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New Dental Finds Associated with the Paleolithic Selenga Culture, Western Trans-Baikal Region

We describe human teeth discovered in 2012 during the re-examination of the lithic assemblage and paleontological complex from Ust-Kyakhta-3, in the western Trans-Baikal region, excavated by A.P. Okladnikov. This is one of the key Final Paleolithic sites in this area, having a distinct two-layer stratigraphy, a consistent series of radiocarbon dates, and the largest (and the most representative) collection of artifacts. Dental finds come from layer 1, whose dates range from 11,505 ± 100 to 12,151 ± 58 BP. The finds include fragments of a deciduous left upper second molar of a child aged 11–13, and an incompletely erupted upper permanent molar, possibly from the same child. Morphological comparison of these teeth with those from Malta in the Cis-Baikal region demonstrates considerable similarity. This finding suggests that the populations of Malta and Ust-Kyakhta-3 represent one and the same southern Siberian Upper Paleolithic dental complex.

Keywords: *Ust-Kyakhta-3, Trans-Baikal region, Final Upper Paleolithic, dental anthropology, southern Siberian Upper Paleolithic dental complex.*

Introduction

Plenty of Middle and Upper Paleolithic sites in Trans-Baikal region illustrate the earliest prehistory of this region (Konstantinov, 1994: 13–38; Lbova, 2000: 6–22; Tashak, 2004; 2005: 5–16; Moroz, 2014: 19–23; Pavlenok G.D., 2015b). Despite abundant publications on archaeological heritage, no anthropological material from the Trans-Baikal Paleolithic has been described in the literature so far. Only V.I. Tashak mentioned orally that the assemblage from the Oshurkovo site contained dental finds, which regrettably have not been published yet.

Studies of Ust-Kyakhta-3, a bilayer site of the Final Paleolithic in the southwestern Trans-Baikal region (Fig. 1), have a long history. The site was discovered in 1947 by A.P. Okladnikov, the Head of the Buryat-Mongolian Expedition (Okladnikov, 1948, 1950). Initially, only occasional finds from the surface were collected (Abramova, 1953, 1959). However, Okladnikov mentioned some artifacts in the archaeological context. For that reason, in 1976 and 1978, excavations at Ust-Kyakhta-3 were carried out, producing an exceptionally abundant archaeological collection from two culture-bearing layers: more than 40,000 lithic artifacts and numerous osteological remains.

Preliminary information on the site and its stratified complex was provided in Okladnikov's reports (1977, 1979). Then, the site was mentioned in several summarizing papers (Lbova, Khamzina, 1999: 125–127;

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Fig. 1. Map of Cis- and Trans-Baikal regions, showing location of Ust-Kyakhta-3.

Lbova, 2000: 136). The most detailed description of the site and its industries was provided by I.V. Aseev (2003: 33–40). The last large review summarized the data on the Paleolithic and Mesolithic sites in the Ust-Kyakhta archaeological area, including Ust-Kyakhta-3 (Tashak, 2005). Studies of the Ust-Kyakhta-3 assemblage were resumed (Pavlenok G.D., 2015b); and in 2012, among the materials from layer 1 (obtained after wet-sieving), two human tooth fragments were identified. This paper is devoted to description of these dental finds.

General information about the site

The site of Ust-Kyakhta-3 was located on the northern bank of the Selenga River (Fig. 2). Initially, its sediments were identified as pertaining to the second fluvial terrace (Okladnikov, 1977). However, observations made by Doctor of Geology E.I. Ravsky, obtained earlier for the whole of Inner Asia, suggest that fluvial terraces at such rivers were either absent, or were exposed only during the lowest water level (1972: 108–118). On the basis of the resumed studies of Ust-Kyakhta-3 in 1978, Okladnikov reconsidered his preliminary inferences. He came to the conclusion that the site deposits represented two morphological structures of different origin, demarcated by a clear borderline. These are the dune sands overlying the lamellar, lacustrine sediments bearing traces of cryogenic processes (Okladnikov, 1979).

Later, a slightly different opinion on the origin of the Ust-Kyakhta-3 sediments was proposed. D.-D.B. Bazarov distinguished here two sedimentological strata: subaerial deposits, which did not contradict Okladnikov's determination (Ibid.), and floodplain and channel river alluvium (unpublished data presented in V.I. Tashak's dissertation) (1995: 105–109). Tashak studied the Ust-Kyakhta-17 site located 6 km from the site under discussion, and described the upper stratum as the aeolian and landslide deposits; the underlying stratum he described as the alluvial deposits (floodplain and channel alluvium facies) (Ibid.: 30).

During the works in 2012, the following stratigraphic situation was established (Pavlenok K.K., 2013; Pavlenok G.D., 2015b). In total, twelve lithological strata were identified (Fig. 3). The upper portion (strata 1–5) were formed through colluvial and aeolian sedimentation processes. The lower unit (strata 6–12) represented the floodplain alluvium, which agrees with the determinations made by Bazarov and Tashak.

Archaeological materials were embedded in two lithological strata. The upper cultural layer was associated with the humic, fine-grained sandy loam layer 4 to 12 cm thick, designated as stratum 9. Artifacts were recovered from a single plane, with vertical dispersal of the

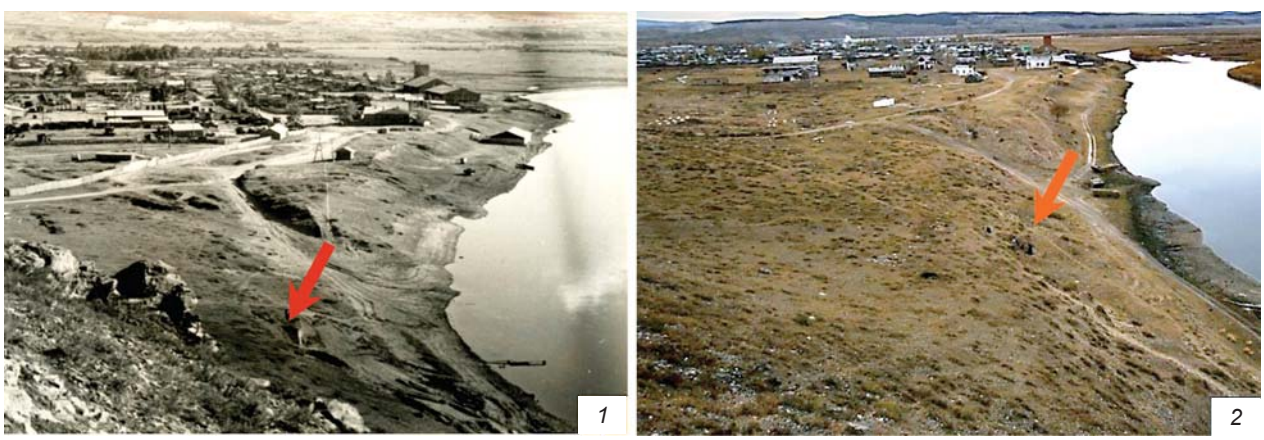

Fig. 2. View on the site.
1 – photo from 1978 (after (Okladnikov, 1978)); *2* – photo from 2012.

artifacts within 1–2 cm, suggesting the *in situ* occurrence of cultural remains. Analysis of lithic artifacts from cultural layer 1 testifies to the homogeneity of the industry, and allows us to attribute it, in terms of its technical-typological features, to the Final Paleolithic (Pavlenok G.D., 2015b).

The lower cultural layer corresponds to stratum 11, which is 15–20 cm thick and comprises gray-brown sandy loam. The vertical dispersal of the artifacts within the layer is considerable; but the analysis of the lithic artifacts attests to the homogeneity of the industry and its attribution to the Final Paleolithic (Ibid.). Refitting of several artifacts was carried out (Pavlenok G.D., 2016), suggesting that this assemblage was formed in quite a short period. The set of available dates in the range of 13,000–15,000 cal BP (see *Table*) supports the attribution of the Ust-Kyakhta-3 deposits to the Final Pleistocene.

Analysis of lithic and bone artifacts allowed us to attribute this site to the Final Paleolithic Selenga culture (Pavlenok G.D., 2015b), the existence of which until recently, like some other Paleolithic cultures of the Trans-Baikal region, had not been supported by any anthropological materials. The term of "Selenga culture" was proposed by G.F. Debets for exposition of lithic artifacts collected near the town of Kyakhta and village of Ust-Kyakhta and attributed to the Early Neolithic (1930). Tashak provided new information concerning this culture. He defined the Selenga culture on the basis of assemblages recovered from Ust-Kyakhta-3 and -17, and attributed it to the Mesolithic, "despite the fact that it was practiced in Pleistocene times" (Tashak, 2005: 115). The most recent studies of the Ust-Kyakhta-3 materials provided significant new data about this culture of the western Trans-Baikal region, and attributed it chronologically to the Final Paleolithic (Pavlenok G.D., 2015b).

The raw materials for this lithic industry were pebbles, including siliceous aleurolite, alueropelite, and sandstone.

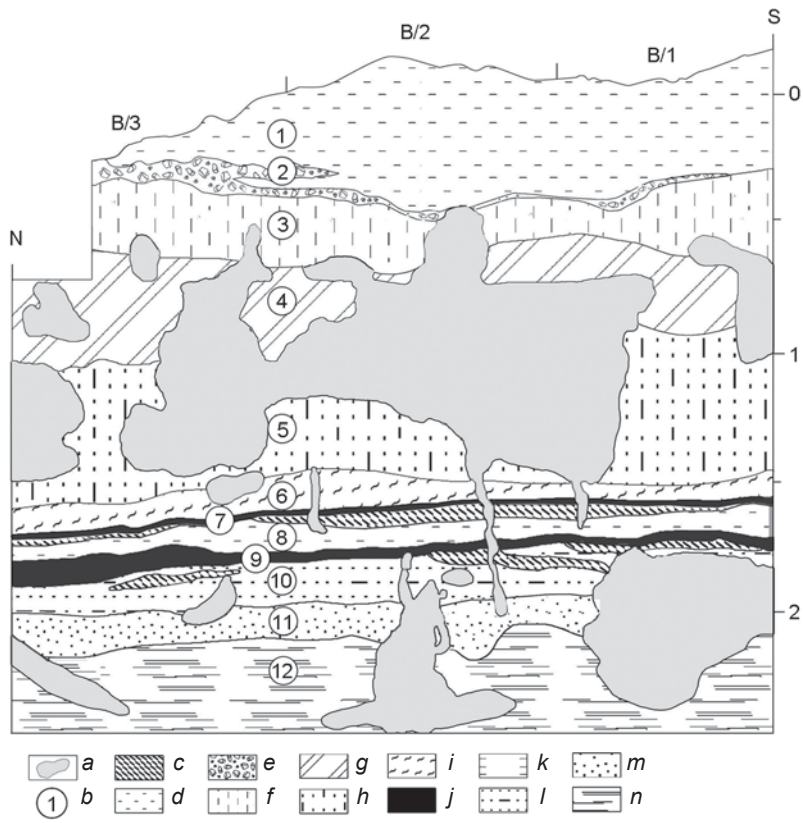

Fig. 3. Ust-Kyakhta-3 stratigraphic section.
a – rodent-burrows; *b* – lithological layer number; *c* – carbonate-formation area; *d* – modern soil (grayish-brown sandy loam); *e* – grayish-brown sandy loam intermixed with gruss and gravel; *f–m* – sandy loam: *f* – brownish-gray intermixed with sand, *g* – grayish-yellow fine-grain, *h* – brown, *i* – whitish-gray, *j* – humic blackish-brown, *k* – dark brown, *l* – light brown, *m* – grayish-brown; *n* – fine whitish-gray sand.

Results of radiocarbon dating of the materials from Ust-Kyakhta-3

Archaeological layer	Radiocarbon date, BP	Calibrated value*, BP	Material	Method	Lab code	Source
1	11,505 ± 100	13,399 ± 140	Charcoal	^{14}C	SO AN–1552	(Orlova, 1995)
1	12,136 ± 54	14,165 ± 236	Bone	AMS	AA-12176; NSKA–00830	(Pavlenok G.D., 2015b)
1	12,151 ± 58	14,183 ± 234	″	″	AA-12185; NSKA–00831	(Ibid.)
2	12,595 ± 150	14,930 ± 367	Charcoal	^{14}C	SO AN–1553	(Orlova, 1995)
2	11,851 ± 53	13,758 ± 138	″	AMS	AA-11936; NSKA–00828	(Pavlenok G.D., 2015b)
2	12,250 ± 60	14,326 ± 266	Bone	″	AA-12292; NSKA–00829	(Ibid.)

*Calibration was carried out using http://www.calpal-online.de/

Stone-knapping was aimed at producing blades by plane or prismatic reduction, and micro-blades by detachment of wedge-shaped cores or flakes from small, often non-standard cores (Fig. 4, *A*, *B*). The specific feature of this culture is that after flattening of the core face, some flat cores (along with pebbles and thick flakes) were used as blanks for wedge-shaped cores (Fig. 4, *C*). This modification was carried out through two different strategies (techniques) (Tashak, 2000; Pavlenok G.D., 2015a).

Each of the reconstructed strategies consisted of a specific chain of operations executed with particular tools at various stages of core reduction. The initial stages of shaping of large flat-faced and prismatic cores

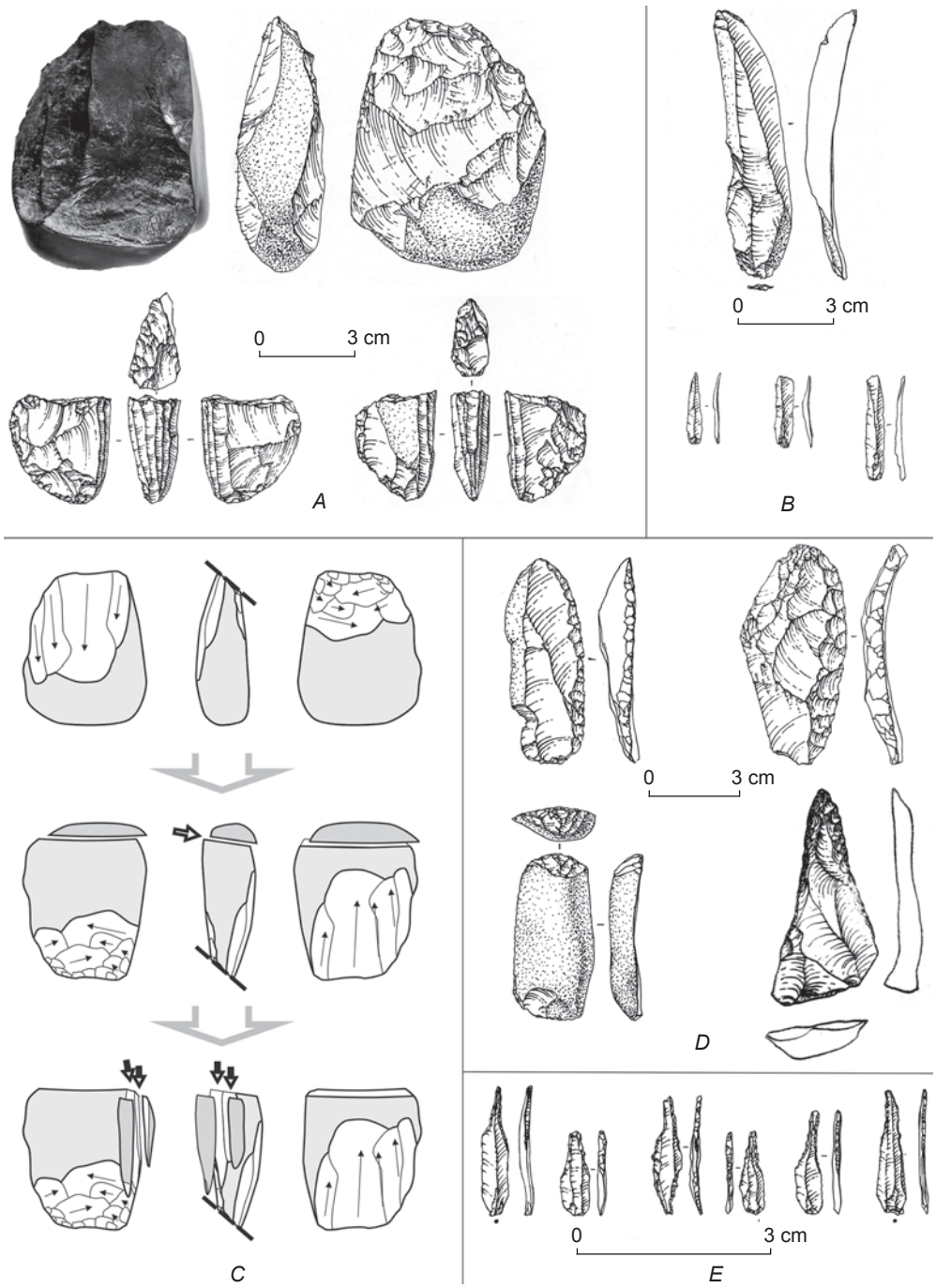

Fig. 4. Lithic industry.
A – cores; *B* – blanks without traces of secondary treatment; *C* – modification of flat cores, and utilization as blanks for wedge-shaped cores; *D*, *E* – tool kit.

were carried out by direct percussion with a hard hammer. Blanks with the proportions of blades were produced through direct or indirect blows with a soft hammer. Similar traces of percussion were noted on flakes that were used for core rejuvenation at the stage of serial production of blanks. Microblades were removed from wedge-shaped cores through pressure flaking technique. Examination of the scars from removals suggested that these could have been obtained by three techniques: use of hand crutch; hand crutch and core clump; shoulder crutch and core clump. The cores were, in addition, shaped with the aid of a soft hammer.

The established technological features of the lithic assemblage are well supplemented by the typological parameters. For example, primary reduction was targeted at blade and micro-blade production, this strategy being supported by the selection of blanks for secondary treatment. The toolkit is dominated by knives, and side- and end-scrapers; more rarely, specific Ust-Kyakhta points (Tashak, 2012) and burins, fashioned mostly on blades (Fig. 4, *D*), occur. A set of borers on microblades is noteworthy (Fig. 4, *E*) (Pavlenok G.D., 2015b: 14, 20). The tools were mostly shaped through dorsal retouching (Tashak, 2005: 41–66; Pavlenok G.D., 2015b: 20).

