 1931, Novokuznetsk), which was founded as a fort in 1618.

In the early 20th century, there were four towns in Kuznetsky Uyezd (since 1948, Kemerovo Region). By the late 1930s, there were twelve towns in the region. The number of settlements having the status of towns and urban settlements further increased rapidly. The indigenous inhabitants mostly remained rural residents, although some of their settlements were located on the outskirts of new towns. According to the 1926 Census, only seven out of 1898 Teleuts and 83 out of 12,601 Shors were urban residents. From 1939 until 2002, the Teleuts were counted as a part of the Altaians. According to the 1970 Census, more than 50 % of the Shors lived in towns and cities (see *Table*).

Analysis of the sources makes it possible to consider the 1950s–1960s as the beginning of the second stage of urbanization. This time was associated with large-scale social and economic transformations in the east of the USSR, which involved mining of the deposits of natural resources, development of energy supplies, industrial development of territories, reorganization of agriculture on industrial basis, liquidation of "depressed" villages, and consolidation of administrative centers (Slezkin, 2008: 383–385).

In 1957, the Resolution of the Central Committee of the Communist Party of the Soviet Union and the Council of Ministers of the USSR "On the Measures for Further Development of the Economy and Culture of the Peoples of the North" was issued. The Resolution stated that as a result of socialist transformations, the peoples of the North "mostly shifted to sedentary way of life, ensured the growth of economy, raised a significant group of their intellectuals, have a network of schools, health-promoting and cultural and educational institutions, built comfortable villages in a number of places, and have great opportunities for further development of their economy and culture" (Postanovleniye…, 1957). The culture and economy of Siberia were meant to develop on this basis.

In fact, the modernization of the North in the 1950s–1970s, which was sanctioned by the authorities, entailed withdrawal of lands of traditional nature management in favor of raw-material enterprises, and the leveling of many areas of traditional subsistence. The practice of "administrative town-formation", whereby the status of urban settlements was assigned to large rural administrative centers, became widespread; transition to a sedentary lifestyle (initiated already in the 19th century) became irreversible (Krivonogov, 2017; Popov, 2005: 217; and others). The policy of settlement consolidation was accompanied by the organization of boarding schools. Education in such schools has produced generations alienated from ethnic traditions and their indigenous language (Lyarskaya, 2003: 16). This determined the context for the social mobility of indigenous peoples of the northern territories, and facilitated their migration to towns and cities.

In the 1950s–1970s, migrations of the "village-town" pattern became typical for the majority of the indigenous peoples of Siberia and the Far East. Owing to the development of transport infrastructure, towns and cities became easily accessible. They offered a qualitatively different standard of living, and satisfied the growing needs of rural residents (Boiko, 1977: 182). Work-oriented and educational migration gradually became the leading factor in the urbanization of the peoples of Siberia and the Far East. For example, in the Far East, in the course of industrialization, twenty four new towns, including fifteen on Sakhalin Island, appeared from 1940 to 1950, and ten towns appeared from 1960 to 1990 (Vlasov, 2013: 104–105).

V.I. Boiko described the redistribution of the indigenous population in the region, using the example of the town of Amursk in the Khabarovsk Territory. This town was founded in 1958, in connection with the construction of the Amur Pulp and Cardboard Mill. In 1962, it became the district center, in the status of industrial township; and in 1973, acquired the status of town. It was built in the shortest time possible, on the site of the Nanai village of Padali-Vostochnoye. "At that time, the Nanais of this village had a choice: to stay at the construction of a new town or to move to another place. A significant part of them moved to the new, well-equipped village of Ommi… However, already in the first five years, every sixth family and almost all young people had moved to Amursk" (Boiko, 1977: 206–207).

Large-scale sociological surveys were carried out in 1968–1987 by the Institute of History, Philology, and Philosophy of the Siberian Branch of the USSR Academy of Sciences; these concerned the peoples living in the Lower Amur region; Yakutia; the northern regions of the Baikal-Amur Mainline; and the Chita, Sakhalin, and Kamchatka regions. According to the results of these, and of other similar studies conducted in the 1990s under the leadership of Boiko, the following conclusions were arrived at. The tactics of state management of social and economic development among the indigenous peoples in the Soviet period was based on the concept of their concentration in large (stationary) rural settlements; the process of transforming villages into urban settlements intensified; from 1959 to 1970, the urban population in most northern regions doubled; youth dominated in the structure of migration from villages to towns; the key factors of urbanization were the increased social and cultural level of the indigenous communities and the growth of the social and economic capacity of the regions; the cellular nature of development preconditioned a limited influence of towns and cities on nearby villages; urbanization did not become a factor in the dispersal of ethnic communities; on the contrary, it often contributed to the intensification of intra-ethnic ties and the growth of ethnic self-awareness (BAM…, 1979; Boiko, 1973, 1977; Boiko, Vasilyev, 1981; Boiko, Popkov, 1987; Vinokurova, 1992; Markhinin, Udalova, 1993; Nivkhi Sakhalina…, 1988; and others).

The third stage of urbanization was associated with a set of ethno-cultural and socio-economic processes in the 1990s. The systemic crisis led to the exodus of population from the Arctic towns and cities of Russia. From 1989 to 2016, dozens of towns and cities in the Russian Arctic lost from 20 to 50 % of their population. Deindustrialization was accompanied by changes in values and in the social and cultural environment, and also by reorganization in the economic structure (Baburin, Zemtsov, 2015: 78; Zamyatina, Pilyasov, 2017: 8). Owing to the cessation of centralized food and fuel supplies, many urban settlements were liquidated, which led to organized redistribution of the population. Some of the indigenous residents from the depopulated settlements were administratively resettled in towns and cities (Kolomiets, 2020: 208). Throughout the 1990s, multidirectional dynamics of absolute and relative indicators of urbanization were typical for many peoples of Siberia and the Far East. For example, there was a sharp decline in the population in industrial cities and towns in the Amur region during that period. The indigenous peoples of the region had a tendency to return to traditional values and technologies against the background of economic recession, degradation of urban infrastructures, and the collapse of the state farming system (Maltseva, 2018: 169).

Ethnic dynamics correlated with reforms of local self-governance, which began in 2003, when rural and urban settlements were reorganized. A new type of municipality—the urban district—appeared. This again changed the nature of urbanization among the indigenous peoples of Siberia and the Far East (see *Table*). In the 1990s–2000s, the process of urbanization among the indigenous peoples living in the zone of resource (oil and gas) development (the Khanty, Mansi, and Nenets)

Dynamics of urbanization indicators among the indigenous

People	1926			1939			1959			1970		
	Total population, persons	including urban population		Total population, persons	including urban population		Total population, persons	including urban population		Total population, persons	including urban population	
		persons	%		persons	%		persons	%		persons	%
1	2	3	4	5	6	7	8	9	10	11	12	13
Aleuts	353	15	4.3	…	…	…	421	85	20.2	441	99	22.5
Altaians	40,600	1089	2.7	47,867	4244	8.9	45,270	4805	10.6	55,812	8229	14.7
Buryats	237,501	2491	1.1	224,719	20,741	9.2	252,959	42,801	16.9	314,671	77,264	24.6
Dolgans	656	0	0	…	…	…	…	…	…	4877	621	12.7
Itelmens	4217	116	2.8	…	…	…	1109	154	13.9	1301	304	23.4
Kamchadals				…	…	…	…	…	…	…	…	…
Kereks	…	…	…	…	…	…	…	…	…	…	…	…
Ket people	1428	49	3.4	…	…	…	1019	50	4.9	1182	135	11.4
Koryaks	7439	4	0.1	7354	70	1.0	6287	438	7.0	7487	1578	21.1
Kumandins	6335	8	0.1	…	…	…	…	…	…	…	…	…
Mansi	5754	12	0.2	6315	199	3.2	6449	702	10.9	7710	2011	26.1
Nanais	5860	37	0.6	8526	240	2.8	8026	1223	15.2	10,005	2596	26.0
Nganasans	…	…	…	…	…	…	748	50	6.7	953	178	18.7
Nedigals	683	0	0	…	…	…	…	…	…	537	129	24.0
Nenets	15,462	87	0.5	24,791	872	3.5	23,007	1912	8.3	28,705	3853	13.4
Nivkhs	4076	8	0.2	3902	76	2.0	3717	607	16.3	4420	1499	33.9
Orochis	647	2	0.3	…	…	…	782	252	32.2	1089	455	41.8
Selkups	1630	0	0	2613	114	4.4	3768	371	9.9	4282	637	14.9
Soyots	229	0	0	…	…	…	…	…	…	…	…	…
Taz people	…	…	…	…	…	…	…	…	…	…	…	…
Siberian Tatars	96,135**	28,206	29.3	…	…	…	…	…	…	…	…	…
Telengits	3415	0	0	…	…	…	…	…	…	…	…	…
Teleuts	1898	7	0.4	…	…	…	…	…	…	…	…	…
Tofalars	2829	7	0.3	…	…	…	586	19	3.2	620	90	14.5
Tubalars	12	0	0	…	…	…	…	…	…	…	…	…
Tuvans	…	…	…	…	…	…	100,145	8988	9.0	139,388	23,879	17.1
Tozhu Tuvans	…	…	…	…	…	…	…	…	…	…	…	…
Udege people	1357	0	0	1743	40	2.3	1444	202	14.0	1469	279	19.0
Uilta people	162	0	0	…	…	…	…	…	…	…	…	…
Ulchis	723	0	0	…	…	…	2055	246	12.0	2448	391	16.0
Khakasses	45,608	492	1.1	52,771	6669	12.6	56,584	10,738	19.0	66,725	17,142	25.7
Khanty	22,306	141	0.6	18,468	553	3.0	19,410	1788	9.2	21,138	3238	15.3
Chelkans	…	…	…	…	…	…	…	…	…	…	…	…
Chuvans	705	3	0.4	…	…	…	…	…	…	…	…	…
Chukchi	12,332	10	0.1	13,835	158	1.1	11,727	957	8.2	13,597	2404	17.7
Chulyms	…	…	…	…	…	…	…	…	…	…	…	…
Shors	12,601	83	0.7	16,265	1813	11.2	15,274	6455	42.3	16,494	8430	51.1