In addition to lithic artifacts, archaeological collections of the Selenga culture include comparatively few, but representative, bone tools, which are conventionally classified into three groups: pointed tools (including needles), shafts of single- or double-edged insertion tools, and fishing-hooks (Tashak, 2005: 57–60; 120–121; Pavlenok G.D., 2014). Other important features of the Selenga assemblages are pieces of art (Zotkina, Pavlenok G.D., Tashak, 2018) and traces of the arrangement of living-space (Tashak, 2005: 28–38).

The Final Paleolithic Selenga culture is an autochthonous culture based on the older Ust-Menza variant of the Late Upper Paleolithic (~18–13 ka BP) (Moroz, 2014: 98–102), which in turn originated from even older archaeological complexes of the region (Pavlenok G.D., 2015b, 23).

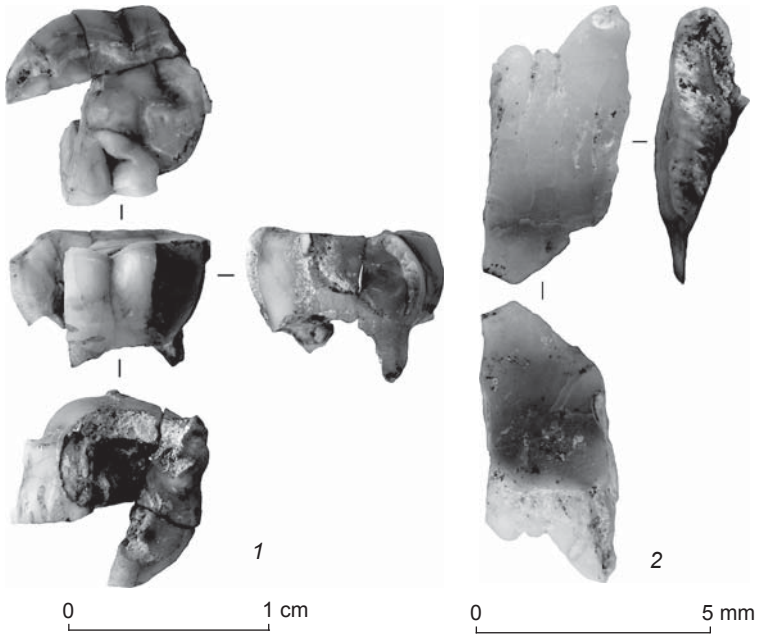

Fig. 5. Dental finds.
1 – deciduous left upper second molar; *2* – a fragment of the enamel of mesial edge of the upper permanent molar.

Materials and methods

Odonthological finds from layer 1 at Ust-Kyakhta-3 (Fig. 5) are represented by four fragments (from 6.2 × 3.1 mm to 6.5 × 9.0 mm) of a molar crown. Three of these belong to one tooth—a deciduous left upper second molar. The first one is a fragment of the vestibular segment of the crown, the other two are from the lingual segment with an adjacent part of the mesial interproximal surface bearing a fragment of a contact facet. The fact that it was a deciduous tooth is evident from the shape of the crown's cavity, its sharp narrowing at the neck, the small thickness of the enamel and dentine, small diameter and a significant curvature of the remaining part of the root, and a small height of the fragments. It can be identified as an upper tooth by the wide shape of the crown with rounded corners, distal shift of the fissure separating the cusps of the lingual side, and significantly less wear on the vestibular cusps as compared to the lingual ones. The last feature is due to the fact that in deciduous occlusion they overlap lower teeth, and are less engaged in the process of mastication. The side of the tooth is evident from the position of fissure IV separating the hypocone and the protocone. Almost complete resorption of the root system and wear on most of the crown enamel suggest that the tooth belonged to an individual aged 11–13 years.

The fourth fragment belongs to another tooth. It is a fragment (6.2 × 3.1 mm) of the enamel of the mesial edge of a upper permanent molar belonging to a child. The roughness of the enamel's surface and preservation of odontoglyphic elements of the third order suggest that the tooth had not completely erupted. Unfortunately, the fragment is too small to be subjected to morphological analysis.

The deciduous tooth was described according to the ASUDAS protocols and the conventional set of traits used in Russian dental anthropology (Zubov, 2006,

Edgar, 2017). Pathological changes (caries, enamel and dentine hypoplasia, dental calculus) and trauma were also registered to study the dietary pattern of the individual from Ust-Kyakhta-3.

Morphological description of the deciduous molar

Most details of the crown's morphology cannot be examined properly owing to severe attrition, but it supposedly had a large metacone (grade 1 according to the Zubov's scale) and a moderately reduced hypocone (grade 4 according to the Dahlberg's scale). Fissure I, separating the metacone and paracone, can be identified at the vestibular side of the tooth; and fissure IV, separating hypocone and protocone, can be identified at the lingual side. Their position implies that the contact zone between the metacone and the protocone was rather long. This suggests that a well-developed plagiocrista (crista oblique) was present in the crown's morphology, although it is not possible to estimate the degree of its continuity. The metacone bears a fragment of a tubercular groove, supposedly 1′me, which falls into fissure I. The presence of this groove reveals an originally highly differentiated odontoglyphic pattern, which is further supported by the significant depth of the fragments of intertubercular grooves. An ante-mortem enamel chip 2.5 mm in diameter impedes observation of the initial development of phenes of the Carabelli' system, but the absence of a well-developed Carabelli cusp is evident. A parastyle is absent.

Metric traits of the crown were measured with an error, as the fragments were subject to paleogenetic analysis and could not be glued together; but this error does not exceed the mean statistical error. The mesio-distal diameter of the crown could not be measured because of the post-mortem damage to the mesial segment; the buccolingual diameter is approximately 9.5 mm. The minimal mesio-distal diameter of the neck is 7.7 mm, the minimal buccolingual diameter 7 mm.

No serious pathological changes were observed on the fragments of the tooth. Enamel hypoplasia, caries, and dental calculus are absent, although some parts of the crown bear minor yellowish spots. Together with the ante-mortem enamel chip at the mesio-vestibular corner of the crown, this indicates low a carbohydrate ratio in the individual's diet, rough food processing, and probably occasional cracking of small animal bones.

Results of comparative analysis

We have limited possibilities for a comparative analysis of the Ust-Kyakhta-3 find, because deciduous left upper second molars in Northern Eurasia have so far only been found at the site in Malta, located in the adjacent region of Cis-Baikal. These belonged to two individuals (Malta 1 and Malta 2), with markedly different dental morphologies (Zubov, Gokhman, 2003; Zubova et al., 2018: Fig. 4; Shpakova, 2001). Malta 1 (the younger child) is characterized by a marked archaic morphology of the deciduous dentition, and its small size. The teeth of the Malta 2 child are notably larger and have less archaic features; in general, they are morphologically close to Caucasoid odonthological complexes. The upper second molars of this individual are not reduced, a large hypocone is present at the disto-lingual corner of the crown, the Carabelli cusp is moderately developed. The corresponding teeth of the Malta 1 child have a moderately reduced hypocone and the Carabelli cusp is absent (as far as can be judged by the incompletely formed crown).

The Ust-Kyakhta-3 molar is morphologically closer to the dentition of the Malta 1 individual than to that of Malta 2. They are similar in the peculiar shape of the crown, marked reduction of the hypocone, absence of the Carabelli cusp, and their overall small size. The buccolingual diameter of the tooth from Ust-Kyakhta-3 (9.5 mm) is notably smaller than its mean values in modern populations (10.1 mm (Zubov, Khaldeeva, 1993: Suppl., tab. 4)), but it is even smaller in the specimen from Malta 1 (9.2 mm).

Notably, the dietary patterns of the elder child from Malta (the incomplete dental formation of the younger one does not allow for examination of his diet) and the Ust-Kyakhta-3 individual could have been similar. The upper molars from Malta lack carious lesions, and dental plaque is present only in the form of yellowish spots. A paleopathological comparison can be made between the Ust-Kyakhta-3 specimen and a mandible belonging to a girl aged 14–15 found in 2014 at the Afontova Gora II site (Derevianko et al., 2014). Unlike the children from Ust-Kyakhta-3 and Malta, she had rather extensive deposits of dental calculus, although her permanent teeth had erupted not long before. This can be partially explained by metabolic disorders (Chikisheva, Zubova, 2016), but may also indicate different dietary patterns for the individuals from Afontova Gora II, Malta, and Ust-Kyakhta-3.

It should be noted that the classic complex of Malta is significantly more ancient (approximately 20–23 ka BP) (Sitlivy, Medvedev, Lipnina, 1997: 31) than those of Ust-Kyakhta-3 and Afontova Gora II. Therefore, a direct comparison of these sites is not possible; we can only assess their positions generally in the regional cultural-chronological pattern of the Paleolithic.

The origins of the Selenga culture assemblages is seen as a result of the autochthonous development of the earlier lithic industries of the region (Tashak, 2000: 69; Pavlenok G.D., 2015b). The Ust-Menza technology of preparation and use of wedge-shaped cores, observed

in the finds from the Late Upper Paleolithic sites of the western Trans-Baikal region (~18–13 ka BP), is seen as a direct predecessor of the Selenga lithic tradition, including one of its main elements—the shaping of wedge-shaped cores on spalls and pebbles (Moroz, 2014: 99–102). Thus, the oldest dates in the chronological range of the Malta complex come close to the latest ones for the Ust-Menza culture.

There are also earlier origins of the tradition of forming wedge-shaped cores on the exhausted flat cores observed in the region (Tashak, 2000: 69). Tashak has discovered this strategy in the assemblages of the initial Upper Paleolithic in the Podzvonkaya (more than 35 ka BP) (Tashak, 2016: 18–19) and Tolbaga (42–26 cal ka BP) (Izuho et al., 2019) archaeological sites. Notably, the samples from these sites exhibit all the elements of the material culture associated with the Selenga cultural complex. Outstanding examples of bone industry (Vasiliev, 2005; Tashak, 2007) and evidence of non-utilitarian human activity (Tashak, 2002; Konstantinov et al., 1983) are present here. Planigraphic study of the Podzvonkaya and Tolbaga sites reveals residential and economic complexes (Kostantinov, 1994: 50–51; Tashak, 2014; 2016: 42–70). The Malta site is also known to exhibit all of these elements (Gerasimov, 1931, 1935, 1958, 1961; Medvedev, 1983; Lipnina, 2002; Kimura, 2003).

We thus support the hypothesis that links the complexes of Podzvonkaya, Tolbaga, Malta, the Ust-Menza variant of the Late Upper Paleolithic, and the Selenga culture into a single evolutionary sequence of material culture. Although the available anthropological and archaeological data are fragmentary, this model seems to be the least contradictory.

Conclusions

The analysis of the dental finds from layer 1 at Ust-Kyakhta-3 allows a conclusion to be drawn that these are fragments of the deciduous left upper second molar of a child aged 11–13, and an incompletely erupted upper permanent molar, possibly from the same child. Both metric and non-metric traits of the deciduous tooth make it similar to the analogous teeth from Malta 1, which may suggest the attribution of anthropological finds from Ust-Kyakhta-3 to one and the same southern Siberian Upper Paleolithic dental complex (Zubova, Chikisheva, 2015). However, on the basis of the available data, this is as yet a premature conclusion.

Paleopathological features point to a good state of health for the Ust-Kyakhta-3 individual, to the dominance of meat in his diet, and probably to differences in diet patterns between him and Malta children on the one hand and the Afontova Gora II girl on the other hand.

The return of research interest in the old collections ensures the obtaining of important new data. The analysis of the Ust-Kyakhta-3 collection included the use of advanced method involving wet-sieving. It was this method that allowed the smallest fragments of anthropological material to be preserved, which proved to be a first in the history of studying the Stone Age in the Trans-Baikal region. Future prospects are associated with paleogenetic studies conducted in the Max Planck Institute for Evolutionary Anthropology, which hopefully will soon provide new information about the population of the Trans-Baikal region at the turn of geological times.

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References

Abramova Z.A. 1953
Paleoliticheskiye nakhodki v rayone g. Kyakhty. In *Paleolit i neolit SSSR*. Moscow, Leningrad: Nauka, pp. 266–275. (MIA; No. 39).

Abramova Z.A. 1959
Pamyatniki paleolita nizovyev r. Selengi. In *Arkheologicheskiy sbornik*, iss. 1. Ulan-Ude: Burgiz, pp. 26–32.

Aseev I.V. 2003
Yugo-Vostochnaya Sibir v epokhu kamnya i metalla. Novosibirsk: Izd. IAET SO RAN.

Chikisheva T.A., Zubova A.V. 2016
Paleopatologicheskaya kharakteristika nizhney chelyusti iz verkhnepaleoliticheskogo mestonakhozhdeniya Afontova Gora II. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXII. Novosibirsk: Izd. IAET SO RAN, pp. 190–193.

Debets G.F. 1930
Opyt vydeleniya kulturnykh kompleksov v neolite Pribaikalya: (Paleoetnologicheskiy etyud). *Izvestiya Assotsiatsii NII pri fiz.-mat. fak-te Mosk. Univ.*, vol. 3 (2-A): 151–169.

Derevianko A.P., Slavinsky V.S., Chikisheva T.A., Zubova A.V., Slepchenko S.M., Zolnikov I.D., Lysenko D.N., Drozdov N.I., Tsybankov A.A., Deev E.V., Rybalko A.G., Stasyuk I.V., Kharevich V.M., Artemyev E.V., Galukhin L.L., Bogdanov E.S., Stepanov N.S., Dudko A.A., Lomov P.K. 2014
Noviye antropologicheskiye nakhodki epokhi paleolita so stoyanki Afontova Gora II (predvaritelnoye opisaniye, kratkiy stratigraficheskiy kontekst). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XX. Novosibirsk: Izd. IAET SO RAN, pp. 431–434.

Edgar H.J.H. 2017
Dental Morphology for Anthropology: An Illustrated Manual. New York: Taylor & Francis group.

Gerasimov M.M. 1931
Malta – paleoliticheskaya stoyanka (predvaritelniye danniye): Rezultaty rabot 1928–1929 gg. Irkutsk: Krayev. muzey.

Gerasimov M.M. 1935
Raskopki paleoliticheskoy stoyanki v s. Malta. In *Paleolit SSSR: Materialy po istorii dorodovogo obshchestva*. Moscow, Leningrad: OGIZ, pp. 78–124. (Izv. GAIMK; iss. 118).

Gerasimov M.M. 1958
Paleoliticheskayia stoyanka Malta: Raskopki 1956–1957 gg. *Sovetskaya arkheologiya*, iss. 3: 28–32.

Gerasimov M.M. 1961
Krugloye zhilishche stoyanki Malta. *KSIA*, iss. 82: 128–134.

Izuho M., Terry K., Vasil'ev S., Konstantinov M., Takahashi K. 2019
Tolbaga revisited: Scrutinizing occupation duration and its relationship with the faunal landscape during MIS 3 and MIS 2. *Archaeological Research in Asia*, vol. 17: 9–23.

Kimura H. 2003
Blade industry of Malta site. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 1: 11–33.

Konstantinov M.V. 1994
Kamenniy vek vostochnogo regiona Baikalskoy Azii. Ulan-Ude, Chita: Izd. BNT SO RAN, Izd. Chitin. Gos. Ped. Inst.

Konstantinov M.V., Sumarokov V.B., Filippov A.K., Ermolova N.M. 1983
Drevneishaya skulptura Sibiri. *KSIA*, No. 173: 78–81.

Lbova L.V. 2000
Paleolit severnoy zony Zapadnogo Zabaikalya. Ulan-Ude: Izd. BNC SO RAN.

Lbova L.V., Khamzina E.A. 1999
Drevnosti Buryatii: Karta arkheologicheskikh pamyatnikov. Ulan-Ude: Izd. BNC SO RAN.

Lipnina E.A. 2002
Maltinskoye mestonakhozhdeniye paleoliticheskikh kultur (sovremennoye sostoyaniye izuchennosti i perspektivy issledovaniya). Cand. Sc. (History) Dissertation. Irkutsk.

Medvedev G.I. 1983
Paleolit Yuzhnogo Priangarya. D. Sc. (History) Dissertation. Novosibirsk.

Moroz P.V. 2014
Kamenniye industrii rubezha pleistotsena i golotsena Zapadnogo Zabaikalya: K IV Mezhdunar. nauch. konf. "Drevniye kultury Mongolii i Baikalskoy Sibiri" (Chita, 2013). Chita: Zabaikal. Gos. Univ.

Okladnikov A.P. 1948
Arkheologicheskiye issledovaniya v Buryat-Mongolii v 1947 godu. *Vestnik drevney istorii*, No. 3 (25): 155–163.

Okladnikov A.P. 1950
Arkheologicheskiye issledovaniya v nizovyakh reki Selengi. *KSIIMK*, iss. XXXV: 85–90.

Okladnikov A.P. 1977
Otchet ob issledovanii paleoliticheskogo poseleniya Ust-Kyakhta v 1976 g. Novosibirsk. Arkhiv IAET SO RAN. F. 1, Inv. 1, D. 224.

Okladnikov A.P. 1979
Nauchniy otchet o raskopkakh stoyanki Ust-Kyakhta-1 (Kyakhtinskiy rayon BurASSR) v 1978 g. Novosibirsk. Arkhiv IAET SO RAN. F. 1, Inv. 1, D. 224.

Orlova L.A. 1995
Radiouglerodnoye datirovaniye arkheologicheskikh pamyatnikov Sibiri i Dalnego Vostoka. In *Metody estestvennykh nauk v arkheologicheskikh rekonstruktsiyakh*, pt. 2. Novosibirsk: Izd. IAET SO RAN, pp. 207–232.

Pavlenok G.D. 2014
Kostyanaya industriya stoyanki Ust-Kyakhta-3 (Zapadnoye Zabaikalye). *Gumanitarniye nauki v Sibiri*, No. 2: 14–18.

Pavlenok G.D. 2015a
Tekhnologiya izgotovleniya klinovidnykh nukleusov v selenginskoy kulture Zapadnogo Zabaikalya (po materialam stoyanki Ust-Kyakhta-3). *Izvestiya Altaiskogo gosudarstvennogo universiteta. Istoricheskiye nauki i arkheologiya*, No. 3/2 (87): 178–184.

Pavlenok G.D. 2015b
Tekhnologiya obrabotki kamnya v selenginskoy kulture Zapadnogo Zabaikalya (po materialam stoyanki Ust-Kyahta-3). Cand. Sc. (History) Dissertation. Novosibirsk.

Pavlenok G.D. 2016
Predvaritelniye rezultaty primeneniya metoda remontazha pri rekonstruktsii tekhnologii rasshchepleniya kamnya v industrii stoyanki Ust-Kyakhta-3 (Zapadnoye Zabaikalye). In *Esse quam videri: K 80-letiiu Germana Ivanovicha Medvedeva*. Irkutsk: Izd. Irkut. Gos. Univ., pp. 248–255.

Pavlenok K.K. 2013
Otchet ob issledovanii pamyatnika Ust-Kyakhta-3 v 2012 godu v Kyakhtinskom rayone Respubliki Buryatii. Novosibirsk. Arkhiv IAET SO RAN. F. 1, Inv. 1, D. 2327.

Ravsky E.I. 1972
Osadkonakopleniye i klimaty Vnutrenney Azii v antropogene. Moscow: Nauka.

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

Sitlivy V., Medvedev G.I., Lipnina E.A. 1997
Les civilisations prehistoriques d'Asie Centrale. I. Le Paléolithique de la rive occidentale du lac Baikal. Bruxelles: Musées royaux d'Art et d'Histoire.

Tashak V.I. 1995
Paleolit i mezolit yuga Buryatii. Cand. Sc. (History) Dissertation. Ulan-Ude.

Tashak V.I. 2000
Tortsoviye klinovidniye nukleusy Zapadnogo Zabaikalya v pozdnem paleolite i mezolite. In *Kamenniy vek Yuzhnoy Sibiri i Mongolii: Teoreticheskiye problemy i noviye otkrytiya*. Ulan-Ude: Izd. BNC SO RAN, pp. 59–74.

Tashak V.I. 2002
Obrabotka skorlupy yaits strausov v verkhnem paleolite Zabaikalya. In *Istoriya i kultura vostoka Azii*. Novosibirsk: Izd. IAET SO RAN, pp. 159–164.

Tashak V.I. 2004
A variant in the development of the Middle Paleolithic industries in the western Trans-Baikal Region. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4: 2–12.

Tashak V.I. 2005
Paleoliticheskiye i mezoliticheskiye pamyatniki Ust-Kyakhty. Ulan-Ude: Izd. BNC SO RAN.

Tashak V.I. 2007
Orudiya iz kosti i ikh proizvodstvo v verkhnem paleolite Zapadnogo Zabaikalya (po materialam Podzvonkoy). *Izvestiya Laboratorii drevnikh tekhnologiy*, iss. 5: 118–137.

Tashak V.I. 2012

Ostrokonechniki ust-kyakhtinskogo tipa i orudiya na divergentnykh skolakh. *Izvestiya Laboratorii drevnikh tekhnologiy*, No. 1 (9): 31–42.

Tashak V.I. 2014

Stanovleniye rannego verkhnego paleolita Zapadnogo Zabaikalya (po materialam Nizhnego kompleksa stoyanki Podzvonkaya). *Stratum plus*. Iss. 1: Fragmenty doistorii: 149–164.

Tashak V.I. 2016

Vostochniy kompleks paleoliticheskogo poseleniya Podzvonkaya v Zapadnom Zabaikalye. Irkutsk: Izd. Inst. Geografii SO RAN.

Vasiliev S.K. 2005

Poseleniye Tolbaga: Tekhnologiya obrabotki kosti i kostyaniye orudiya. In *Paleoliticheskiye kultury Zabaikalya i Mongolii (noviye pamyatniki, metody, gipotezy)*. Novosibirsk: Izd. IAET SO RAN, pp. 56–63.

Zotkina L.V., Pavlenok G.D., Tashak V.I. 2018

Tekhnologiya proizvodstva busin iz skorlupy yaits strausa v finalnom paleolite Zapadnogo Zabaikalya. *Stratum plus*, No. 1: 181–197.

Zubov A.A. 2006

Metodicheskoye posobiye po antropologicheskomu analizu odontologicheskikh materialov. Moscow: Etno-online.

Zubov A.A., Gokhman I.I. 2003

Nekotoriye noviye odontologicheskiye danniye po verkhnepaleoliticheskoy stoyanke Malta. *Vestnik antropologii*, No. 10: 14–23.

Zubov A.A., Khaldeeva N.I. 1993

Odontologiya v antropofenetike. Moscow: Nauka.

Zubova A.V., Chikisheva T.A. 2015

The morphology of human teeth from Afontova Gora II, Southern Siberia, and their status relative to the dentition of other Upper Paleolithic Northern Eurasians. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 43 (4): 135–143.

Zubova A.V., Moiseev V.G., Khlopachev G.A., Kulkov A.M. 2018

Deciduous human teeth from the Upper Paleolithic site of Yudinovo, Western Russia. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 46 (3): 138–145.

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The "Kalgutinsky" Style in the Rock Art of Central Asia

On the basis of petroglyphic sites Kalgutinsky Rudnik (Kalgutinsky mine) on the Ukok Plateau, Baga-Oygur, and Tsagaan-Salaa in northwestern Mongolia, a distinct "Kalgutinsky" style of rock art of the Russian and Mongolian Altai is described. The distance between these sites is about 20 km. This group is marked by very specific stylistic features, common technological properties, a narrowly defined subject featuring only animals, and a very intense desert varnish. All these features, together with the proximity of the sites, suggest that they should be regarded as a special group, which we term the "Kalgutinsky" style, and date to the Upper Paleolithic on the basis of several criteria. Images of mammoths at Baga-Oygur and Tsagaan-Salaa are similar to those known in the classic Upper Paleolithic cave art of Western Europe. An entire set of stylistic features typical of the "Kalgutinsky" canon is seen also in the representations of mammoths, and this manner is consonant with that of European Upper Paleolithic rock art. Our findings suggest that a peculiar "Kalgutinsky" style existed, and moreover, that it represented a separate Central Asian locus of Upper Paleolithic rock art.

Keywords: *Rock art, petroglyphs, style, iconography, technology, Mongolian Altai, Russian Altai, Ukok Plateau, Kalgutinsky Rudnik.*

Introduction

In the 1990s, large-scale archaeological studies were conducted on the Ukok Plateau, in the southern part of the Russian Altai Mountains (Molodin, 1995). These resulted in a series of brilliant discoveries, one of which was identification of the earliest pictorial stratum known in the region and vividly represented at the site of Kalgutinsky Rudnik (Molodin, Cheremisin, 1999: 83–86). The authors of the monographic study analyzing the site provided some arguments for dating the petroglyphs found there to the Final Pleistocene, primarily on the basis of stylistic features of the main part of the representations.

Discoveries made at the turn of the 20th and 21st centuries by the Russian-Mongolian-American

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expedition in a huge petroglyphic array at the Tsagaan-Salaa and Baga-Oygur sites, located near the Ukok Plateau, made it possible to identify the earliest layer of representations. Although different chronological interpretations were given*, scholars considered this layer to be archaic and different from the rock art of the Bronze Age, Early Iron Age, and the Middle Ages (Jacobson, Kubarev, Tseveendorj, 2001a: 63). Notably, in addition to the stylistic features, these petroglyphs represented images of the animals that lived in this area only in the Pleistocene, such as mammoths (Ibid.). The series of petroglyphs at the Ishgen-Tolgoi site was also attributed by the Mongolian scholars to the earliest stratum, on the basis of its stylistic features (Tseveendorj, 1982; 1999: 95–100, tab. 132). Already, at the beginning of the 21st century, stylistically similar images had been discovered in the areas of Mongolia further to the south (Jacobson, Kubarev, Tseveendorj, 2001a, b), and in the areas of the Russian Altai Mountains further to the north, than the area under consideration (Miklashevich, 2000).

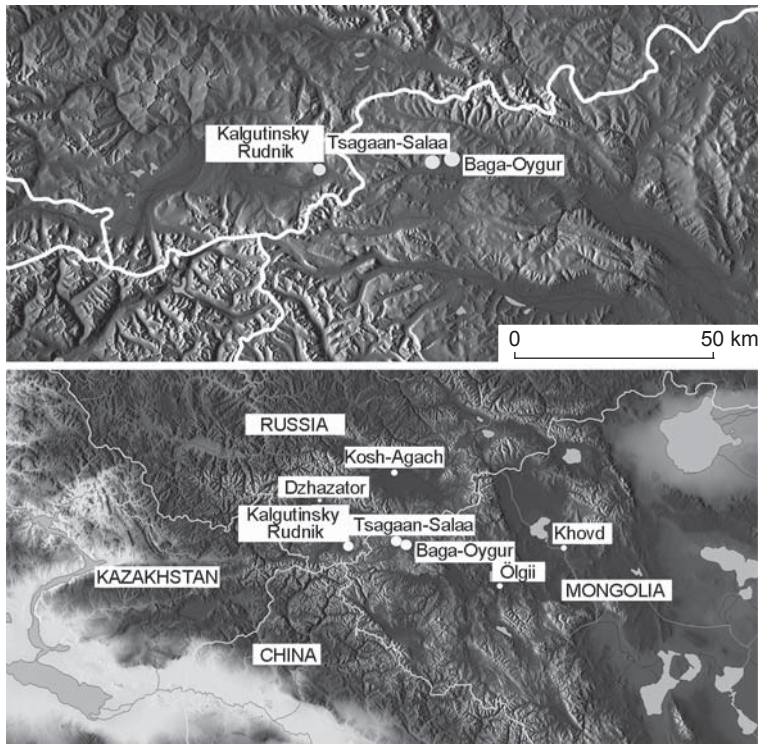

Fig. 1. Location of the sites of Kalgutinsky Rudnik (Russia), Baga-Oygur and Tsagaan-Salaa (Mongolia).

The sites of the Kalgutinsky Rudnik, Baga-Oygur, and Tsagaan-Salaa are located very close to each other, at a distance of about 20 km (Fig. 1). This situation required a focused approach to dating the petroglyphs from the earliest layer. This task was undertaken by the Russian-French expedition of the International Associated Laboratory ARTEMIR (LIA ARTEMIR), which included the authors of this article. Multidisciplinary studies conducted at the site of Kalgutinsky Rudnik on the Ukok Plateau (Fig. 2) have resulted in the discovery of new images, which in terms of their iconographical canons showed undoubted similarities to the representations found there earlier (Molodin et al., 2016). A specialized expedition to the sites of Tsagaan-Salaa and Baga-Oygur in northwestern Mongolia continued this work. Mongolian colleagues led by Academician D. Tseveendorj joined the team of the expedition. In 2017, over 20 images from the early chronological stratum were found; the already described representations were revisited, and a large number of previously unknown archaic petroglyphs were discovered (Cheremisin et al., 2018).

Thus, over 50 images made in a stylistically similar manner have been found at only three sites (Kalgutinsky Rudnik, Tsagaan-Salaa, and Baga-Oygur). From our point of view, this makes it possible to raise the issue of identifying a specific style, at least in this particular region of Asia, which may be called "Kalgutinsky" style. This study focuses on establishing the validity of this style and defining its main canons.

The notion of style in prehistoric art

It has long become clear to researchers of prehistoric art that rock art, which most often does not have a direct connection with the cultural layer, cannot be linked to stratigraphy and thereby reliably dated. Therefore, such methods as correlation of the petroglyphs with the remains of the material culture, including mobile art, are used for studying rock art. Fortunately, the pigments can sometimes be dated directly, which makes it possible to determine the absolute chronology of the rock art.

Quite early, chronological attribution became a priority for researchers of Paleolithic art. For this purpose, the methods of indirect dating were applied, such as analysis of palimpsests, use of parallels from the mobile art, and study of the development of figurative manner and stylistic features. Abbot A. Breuil and later A. Leroi-Gourhan proposed two chronological models.

Breuil elaborated a concept (1952) based on various criteria, including formal stylistic features manifested in the methods of rendering representations, as well as

*D. Tseveendorj dated it to the Paleolithic; E. Jacobson suggested the Mesolithic, while V.D. Kubarev attributed the images to the Early Holocene (Jacobson, Kubarev, Tseveendorj, 2001a: 63)

Fig. 2. General view of some planes of the Kalgutinsky Rudnik site.

the presence of artistic perspective in the depiction of animals and their parts. Following this model, Breuil identified two large cycles in the development of the art, independent of each other: the Aurignaco-Perigordian and then the Solutreo-Magdalenian cycles. Currently, his system has almost fallen out of use.

Leroi-Gourhan (1965b) adopted the concept of Breuil, relying on the sources that were dated by the stratigraphic method. He identified various ways of depicting animal figures in perspective and, using statistical data, established successive styles, which characterize specific chronological periods. Leroi-Gourhan traced the evolution of the manner of representation of animals on the basis of its chronological stages, which were associated with four styles that were themselves preceded by the "prefigurative" style. He identified the four successive stages in the imagery's development: pure geometric, figurative geometric, synthetic, and analytical. The chronological classification of Leroi-Gourhan, created with some caution, was marked by its practical validity. The chronological sequence of styles, which he distinguished on the basis of the formal analysis of images, did not always coincide with phases in the development of material culture. In addition to these problems, the system of Leroi-Gourhan contained several controversial points, which were repeatedly challenged by other scholars (see, e.g., (The Use of Style…, 1990; Lorblanchet, Bahn, 1993)) and later underwent a well-known conceptual adjustment. This was related to his concept of a single line of development of the figurative tradition in the Paleolithic, to the opposition of features of the mobile and cave art, and to the idea of stable cultural unity throughout the development of Paleolithic art in Europe.

At present, the problem of style as a "manner of representation" has been revised, and the stylistic approach to the analysis of sources has been reasonably rehabilitated (Otte, Remacle, 2000). Style is now regarded as a kind of cultural code. For example, if we take a specific period of rock art, the reliably dated images from Foz Côa in Portugal (Aubry, Sampaio, 2008) have made it possible to identify similar figurative features at sites belonging to widely different periods and territories (Guy, 2010). Recently, the rock art assemblages of the Early Upper Paleolithic in the Franco-Cantabrian region were reliably attributed thanks to their comparison with the directly dated art of Chauvet-Pont-d'Arc (Petrognani, 2013), which shows a certain stylistic freedom—especially noticeable in contrast with the later tradition of the Magdalenian, where conventions of style were much more explicit.

In the light of recent research, it is important to recall how the data on the figurative manner (which is called style) can be used in the European archaeology of the Paleolithic; but first of all we should mention another purpose for studying this phenomenon, in addition to

chronological attribution, as did our famous predecessors Breuil and Leroi-Gourhan. The concept of culture in prehistory is mainly based on the study and interpretation of its economic aspects. The items of everyday life first attracted the attention of scholars, because they were the products of material culture. Given that this is a distant prehistoric time, many findings in this area were unexpected, because they indicated functions of tools and human capacities which scholars had not expected to discover.

This vision of issue in the spirit of materialism has become the basis for shifting research towards cave art and expanding opportunities in this field. In addition, the very phenomenon of prehistoric rock art was not limited by the framework of stratigraphy of archaeological layers, which would isolate the material culture within the chronological "envelopes". The general concept of the developments in the field of prehistory from the very moment of its emergence has borrowed many tools from natural sciences. In this context, the lack of information inherent in the study of cave art has led scholars to use style as the main tool for establishing the chronological sequence.

Artifacts, which form material culture, allow us to establish their purpose, but not the values and ideas that united the carriers of the same culture (Testart, 2012). Meanwhile, the method of representing animals in the caves of Chauvet, Lascaux, or Altamira gives grounds to pose the question: what was the style of these different sites of cave art of the Upper Paleolithic from the social point of view? As Leroi-Gourhan and other scholars of his school have clearly shown, images of animals in the caves testify to the existence of common concepts that were shared by the population of vast territories for thousands of years. These concepts may have constituted a certain mythologized and structured worldview (Leroi-Gourhan, 1965a, b; 1992).

Innovative approaches closer to our time fostered the development of a hypothesis that in Paleolithic art one may find distinctive traces of symbolic use of animal imagery for ritual purposes to achieve a certain result (economic or political), as it happened in other chronological periods and in other historical and ethnographic contexts. The absolute predominance of animal imagery, the selectiveness of the subject matter, the lack of context and narrative, the exact reproduction of the typical features, which allows the species to be clearly identified, and the repetition of motif and formal features in rendering images from one site to another, indicate a high degree of image standardization (Guy, 2017: 170–177). The outlines of the figures underwent the process of geometrization at a fairly early stage. This facilitated standardization and made it possible to achieve unmistakable and instant recognition, which ensured the continuity and transmission of such forms.

The most recent studies based on comparison of data on the stability of formal features (criteria of style) in time and space suggest the existence of various artistic "schools", which many archaeologists mentioned earlier on the basis of other features relating to the principles described above. The transmission of the figurative manner was intended to convey certain collective cultural codes, which perpetuated the values. Undoubtedly, representations in caves, with their monumental sizes, topographic location, and abundance of figurative and non-figurative symbols, were designed to impress the viewer and establish some power over him with the help of visual effect, which is typical of prestige strategies (Ibid.: 187). The high degree of standardization in the art of the Late Paleolithic, achieved by means of a special style, indicates the adaptability of cave artworks to the transmission of information. Perhaps, for the first time in history, the great flourishing of culture can be observed throughout the entirety of Eurasia.

In Soviet and Russian archaeology, as in art history, the notion of style was used to describe the phenomena of artistic culture of the past; and stylistic analysis served as a productive tool for archaeological research. Even now, after the introduction of innovations used by the specialists for studying rock art, it remains the most important method for determining the unity of visual canons adopted in a specific community.