population of Siberia and the Far East (1926–2010)*

1979			1989			2002			2010		
Total population, persons	including urban population		Total population, persons	including urban population		Total population, persons	including urban population		Total population, persons	including urban population	
	persons	%		persons	%		persons	%		persons	%
14	15	16	17	18	19	20	21	22	23	24	25
546	195	35.7	702	267	30.0	540	172	31.9	482	155	32.2
60,015	10,928	18.2	70,777	13,630	19.3	67,239	13,897	20.7	67,380	16,027	23.8
352,646	122,775	34.8	421,380	178,337	42.3	445,175	194,562	43.7	461,389	217,134	47.1
5053	742	14.7	6945	1572	22.6	7261	1334	18.4	7885	1840	23.3
1370	394	28.8	2481	956	38.5	3180	1194	37.6	3193	1245	39.0
…	…	…	…	…	…	2293	1297	56.6	1927	566	29.4
…	…	…	…	…	…	8	4	50.0	4	4	100
1122	206	18.4	1113	219	19.7	1494	406	27.2	1219	317	26.0
7879	2223	28.2	9242	2778	30.1	8743	2765	31.6	7953	2917	36.7
…	…	…	…	…	…	3114	1704	54.7	2892	1400	48.4
7563	2721	36.0	8474	3934	46.4	11,432	5919	51.8	12,269	7028	57.3
10,516	3880	36.9	12,023	4783	39.8	12,160	3702	30.4	12,003	3518	29.3
867	98	11.3	1278	360	28.2	834	165	19.8	862	315	36.5
504	158	31.4	622	250	40.2	567	164	28.9	513	155	30.2
29,894	4564	15.3	34,665	6193	17.9	41,302	7844	19.0	44,640	9543	21.4
4397	2077	47.2	4673	2383	51.0	5162	2483	48.1	4652	2374	51.0
1198	694	57.9	915	444	48.5	686	338	49.3	596	287	48.2
3565	703	19.7	3612	934	25.9	4249	786	18.5	3649	773	21.2
…	…	…	…	…	…	2769	252	9.1	3608	255	7.1
…	…	…	…	…	…	276	110	39.9	274	114	41.6
…	…	…	…	…	…	9611	4271	44.4	6779	1133	16.7
…	…	…	…	…	…	2399	115	4.8	3712	300	8.1
…	…	…	…	…	…	2650	1142	43.1	2643	1198	45.3
763	161	21.1	731	104	14.2	837	138	16.5	762	98	12.9
…	…	…	…	…	…	1565	150	9.6	1965	357	18.2
166,082	37,327	22.5	206,629	65,983	31.9	243,442	107,850	44.3	263,934	129,035	48.9
…	…	…	…	…	…	4442	7	0.2	1858	4	0.2
1551	416	26.8	2011	775	38.5	1657	425	25.7	1496	375	25.1
…	…	…	190	159	83.7	346	201	58.1	295	177	60.0
2552	711	27.9	3233	923	28.6	2913	564	19.4	2765	589	21.3
70,776	24,850	35.1	80,328	34,736	43.2	75,622	32,743	43.3	72,959	31,572	43.3
20,934	4832	23.1	22,521	6828	30.3	28,678	9924	34.6	30,943	11,879	38.4
…	…	…	…	…	…	855	135	15.8	1181	231	19.6
…	…	…	1511	834	55.2	1087	366	33.7	1002	396	39.5
14,000	2015	14.4	15,184	2176	14.3	15,767	3402	21.6	15,908	3808	23.9
…	…	…	…	…	…	656	54	8.2	355	26	7.3
16,033	10,626	66.3	16,652	12,293	73.8	13,975	9939	71.1	12,888	9353	72.6

1	2	3	4	5	6	7	8	9	10	11	12	13
Evenks	38,805	151	0.4	29,666	1576	5.3	24,710	3272	13.2	25,149	3846	15.3
Evens	2044	0	0	9698	166	1.7	9121	571	6.3	12,029	2036	16.9
Enets	…	…	…	…	…	…	…	…	…	…	…	…
Eskimos	1293	11	0.9	…	…	…	1118	331	29.6	…	…	…
Yukagirs	443	4	0.9	…	…	…	442	86	19.5	615	208	33.8
Yakuts	240,709	5288	2.2	242,080	16,892	7.0	236,655	40,408	17.1	296,244	62,372	21.0

*After (Perepisi naseleniya… (s.a.)).
**After (Kondratieva, Batueva, 2013: 195).

remained progressive. The beginning of urbanization among the indigenous communities in northwestern Siberia was associated with organizing the Yamal-Nenets and Ostyak-Vogul (since 1940, the Khanty-Mansi) ethnic okrugs in 1930, which in 1977 and 1978, respectively, acquired the status of autonomous okrugs. The center of the Yamal-Nenets Okrug was the village of Obdorsk (founded in 1595 as Fort Obdorsk), transformed into the village of Salekhard and receiving the status of town in 1938. The capital of the Ostyak-Vogul Okrug was a newly built town that was renamed as Khanty-Mansiysk in 1940.

In the 1920s–1940s, urbanization among the indigenous population of the region was slow. The discovery of oil in 1953 gave a powerful impetus to this process. The strategy for the exploitation of oil-deposits entailed intense development of urban settlements and towns. By the early 1990s, there were sixteen towns and cities in the Khanty-Mansi Autonomous Okrug–Yugra (by the late 2000s, 40 urban settlements together with townships), and eight towns and cities in the Yamal-Nenets Autonomous Okrug (by the late 2000s, twelve). During the oil boom, the urban population increased many times: by the early 2000s, it exceeded 80 % in Yamal and 90 % in Yugra (Popov, 2005: 238). From 1959 to 2010, the number of urban residents increased more than ten times among the Mansi, five times among the Khanty, and six times among the Nenets people (see *Table*).

During the 1990s–2000s, some peoples of Siberia showed stable rates of urbanization, others a noticeable decrease. Changes in indicators were caused by ethnic and political processes. Several ordinances shaped the normative aspects of life among the indigenous peoples. These were the laws "On Guarantees of the Rights of Indigenous Peoples of the Russian Federation" of 1999 and "On General Principles of Organizing Communities of Indigenous Peoples of the North, Siberia, and the Far East of the Russian Federation" of 2000; and also orders of the Government of the Russian Federation "On the Approval of the List of Indigenous Peoples of the North, Siberia, and the Far East of the Russian Federation" of 2006 and "On the Approval of the List of Places of Traditional Residence and Traditional Economic Activities Among the Indigenous Peoples of the Russian Federation, and List of Types of Traditional Economic Activities of the Indigenous Peoples of the Russian Federation" of 2009. The connection between social and economic preferences, and the fact of traditional settlement of indigenous peoples, indicated in the legislation, led to dynamic changes in the number of urban residents in these peoples' composition.

Thus, the emergence of towns in the 17th–18th centuries in Siberia during its accession to the Russian state marked the beginning of the first stage of urbanization among its indigenous inhabitants. The key role in this process was played by the state policy of paternalism. The processes of social transformation fostered by administrative and proselytizing practices were prerequisites for urbanization, which continued to develop at accelerated pace during the Soviet period. At that time, urbanization was associated with the emergence of ethnic administrative structures, where the stratum of urban dwellers from the indigenous peoples was rapidly growing. The second stage of urbanization, which began in the 1950s–1960s, was large-scale; it was associated with the industrialization of the east of the Soviet Union. The set of ethnic and cultural, as well as social and economic, transformations in Siberia in the 1990s determined the direction of urbanization among the indigenous peoples at the third stage.