Notably, A.P. Okladnikov attributed the emergence of pictorial activity to the Mousterian period and the Neanderthal culture. This is confirmed by the results of studying Paleolithic complexes in the Altai Mountains (Derevianko, Shunkov, Volkov, 2008; Shunkov, Fedorchenko, Kozlikin, 2017a, b; Derevianko et al., 2018; Shunkov, Fedorchenko, Kozlikin, 2018). Okladnikov associated a number of sites in western Mongolia with the Upper Paleolithic, and formulated a concept of a specific Central Asian center of prehistoric art (1967: 120, 126). He dated the painted representations of the Hoyt Tsenker Agui cave and petroglyphs of the Arshan Khad site to this period (1972: 76), relying on a number of animal figures as images of the Pleistocene fauna, as well as the thematic and stylistic originality of other animal representations. Okladnikov understood style as a stable set of expressive means used by an ancient artist, or as a pictorial canon typical of a specific group of images (1980: 88).

Following up on this point, it is appropriate to cite the definition of artistic style proposed by E.E. Kuzmina: "A sustainable… set of pictorial techniques, elements of interpreting a certain range of images in a specific territory and in a specific chronological period" (1983: 95). V.A. Korenyako defined style as a structural unity of the image-based system and methods of artistic expression, which make it possible to differentiate between the styles and use the style for establishing the chronological period (1998: 69–77). According to E.F. Korolkova, these are

the stylistic parameters, which provide a cultural and chronological attribution (1996).

The concept of style in the context of studying the "language" of prehistoric art, using the petroglyphs of Central and Middle Asia, was analyzed in detail in the works by Y.A. Sher, who proposed a method of formalizing elusive stylistic details—the theory of "pictorial invariants" as formal expressive elements of artistic features of early representations, serving as a tool for establishing their originality. Sher identified such elements in the course of "dissecting", deconstructing images into their constituent parts, and determining their structural components (1980: 28–32). A stable combination of stylistic invariants or sets of such invariants determines the originality of style.

Later, when Sher was developing the idea of origin of arts, he demonstrated the possibility of applying the concept of style to the study of the earliest Paleolithic art (Pervobytnoye iskusstvo…, 1998: 63–84; Sher, 2004). In his opinion, "style as a totality of expressive means creating the originality of the artistic manner appeared along with pictorial activity. Already at the dawn of art in the Upper Paleolithic, the expressive features of planar, relief, and three-dimensional images emerged, inherent only in this period and not repeated anywhere else" (Pervobytnoye iskusstvo…, 1998: 74). Prominent researchers of the rock art of Asia H.-P. Francfort and E. Jacobson defined style as "a set of distinctive features for artistic expression of ideas inherent in individuals, groups of people, schools of craftsmen, or chronological periods" (2004: 62).

The idea of the pictorial canon that comprises stylistic features of images was behind the interpretation of style proposed by D.G. Savinov (2009). He introduced the important concept of "pictorial stratum", implying "the spatial and temporal distribution of images made in a single figurative tradition, which corresponds to a certain state of spiritual culture" (Savinov, 2008: 73). Typical style is a kind of core for each pictorial stratum. Probably for the first time, Savinov synchronized the styles in the rock art of Central and Northern Asia in the Holocene. He attributed the Minusinsk and Angara styles to the Neolithic; the Okunev, Seima-Turbino, and Karasuk styles to the Bronze Age; the Arzhan-Mayemir style to the Early Scythian period; and the Pazyryk style to the period of the early nomads of the Altai Mountains. He regarded the "labyrinths" as ideograms of the Xiongnu period, and attributed the realistic style of the multifigured compositions to the Early Middle Ages (Ibid.).

There are various classifications of the concept of style. The following categories can be mentioned: in accordance with chronology ("earliest", "early", "archaic", "late") (Okladnikov, 1968: 26–27; Cheremisin, 2006; Molodin, Cheremisin, 2007); degree of realism ("realistic", "dynamic-realistic", "abstract stylized") (Leontiev, 1976; Podolsky, 1973; Okladnikov, Martynov, 1972: 176–187); area of distribution ("Minusinsk", "Angara"); pictorial features ("linear", "geometric", "bitriangular") (Okladnikov, 1976: 44–50; Rogozhinsky, 2008); or cultural and regional aspect ("Scytho-Siberian animal style") (Savinov, 1995). This list can be continued.

At the end of this section, it would be appropriate to cite the point of view of M.A. Devlet and E.G. Devlet, who stated that the chronological scale of European cave art (as essentially the earliest art), which was developed on the basis of stylistic analysis and study of palimpsests, has been supported today by the results of direct radiocarbon dating (2001: 130). Thus, we may conclude that stylistic analysis is a basic method, which makes it possible to evaluate the cultural and chronological unity of rock art creators. Stylistic aspects without context cannot be considered as an independent tool for chronological attribution of petroglyphs. However, the correlation of stylistic features of rock art with other data (subject matter, technological component, etc.) allows a conclusion to be drawn about the place of a particular style in the cultural and chronological pattern of the region.

The "Kalgutinsky" style

After the first studies at the site of Kalgutinsky Rudnik, a hypothesis was proposed about the earliest age of a series of petroglyphs of archaic appearance (Molodin, Cheremisin, 1993; 1999: 83–86). This hypothesis was based on several arguments: a very intense desert varnish on pecked surfaces, the absence of images of unambiguously Holocene representatives of fauna, an archaic manner of rendering images, an almost complete lack of parallels in the adjacent territories, and, in contrast, stylistic similarity to the Western European cave and rock art of the Paleolithic. Results of experimental traceological analysis of petroglyphs from the site, which was carried out later, served as additional indirect argument in favor of the early age of the images. Without dwelling on the details, we can state that all studied images, which were supposedly associated with the earliest layer, were made with stone tools from local raw materials or even in some cases with unprocessed pebbles. However, it should be mentioned that even in the later periods, stone remained the only effective material for processing rhyolite—hard type of rock intensely polished during the movement of the glacier and extremely resistant to any impacts—on the outcrops of which the petroglyphs were made.

In recent years, new petroglyphs, stylistically related to the earliest layer, have been found at Kalgutinsky Rudnik. However, these still do not include subjects that could be interpreted as exclusively late (for example, Holocene fauna, anthropomorphic representations,

horsemen, etc.). Images such as horses, bulls, goats, and (less frequently) deer remain typical here.

During numerous studies it has been found that many of the images at Kalgutinsky Rudnik often are not even completely visible (Fig. 3, *2*). This was caused by extremely intense desert varnish of this group of petroglyphs, as well as the specific technique of execution of some of them. The most common techniques were surface pecking and rubbing. Experiments have shown that these methods make it quite easy to break the integrity of the rock crust and create a contrast effect with light areas of the damaged surface, which sometimes acted as independent areas and sometimes as preparatory ones before deeper processing. Such extremely superficial traces obviously become dark much faster than deep traces.

Another important aspect is weathering of the damaged areas on the rocky crust. After deep pecking (Fig. 3, *1*, *3*, *4*), rock loses its natural strong layer polished by the glacier, and the granules that it consists of begin to crumble rapidly. Therefore, even despite long-term exposure to the sun, the surface treated with deep pecking looks lighter. The difference in the intensity of desert varnish between the petroglyphs made in the technique of deep pecking, reliably dated to the Iron Age (Fig. 3, *3*), and presumably the earliest images is obvious (Fig. 3, *1*). The early representations look as dark as the untreated surface of the rock. Noteworthy is the technique of fine engraving, which also appears among the Kalgutinsky petroglyphs of the early layer. This is a small image of horse, completely invisible on the surface of the rock, because it was made with very thin, highly varnished lines (Fig. 4, *7*). Stylistically and compositionally, this petroglyph is associated with a large image of horse, made with the rubbing technique (Fig. 4, *6*).

These distinctive representations at the rock art sites of the neighboring regions of Russia and Mongolia are united into one group because of their similar manner of rendering images. First of all, it is realistic (Fig. 4, *5*). Sometimes, partial images occur, and this is not due

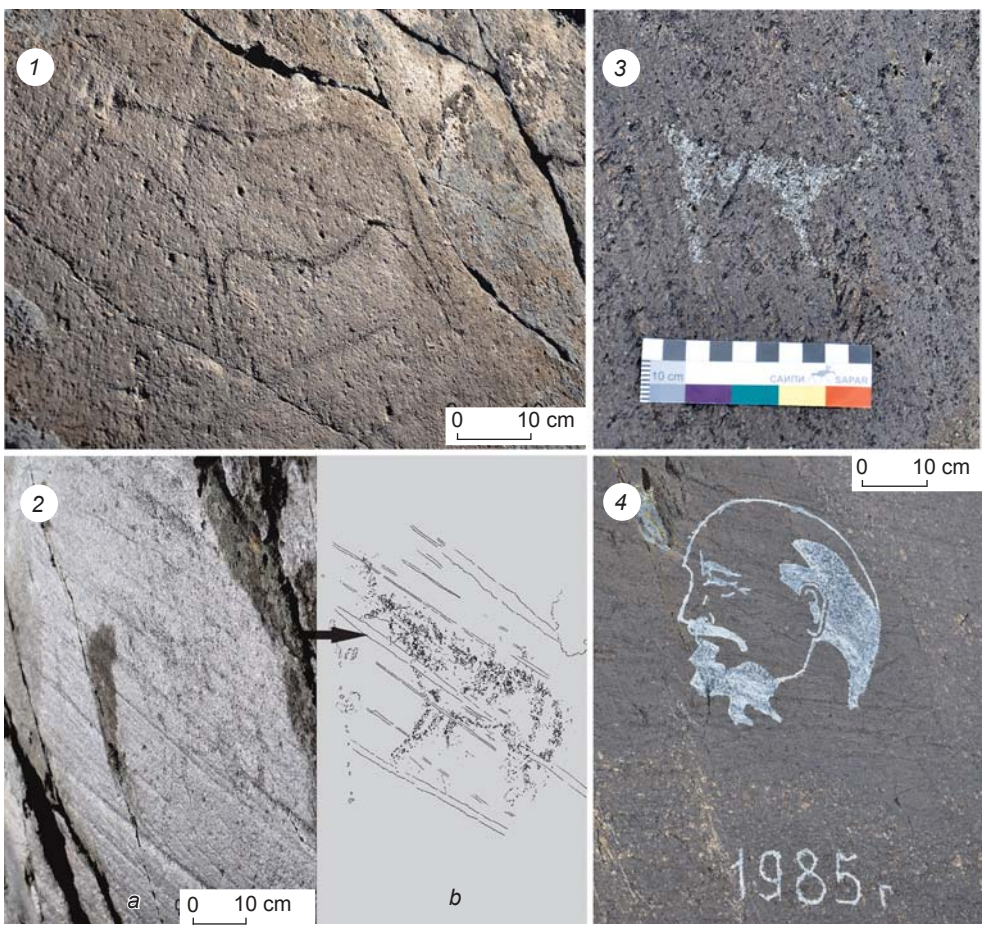

Fig. 3. Comparison of the intensity of desert varnish of the petroglyphs at Kalgutinsky Rudnik.
1 – image of horse, made by deep pecking; tentatively attributed to the earliest layer; *2* – image-"phantom" of horse with a bent leg (*a*), and its tracing (*b*); *3* – image made by deep pecking, dated to the Iron Age; *4* – modern image of Vladimir Lenin, made with a metal tool in the technique of deep pecking.

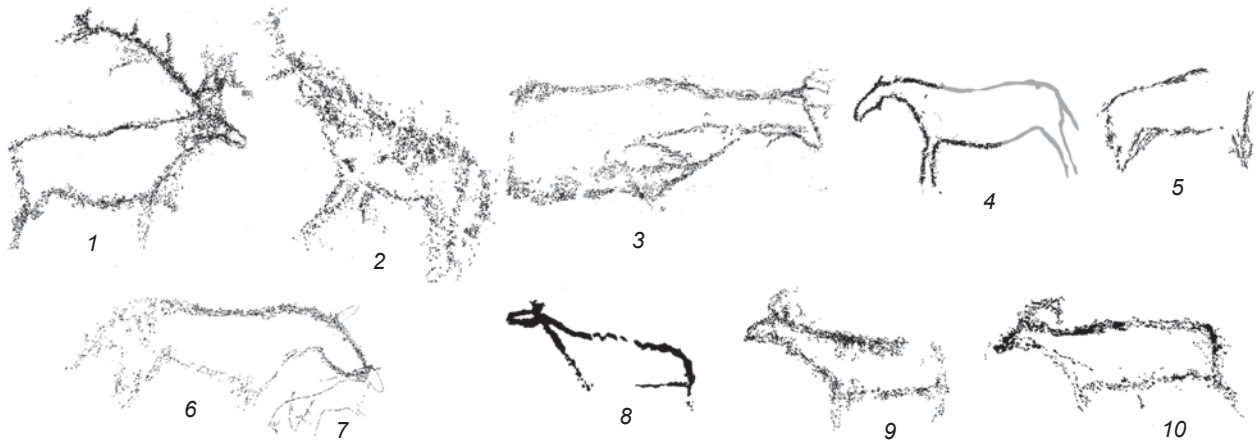

Fig. 4. Petroglyphs of the "Kalgutinsky" style at Kalgutinsky Rudnik (Ukok Plateau, Russian Altai).

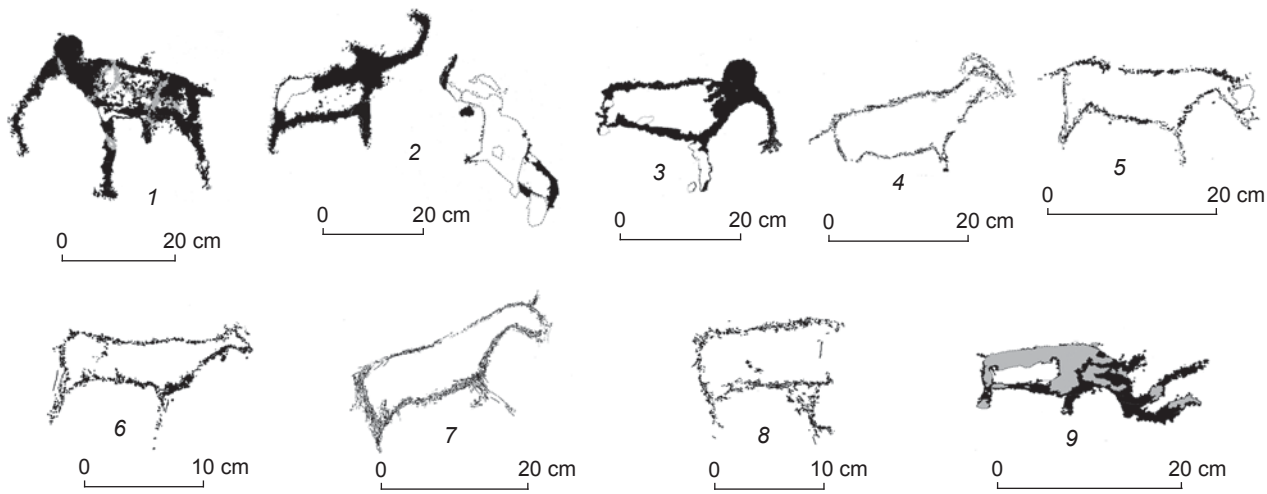

Fig. 5. Petroglyphs of the "Kalgutinsky" style at Baga-Oygur and Tsagaan-Salaa (Mongolian Altai).
1–2, *9* – Baga-Oygur II; *3* – Tsagaan-Salaa; *4–8* – Baga-Oygur III.

to poor preservation; they were intentionally left incomplete (see, for example, Fig. 4, *3*, *6*, *8*, *10*). Static posture and lack of perspective (with rare exceptions) can also be called the common features. Distinctive methods for rendering some image details have been identified.

The artistic manner of representing the animal's head is the most important feature of this series of petroglyphs. There were two ways doing this. In the first case, it was drawn as a triangle, without details; an angle of 90 degrees can be clearly seen between the lines of the head and neck (the latter continues into the outline of the back) (Fig. 6, *1–9*). Other elements, such as antlers or horns, correspond to this manner of representation of the head. This technique is associated with the obvious interruption in the pecking process: after portrayal of the upper part of the head, which could be continued into the horn or antler, the direction and position of the artist's hand and tools changed, and a new line for the back began. This way of organizing visual space was common in classic Paleolithic art (Fig. 6, *15*, *16*). The second technique was fundamentally different: the upper line of the head smoothly continued into the outline of the back (Fig. 6, *10–14*). Such a manner has been quite often found in prehistoric art, including the classic Western European examples (Fig. 6, *17*). In both cases, the lower line of pecking, which constitutes the outline of the muzzle, seems separate; that is, the outline of the animal's head was formed, not by one continuous line, but by at least two lines connected in the area of the mouth.