Scale, features, and results of urbanization

The determining factors in urbanization processes among the peoples of Siberia were programs for the social and economic development of different aboriginal communities, supported by the state. The pace and extent of urbanization initially varied. According to the 1926 Census, their level of urbanization was extremely low. The results of the 1939 survey showed that the leaders of urbanization were the Khakasses (12.6 % of the total population) and the Shors (11.2 %). In 1959, Shors (42.3 %), Orochis (32.2 %),

Table (end)

14	15	16	17	18	19	20	21	22	23	24	25
27,294	5864	21.5	30,163	6272	20.8	35,527	8576	24.1	38,396	10,141	26.4
12,523	2246	17.9	17,199	4369	25.4	19,071	6116	32.1	21,830	7929	36.3
…	…	…	209	90	43.1	237	51	21.5	227	57	25.1
1510	333	22.1	1719	399	23.2	1750	557	31.8	1738	628	36.1
835	255	30.5	1142	437	38.3	1509	685	45.4	1603	740	46.2
328,018	82,898	25.3	381,922	106,727	28.0	443,852	157,825	35.6	478,085	193,251	40.4

Eskimos (29.6 %), and Aleuts (20.2 %) moved to towns and cities; in 1970, it was the Shors (51.1 %), Orochis (41.8 %), Nivkhs (33.9 %), and Yukaghirs (33.8 %); in 1979 these were Shors (66.3 %), Orochis (57.9 %), and Nivkhs (47.2 %), and in 1989 it was the Uilta people (83.7 %), Shors (73.8 %), Chuvans (55.2 %), Nivkhs (51.0 %), and Orochis (48.5 %). However, the 1970 Census showed the reversibility of the process of urbanization among the indigenous population. The number of urban Eskimos decreased from 29.6 % in 1959 to 27.5 % in 1970, and to 22.1 % in 1979; that of the Nganasans decreased from 18.7 % in 1970 to 11.3 % in 1979; of the Chukchi from 17.7 % in 1970 to 14.3 % in 1989; of the Yukaghirs from 33.8 % in 1970 to 30.5 % in 1979; of the Evenki 21.5 % from in 1979 to 20.8 % in 1989; and of the Tofalars from 21.1 % in 1979 to 14.2 % in 1989.

Highly urbanized (according to formal criteria) peoples in 2010 were the Kamchadals (56.6 % in 2002 and 29.4 % in 2010), Kereks (100 % in 2010), and Kumandins (54.7 % in 2002 and 48.4 % in 2010). A high level of urbanization was maintained by the Nivkhs (51.0 %), Mansi (57.3 %), Uilta people (60.0 %), and Shors (72.6 %).

In the 1990s–2000s, deurbanization was observed in two dozen autochthonous communities, including the Kamchadals, Siberian Tatars, and Uilta people; the decrease in the share of the urban population was over 20 %. At the same time, the change in relative indicators did not always correlate with the absolute data.

The Khakasses in the intercensal period of 1926–1939 and 1970–1979, as well as the Itelmens (and possibly Kamchadals, Chuvans, and Enets) in 1959–1970 and 1979–1989 and the Udege in 1939–1959 and 1979–1989, experienced two waves of rapid urbanization. The Nganasans went through three such waves: in 1959–1970, 1979–1989, and 2002–2010. Among the Orochis and Shors, the first wave was larger; it occurred in 1939–1959, while the second, weaker wave was in 1970–1979.

Relatively long intensive urbanization in 1939–1979 was typical for a number of peoples living in the Amur region: the Nanais, Nivkhs, Orochis, and Negidals (until 1959). The rest of the peoples manifested a short but intense growth of urban population: in 1939–1959, among the Eskimos; in 1959–1970, among the Koryaks, Tofalars, Evens, and Yukagirs; in 1959–1979, among the Mansi; in 1970–1979, among the Aleuts and Ulchis; in 1989–2002, among the Tuvans and probably Chelkans; and in 2002–2010, among the Tubalars. The most active period of migration to towns and cities among the Kumandins occurred in 1959–1979 (Nikolaev, Nazarov, 2021: 151).

Steady, gradual urbanization was typical of numerous peoples, such as Altaians, Buryats, and Yakuts, as well as such peoples as Dolgans, Kets, Nenets, Selkups, Teleuts, Khanty, Chukchi, and Evenks, who received the status of indigenous minorities in 2000 (see *Table*).

A low level of urbanization throughout the 20th century remained among the Soyots, Siberian Tatars, Telengits, Tofalars, Tubalars, Chelkans, and Chulyms, as well as Tozhu Tuvans, who had the lowest indicator (0.2 %). Their territories of traditional residence were not of interest for extracting natural resources and were located far from industrial facilities.

The analysis of statistical data for Siberia and the Far East has shown that the leaders of urbanization by 1989 were the Khanty-Mansi Autonomous Okrug (91.0 % of urban residents from the total population), Kemerovo Region (87.3 %), Sakhalin Region (82.3 %), Magadan Region (80.5 %), Kamchatka Region (81.5 %), Irkutsk Region (80.5 %), and Khabarovsk Territory (78.4 %). Local industrialization in Magadan and Kamchatka regions was not accompanied by high rates of urbanization among the Evens, Koryaks, and Itelmens. Assessment of dynamics manifested by the number of urban residents in relation to the total population is not the only criterion of urbanization, since quantitative indicators do not correspond to qualitative features of urban population among the indigenous peoples of Siberia and the Far East (Pivovarov, 2010: 230–235).

Researchers of lifestyle, which implies a set of sustainably reproducible patterns of behavior, distinguish different types of urbanization. The analysis of the authors' field evidence and published materials has

shown that transition to the category of urban residents in many aboriginal communities was not accompanied by changes in their life values, especially at the initial stages of urbanization. According to historians, a number of Siberian towns (especially in the first half of the 20th century) could not properly be called towns because of the low levels of industry, transport, and social and cultural infrastructure. The processes that took place in the east of the USSR in the first half of the 20th century, especially during the periods of forced industrialization, corresponded mostly to the model of quasi-urbanization (Efimova, 2014: 9; Isupov, 2013). For the indigenous inhabitants of Siberia, acquisition of the status of urban residents often resulted from a change in the status of settlements, when villages turned into towns. The nearest towns became the centers attracting rural indigenous population. Migrations were mostly limited to the region of traditional residence; only in the second generation might it go beyond (Nikolaev, 2018: 143). Most often, former villagers settled in the suburbs or on the outskirts of towns or cities; their traditional settlements they used as summer residences. After acquiring stationary housing in cities, towns, or townships, they regarded it as a place of temporary residence, and continued to maintain a traditional economy, which determined their way of life and basic forms of employment. These trends remained relevant in the late 20th to early 21st century (Volzhanina, 2009: 355–357; Lyarskaya, 2016: 63; Pivneva, 2018: 110–113; Povoroznyuk, 2011: 108; and others).

Analysis of the stratum of "new urban residents" of Siberia, based on field evidence of the authors' and research data in various regions, makes it possible to draw some conclusions concerning sophisticated social differentiation in the aboriginal population: absence of strict division between the groups of rural residents who preserve their traditional way of life, population of villages not engaged in traditional economy, and urban residents. The lack of a clear urban self-awareness among the representatives of indigenous peoples is associated with the accelerated pace of urbanization, the actual (intra-ethnic) system of social and economic ties oriented at kindred and ethno-local communities, and an orientation to the values of traditional culture, which is considered to be the basis for consolidation and self-preservation among the indigenous peoples of Siberia (Lyarskaya, 2016; Oktyabrskaya, Samushkina, Nikolaev, 2021; Pivneva, 2018).

Data on education and sources of livelihood are important indicators of urbanization processes among the indigenous population of Siberia. Already in the 1970s–1980s, scholars had drawn attention to the number of unemployed persons among urban residents who were the representatives of indigenous peoples. For example, "among the Evenks of the Baikal-Amur Mainline in 1976 and in Chita Region in 1982, over 14 % of the employable population was not engaged in public production" (Boiko, Popkov, 1987: 102).

According to the 2010 Census, low rates of labor activity were typical of the Tofalars—18.8 % of the total number, Tuvans—22.3 %, Nganasans—22.8 %, Negidals and Uilta people—24.0 %. Auxiliary farming remained an important help for 15.8 % of Tofalars, 9.9 % of Telengits, 9.1 % of Teleuts and Chulyms, and 8.7 % of Tubalars. The Telengits (51.0 %), Nganasans (46.6 %), Negidals (44.7 %), Ulchi people (42.3 %), Ket people (41.6 %), and Enets (41.3 %) relied mostly on state aid, while Tofalars (37.5 %), Soyots (37.4 %), Mansi (36.2 %), Tuvans (36.0 %), and Dolgans (35.8 %) counted mostly on the help of relatives, alimony, etc. These data make it possible to conclude that not all indigenous peoples had been successfully integrated into the urban environment, even with high quantitative parameters. The quality indicator of urbanization is the level of education and social mobility. For instance, according to the 2010 Census, 100 % of the Uilta people with higher education and 55.5 % with secondary education lived in an urban environment; these indicators were 86.8 % and 72.6 % for the Shors, and 79.4 % and 53.2 % for the Mansi. A similar situation was typical for poorly urbanized peoples, for example, for the Soyots (13.2 % and 5.2 %), Telengits (17.1 % and 5.8 %), and Chelkans (39.2 % and 12.7 %). Improvement of the educational system and professional training, and modernization of social structures generally determine the prospects for urbanization of the indigenous peoples of Siberia.

The tendencies of deurbanization in their environment reflect the priorities of the state policy of Russia to protect the rights and traditional ways of life for the peoples of the North. Benefits for the representatives of indigenous minorities of the North living in places of traditional nature management and engaged in traditional economic activities are provided for by the Tax, Forestry, Water, and Land Codes of the Russian Federation.

Several federal, and numerous regional, target-oriented programs have been implemented in the Russian Federation over the past fifteen years. These provide for actualization of traditional types and forms of life as a condition for the sustainable social and economic development of the indigenous peoples of the North. This strategy was systematically formulated in the 2009 Concept for Sustainable Development of the Indigenous Minorities of the North, Siberia, and the Far East of the Russian Federation (Rasporyazheniye…, 2009). Paternalism and support for authentic cultures have retained their importance as priorities in building a dialog between the state and the indigenous peoples of Siberia and the Far East in the early 21st century.