Another important feature is related to the depiction of the hind leg. The first manner of execution was based on simple connection of two almost straight lines—the abdomen and outer contour of the leg (sometimes it is the continuing line of the back). In such cases, a distinctive angle (straight, less often close to acute) was

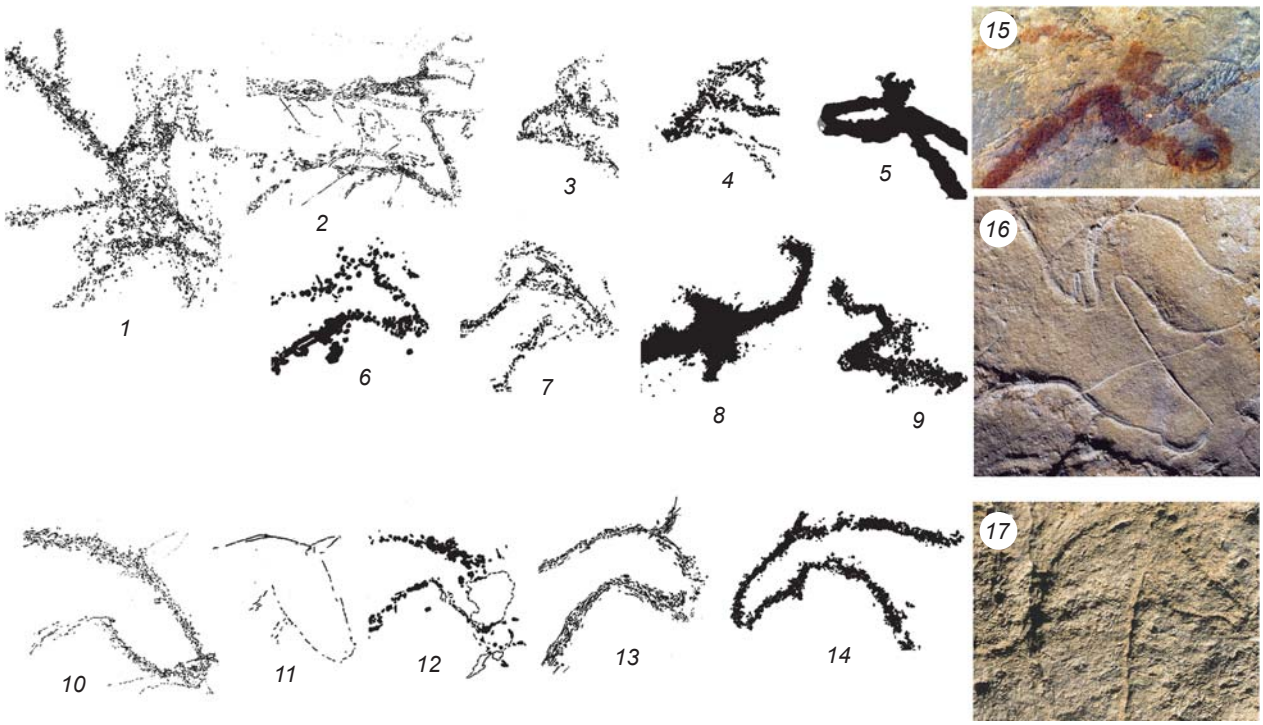

Fig. 6. Two methods of representing the head in zoomorphic images.
1–5, *10*, *11*, *14* – Kalgutinsky Rudnik, Russian Altai (tracing by the authors); *6–9*, *12*, *13* – Baga-Oygur, Mongolian Altai (tracing by the authors); *15* – La Pasiega, Spain (after (Groenen, 2016)); *16* – Cosquer, France (after (Clottes, Courtin, Vanrell, 2005)); *17* – Pair-non-Pair, France (after (Clottes, 2008)).

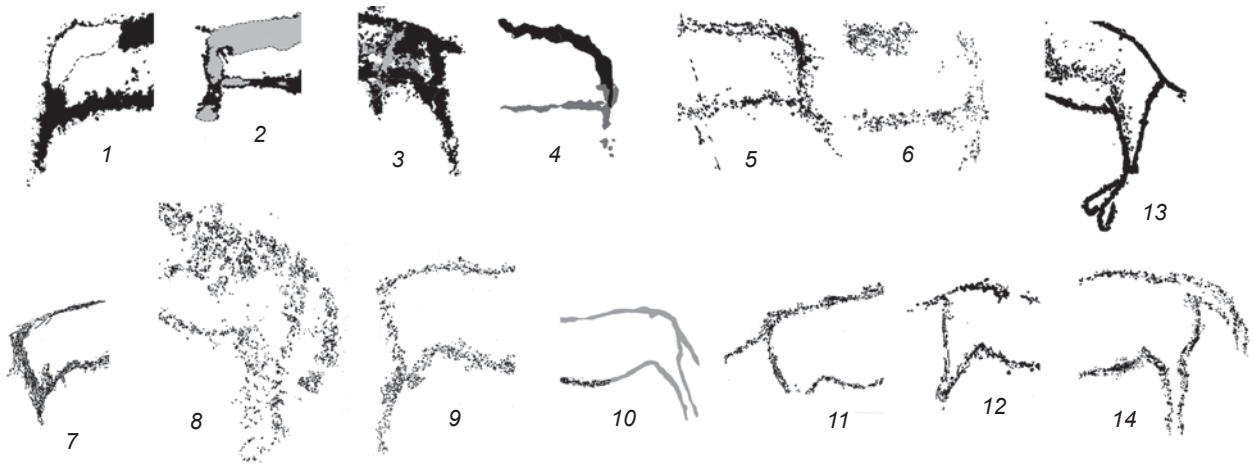

Fig. 7. Two methods of representing the hind leg in zoomorphic images.
1–3, *7*, *11*, *12* – Baga-Oygur, Mongolian Altai (tracing by the authors); *4–6*, *8–10* – Kalgutinsky Rudnik, Russian Altai (tracing by the authors); *13* – Rego de Vide, Portugal (after (Baptista, 2009)); *14* – Marcenac, France (after (Lorblanchet, 2010)).

formed between two lines inside the outline of the figure (Fig. 7, *1–7*). This method of simple connection of two lines implies the absence of hip-details. This manner was quite common. Another, no less frequently encountered method, in contrast, made it possible to depict the leg in a more realistic way. The leg was shown with two lines, one of which was connected with the outline of the abdomen. Outside the outline, they formed an angle close to obtuse. This technique made it possible to emphasize a convex, sometimes even deliberately heavy belly (Fig. 7, *8–12*). Both of these methods were typical of prehistoric rock art of Western Europe (Fig. 7, *13–14*).

Another important detail is representation of the tail. In the cases where the tail is present, it is a continuation

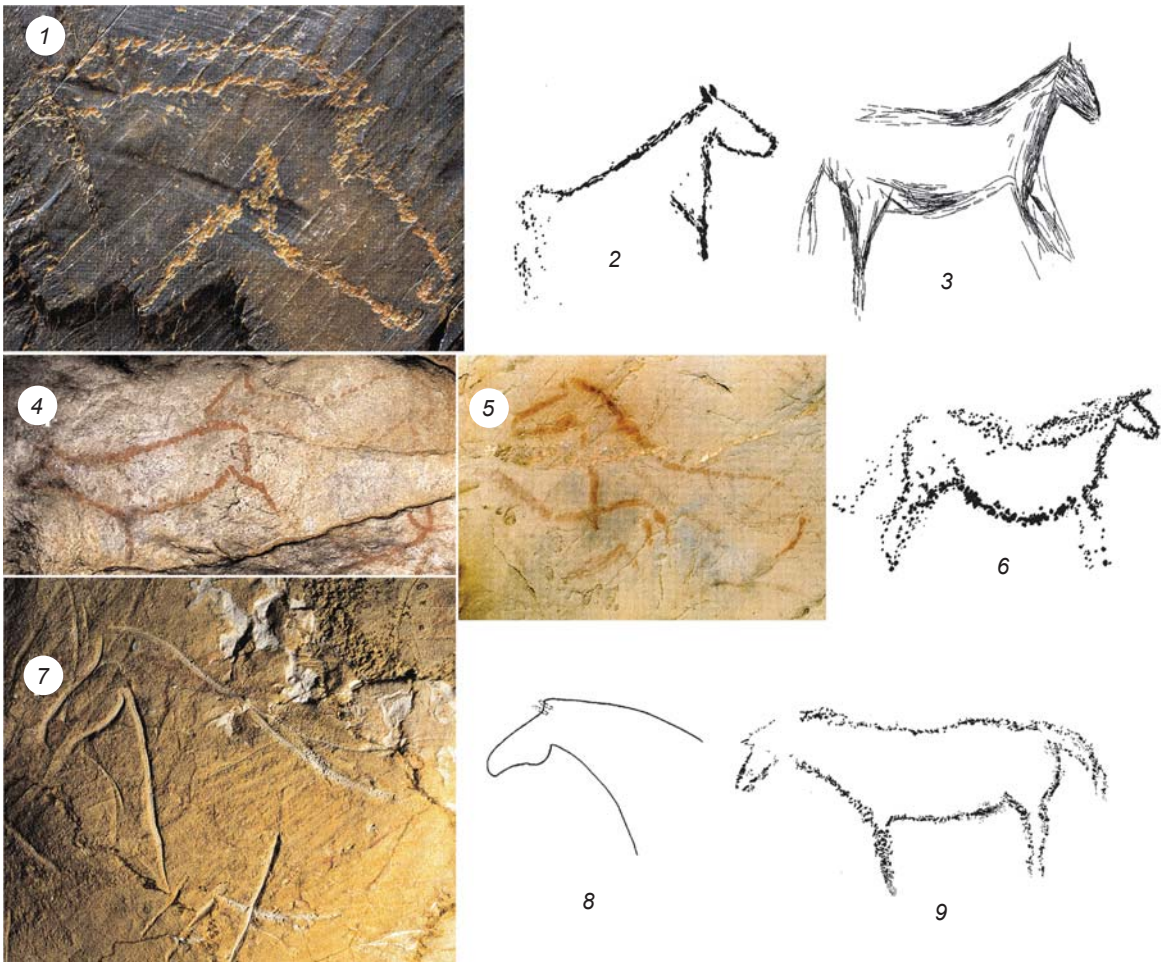

Fig. 8. Parallels to petroglyphs of the "Kalgutinsky" style in the cave and rock art of Western Europe.
1 – Siega Verde, Spain (after (Groenen, 2016)); *2*, *3* – Canada do Inferno, Portugal (after (Baptista, 1999)); *4* – Covalanas, Spain (after (Clottes, 2008)); *5* – La Pasiega, Spain (after (Groenen, 2016)); *6* – Costalta, Portugal (after (Baptista, 2009)); *7* – Cosquer, France (after (Clottes, Courtin, Vanrell, 2005)); *8* – Roucadour, France (after (Lorblanchet, 2010)); *9* – Marcenac, France (after (Clottes, Courtin, Vanrell, 2005)).

of the line of the back (Fig. 7, *7*, *8*, *10–12*). Most often, the tail is shown in animal figures with emphasized bellies and hips. Notably, with rare exceptions, the legs of animals are always depicted without hooves, and are often left unfinished (see Fig. 4, 5).

The modeling of the back should be given special attention. Usually it was the longest line, which was drawn first, acting as a "load-bearing" line for the entire image of the animal: the rest of the details seem to have been mounted on it. It should be noted that in many figures the back was often made with a concave curve parallel to the stomach (see Fig. 4, *2–4*), although a double bent line when depicting a hump, for example in goats, deer, or bulls, also occurs (see Fig. 4, *1*, *3*; 5, *4*, *6*).

All the above features can only be viewed as archaic and specific to Paleolithic art (Fig. 8). The triangular head of the figure or single line of the head and horn/antler, separated from the back, simple connection of two lines at the right angle for representing the hind leg (without details of the hip) clearly indicate a certain stylistic specificity of the Kalgutinsky petroglyphs. Moreover, various techniques are often combined in one image. Thus, the Kalgutinsky petroglyphs not only look similar to the classic examples of archaic art, but show the influence of a certain, possibly regional, component, which adds originality to the Kalgutinsky rock representations.

Similar, and in some cases identical stylistic techniques occur both in the Kalgutinsky petroglyphs and in archaic images from the sites of Baga-Oygur and Tsagaan-Salaa in the Mongolian Altai (see Fig. 1, 4, 5), which makes it possible to speak about a single cultural space for the carriers of this style. Vivid manifestations of this distinctive style have also been observed at more distant sites of Mongolia, such as Hoyt-Tsenker Agui (Okladnikov, 1972), Aral Tolgoi (Tseveendorj, Kubarev,

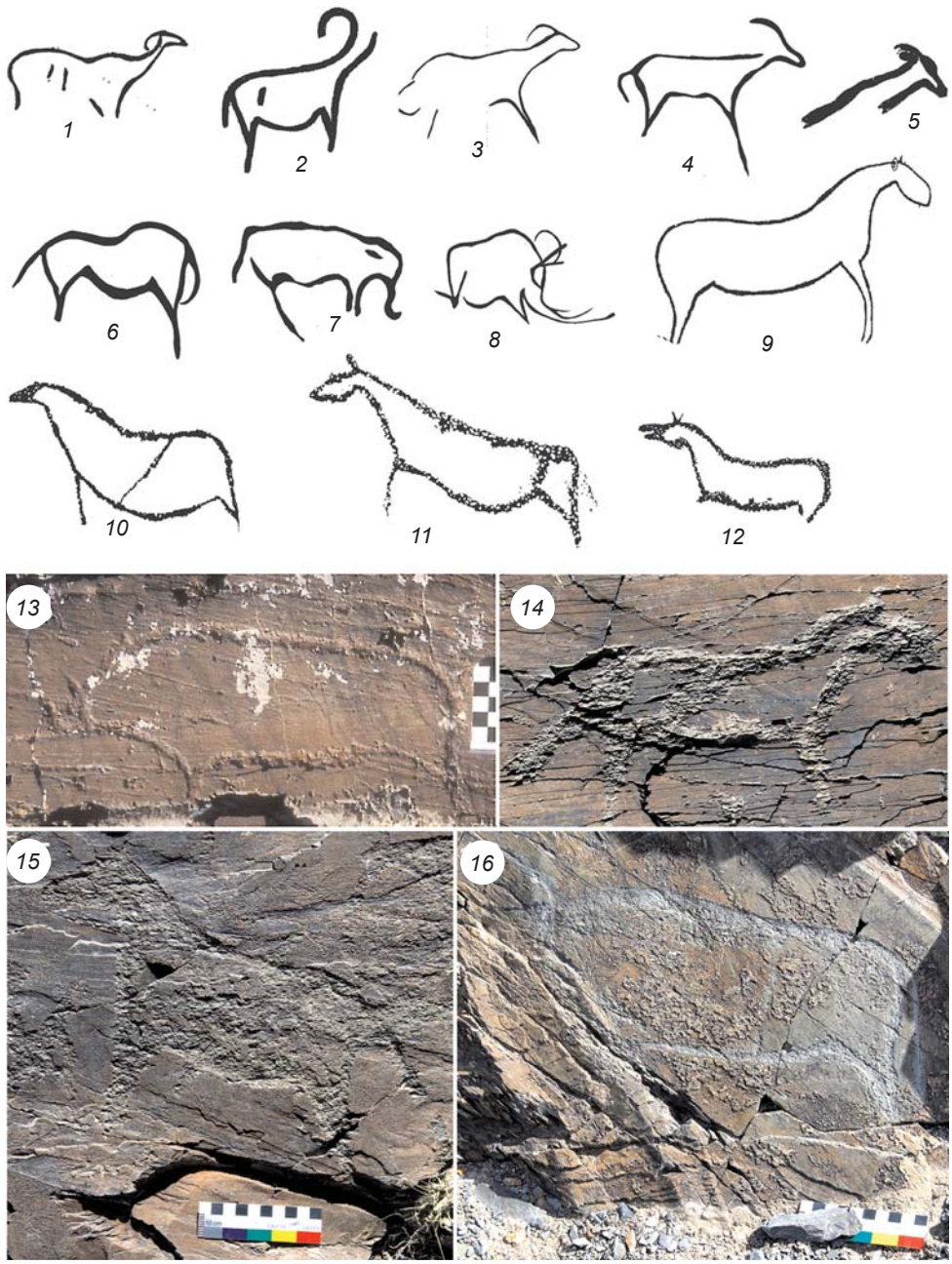

Fig. 9. Parallels to petroglyphs of the "Kalgutinsky" style in the rock art of Mongolia.
1–8 – Hoyt-Tsenker Agui (after (Okladnikov, 1972)); *9–13* – Aral Tolgoi (after (Tseveendorj, Kubarev, Jacobson, 2005; Jacobson-Tepfer, 2013)); *14–16* – Ishgen Tolgoi (photo by E.A. Miklashevich).

Jacobson, 2005; Kubarev, 2007), and Ishgen Tolgoi (Tseveendorj, 1982) (Fig. 9).

Discussion and parallels

The stylistic unity of these sites is ensured by their similar technological features. Unfortunately, owing to a sometimes extremely poor state of preservation, it was impossible to establish the tools used for depicting all petroglyphs at the sites of the Mongolian Altai. However, a whole series of images (see Fig. 5, *4–8*) appear to have been made using identical techniques, such as surface pecking and rubbing with stone tools. The Kalgutinsky petroglyphs were created exclusively by such tools. Given that the Baga-Oygur and Tsagaan-Salaa sites are located on the outcrops of chert, which is much softer and more pliable rock than solid rhyolite polished by the glacier, the

use of the same methods for treating the rock surface as at Kalgutinsky Rudnik was not technologically necessary: chert permits using almost any method for creating petroglyphs. Nevertheless, a whole series of archaic representations stylistically close to the Kalgutinsky images was made in a technique that was not common for the sites of Baga-Oygur and Tsagaan-Salaa. It can be assumed that the technological methods of creating petroglyphs developed by the end of the Stone Age were fairly stable, and continued to be used even in the absence of objective necessity.

Thus, the groups of archaic rock images made in the technique of deep and surface pecking and rubbing, and in a specific artistic manner, distinguished by a high degree of desert varnish, represent a single style that we propose to call "Kalgutinsky" style. An additional argument in favor of our hypothesis is the territorial proximity of the sites with such petroglyphs (see Fig. 1).

Notably, some scholars interpreted the petroglyphs made in the stylistic manner described above at the sites of Baga-Oygur and Tsagaan-Salaa as images of mammoths (see Fig. 5, *1–3*). Similar features can also be observed in the image of a supposed rhinoceros at the site of Baga-Oygur I (see Fig. 5, *9*). The stylistic similarity between the petroglyphs from Kalgutinsky Rudnik and mammoth images from Baga-Oygur and Tsagaan-Salaa suggests that they belong to a single local figurative tradition.

However, there is an opinion that these were not images of mammoths. Counter-arguments usually boil down to the claiming that they do not entirely look like these animals (Kubarev, 2003, 2004). For instance, the mammoth's body was usually depicted as bulky, owing to its long wool. However, among the classic examples of Western European cave art and Siberian mobile art, there are many images of the so-called thin mammoths (Fig. 10). As far as the lack of the typical hump is concerned, which was indicated by V.D. Kubarev, the cave art of France sometimes also omits this detail (Fig. 10, *2–8*). Moreover, in the composition of two mammoths from Baga-Oygur II, one animal is shown with pronounced hump (see Fig. 5, *2*). If we consider that the archaic images of Baga-Oygur, Tsagaan-Salaa, and Kalgutinsky Rudnik belong to the same distinctive style, this seemingly strange way of conveying the images of mammoths ceases to be something unusual, but turns out to be subjected to a certain, in this case the "Kalgutinsky", canon.