Modernization standards were outlined in the strategies for social and economic development of the Siberian regions. For example, the law "On the Strategy of Social

and Economic Development of the Republic of Sakha (Yakutia) Until 2032, with the Target Vision Until 2050", adopted in 2018 (amended on June 18, 2020), announced the creation of the conditions for fostering the key value of the state—people. This presupposes the achievement of a high standard of living, the organization of effective territorial management, and the development of competitive sectors of a non-resource-based export-oriented economy, while maintaining cultural diversity and strengthening the civic identity and unity of the peoples living in the Republic of Sakha (Yakutia) (Zakon…, 2018).

Reliance upon traditions in identifying the prospects for modernization determines specific features of urbanization processes among the peoples of Siberia and the Far East for the coming decades.

Conclusions

On the basis of the above analysis, three stages of urbanization of the indigenous peoples of Siberia and the Far East can be distinguished: before the mid 20th century, the 1950s–1980s, and from the 1990s till nowadays. It should be acknowledged that the leading factor of urbanization was the policy of paternalism pursued by the state throughout the entire 20th century. Administrative-political and socio-economic transformations in the regions of Siberia predetermined the ethnic and cultural rapprochement of the indigenous population and the newcomers, and also systemic transformations of aboriginal communities, with changes in their life-support systems and their movement to cities and towns. The industrial development of Siberia—development of energy resources, industrialization, and the building of transport infrastructure—was crucial in accelerating urbanization by the late 20th century. The opportunities for preserving traditions under conditions of active modernization have determined the current projects of the indigenous peoples of Siberia for the coming decades. Strategic planning in this area has become possible with active participation of the Russian state.

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Patterns in the Population History of Northern Eurasia from the Mesolithic to the Early Bronze Age, Based on Craniometry and Genetics

In memory of Oleg Balanovsky

This study examines the craniometric differentiation of Northern Eurasian groups with reference to genetic and partly linguistic facts. Measurements of 66 series of male crania from that territory, dating to various periods from the Mesolithic to the Early Bronze Age, were subjected to statistical methods especially destined for detecting spatial patterns, specifically gradients. Using the nonmetric multidimensional scaling of the matrix of D^2 distances corrected for sample size, a two-dimensional projection of group constellation was generated, and a minimum spanning tree, showing the shortest path between group centroids in the multivariate space, was constructed. East-west clines in Northern Eurasia, detected by both genetic and craniometric traits, likely indicate not so much gene flow as isolation by distance, resulting from an incomplete evolutionary divergence of various filial groups constituting the Boreal meta-population. The western filial component, which, in Siberia and Eastern Central Asia, is mostly represented by Afanasyevans, has evidently made little contribution to the genetic makeup of later populations. The eastern filial component, which had appeared in the Cis-Baikal region from across Lake Baikal no later than the Neolithic, admixed with the autochthonous Paleosiberian component. The latter's principal marker—the ANE autosomal component—had been present in Siberia since the Upper Paleolithic. Likewise autochthonous were both Eurasian formations—Northern and Southern; statistical analysis has made it possible to make these more inclusive, whereby the former has been expanded in the eastern direction to include the Kuznetsk Basin, and the latter westwards, to the Middle Irtysh. Nothing suggests that Eastern European groups had taken part in the origin of either the Northern Eurasian formation or the proto-Uralic groups.

Keywords: *Southern Siberia, Western Siberia, Eastern Europe, Mesolithic, Neolithic, Early Bronze Age, craniometric differentiation.*

Introduction

The recent achievements of paleogenetics, especially at the whole-genome level, are increasingly helpful in resolving matters over which specialists in skeletal studies have been arguing for many decades. One of the most illustrative examples is the debate as to whether the cranial specificity of the Neolithic and Early Bronze Age Baikalians was caused by European admixture (Debetz, 1948: 61) or by the preservation of a specific trait combination known as Paleosiberian (Debetz, 1951: 95). Craniologists have failed to reach a consensus on that matter: some believed European admixture to have been minimal (Mamonova, 1983), whereas other claimed that its role was critical and that the term "Paleosiberian" should be abolished (Alekseyev, Gokhman, Tumen, 1987).

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Genetic studies have given a quietus to this argument by having convincingly demonstrated that the specificity of Baikalians was not due to European admixture—at least not to the gene flow that, according to Debetz, had reached the Baikal area from the west along the steppes beginning from the Early Bronze Age (Damgaard et al., 2018). This sort of admixture has been detected in just one of 53 Neolithic and Early Bronze Age individuals from the Cis-Baikal and Trans-Baikal regions (1.9 %)—apparently, in a male buried at a Glazkovo cemetery Khaptsagay, on the Upper Lena (Yu et al., 2020)*. Other individuals from Late Neolithic and Early Bronze Age burials in the Cis-Baikal deviate from those with the highest amount of the autosomal component NEA (Northeast Asian), especially marked in Mongoloids, such as those from the Neolithic Devil's Gate in Primorye, and in Kitoi people**, not toward Bronze Age people of the western steppe, but toward descendants of the Upper Paleolithic Siberians, marked by the ANE (Ancient North Eurasian) autosomal component, first described in a boy buried at Malta some 24 ka BP, as well as in a male and a girl who lived at Afontova Gora 15–17 ka BP (Raghavan et al., 2014; Fu et al., 2016). In the Cis-Baikal, the amount of ANE increases from 14 % during the Kitoi stage to 23 % during later stages of the Neolithic and Early Bronze Age (Yu et al., 2020).

Abandoning the term "Paleosiberian", therefore, is hardly reasonable, because it likely refers to the morphological correlate of the ANE component. This, of course, does not imply direct connection between cranial features and the analytically separated part of the genome ensuring the most efficient classification of groups. An indirect connection, however, is quite probable, because cranial trait combinations, too, are a classification tool, designed for the same purpose.

The origin of the ANE component is a complete mystery. While archaeological parallels to the Malta-Buret culture in Eastern and Central Europe are well known, the hypothesis that this culture was introduced to Siberia by migrants from those regions is not supported by genetic data (Fu et al., 2016). No more plausible is the opposite hypothesis: although the ANE component was introduced to Central and Western Europe from the east, this happened much later than the Upper Paleolithic, since ANE was absent there before the Yamnaya expansion (Ibid.; Haak et al., 2015).

ANE makes up the principal share of the EHG (Eastern Hunter-Gatherer) autosomal component, whose content is especially high in the genomes of Mesolithic and Early Neolithic inhabitants of northeastern Europe buried at Yuzhny Oleny Ostrov, Popovo, Sidelkino, Lebyazhinka IV, etc. (Haak et al., 2015; Damgaard et al., 2018). They passed EHG on to the Yamnaya people, from whom it was inherited by several filial populations, including Afanasyevans. As early as the Mesolithic, EHG was introduced from northern Russia to Scandinavia, as evidenced by genomes of the Motala people in southern Sweden. Their ancestors had migrated there from the east along the coast of Norway, because the share of EHG in more southern populations, such as the earlier Kunda people of the eastern Baltic, is lower (Haak et al., 2015; Mittnik et al., 2018). As shown by the chronologically diverse materials from the Zvejnieki cemetery in Latvia, the proportion of EHG rises in the Middle Neolithic in parallel with archaeological signs of contact with the Pit-Comb Ware culture (Jones et al., 2017).

The roots of ANE in Siberia are much deeper than those of EHG in Eastern Europe, where, judging by the mitochondrial haplogroups, ANE was introduced from Siberia (Mittnik, 2018). The ancestor of ANE was the ANS (Ancient North Siberian) autosomal component, represented in a male from the Upper Paleolithic Yana site, dating to 31.6 ka BP (Sikora et al., 2019). ANS is thought to have originated among West Eurasians soon after their divergence from East Eurasians about 43 ka BP. The picture is complicated by an approximately 22 % genetic contribution received by early West Eurasians from East Asians shortly after their split (Ibid.).

From Siberia, ANE spread in both directions—westwards and eastwards. The ancestors of American Indians brought it to the New World, where its share in modern aboriginal populations is about 30–40 % (Flegontov et al., 2016; Sikora et al., 2019). Modern Old World groups closest to native Americans in this respect are Chukchi, Koryaks, Kets, and Selkups, and among the ancient groups, Okunev people and those of the Botai culture*, suggesting that both these groups are direct descendants of the Malta-Buret people. In both these populations, ANE is mixed with the Northeast Asian component. The same mixture is seen in two males who are genetically very close to native Americans—that from the Upper Paleolithic site Ust-Kyakhta in the western Trans-Baikal, dating to ~14 ka BP (Yu et al., 2020), and that from the Mesolithic site Duvanny Yar on the Kolyma, dating to ~10 ka BP (Sikora et al., 2019).

It is absolutely unclear from where the Upper Paleolithic inhabitants of western Caucasus (Satsurblia, 13 ka BP) and the Early Neolithic people of Iran (Ganj Dareh, 8th millennium BC) received large amounts of the ANE

*This is evidenced by the code "KPT005". In the text, admittedly, a different cemetery in the same region is mentioned—Kachug; but this must be an error.

**The same or similar component is sometimes denoted AEA (Ancient East Asian) or ESHG (East Siberian Hunter-Gatherer).

*Okunev people have an additional western admixture originating from the Yamnaya-Afanasyevo population (Damgaard et al., 2018; Jeong et al., 2019; Yu et al., 2020).

component (Lazaridis et al., 2018). Judging by the huge distribution area of ANE, it was a legacy of early *Homo sapiens*, members of the Boreal meta-population (Biasutti, 1941: 275; Kozintsev, 2013, 2014), who inhabited northern Eurasia and America at various stages of the disintegration of this major branch of the human species and were variously affected by contacts between its filial branches.

Genomic studies have revealed a number of early east-west clines passing across northern Eurasia and connecting northeastern Europe (the distribution area of EHG) with Trans-Baikal and the Amur Basin, where the NEA/AEA component was distributed (Damgaard et al., 2018; Jeong et al., 2019; Narasimhan et al., 2019; Kılınç et al., 2021). They might be regarded as genetic correlates of the Caucasoid to Mongoloid vector of traditional classifications, were it not for the fact that the earliest individual carrying ANE—the key component in these clines—was geographically neither western nor eastern, but intermediate. And whereas the considerable (Upper Paleolithic) age of the NEA/AEA component in the eastern part of the gradients is beyond doubt, like its role in the early population history of northern Eurasia (Mao et al., 2021; Yu et al., 2020), the western component, differing from EHG by a large amount of southern admixtures (such as Iranian, Caucasian, and Anatolian) had taken part in this process only since the Early Bronze Age—specifically, since the time of the Yamnaya-Afanasyevo migrations. Before that, the role of the equal partner of the NEA/AEA component was played by ANE.

This means that the challenge for skeletal studies in reconstructing population history is to focus on trait combinations that might be evolutionarily conservative rather than hybrid, such as Paleosiberian and the like. A well-founded hypothesis about one of them, marking the so-called Southern Eurasian Formation, was advanced, postulating its autochthonous nature in the Altai-Sayan region and the adjoining mountain systems (Chikisheva, 2012: 57, 153, 169). The standard example of this trait combination is presented by the Okunev people. Another combination, observed in a number of Neolithic and Early Bronze Age samples from the Baraba forest-steppe, was referred to as the Northern Eurasian Formation by Chikisheva (Ibid.: 6, 56, 59, 123–124, 179–180), who borrowed this term from Viktor Bunak (1956). A similar trait combination, partly matching the broadly defined Uralian race of the traditional classifications, is observed in a number of Mesolithic and Neolithic cranial series from the forest belt of northeastern Europe—precisely those marked by the EHG component. As Chikisheva believes, the Baraba forest-steppe was populated from the forest zone of the Russian Plain in the Early Holocene (Chikisheva, Pozdnyakov, 2021). Both Eurasian formations, Northern and Southern, as she believes, are filial branches of the Boreal meta-population and have the same taxonomic rank as its two principal branches—western and eastern.

Anatoly Bagashev (1998), who disagrees with Bunak's (1956) notion of the Uralian race in the broad sense, denies the genetic affinities between modern populations of Western Siberia (he attributes them to what he calls Western Siberian race), and Eastern European groups, which he believes to be related to other groups of Europe*. Cranial nonmetrics, on the other hand, demonstrate these affinities quite convincingly; in fact, they oppose modern Uralic-speaking groups to all other known human populations (Kozintsev, 1988: 137–140; Kozintsev, 1992; Moiseyev, Kozintsev, 1998). The integration of data relating to four independent trait systems—craniometric, cranial nonmetric, dental, and dermatoglyphic—make this result even more compelling (Moiseyev, 2001). If, therefore, rejecting the common origin of Uralic speakers on both sides of the Urals has become an anachronism, and if Vladimir Napolskikh (1997: 177–178) is right when he describes these facts as a proof of a "flesh-and-blood proto-Uralic people that lived in the past", the question arises: How deep are the roots of the Uralic people? And how do they relate to the Northern Eurasian Formation?

The objective of this study is to revise the craniometric classification in the light of new genetic and partly linguistic facts, with special attention to distinguishing evolutionary conservatism from admixture. This motivates the choice of analytical techniques.

Material and methods

Male cranial samples representing the following cultures, periods, and territories were used:**.

1. Boisman culture, Primorye (Chikisheva, 2012: 38–39);
2. Neolithic, Yakutia (Ibid.);
3. Neolithic and Bronze Age, Trans-Baikal (Gokhman, 1980);
4. Kitoi tradition, eastern Trans-Baikal (Mamonova, 1983);
5. Kitoi tradition, western Trans-Baikal (Ibid.);
6. Kitoi tradition, Fofanovo (Gerasimova et al., 2010);
7. Kitoi tradition, Lena (Mamonova, 1983);
8. Kitoi tradition, Angara (Ibid.);
9. Kitoi tradition, Shamanka (D.V. Pezhemsky's unpublished data);
10. Isakovo tradition, Angara (Mamonova, 1983);
11. Serovo tradition, Lena (Ibid.);

*To all appearances, this conclusion results from an insufficient number of European samples representing Uralic-speaking groups in Bagashev's study.

**In cases where a sample has been studied or rearranged by several specialists, only the latest publication is indicated—one from which the measurements were taken.

12.Serovo tradition, Angara (Ibid.);
13.Glazkovo tradition, western Trans-Baikal (Ibid.);
14. Glazkovo tradition, Fofanovo (Gerasimova et al., 2010);
15. Glazkovo tradition, Olkhon (Mamonova, 1983);
16. Glazkovo tradition, Lena (Ibid.);
17. Glazkovo tradition, Angara (Ibid.);
18. Neolithic, Krasnoyarsk-Kansk forest-steppe (Solodovnikov, Bagashev, Savenkova, 2020);
19. Neolithic, Lower Angara (Ibid.);
20. Bolshoy Mys culture, Biysk stretch of the Ob (Itkul, Kostenkova Izbushka) (Chikisheva, 2012: 36–37);
21. Neolithic, Barnaul stretch of the Ob (Firsovo XI) (Solodovnikov, Tur, 2017);
22. Kuznetsk-Altai culture, Upper Ob (Solontsy-5, Ust-Isha) (Chikisheva, 2012: 36–37);
23. Neolithic and Chalcolithic, Middle Irtysh (Solodovnikov et al., 2019);
24. Neolithic, forest-steppe Trans-Urals and northern Kazakhstan (Botai culture, Gladunino) (Khokhlov, Kitov, 2015);
25. Neolithic, Kuznetsk Basin (Solodovnikov, Tur, 2017);
26. Neolithic, Novosibirsk-Kamen stretch of the Ob (Ibid.);
27. Neolithic, Baraba forest steppe (Chikisheva, 2012: 36–37; Chikisheva, Pozdnyakov, Zubova, 2015);
28. Ust-Tartas culture, Sopka 2/3 (Chikisheva, 2012: 69–72);
29. Ust-Tartas culture, Sopka 2/3A (Ibid.);
30. Odino culture, Sopka 2/4A (Ibid.: 98–101);
31. Odino culture, Tartas-1 (Chikisheva, Pozdnyakov, 2019);
32. Odino culture, Preobrazhenka-6 (Ibid.);
33. Krotovo culture, Sopka 2/4B, C (Chikisheva, 2012: 98–101);
34. Okunev culture, Uibat (Gromov, 1997);
35. Okunev culture, Verkh-Askiz I (Ibid.);
36. Okunev culture, Chernovaya IV, VI, VIII (Ibid.);
37. Okunev culture, Tas-Khazaa (Ibid.);
38. Karakol culture, Altai (Tur, Solodovnikov, 2005);
39. Chaa-Khol culture, Tuva (Aimyrlyg) (Gokhman, 1980);
40. Yelunino culture, Upper Ob (Solodovnikov, Tur, 2003);
41. Samus culture, Upper Ob (Solodovnikov, 2005);
42.Chemurchek culture, western Mongolia (Solodovnikov, Tumen, Erdene, 2019);
43. Afanasyevo culture, western Mongolia (Gokhman, 1980);
44. Afanasyevo culture, southeastern Altai (Solodovnikov, 2009);
45. Afanasyevo culture, northwestern Altai (Ibid.);
46. Afanasyevo culture, Middle Katun (Ibid.);
47. Afanasyevo culture, Ust-Kuyum (Ibid.);
48. Afanasyevo culture, Kurota (Ibid.);
49. Afanasyevo culture, Ursul (Ibid.);
50. Afanasyevo culture, Saldyar (Ibid.);
51. Afanasyevo culture, Minusinsk Basin (Ibid.);
52. Afanasyevo culture, Karasuk III (Alekseyev, 1981);
53. Afanasyevo culture, Afanasyeva Gora (Ibid.);
54. Neolithic and Early Chalcolithic, Volga-Ural region (Khokhlov, 2017: 219–223);
55. Mesolithic, northern Russian Plain, Yuzhny Oleny Ostrov (Alekseyev, Gokhman, 1984);
56. Mesolithic, northern Russian Plain, Popovo (Gokhman, 1984);
57. Mesolithic, eastern Baltic, Zvejnieki (Denisova, 1975: 187–188);
58. Early Neolithic, eastern Baltic, Zvejnieki (Ibid.: 193–194);
59. Middle and Late Neolithic, eastern Baltic, Zvejnieki (Ibid.: 202–203);
60. Pit-Comb Ware culture, northern Russia and the Volga-Oka watershed (Chikisheva, 2012: 38–39);
61. Volosovo culture, the Volga-Oka watershed (Ibid.);
62. Khvalynsk culture, Khvalynsk cemeteries (Khokhlov, 2017: 226–230);
63.Khvalynsk culture, Khlopkov Bugor (Ibid.: 230–231);
64. Mesolithic, Ukraine (Konduktorova, 1973: 13–14);
65. Neolithic, Ukraine, Dnieper-Donets culture (Potekhina, 1999: 190–192);
66. Early Chalcolithic, Ukraine, Sredny Stog II culture (Ibid.: 204–208).