We should point to the similarity of some images from Baga-Oygur and Baume-Latrone, Tsagaan-Salaa and Rouffignac, even Baga-Oygur and Chauvet (see Fig. 5; 10, *4*, *5*, *7*). In Mongolia and Altai, mammoths, not to mention rhinoceroses, lived until the Early Holocene (Tseitlin, 1973), which gives some grounds to attribute the petroglyphs of the "Kalgutinsky" style to the Final Paleolithic.

There are many parallels to the petroglyphs made in the "Kalgutinsky" style among the reliably dated Paleolithic examples of European cave and rock art; for example, those from sites in the valleys of the Côa and Zêzere Rivers in Portugal (Fariseu, Canada do Inferno, Rego de Vide, Costalta, etc.), in France (Pair-non-Pair, Cosquer, Roucadour, Marcenac), and Spain (La Pasiega, Siega Verde, Covalanas, etc.) (see Fig. 8). Stylistically similar petroglyphs also occur in the less-distant sites of Hoyt-Tsenker Agui, Aral Tolgoi, and Ishgen Tolgoi (see Fig. 9).

Another important argument in favor of Upper Paleolithic attribution for the stratum of rock art under consideration on the border of the Mongolian and Russian Altai is the concept of reserved execution of an image with its simultaneous unmistakable recognizability, which fully complies with the canons of classic prehistoric art (Guy, 2010, 2017: 170–177). This principle is associated with the fundamental aspects of styles in the Paleolithic: minimum detail, high degree of standardization, and partial rendering of images.

Conclusions

The above analysis allows the following conclusions to be drawn. A series of images, which represent a stylistic unity, have been found on the border of the Mongolian and Russian Altai (at the sites of Kalgutinsky Rudnik, Tsagaan-Salaa, and Baga-Oygur). The following features have been identified as criteria for such a conclusion:

– the subject matter is always highly specialized; only animals were represented (mainly horses, deer, bulls, goats; and also rhinoceros and mammoths in Mongolia);

– these petroglyphs are never accompanied by anthropomorphic figures, and generally (with rare exceptions) do not constitute parts of compositions;

– the main details of the images are the head and back of the animal; these were treated with special care;

– partial representation is typical; legs are often not shown or treated less carefully (sometimes these are disproportionately short);

– only two legs are depicted (often but not always);

– the belly is often markedly rounded;

– the back is shown with a concave curve;

– anatomical details (ears, tail, etc.) are extremely poorly represented; there are almost no representations of eyes; at the same time, images are realistic and recognizable;

– generally static posture;

– prevailing techniques are surface pecking and rubbing, less often deep pecking.

In addition to the common features that unite these petroglyphs, we can distinguish two specific methods of rendering details, such as the head and back (in the form

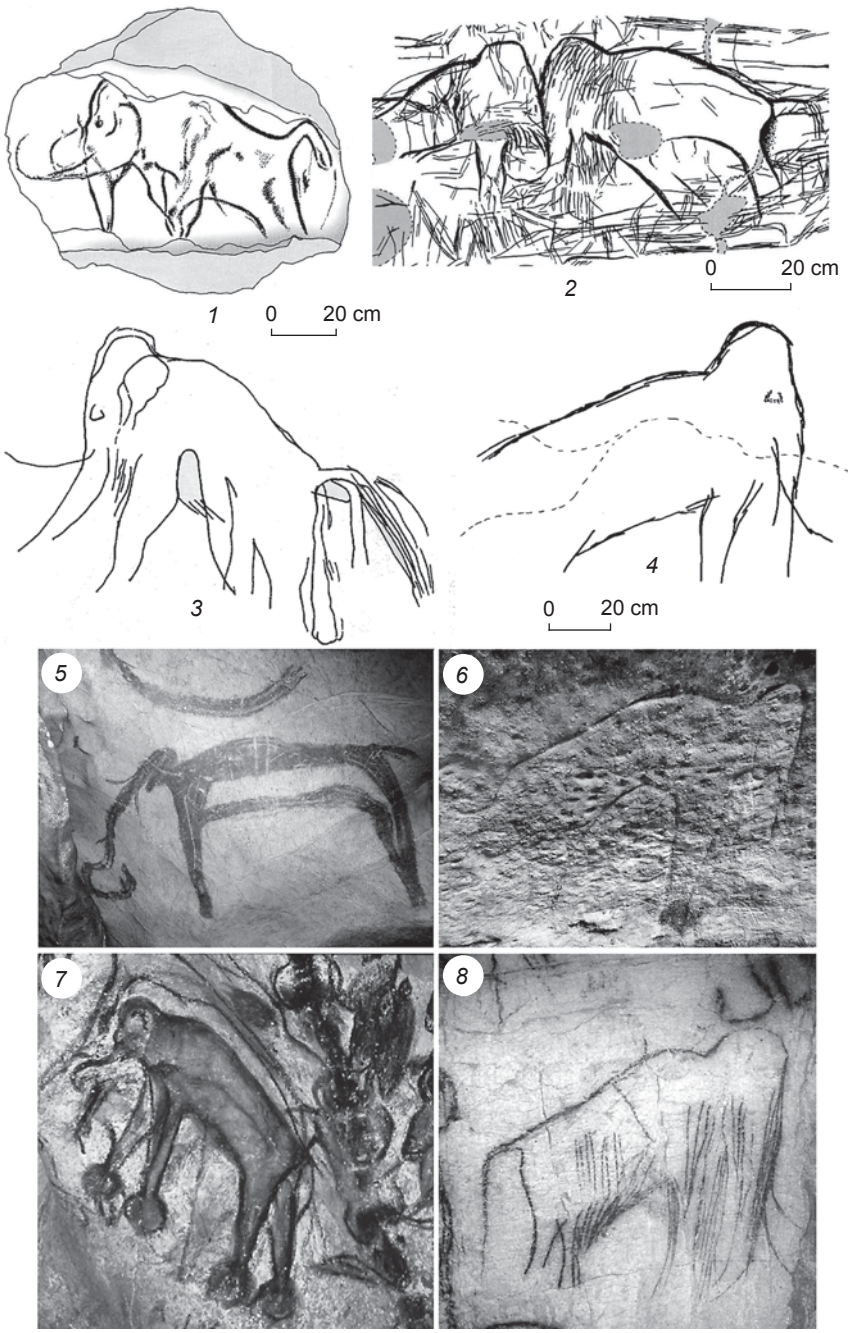

Fig. 10. Parallels to mammoth representations of the "Kalgutinsky" style in the prehistoric art of France.

1 – Jean-Blanc, fragment of limestone (after (Paillet, 2018)); *2* – Laugerie-Haute, fragment of a reindeer antler (after (Ibid.)); *3* – Combarelles (after (Barrière, 1997)); *4* – Rouffignac (after (Barrière, 1982)); *5* – Baume-Latrone (after (Plassard, 2018)); *6* – Jovelle (after (Ibid.)); *7* – Chauvet-Pont-d'Arc (after (Baffier, 2018)); *8* – Pech Merle (after (Plassard, 2018)).

of a triangle with interrupted lines, or continuous a line from the top of the head to the end of the back), as well as two ways of depicting the hind leg (simple connection of lines of the back and abdomen, or with additionally marked hip). It is important to note that both methods of depicting the head occur in combination with both ways of representing the hind leg. This means that these are not two different invariants of style, but rather several different artistic methods within a single pictorial canon.

We attribute the petroglyphs to the Final Upper Paleolithic because the examples with typical features of this style depict the Pleistocene fauna (mammoths,

rhinoceros). Indirect arguments in favor of the early age of these petroglyphs include the use of exclusively stone tools for and presence of intense desert varnish. These stylistic features find their parallels among the typical examples of the Upper Paleolithic rock art of Europe.

Thus, we may conclude that the petroglyphs of the early stratum at the sites of Kalgutinsky Rudnik, Baga-Oygur, and Tsagaan-Salaa belong to the "Kalgutinsky" style of the Final Paleolithic. Perhaps over time, the distribution area of this figurative tradition will be expanded, but today we may observe the uniqueness and originality of the "Kalgutinsky" petroglyphs in a very localized area. If we distance ourselves from the twists and turns of historiography and numerous discussions of past years, it becomes clear that we are dealing with an example of Upper Paleolithic petroglyphs that are rare for this region. So today we may speak not only about the Western European, but also about the Asian center of prehistoric rock art.

References

Aubry T., Sampaio J. 2008
Fariseu: New chronological evidence for open-air Paleolithic art in the Côa Valley (Portugal). *Antiquity*, vol. 82 (312): 41–49.

Baffier D. 2018
Les mammouths dans la grotte Chauvet-Pont d'Arc (Ardèche) et de la Grande Grotte d'Arcy-sur-Cure (Yonne). In *Mémoire de Mammouth (Exposition Musée national de Préhistoire. Les Eyzies-de-Tayac, 29 juin–12 novembre 2018)*. Les Eyzies-de-Tayac: Musée national de Préhistoire, pp. 112–115.

Baptista A.M. 1999
No tempo sen tempo: A arte dos caçadores paleoliticos do vale do Côa. Vila Nova de Foz Côa: Ed. Afrontamento e Parque Arqueólogico do Vale do Côa.

Baptista A.M. 2009
O Paradigma Perdido: O Vale do Côa e a Arte Paleolitica de Ar Livre em Portugal. Villa Nova de Foz Côa: Ed. Afrontamento e Parque Arqueólogico do Vale do Côa.

Barrière C. 1982
L'art pariétal de Rouffignac: la grotte aux cent mammouths. Paris: Picard. (Mémoires de l'Institut d'art préhistorique; iss. 4).

Barrière C. 1997
L'art pariétal des grottes des Combarelles. Les Eyzies-de Tayac: Musée national de Préhistoire. (Paléo, hors-série; 1).

Breuil H. 1952
Quatre cents siècles d'art pariétal. Montignac: Centre d'études et de documents préhistoriques.

Cheremisin D.V. 2006
Toward a discussion on the information content of petroglyphs and the methods of their study. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 3 (27): 89–100.

Cheremisin D.V., Molodin V.I., Zotkina L.V., Tseveendorj D., Kreten K. 2018
Noviye issledovaniya rannego plasta naskalnogo iskusstva Mongolskogo Altaya. *Vestnik Novosibirskogo gosudarstvennogo universiteta.* Ser.: Istoriya, filologiya, vol. 17 (3): Arkheologiya i etnografiya: 57–77.

Clottes J. 2008
L'art des cavernes. London: Phaidon.

Clottes J., Courtin J., Vanrell L. 2005
Cosquer redécouvert. Paris: Seuil.

Derevianko A.P., Shunkov M.V., Fedorchenko A.Y., Kozlikin M.B. 2018
Paleoliticheskaya diadema iz Denisovoy peshchery. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIV. Novosibirsk: Izd. IAET SO RAN, pp. 87–90.

Derevianko A.P., Shunkov M.V., Volkov P.V. 2008
A paleolithic bracelet from Denisova Cave. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 2 (34): 13–25.

Devlet M.A., Devlet E.G. 2001
Review of Molodin V.I., Cheremisin D.V. Drevneishiye naskalniye izobrazheniya ploskogorya Ukok. Novosibirsk: Nauka, 1999. *Rossiyskaya arkheologiya*, No. 1: 128–132.

Francfort H.-P., Jacobson E. 2004
Approaches to the study of petroglyphs of North and Central Asia. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 2: 53–78.

Groenen M. 2016
L'Art des grottes ornées du Paléolithique supérieur: Voyage dans les espaces-limites. Bruxelles: Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique. (Mémoire de la Classes des Arts).

Guy E. 2010
Préhistoire du sentiment artistique: L'invention du style, il y a 20 000 ans. Fabula: Les presses du réel.

Guy E. 2017
Ce que l'art préhistorique dit de nos origines. Paris: Flammarion.

Jacobson E., Kubarev V.D., Tseveendorj D. 2001a
Mongolie du Nord-Ouest: Tsagan Salaa. In *Baga Oigor: Textes et figures*. Paris: De Boccard. (Mémoires de la Mission Archéologique Française en Asie Centrale, H.-P. Francfort, Ja. A. Sher (eds.), vol. 6). (Répertoire des petroglyphes d'Asie Centrale; fasc. 6).

Jacobson E., Kubarev V.D., Tseveendorj D. 2001b
Mongolie du Nord-Ouest: Tsagan Salaa. In *Baga Oigor: Planches*. Paris: De Boccard. (Mémoires de la Mission Archéologique Française en Asie Centrale, H.-P. Francfort, Ja. A. Sher (eds.), vol. 6). (Répertoire des petroglyphes d'Asie Centrale; fasc. 6).

Jacobson-Tepfer E. 2013
Late Pleistocene and Early Holocene rock art from the Mongolian Altai: The material and its cultural implications. *Arts*, iss. 2: 151–168.

Korenyako V.A. 1998
K probleme proiskhozhdeniya skifo-sibirskogo zverinogo stilya. *Rossiyskaya arkheologiya*, No. 4: 64–77.

Korolkova E.F. 1996
Teoreticheskiye problemy iskusstvoznaniya i "zveriniy stil" skifskoy epokhi. St. Petersburg: Izd. Gos. Ermitazha.

Kubarev V.D. 2003
Altai-Mongoliya: Itogi i perspektivy izucheniya naskalnogo iskusstva. In *Drevnosti Altaya: Mezhvuzovskiy sb. nauch. tr.*, No. 10. Gorno-Altaisk: Izd. Gorno-Alt. Gos. Univ., pp. 46–61.

Kubarev V.D. 2004
Drevneishiye izobrazitelniye pamyatniki Mongolii i Altaya: Problemy khronologii i interpretatsii. In *Problemy pervobytnoy arkheologii Yevrazii: Sbornik st. k 75-letiyu A.A. Formozova*. Moscow: IA RAN, pp. 228–242.

Kubarev V.D. 2007
Aral Tolgoi – new rock art site in Mongolia. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 1 (29): 111–126.

Kuzmina E.E. 1983
O "prochtenii teksta" izobrazitelnykh pamyatnikov iskusstva yevraziyskikh stepey skifskogo vremeni. *Vestnik drevney istorii*, No. 1: 95–106.

Leontiev N.V. 1976
Naskalniye risunki Korovyeva Loga (k voprosu o periodizatsii antropomorfnykh izobrazheniy okunevskoy kultury). *Izvestiya SO AN SSSR*. No. 11: Ser. obshchestv. nauk, iss. 3: 128–136.

Leroi-Gourhan A. 1965a
Le geste et la parole. Vol. II: La mémoire et les rythmes. Paris: Albin Michel.

Leroi-Gourhan A. 1965b
Préhistoire de l'art occidental. Paris: Mazenod.

Leroi-Gourhan A. 1992
L'Art pariétal: Langage de la préhistoire. Grenoble: Jérôme Millon.

Lorblanchet M. 2010
Art pariétal. Grottes ornées du Quercy. Tarascon: Ed. du Rouergue.

Lorblanchet M., Bahn P. 1993
Rock art studies: The post-stylistic era or where do we go from here?: Symposium a of the Second Australian Rock Art Research Association (Aura) Congress, Cairns, 1992. Oxford: Oxbow Books.

Miklashevich E.A. 2000
Petroglify doliny reki Ursul (nekotoriye rezultaty stilisticheskogo i khronologicheskogo analiza). In *Obozreniye rezultatov polevykh i laboratornykh issledovaniy arkheologov i etnografov Sibiri i Dalnego Vostoka v 1994–1996 gg*. Novosibirsk: Izd. IAET SO RAN, pp. 38–42.

Molodin V.I. 1995
Perspectives and preliminary results of archaeological investigations of the South-Western Altai (the Ukok Plateau). In *Science Policy: New Mechanisms for Scientific Collaboration Between East and West*. Dordrecht, Boston, London: Kluwer Academic Publ., pp. 215–222. (Science and technology policy; vol. 1).

Molodin V.I., Cheremisin D.V. 1993
Velikolepniye loshadi blestyashchikh skal Altaya. *Priroda*, No. 9: 55–61.

Molodin V.I., Cheremisin D.V. 1999
Drevneishiye naskalniye izobrazheniya ploskogorya Ukok. Novosibirsk: Nauka.

Molodin V.I., Cheremisin D.V. 2007
Petroglyphs of the Ukok Plateau. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4 (32): 91–101.

Molodin V.I., Cheremisin D.V., Kreten K., Zotkina L.V., Zhenest Z.-M., Mylnikov V.P. 2016
Issledovaniye petroglifov na ploskogorye Ukok v ramkakh rossiysko-frantsuzskoy ekspeditsii v 2016 godu. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXII. Novosibirsk: Izd. IAET SO RAN, pp. 361–365.

Okladnikov A.P. 1967
Utro iskusstva. Leningrad: Iskusstvo.

Okladnikov A.P. 1968
Liki drevnego Amura (petroglify Sikachi-Alyana). Novosibirsk: Zap.-Sib. kn. izd.

Okladnikov A.P. 1972
Tsentralnoaziatskiy ochag pervobytnogo iskusstva (peshcherniye rospisi Khoit-Tsenker Agui, Sengri-Agui, Zapadnaya Mongoliya). Novosibirsk: Nauka.

Okladnikov A.P. 1976
Neoliticheskiye pamyatniki nizhney Angary (ot Serovo do Bratska). Novosibirsk: Nauka.

Okladnikov A.P. 1980
Petroglify Tsentralnoy Azii: Khobd-Somon (gora Tebsh). Leningrad: Nauka.

Okladnikov A.P., Martynov A.I. 1972
Sokrovishcha Tomskikh pisanits (naskalniye risunki neolita i bronzy). Moscow: Iskusstvo.

Otte M., Remacle L. 2000
Réhabilitation des styles paléolithiques. *L'Anthropologie*, iss. 104: 365–371.

Paillet P. 2018
Le mammouth dans l'art mobilier. In *Mémoire de Mammouth (Exposition Musée national de Préhistoire. Les Eyzies-de-Tayac, 29 juin–12 novembre 2018)*. Les Eyzies-de-Tayac: Musée national de Préhistoire, pp. 81–96.

Pervobytnoye iskusstvo: Problema proiskhozhdeniya. 1998
Y.A. Sher (ed.). Kemerovo: Kem. Gos. Inst. kultury i iskusstva.

Petrognani S. 2013
De Chauvet à Lascaux: L'art des cavernes, reflet de sociétés préhistoriques en mutation. Arles: Errance.

Plassard F. 2018
Le mammouth dans l'art des grottes. In *Mémoire de Mammouth (Exposition Musée national de Préhistoire. Les Eyzies-de-Tayac, 29 juin–12 novembre 2018)*. Les Eyzies-de-Tayac: Musée national de Préhistoire, pp. 102–111.

Podolsky N.L. 1973
O printsipakh datirovaniya naskalnykh izobrazheniy: Po povodu knigi A.A. Formozova "Ocherki po pervobytnomu iskusstvu". *Sovetskaya arkheologiya*, No. 3: 265–275.

Rogozhinsky A.E. 2008
Petroglyph sites of Kazakhstan and Western Central Asia as part of the archaeological landscape: New challenges. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4 (36): 83–94.

Savinov D.G. 1995
O proiskhozhdenii tashtykskogo stilya. In *Drevneye iskusstvo Azii (petroglify)*. Kemerovo: Izd. Kem. Gos. Univ., pp. 6–10.

Savinov D.G. 2008
Izobrazitelniy plast kak forma sushchestvovaniya i izucheniya naskalnogo iskusstva (po materialam Tsentralnoy Azii i Sibiri). In *Trudy II (XVIII) Vserossiyskogo arkheologicheskogo syezda v Suzdale*, vol. III. Moscow: IA RAN, pp. 73–74.

Savinov D.G. 2009
On the interpretation of Central Asian and South Siberian rock art. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 37 (2): 92–103.

Sher Y.A. 1980
Petroglify Sredney i Tsentralnoy Azii. Moscow: Nauka.

Sher Y.A. 2004
Stil v pervobytnom iskusstve. In *Izobrazitelniye pamyatniki: Stil, epokhi, kompozitsii: Materialy nauch. tematich. konf.* St. Petersburg: pp. 9–13.

Shunkov M.V., Fedorchenko A.Y., Kozlikin M.B. 2017a
Braslet iz bivnya ranney stadii verkhnego paleolita iz Denisovoy peshchery. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIII. Novosibirsk: Izd. IAET SO RAN, pp. 255–258.

Shunkov M.V., Fedorchenko A.Y., Kozlikin M.B. 2017b
Kostyaniye izdeliya nachala verkhnego paleolita iz yuzhnoy galerei Denisovoy peshchery (kollektsiya 2017 goda). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIII. Novosibirsk: Izd. IAET SO RAN, pp. 259–262.

Shunkov M.V., Fedorchenko A.Y., Kozlikin M.B. 2018
Personalniye ukrasheniya ranney stadii verkhnego paleolita iz yuzhnoy galerei Denisovoy peshchery. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIV. Novosibirsk: Izd. IAET SO RAN, pp. 198–202.

Testart A. 2012
Avant l'histoire: L'évolution des sociétés, de Lascaux à Carnac. Paris Gallimard. (Bibliothèque des Sciences humaines).

The Use of Style in Archaeology: New Direction in Archaeology. 1990
M. Conkey and C. Hastorf (eds.). Cambridge: Cambridge Univ. Press.

Tseitlin S.M. 1973
Chelovek i sreda paleolita Sibiri. In *Pervobytniy chelovek, yego materialnaya kultura i prirodnaya sreda v pleistotsene i golotsene: Tezisy dokl. Vsesoyuz. simp*. Moscow: Nauka, pp. 64–66.

Tseveendorj D. 1982
Ishgen tolgoin khadny zurag. *Studia archaeologica Instituti archaeologici Academiae scietiarum Mongolicae*, vol. X (2): 6–21.

Tseveendorj D. 1999
Mongolyn ertnii urladiin tuukh. Ulaanbaatar: Gamma.

Tseveendorj D., Kubarev V.D., Jacobson E. 2005
Aral Tolgoin khadny zurag. Ulaanbaatar: Mongol uls shinzhlekh ukhaany Akademi arkheologiin Khureelen.

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Technical and Social Innovations: A New Field of Research

The grand narrative of cultural developments claims that all technical achievements in prehistory stemmed from urban centers in Mesopotamia and Egypt. But current studies, for instance on the oldest wagons, have opened up space for alternative working hypotheses and models: modern radiocarbon dating of complexes that revealed the cited innovations, e.g. the oldest wagons, functional metal tools, and an advanced copper metallurgy, which predate their first appearance in Mesopotamia, questions the role of this region in the development of technology. Possibly, Mesopotamian cities operated rather as a melting pot of numerous innovations obtained from various areas, which were then re-combined and placed into a different context. The North Caucasus, in particular the Early Bronze Age Maykop culture, is an exemplary candidate for such an interactive process in technical developments. The Maykop culture has been known in research for 120 years, and its genesis is supposed to have originated in Mesopotamia. This is an archaeological narrative meant to explain the high technical state of the Maykop culture. In the light of the new chronology based on a relatively small number of radiocarbon dates, a re-examination and alternative models are necessary. It is obvious that this culture developed a highly innovative potential in metalworking and sheep breeding, and fulfilled an important function as mediator in knowledge transfer between the Eurasian steppe and Upper Mesopotamia. Recent aDNA studies support this view.

Keywords: *Innovations, Early Bronze Age, Caucasus, wagon, composite bow, shaft-hole axe.*

Introduction

The Early Bronze Age of the 4th millennium BC was one of the most vibrant epochs, which was of crucial importance for the cultural development in Europe and Eurasia. A substantial number of technical innovations was developed within only a few centuries' time in the 4th millennium BC (Hansen, 2011). They constitute Eurasia's specific historical development: it was a time of radical changes and transformations.

Technical innovations have always played an outstanding role in prehistory. Indeed, technical, artistic, and social innovations have brought forth fundamental changes in the life of humankind, again and again. One need only recall man' control of fire, the development of communal hunting strategies, and the invention of hand-axe and later blade production. The millennia-long accumulation of knowledge by Palaeolithic gatherers and hunters formed their existence, and had to be nurtured and communicated to the next generations. This knowledge was present not only among smaller populations, but also in larger groups; for instance, among communal winter camps, as well as in transregional networks on a broader basis, and was thus protected from sudden extinction.

Summing up, the basic innovations of the Neolithic include: the domestication of livestock, production of pottery and house building, or the start of copper and gold metallurgy. Yet, in the 4th millennium BC, the density of innovations increased on a hitherto unknown

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scale. Among the most important innovations were the wheel and the wagon (Klimscha, 2017), the breeding of the woolly sheep, the domestication of the donkey (Rossel et al., 2008) and the horse (Warmuth et al., 2011), and the cultivation of olives (Salavert, 2008) and wine (McGovern et al., 1997). By improving metal objects with various alloys the production of prestigious items was transformed into that of common commodities. In the course of time, this was enhanced by innovative techniques, such as casting in the lost-wax form (Hansen, 2014b). Silver was extracted from lead by means of cupellation, and this technology spread throughout the entire Near East and the eastern Mediterranean during the 4th millennium BC (Hansen, Helwing, 2016). Concerning pottery production, the impact of the potter's wheel must be emphasised (Doherty, 2015). The development of seals to manage goods and of writing for recording were innovations of utmost importance (Nissen, Damerow, Englund, 1991). Many of these innovations caused changes in the way of production. Mass production and repetitiveness in work processes already started in the 4th millennium BC (Pollock, 2017).

Each of these innovations brought considerable economic, social, and cultural consequences. Moreover, they shaped the bodies of men and women. People became drivers, horsemen, warriors or writers and readers through intensive training and repetitive practice. The wagon enabled heavy goods, e.g. the harvest, to be transported, and thus indirectly affected the spread of agricultural production. The wagon facilitated the development of a mobile way-of-life of cattle and sheep herders in the vast steppe, which was coining Eurasia well into medieval times. Breeding sheep with long hair enabled the procurement and processing of wool, an achievement that led to a revolution in textile production. It provided steppe dwellers with well isolating fabrics for clothes or mobile tents and yurts. The domestication of the horse allowed control over large herds of cattle and sheep. Even more important was the ability to cover great distances swiftly by riding on horseback; this speed held pace well into the modern era. It was first surpassed by the railway in the early 19th century. The development of various copper alloys led to a decisive improvement in the properties of metals: casting became easier, and the elasticity and hardness of alloyed metals were enhanced considerably as compared to that of pure copper. From a technique primarily meant for prestigious goods emerged an efficient metal industry aimed at basic commodities. Linked with these technical improvements in metallurgy were technical innovations in weaponry: the first swords and spearheads, as well as more effective battle axes, appeared in the Caucasus and eastern Anatolia. A transformation in warfare can be presupposed by these developments, and there is evidence of warlike conflicts and rebellions among the population in northern Mesopotamia during the 4th millennium BC (Reichel, 2006; Bernbeck, 2009; McMahon, 2009). Finally, in the Near East and in Egypt the production of stone statues began, larger than life-size, which represented deities and rulers (Kemp, 2000). Further, large anthropomorphic stone stelae found between the Caucasus mountains and the Atlantic coast can also be seen as an iconographic innovation of the 4th millennium BC (Robb, 2009). They are very appropriately designated "stones of power", because they are illustrative of the concentration of power in a few hands at that time (Vierzig, 2017).

Theoretical background

The modern use of the term "innovation" goes back to J.A. Schumpeter, who recognised at the end of the 1930s that technical innovations were the foundation for the existence of longer economic cycles, which overlie short-term cycles. For Schumpeter, innovations play a decisive role in economic development (1939). He largely built upon an article by N.D. Kondratieff (1926), in which the existence of long term (50 to 60 years) cycles of economic boom followed by depression was postulated. Each of these long cycles was triggered by certain innovations, e.g. the steam engine, railway, chemistry, etc. Adopting this model for archaeology has high heuristic potential. Concentrations of innovations in the Neolithic period and in the 4th millennium BC seem to confirm modern-day observations, that technical innovations did not appear continuously and singly, but were instead discontinuous and materialised in clusters. According to G. Mensch (1975), innovations arose quite likely in times of crisis, and thereby formed the prerequisite for a new long wave of economic prosperity.

Schumpeter also focused on the co-evolution of technology, organizations, and institutions, which is elementary for modern innovation theory (The Oxford Handbook…, 2004). R.R. Nelson and S.G. Winter (1977, 1982) followed Schumpeter's discussion of innovation in detail. They emphasized the Schumpeterian insight that innovation in the economic system is likewise the creation of any sort of novelty in art, science, or practical life, and that it consists to a substantial extent of a recombination of conceptual and physical materials that were previously in existence (Nelson, Winter, 1982). They addressed the importance of the institutional structure for the adaption of innovations: "technological regimes" and "selection environment" (Nelson, Winter, 1977). Technological regimes are the frames of research comparable with L. Flecks "Denkstile" (1993). Selection environments of innovations are the "firms", the consumers, and the regulators (state institutions). In pre-state societies, households, their members, and political and religious authorities are decisive factors.

The importance of the institutional frame is also stressed by F.W. Geels' multi-level perspective including niche-innovations, sociotechnical regimes, and sociotechnical landscape as heuristic concepts (Geels, 2002; Geels, Schot, 2007). Sociotechnical regimes refer to shared cognitive routines in an engineering community, but also to broader communities of social groups. Technological niches are the micro-level, at which radical novelties emerge. These novelties are initially unstable "sociotechnical configurations" with low performance. Niche-innovations are developed by small networks of specialists, often outsiders or fringe actors. Sociotechnical landscapes form exogenous environments beyond the direct influence of niche and regime actors (macro-economics, cultural patterns, macro-political developments). Changes at the landscape level usually take place slowly (over decades or even centuries). According to Geels, all three levels operate with network models. Transfer processes through space, and also the interlinkage of archaeological phenomena networks in the late 4th and 3rd millennia BC were analysed in the case of the Baden culture (Furholt, 2008).

Network structures can also be supposed for the diffusion of innovations through space. In the case of the earliest metallurgy, the rapid transfer of knowledge was most likely triggered by existing networks between Iran and the Balkans (Hansen, 2016). Archaeologically, the diffusion of innovations is often visible only in the technical object, e.g. the artefact itself, but not in greater parts of material culture. In whatever ways the transfer of metallurgy may have been sustained, the result was that it helped to preserve the knowledge that had been gained through experimentation. The integration of technical knowledge with different origins in a larger network might have been the operational basis for the Mesopotamian cities to become hubs of complex organised innovative societies. Another way of knowledge transfer is the migration of larger groups of peoples, which is widely attested for prehistoric as well as historical periods. The new results of aDNA have shown possible migration events in the early 3rd millennium BC (Haak et al., 2015).

The micro level in Geels' concept can be approached in archaeology through detailed research of innovations using scientific analyses, which allow e.g. the differentiation of certain recipes in metal alloys or the construction routines of wooden wheels. Developmental changes in the sociotechnical landscape can be described on the macro level. The new research tool "Digital Atlas of Innovations" (https://atlas-innovations.de/en/) allows the illustration of trajectories and periods of increased spread of innovations in dynamic maps. Furthermore, it is possible to quantify innovation density in the *longue durée*. This aids in describing the knowledge of prehistoric societies and in tracing the transfer of knowledge through space and time.

The cradle-of-civilisation-narrative

The ongoing discussion as to whether the introduction of innovations is caused by (consumer) demand or (provider) technology—so-called "pull and push" theories—does not aid in explaining the cases discussed here (Rogers, 1995). A multi-level perspective seems to be more fruitful in describing these innovations. Furthermore, new radiocarbon-based chronology shows that the old model of the development of all technical innovations in the civilisations of Mesopotamia and Egypt is impossible to uphold. New data have now opened room for a different line-of-thought. The hypothesis is: it was not the development of new techniques, but the adaption of techniques from various "peripheries" and their new combination in "centers", which formed the actual basis for the success of Mesopotamian and Egyptian "civilisations". This challenges one of the most influential and still prevailing cultural narratives of Western civilisation, that technical innovations were all developed in centres of "advanced civilisations" and from there diffused to the "peripheries" (Childe, 1958; Sherratt, 1981; Frank, Gills, 1992).

The institutional structure discussed by Nelson and Winter necessitates an understanding of technical innovations in their social dimensions and consequences as well. Hence, the frequent question is whether technological developments induce social change, or social reforms cause technical developments. Ethnographical evidence seems to show that political centralisation triggered chains of innovations (Sigrist, 1979). This is in line with a different but connected phenomenon, the production of surplus. H.W. Pearson (1957) argued in his seminal paper that "There are always and everywhere potential surpluses available. What counts is the institutional means for bringing them to life". In consequence, surplus (as innovation) was enforced by political centralisation in the hand of strong rulers (Hansen, 2018). In this respect, the 4th millennium BC was a "watershed" in Eurasian prehistory, not only because of new key technologies, but also new forms of social domination (Hansen, 2014a). A supra-regional warrior ideology evolved in the Caucasus and reached as far as western Europe (Hansen, 2013; Jeunesse, 2015). This can be understood as a new *dispositif* by which all relations in society were rearranged (Das Spiel…, 2003).

The formation of steep hierarchy did not need the influence of advanced "civilisations". Under certain conditions such hierarchies formed autochthonously, but they also collapsed regularly (Jeunesse, 2014). Early states, too, were always threatened by diseases, revolts, or military conflicts, and they collapsed not only once (Scott, 2017). The course in history of social institutions was less likely in a straight continuous line, but instead marked by breaks and discontinuities (Ur, 2010).

The apparent parallelism of the 4th millennium BC innovation clusters and the social rearrangements of this epoch fits with the concept of understanding social and technical innovations as a co-evolutionary process (Alijani, Wintjes, 2017). Theoretical approaches to innovation allow prehistoric, historic, and modern analyses of innovations processes to be connected.

Chronology

The first calibrated radiocarbon datings changed the prehistoric chronology dramatically. This had consequences especially for the 4th and 3rd millennia BC. It became clear that many cultural manifestations, once assumed for only a few centuries' time in the 2nd millennium BC, in reality encompass nearly the entire 3rd millennium BC (Chernykh, Orlovskaya, 2004). The finds from the famous burial in Maykop must even be re-dated more than 1000 years prior to the middle of the 4th millennium BC (Govedarica, 2002; Chernykh, Orlovskaya, 2008; Chernykh, 2008).

The end of the bloc confrontation enabled cooperative research in eastern Europe and Eurasia for the first time since the October Revolution in 1917. With that, the North Pontic and Eurasian steppes and the Caucasus came into view again (Anthony, 2007; Kohl, 2007; Cunliffe, 2015). Yet, ^{14}C-chronology raised considerable doubt about the idea that all innovations were developed in the Near East. Today, it can no longer be stated without any doubt where the wheel and wagon were "invented", because the earliest archaeological evidence is distributed within a very narrow time-window around 3500 BC between the Baltic Sea and Mesopotamia (Klimscha, 2017).

The famous grave mound of Maykop (Piotrovsky, 1998; Bronzovy vek…, 2013), uncovered in 1897 by N.I. Veselovsky, was discussed during the 20th century by eminent scholars like M. Rostovtzeff (1922) and V.G. Childe (1936), among others. With the royal graves in Ur in mind, the strong narrative of the Mesopotamian background of the Maykop grave goods seemed plausible. However, radiocarbon revolution in the last 25 years has made clear that the grave was built between 3700 and 3500 BC, not around 2500 BC. This predates the grave for more than one millennium in time, as was long assumed (Govedarica, 2002).

Regardless of this re-dating, the narrative is still maintained that the Maykop grave and the Maykop culture generally were the result of direct Mesopotamian influence or of larger migrations from the South (Masson, 1997; Izbitser, 2003; Pitskhelauri, 2012).