The trait battery includes 14 key traits (listed with their standard codes, see (Alekseyev, Debetz, 1964)): cranial length (1), cranial breadth (8), cranial height (17), minimal frontal breadth (9), bizygomatic breadth (45), upper facial height (48), nasal height (55), nasal breadth (54), orbital breadth (51), orbital height (52), naso-malar angle (77), zygo-maxillary angle, simotic index (SS : SC), and nasal prominence angle (75 (1)). Measurements were processed using the multiple discriminant (canonical) analysis, and Mahalanobis D^2 distances corrected for sample size were calculated. The distance matrix was subjected to nonmetric multidimensional scaling, and the minimum spanning tree, showing the shortest path between the points in the multivariate space and therefore optimal for detecting clines, was constructed. Boris Kozintsev's program CANON for calculating Mahalanobis distances corrected for sample size and Øyvind Hammer's software package PAST (version 4.05) were used (Hammer, 2012)*.

*Earlier versions are worse in this respect, because they track the shortest path on the plane rather than in the original multivariate space.

The minimum spanning tree method generates clusters less formally than the traditional cluster analysis does. But such clusters make more sense in terms of geography*. Cluster analysis is unsuited for studying clines, and therefore is used here only as an auxiliary device, in two varieties—unweighted pair-group (UPGMA) and neighbor joining (NJ); both techniques were implemented in respective modules of the PAST package. The resulting dendrograms are not shown, because of their large size, but can be obtained by e-mail upon request.

Results

The two-dimensional projection of the group constellation is shown in Fig. 1. We will examine it in the direction of the principal gradient of craniometric variation—from the eastern (Mongoloid) extreme to the western (Caucasoid). This gradient is generally consistent with the geographic position of groups.

Groups of the eastern extreme and Paleosiberian. Samples with the utmost expression of Mongoloid features include the following (ranked in the order from greater to lesser expression, i.e., in the increasing order of NMDSCAL coordinate 1): Kitoi of eastern Trans-Baikal (No. 4), Boisman of Primorye (No. 1), Kitoi of western Trans-Baikal (No. 5), and Neolithic of Yakutia (No. 2).

Does craniometry show the Kitoi people to be more Mongoloid than representatives of later traditions of the Baikal Neolithic and Bronze Age, as the results of the genetic studies suggest? Perhaps the use of individual data would confirm that, but the comparison of averages yields an indeterminate result. The mean value of coordinate 1 (Fig. 1) in six Kitoi samples (No. 4–9) is –0.147 ± 0.032, and the respective value for eight samples from later burials on both coasts of Lake Baikal (No. 10–17) equals –0.098 ± 0.007. The difference, according to the Mann-Whitney test, may be due to chance ($U = 16$, $p = 0.33$). If only distances between the Baikal groups are subjected to NMDSCAL (Fig. 2), the difference between Kitoi and the remaining groups remains insignificant, despite the extreme expression of Mongoloid features in the Kitoi sample from Trans-Baikal**.

The geographic factor turns out to be more important than that relating to chronology. In Fig. 1, the Trans-Baikal cluster is opposed to that of Cis-Baikal by being definitely more Mongoloid (apart from the nine samples from the Cis-Baikal area, the latter cluster includes two Neolithic crania from the Lower Angara (No. 19) and two Chemurchek crania from western Mongolia (No. 42))*. The mean value of coordinate 1 in five Trans-Baikal samples (disregarding the pooled Trans-Baikal group) equals –0.172 ± 0.029, whereas the respective value for nine Cis-Baikal samples is -0.088 ± 0.006. According to the Mann-Whitney test, the difference is highly significant ($U = 0.5$, $p = 0.004$). Trans-Baikal groups differ from those of the Cis-Baikal also in Fig. 2, where other groups are excluded from the analysis; but in this case it is only a tendency, which does not reach the required significance level on any of the two NMDSCAl coordinates.

Eurasian formations—Northern and Southern. After Chikisheva's publications it appeared that the eastern boundary of the distribution area of the Northern Eurasian Formation is marked by the Ob River. Apart from the seven Neolithic and Early Bronze Age samples from the Baraba forest-steppe, which she mentioned (Fig. 1, No. 27–33), this cluster includes the Neolithic sample from the Novosibirsk-Kamen stretch of the Ob (No. 26). Among the two cluster analytic techniques, admittedly, this is confirmed only by NJ, but not by UPGMA. However, one more Neolithic sample from a much more easterly area, the Kuznetsk Basin (No. 25), merges with the Baraba cluster by all the techniques used—minimum spanning tree and both versions of cluster analysis, implying that the Northern Eurasian formation should be extended eastwards, possibly even as far as the Yenisei. Notably, it is the Northern, not the Southern Eurasian, formation that is directly linked with the Eastern Siberian clusters: the minimum spanning tree edge connects the sample from Preobrazhenka-6 (No. 32) with that from the Lower Angara (No. 19).

On the contrary, the Southern Eurasian formation, as it appeared until recently, spread from the Yenisei in the western direction, because the Neolithic people of the Krasnoyarsk-Kansk forest-steppe (No. 18) seemed to be the best candidates for the role of the ancestors of the Okunev people (No. 34–37). It now turns out, however, that the Neolithic and Chalcolithic people who lived well to the west—on the Middle Irtysh (No. 23)—are likewise suited for that role. The authors of the publication attempt to split this group in terms of geography, claiming that crania from the forest and forest-steppe zone display features of the Northern Eurasian formation, whereas those from the steppe are closer to the Southern Eurasian formation (Solodovnikov et al., 2019). But the sample is very small, and according to its average values falls within the Southern formation, which is supported by the cluster analysis. Four samples from the Upper Ob—Bolshoy

*Methodological limitations inherent in the traditional cluster analysis have been discussed more than once (see, e.g., (Kozintsev, 2016)).

**This sample consists of just two poorly preserved crania.

*The advantage of the minimum spanning tree method over cluster analysis is evident in this case: none of the two clustering algorithms, neither UPGMA nor NJ, is capable of separating Cis-Baikal groups from those of Trans-Baikal. Instead, members of each of these clusters are separated from one another and intermixed with samples from other regions.

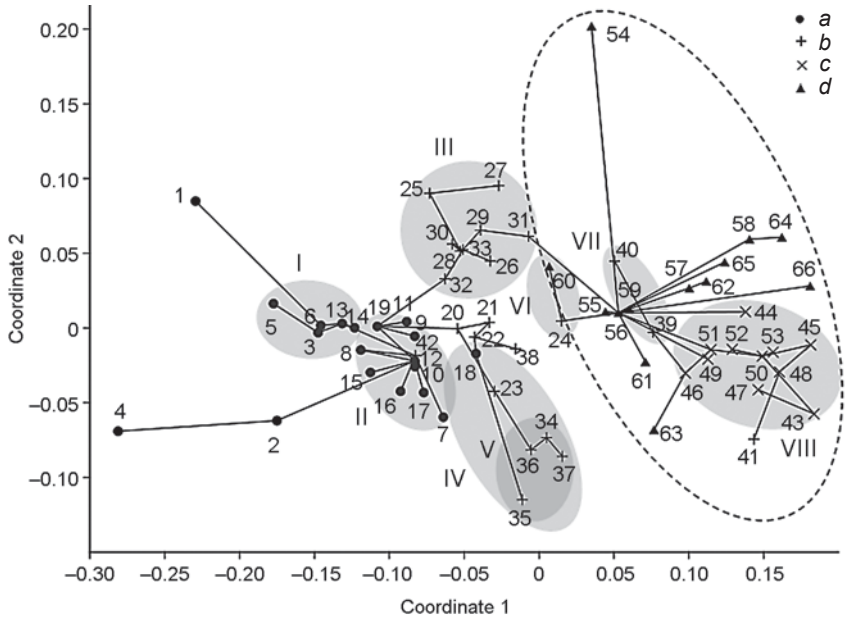

Fig. 1. The position of male cranial samples in the space generated by two axes of the nonmetric multidimensional scaling of Mahalanobis D^2 distances, corrected for sample size.

Straight lines are edges of the minimum spanning tree showing the shortest path between points in the original multivariate space. Spots show clusters: I – Paleosiberian, Trans-Baikal, II – Paleosiberian, Cis-Baikal, III – Northern Eurasian formation, IV – Southern Eurasian formation, V – Okunev, VI – Pit-Comb Ware, VII – Chaa-Khol-Yelunino, VIII – Afanasyevo. The dashed contour encloses groups displaying the western trait combination. *a* – groups of Eastern Siberia and the Russian Far East; *b* – groups of Southern and Western Siberia, and Western Mongolia except Afanasyevan; *c* – Afanasyevan; *d* – European. Numbers of groups refer to the list (see text).

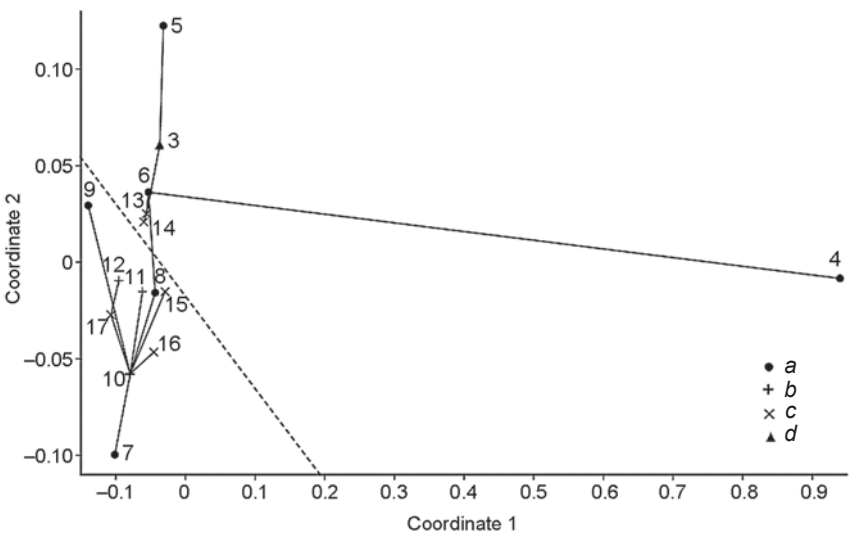

Fig. 2. The position of male cranial samples from Cis-Baikal and Trans-Baikal in the space generated by two axes of the nonmetric multidimensional scaling of the Mahalanobis D^2 distances corrected for sample size.

a – Kitoi, *b* – Isakovo and Serovo, *c* – Glazkovo, *d* – tradition not indicated. The dashed line separates Cis-Baikalian groups from those of Trans-Baikal. See Fig. 1 for other conventions. Numbers of groups refer to the list (see text).

Mys from Itkul and Kostenkova Izbushka (No. 20), Neolithic from Firsovo XI (No. 21), that of the Kuznetsk-Altai culture from Ust-Isha and Solontsy-5 (No. 22), and Karakol (No. 38)—take an intermediate position between the two formations, without falling in any of them, according to the results of cluster analysis. Not far from these groups, in the interval between them and the western hyper-cluster, is a sample from the forest-steppe Trans-

Urals and northern Kazakhstan (No. 24), which includes the few Botai crania. Displaying the "westernmost" trait combination among all the Neolithic groups of northern Asia, this sample forms a separate pair with the Pit-Comb Ware group (No. 60)—the most Mongoloid-like among the European groups.

As T.A. Chikisheva believes, Siberian members of the Northern Eurasian formation, unlike those belonging to the Southern Eurasian formation, are somewhat similar to Mesolithic and Neolithic groups of the forest belt of northeastern Europe. Indeed, the Odino sample from Tartas-1 (No. 31) is directly connected with the Mesolithic sample from Popovo (No. 56) by the minimum spanning tree's edge. However, the average D^2 distance separating eight Mesolithic and Neolithic samples from the forest zone of northeastern Europe (No. 54–61) from nine members of the Northern Eurasian formation of Siberia (No. 25–33) is only slightly less than that separating the former from the six members of the Southern Eurasian formation (No. 18, 23, 34–37): 13.90 versus 15.60, respectively. According to the Wilcoxon test for paired data, the difference is insignificant ($z = 1.82$, $p = 0.069$). Therefore, the available data do not warrant the idea of a single Northern Eurasian formation spanning the area from the eastern Baltic to the Kuznetsk Basin. So far, it can only be stated that both Eurasian formations of Siberia taken together and groups that are close to them fill in the gap between Paleosiberian, specifically Cis-Baikal, populations and European groups in which the expression of western traits is relatively weak.

Western groups. Apart from groups of the forest zone (see above), the weaker expression of western traits is seen in the Khvalynsk sample from Khlopkov Bugor (No. 63), which, on the western scale, is markedly different from the Khvalynsk sample from the eponymous cemeteries (No. 62), and in two Siberian groups of an arguably European origin—Chaa-Khol (No. 39) and Yelunino (No. 40), which make up a separate pair. A considerable temporal variation is observed in the Zvejnieki population: a moderately western pattern in the Mesolithic (No. 57) is replaced by a pronouncedly western combination in the Early Neolithic (No. 58), after which the expression degree of western features drops again sharply, and the series from the Middle and Late Neolithic burials (No. 59) is markedly shifted toward the Pit-Comb Ware sample. The opposite, western, extreme of the scale is taken by three samples from Ukraine (No. 64–66), and by most Afanasyevan series, to which the Samus sample (No. 41) is close.

Discussion

Material and methods used in this study have failed to demonstrate the difference between the Kitoi people as a whole and those representing later traditions of the Baikal Neolithic and Bronze Age. There is no doubt, however, that the eastern component spread westwards from across Lake Baikal. This is evidenced by two extremely Mongoloid crania from the eastern Trans-Baikal (in this respect they surpass even the Boisman sample), by a direct link between the latter and the Trans-Baikal cluster, and by a statistically significant difference between the Trans-Baikal and Cis-Baikal clusters.

Because the European admixture, as we now know, reached Lake Baikal only in exceptional cases at that time, the position of groups on the east-to-west axis indicates admixture between the eastern component and that traditionally known as Paleosiberian, or, in genetic terms, between groups marked by the NEA/AEA component and those marked by the ANE component, respectively. The same applies to both Eurasian formations. At the stage when the process of disintegration of the Boreal meta-population had not yet terminated, genetic and craniometric gradients directed east to west, from Eastern Siberia to Eastern Europe (and perhaps further west), testify, apparently, not so much to admixture as to the isolation by distance effect. This effect was evidently the principal reason why numerous groups inhabiting vast territories of Eurasia demonstrate all transitional stages between the two extremes revealed by craniometric traits—eastern and western.

Those closest to the western extreme in our sample are three groups from the Ukraine, including the Sredny Stog people (No. 66), and the Afanasyevans. Indications that the former were likely ancestors of the latter have been provided both by archaeologists (Nikolaeva, 2019a, b) and by physical anthropologists (Solodovnikov, 2009). The plot (Fig. 1) shows this rather clearly. The temporal dynamics of the physical type of the Zvejnieki people, specifically the "eastern" tendency displayed by the sample from the Middle and Late Neolithic burials, recalls archaeological evidence of contacts with the Pit-Comb Ware people and genetic facts showing the rise in the EHG autosomal component at that stage (Jones et al., 2017).

Genetic data suggest that the role of the Early Bronze Age migrants from the western steppe as a source of European admixture in Siberia should not be overstated. In the words of Narasimhan et al. (2019: Suppl. materials, p. 235), on their way to the east, Afanasyevans "leapfrogged" the autochthonous populations, without intermixing with them. Chikisheva (2012: 180), therefore, was absolutely right in claiming that vis-à-vis the arguably local origin of populations belonging to the Southern Eurasian formation, "the impact of migrations on the origins of the Altai-Sayan groups was somewhat exaggerated" (for a new summary of data relating to the Okunev population and supporting this idea, see (Kozintsev, 2020)).

But the same conclusion, to all appearances, is true with regard to the Northern Eurasian formation. I see

no particular reason to ascribe its origin to a migration from the forest zone of northeastern Europe to Western Siberia. As concerns the relationship between the Northern Eurasian formation and the Uralian race *sensu lato* of traditional classifications, the issue cannot be resolved with the database used in this study. First, it proved impossible to demonstrate that either of the two Eurasian formations of Siberia is closer to the Mesolithic and Neolithic people of the northeastern European forest zone than the other. Second, given the unusually high degree of biological specificity of modern Uralic-speaking groups on both sides of the Urals (see above), looking for the sources of proto-Uralians in such a vast territory in the Mesolithic or Neolithic is pointless. No doubt the Uralic homeland was situated in the taiga zone of Western Siberia and, possibly, in the adjoining part of northwestern Urals (Napolskikh, 1997: 132, 140; Janhunen, 2009). Early cranial finds from those territories are quite scarce. The more western parts of the forest zone, specifically the Volga basin and the Baltic, were populated by the Uralic (specifically Finno-Ugric) speakers no earlier that the second millennium BC (Napolskikh, 1997: 125, 197–198; Janhunen, 2009).

The same applies to the more southerly regions, such as the forest-steppe zone of Western Siberia, where Uralic speakers appeared likewise late, as evidenced by cranial nonmetric data, especially sensitive to the Uralic component (Gromov, Moiseyev, 2004; Moiseyev, 2006). The combination of craniometric and cranial nonmetric traits displayed either by the Okunev people, or by those buried at Sopka, regardless of their chronological position, or by people with a western genetic legacy (Afanasyevo, Andronovo, Karasuk, Irmen, and Tagar) does not point in the Uralian direction (Kozintsev, 2004). The "Uralic" trait combination first appears in a group from Yelovka II in the Tomsk stretch of the Ob, dating to the Andronovo era but hardly representing migrants from the west (Ibid.), and this is the earliest evidence suggestive of a southward migration of Uralic speakers from the taiga to the sub-taiga zone of Western Siberia in the Final Bronze Age.

The origin of the Chemurchek people remains mysterious. Genetic studies suggest that they had originated from a complex mixture of western, eastern, and southern constituents. One of the main components, ANE, could have been received from the Botai people (Jeong et al., 2020; Wang et al., 2021). Craniometric analysis (Fig. 1) places the two Chemurchek crania (No. 42) in the Cis-Baikal cluster, but because of the admixture revealed by genetics, this fact is hardly indicative of origin.

The sample that includes the few Botai crania (No. 24) takes a more "western" position (Fig. 1), forming a pair with the Pit-Comb Ware group of European Russia, and this is supported by archaeological data suggesting that these cultures are related (Mosin, 2003: 97–98). However, the idea that they were associated with Finno-Ugrians (Ibid.) disagrees with numerous facts demonstrating a later penetration of Finno-Ugric tribes into areas west of the Cis-Urals (see above).

Conclusions

1. Craniometric data support the conclusions made by geneticists about the early (no later than the Neolithic) penetration of the eastern component from the eastern Trans-Baikal to the Cis-Baikal, where it mixed with the autochthonous (Paleosiberian) component.

2. The Northern and the Southern Eurasian formations, as well as groups that are close to them, take an intermediate position between the Cis-Baikal (Paleosiberian) cluster and European groups with a weak expression of western traits. The relationship between the Northern Eurasian formation and the Uralian race of traditional classifications is unclear.

3. East-west gradients revealed by both genetic and craniometric traits in northern Eurasia apparently do not indicate admixture, the extent of which during the Neolithic and Early Bronze Age was minor, at least in central and western parts of northern Eurasia. Rather, they suggest that the divergence of groups filial with regard to the Boreal meta-population was still incomplete at that time.

4. Groups that can be considered admixed (Chaa-Khol and Yelunino) constitute a small minority and are opposed both to autochthonous groups, specifically members of the Paleosiberian cluster and both Eurasian formations, on the one hand, and migrant ones such as the Afanasyevan, on the other.

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Academician V.S. Myasnikov as Archaeologist and Ethnologist

Preparation and celebration of a great anniversary commemorated this year by the scholarly community—the 90th birthday of a recognized leader of Russian historical science Academician V.S. Myasnikov—fostered publication of a number of articles on various aspects of work done by this outstanding scholar. We would like to make our own contribution to the overview of his accomplishments, focusing on two areas that are close to us and that have not yet received sufficient attention in Russian historiography.

The title of this article may cause some surprise even among the readers well familiar with works of Vladimir Myasnikov, since he is primarily known for his source studies embodied in publication of many volumes of archival materials that created a reliable basis for the study of the Russian-Chinese and Russian-Mongolian relations in the 17th to 20th centuries. V.S. Myasnikov explored a number of important aspects of the Chinese civilization, primarily in the context of contacts with Russia, and gave a historical assessment of the Treaty of Nerchinsk of 1689 and other important "treaty articles". This research has become a new stage in historiography and turned out to be useful for the needs of practical diplomacy. The most important scholarly discoveries of the celebrant include the identification of stratagem thinking as an essential feature in the social consciousness of the Chinese, which was a notable contribution to global sinology and caused a surge of both scholarly and applied interest in this topic in the People's Republic of China. His works on archival studies, history of diplomacy, various aspects of modern and recent history of China and the Asia-Pacific Region as a whole made up a multivolume collected works published in 2014 by the *Nauka* Publishing House under the common title "Kastalskiy Klyuch Kitaeveda" [The Castalian Spring of a Sinologist]. All this is true. But in his quest of researching the sources, in reverent attitude to documents, Vladimir Myasnikov could not but reach the frontiers of archaeology—the science, the main content of which is discovering, extracting, and processing sources for reconstructing material and spiritual culture of the past.

V.S. Myasnikov's attention was primarily attracted by the materials of Russian academic expeditions to

Xinjiang. The main stages in organizing the study of Turkestan antiquities were established in a number of articles, including "Obraz Akademika S.F. Oldenburga v Dokumentakh ego Sovremennikov" [The Image of Academician S.F. Oldenburg in the Documents of His Contemporaries], "Issledovaniye Dunkhuanskogo Kompleksa Pamyatnikov: Proshloye, Nastoyashcheye, Nadezhdy na Budushcheye" [Study of the Dunhuang Complex of Sites: Past, Present, Hopes for the Future], "Obraz N.F. Petrovskogo v Angliyskom Zerkale" [The Image of N.F. Petrovsky in the English Mirror] (see all in (Kastalskiy Klyuch…, vol. 4), "O Roli Rossiyskoi Akademii Nauk v Issledovanii Vostochnogo Turkestana" [On the Role of the Russian Academy of Sciences in Studying Eastern Turkestan] (Kastalskiy Klyuch…, vol. 6). These antiquities were obtained by the expedition of V.I. Roborovsky in 1893–1895; a special commission was established for analyzing the collections at the

We would like to thank T.A. Pan, the Deputy Director of the Institute of Oriental Manuscripts of the Russian Academy of Sciences, for the photograph that she kindly provided.

Department of Historical and Philological Sciences of the Academy of Sciences. In 1898, the first specialized archaeological expedition to the Turfan region took place under the leadership of D.A. Klements. The work of that Expedition marked the beginning of scientific archaeology in the territory of China ("Istoriya Arkheologicheskikh Issledovaniy v Kitae: Istoriograficheskiy Ocherk" [History of Archaeological Research in China: Historiographical Overview], V.I. Molodin, S.A. Komissarov (eds.), Moscow: Yurayt, 2020: 20–21). This was preceded by active work of N.F. Petrovsky, the Russian consul in Kashgar, who was elected a member of the Russian Archaeological Society. His "Turkestanskiye Pisma" [Turkestan Letters], a significant part of which contains reports on the conducted studies, were published under the editorship of V.S. Myasnikov in 2010.

High scholarly and civil reputation of Vladimir Myasnikov allowed him to give an objective assessment of one of important events in the study of the past of Xinjiang—the expedition of Baron C.G.E. Mannerheim (1867–1951). This figure is ambivalent, and the attitudes to his activities after 1917 were different in Russian society. Without going into endless disputes on this matter, V.S. Myasnikov wrote the article "Po Sledam Mannergeima" [In the Footsteps of Mannerheim] (Kastalskiy Klyuch…, vol. 6), where he showed that in the early 20th century, the Baron was undoubtedly one of the best Russian officers. An excellent cavalryman and competent general staff officer, he managed in 1906–1908 to make (mostly on the horseback) the way from Kashgar to Beijing, to brilliantly fulfill the task entrusted to him, and also to collect an extensive archaeological and ethnographic collection (several thousand Buddhist manuscripts and their fragments, 250 medieval coins, ancient pottery, jewelry, etc.). Currently, these materials, as well as diaries and photographs, are kept in several museums in Helsinki and are available to scholars (International Dunhuang Project; http://idp.bl.uk/pages/collections_other.a4d#4).

Vladimir Myasnikov contributed to reprinting an important, but problematic for Russian historiography, book "Kitaitsy v Ussuriyskom Krae" [The Chinese in the Ussuri Region] by V.K. Arsenyev. In the preface to that edition, Myasnikov emphasized that Vladimir Arsenyev was the first scholar to conduct ethnological research in the zone of contact of two great civilizations—Russian and Oriental (Kastalskiy Klyuch…, vol. 5). Vladimir Myasnikov considered ethnic psychology to be a crucial aspect of "social culture of each nation", which influences the interaction of civilizations. The term "ethnic psychology" was first proposed by the outstanding Russian philosopher G.G. Shpet. In order to give the readers better understanding of the Shpet's methodology, V.S. Myasnikov contributed to publishing Shpet's book "Istoriya kak Problema Logiki" [History as a Problem of Logic] in 2002, not only acting as its scientific editor, but also writing extensive introductory article (Kastalskiy Klyuch…, vol. 6). The proposed theoretical approach has been implemented in the practices of new studies. Myasnikov wrote in his article "Rol Etnopsikhologii v Mezhkulturnom Dialoge" [The Role of Ethnic Psychology in Intercultural Dialogue]: "We consider attractive such an issue, for example, as the influence of hieroglyphic writing or martial and military arts of the peoples of China, Japan, Korea, and Vietnam, which gave rise to stratagem thinking, on their ethnic psychology. It seems that many interesting discoveries await us on this path" (Kastalskiy Klyuch…, vol. 4: 79). Sic et simpliciter; we should only add that is was Academician V.S. Myasnikov who was a pioneer on this path. We wish him creative longevity and new scholarly publications, including those addressing such important topics as archaeology and ethnology!

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AKIN – Agency for Cultural and Historical Heritage of the Altai Republic (Gorno-Altaysk)

AN SSSR – USSR Academy of Sciences

ASGE – Archaeological Collection of the State Hermitage Museum

GANIIIYaL – Gorno-Altaysk Research Institute of History, Linguistics, 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)

IRGO – Imperial Russian Geographical Society

IV RAN – Institute of Oriental Studies, Russian Academy of Sciences (Moscow)

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)

NAN RK – National Academy of Sciences of the Republic of Kazakhstan

NIPIPMK – State Institute for Scientific Research and Planning on Monuments of Material Culture (Almaty, Kazakhstan)

RGO – Russian Geographical Society

SAI – Collection of Archaeological Sources

UIIYAL UrO RAN – Udmurt Institute of History, Linguistics, and Literature, Ural Branch, Russian Academy of Sciences (Izhevsk)

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