The monumental kurgan, more than 10 metres in height, was erected above the grave of one important individual and two other persons. The grave chamber contained vessels made of gold, silver, and bronze, which represent the oldest evidence ever of metal vessels. Further, the chamber held bull figurines made of gold and silver, which provide early evidence for casting in the lost-wax technique. The seventy gold appliques in the form of lions that were found had likely been sewn onto a mantle. This interment is the earliest known grave that is associated with the iconography of the lion as the heraldic animal of a ruler (Trifonov, 1998; Hansen, 2017). Additionally, thousands of gold beads, as well as beads of turquoise and carnelian, were found.

Grave mounds were erected already in the 5th millennium BC (Govedarica, 2004; Korenevskiy, 2012). Nonetheless, the monumentality of the mound in Maykop represented something hitherto unknown that signified the new, powerful, social rank of the deceased, a status that was accentuated especially by the persons who were obliged to follow the deceased to the grave (Testart, 2004). This fits with the political landscape of that time. In north Mesopotamian towns, such as Arslantepe (Frangipane, 2016), Tell Brak (Emberling, 2002; Oates et al., 2007; McMahon, 2013), Hamoukar (Reichel, 2006), and Tepe Gawra (Tobler, 1950), the emergence of strong rulers and the first steps towards the state likely occurred during the first half of the 4th millennium BC (Stein, 2012).

Innovations and migrations in the 4th and 3rd millennium BC

Many of the innovations mentioned before are found in the archaeological record all over the western parts of Eurasia and the Near East nearly at the same time. For understanding the transfer of techniques and knowledge during the 4th and 3rd millennia BC, the Caucasus region plays a key role (Munchaev, 1975; Hansen 2014b; Kohl, Trifonov, 2014; Chernykh, 2017; Sagona, 2018). The Maykop phenomenon provides us with a number of early evidence of innovations like wool (Shishlina, Orfinskaya, Golikov, 2003), traction (Reinhold et al., 2017), metal alloys, silver, etc. The Caucasus is one of the richest areas of mineralisation in Eurasia (Iessen, 1935). Copper, gold, and antimony ores were exploited at the latest from the Bronze Age onwards. The oldest gold mine in Sakdrissi, Georgia, dates to the 4th millennium BC (Gambashidze et al., 2010; Stöllner, 2014). Without doubt, these resources were attractive, not least for the evolving urban cultures of Mesopotamia. The North Pontic steppe, northwest of the Caucasus, was likewise interested in metal and an area of important, wide-reaching interactions, which connected the Caucasus to the Carpathians and to Central Europe.

As early as the 4th millennium BC, a network of connections existed between the Caucasus and Central Europe. This can be observed in a multitude of individual elements and is also evident in the plenteous material in later burials of the Maykop and Novosvobodnaya cultures

(Rezepkin, 2000; Kantorovich, Maslov, Petrenko, 2013; Belinskij, Hansen, Reinhold, 2017). One need only recall the shaft-hole axes (Hansen, 2010) or daggers (Korenevskiy, 2011).

Further, the depictions of oxen teams on stones in the Kammenaya Mogila in Ukraine (Fig. 1), in the Alps, and in the megalithic chamber grave at Züschen near Fritzlar in northern Hesse (Fig. 2) are well known. Recognisable are the large horns of both bovids—left and right, whose body is rendered with a simple vertical line. Both draught animals are fastened to the yoke, signified by a horizontal line. Visible between them is the two-wheeled wagon with its long drawbar. This graphic representation (today we would say *iconic*) emphasises the great prestige value of the innovation of the wagon.

Astonishing connections can be noted among the elements in two megalithic burials, one burial located in Novosvobodnaya near Maykop (Fig. 3) in the western foothills of the Caucasus, the other in Göhlitzsch near Leuna in Saxony-Anhalt (Fig. 4). A. Rezepkin has already pointed out these ties (2000, 2012). The equipment of weapons, reflex bows, and quivers in both burials was depicted on one of the stone slabs in the grave chamber. In Göhlitzsch, the slabs of the chamber were covered with a dense geometric ornamentation (zig-zags and triangles). This decoration, unusual in Central Germany, is found in similar form at the same time in stone-slab graves in the northern Black Sea area (Szmyt, 2014). Surprising traces of such grave complexes were identified in the Regnitz River valley in middle Franconia, too (Nadler, 2011).

Thus, it can be stated that connections between the Caucasus and the northern Black Sea can be confirmed; namely, ties that far exceed an occasion exchange of portable goods. Moreover, these contacts also possessed a religious-ideological dimension, in that they also influenced the way in which a burial was designed.

Fig. 1. Depictions of oxen teams and wagons. Kamenaya Mogila, Ukraine (after (Gladilin, 1966/1969)).

Fig. 2. Depiction of an oxen team and a two-wheeled wagon on a slab in the chamber of the tomb at Züschen (Hessen, Germany). Photo Museumslandschaft Hessen Kassel.

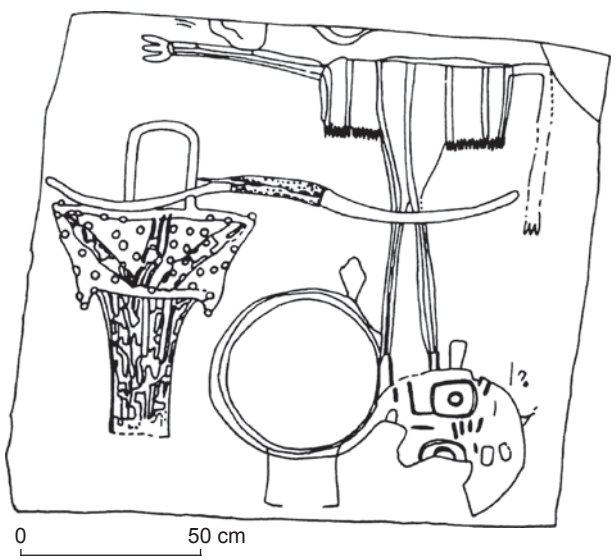

Fig. 3. Depiction of bow and quiver. Novosvobodnaya, Adygeia, Russia (after (Rezepkin, 2000)).

Transfer of knowledge

Technical knowledge spread among societies without script by means of direct contact, personal communication, imitation, and learning (Hansen, 2016). Thus, the transfer of knowledge was linked to the high degree of mobility of peoples in existing networks. The Corded-Ware, Single-Grave, and Yamnaya cultures have long been interpreted as migration phenomenon and identified with the Indo-Europeans (Glob, 1968; Gimbutas, 1994). Since then, there is a growing tendency towards recognising specific, social forms of representation in these cultures (Damm, 1991).

Today, for the first time in the history of archaeological research, the field of palaeogenetics provides unambiguous evidence for immigrations from the Eurasian steppe area in the early 3rd millennium BC (Lazaridis et al.,

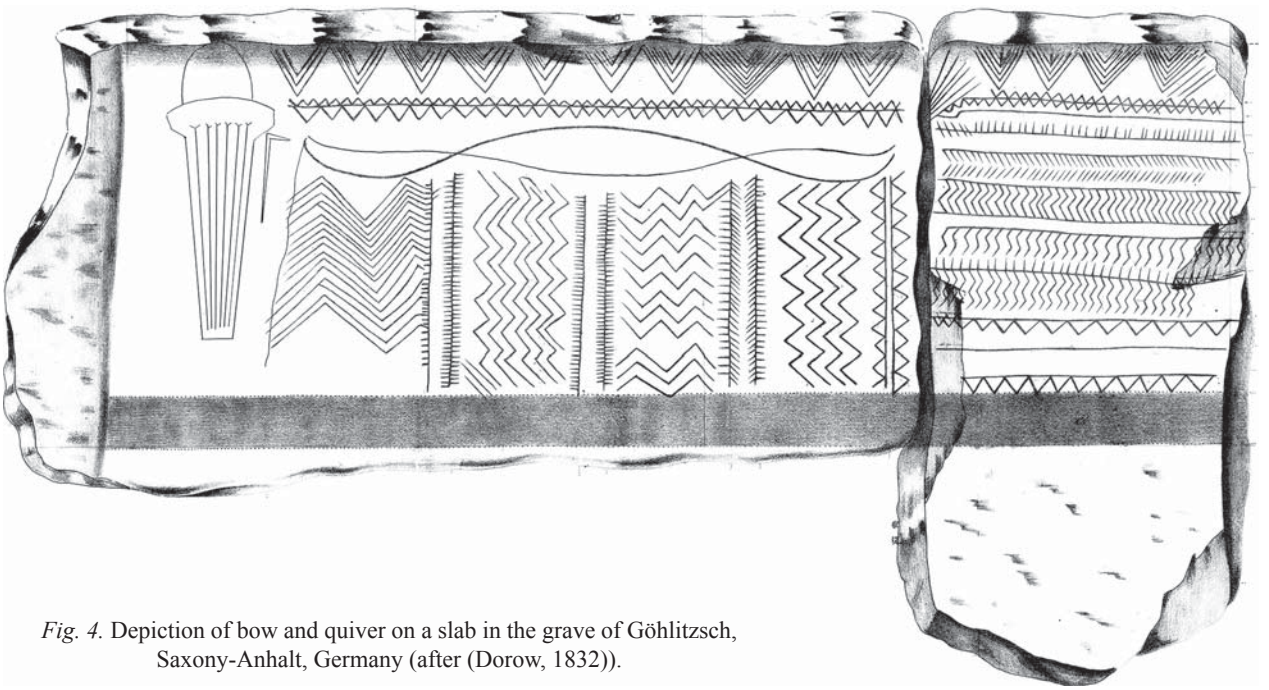

Fig. 4. Depiction of bow and quiver on a slab in the grave of Göhlitzsch, Saxony-Anhalt, Germany (after (Dorow, 1832)).

2013; Allentoft et al., 2015; Haak et al., 2015). Basing on evidence of the plague bacterium *Yersinia pestis* in skeletons from various European sites (Rasmussen et al., 2015), this pathogen could also be identified in the remains of the deceased person in grave 11, mound 21 in necropolis Rasshevatsky-1, region of Stavropol (Andrades Valtueña et al., 2017). The mound measured 85 × 110 m and was 6.2 m high. Its period of use for funerary practices extended from the time of the Maykop and the Yamnaya culture until the Novotitorovka culture. According to ^{14}C-datings, the mound was used for more than 600 years. Grave 11 is a Yamnaya burial in supine position. The interred individual was dated directly, likely buried between 2875 and 2699 cal BC (4171 ± 22 uncal BP; MAMS-29816). Thus, at present, this case and another with the skeletal remains of a person ascribed to the Afanasievo culture (the Altai Mountains) are the oldest known individuals in which the pathogen *Yersinia pestis* has been confirmed. It is indeed noteworthy that these cases belong to a time span during which ever more extensive migrations to Central Europa are purported to have taken place. The relationship of the plague pathogen from the Late Neolithic and the Early Bronze Age suggest that around 2800 BC *Yersinia pestis* was introduced to Central Europe from the Pontic steppe.

Whether or not humans were carriers of the bacterium, in their flight from areas of the plague, or whether the levels of resistance against this disease varied, is still unclear. Nonetheless, the effects of BC *Yersinia pestis* might explain why the "Neolithic" population in Central Europe was genetically reduced within such a short time. Whatever the causal agent was, evidence of the plague pathogen at that early time, long before the well-known epidemics in Antiquity (e.g. the Justinian plague), is of great significance. For until now widespread epidemics have not played any role in archaeological discourse. Yet, at the same time, it is becoming all the more obvious how little is known about the backgrounds, causal relationships, and consequences of migrations.

Massive population shifts in the 3rd millennium BC, in connection with the expansion of the groups from the steppe who were part of the Yamnaya culture, have long been associated with the transfer of significant technological innovations from Mesopotamia to Europe (Harrison, Heyd, 2007; Kristiansen et al., 2017; Reich, 2018: 108–109). But it is apparent that the results of aDNA-analyses should be studied in combination with the archaeological material in a more complex and nuanced way (Furholt, 2018; Wang et al., 2019).

The spread of early wagons, metal axes or compound bows was embedded in an exchange network between Europe, the Caucasus, and Mesopotamia much earlier, already in the 4th millennium BC. However, can evidence of these technological exchanges also be provided by genetic interactions? The genomes of some Yamnaya individuals from the steppe bordering the Caucasus show subtle genetic traces that are also characteristic of the neighbouring farming populations in southeastern Europe. Detailed analysis now shows that this subtle gene flow cannot be linked to the Maykop population, but that it could have come from the West (Wang et al., 2019). These subtle genetic traces from the West are indeed remarkable and suggest contact between peoples in the steppes and western groups, such as the Globular

Amphora culture, between the late 4th and the early 3rd millennium BC. The Globular Amphora culture connected the Carpathian Mountains with the Baltic Sea. The world of the 4th millennium BC was well-connected long before the migrations of steppe pastoralists. In this wide-ranging network of contacts, people not only spread and exchanged goods and knowledge, but occasionally they also exchanged genes, and not only in one direction.

In the present state of research, the dissemination of innovations cannot be ascribed solely to migrations. Furthermore, the understanding of the Maykop culture must seek a much more complex explanation rather than simply "migration(s) from the South". This is recognisable not only in archaeological findings, but now in genetic contexts as well (Ibid.).

References

Alijani S., Wintjes R. 2017
Interplay of technological and social innovation. In *SIMPACT Working Paper*, No. 3. Gelsenkirchen: Inst. vor Work and Technology, pp. 1–23.

Allentoft M.E., Sikora M., Sjøgren K.G., Rasmussen S., Rasmussen M., Stenderup J., Damgaard P.B., Schroeder H., Ahlström T., Vinner L., Malaspinas A.S., Margaryan A., Higham T., Chivall D., Lynnerup N., Harvig L., Baron J., Della Casa P., Dąbrowski P., Duffy P.R., Ebel A.V., Epimakhov A., Frei K., Furmanek M., Gralak T., Gromov A., Gronkiewicz S., Grupe G., Hajdu T., Jarysz R., Khartanovich V., Khokhlov A., Kiss V., Kolář J., Kriiska A., Lasak I., Longhi C., McGlynn G., Merkevicius A., Merkyte I., Metspalu M., Mkrtchyan R., Moiseyev V., Paja L., Pálfi G., Pokutta D., Pospieszny Ł., Price T.D., Saag L., Sablin M., Shishlina N., Smrčka V., Soenov V.I., Szeverényi V., Tóth G., Trifanova S.V., Varul L., Vicze M., Yepiskoposyan L., Zhitenev V., Orlando L., Sicheritz-Pontén T., Brunak S., Nielsen R., Kristiansen K., Willerslev E. 2015
Population genomics of Bronze Age Eurasia. *Nature*, vol. 522: 167–172.

Andrades Valtueña A., Mittnik A., Key F.M., Haak W., Allmäe R., Belinskij A., Daubaras M., Feldman M., Jankauskas R., Janković I., Massy K., Novak M., Pfrengle S., Reinhold S., Slaus M., Spyrou M.A., Szécsényi-Nagy A., Tõrv M., Hansen S., Bos K.I., Stockhammer P.-W., Herbig A., Krause J. 2017
The Stone Age plague and its persistence in Eurasia. *Current Biology*, vol. 27: 3683–3691.

Anthony D.W. 2007
The Horse, the Wheel and Language: How Bronze Age Riders from the Eurasian Steppes Shaped the Modern World. Princeton, Oxford: Princeton Univ. Press.

Belinskij A., Hansen S., Reinhold S. 2017
The Great Kurgan from Nalčik: A preliminary report. In *At the Northern Frontier of Near Eastern Archaeology: Recent Research on Caucasia and Anatolia in the Bronze Age*, E. Rova, M. Tonussi (eds.). Turnhout: Brepols, pp. 13–31. (Subartu XXXVIII).

Bernbeck R. 2009
Class conflict in ancient Mesopotamia. Between knowledge of history and historicising knowledge. *Anthropology of the Middle East*, vol. 4: 33–64. DOI: 10.3167/ame.2009.040104

Bronzovy vek: Evropa bez granits: katalog vystavki. 2013
Y.Y. Piotrovsky (ed.). St. Petersburg: Chisty list.

Chernykh E.N. 2008
The "Steppe Belt" of stockbreeding cultures in Eurasia during the Early Metal Age. *Trabajos de Prehistoria*, vol. 65: 73–93.

Chernykh E.N. 2017
Nomadic Cultures in the Mega-Structure of the Eurasian World. Boston: Academic Studies Press.

Chernykh E.N., Orlovskaya L.B. 2004
Radiouglerodnaya khronologiya drevneyamnoi obshchnosti i istoki kurgannykh kultur. *Rossiyskaya arkheologiya*, No. 1: 84–99.

Chernykh E.N., Orlovskaya L.B. 2008
Fenomen Maikopskoi obshchnosti i ee radiouglerodnaya khronologiya. In *Arkheologiya Kavkaza i Blizhnego Vostoka*, N.Y. Merpert, S.N. Korenevskiy (eds.). Moscow: Taus, pp. 259–275.

Childe V.G. 1936
The axes from Maikop and Caucasian metallurgy. *Annals of Archaeology and Anthropology*, vol. 23: 113–119.

Childe V.G. 1958
The Prehistory of European Society. Harmondsworth: Penguin Books.

Cunliffe B. 2015
By Steppe, Desert, and Ocean: The Birth of Eurasia. Oxford: Oxford Univ. Press.

Damm Ch. 1991
The Danish Single Grave culture – ethnic migration or social construction. *Journal of Danish Archaeology*, vol. 10: 199–204.

Das Spiel des Michel Foucault. 2003
Foucault M. Schriften in vier Bänden: Dits et Ecrits. Bd. III: 1976–1979. Frankfurt am Mein: Suhrkamp, pp. 391–429.

Doherty S.K. 2015
The Origin and Use of the Potter's Wheel in Ancient Egypt. Oxford: Archaeopress.

Dorow W. 1832
Altes Grab eines Heerführers unter Attila entdeckt am 18. April 1750 bei Merseburg: Zum ersten Mal nach den im kgl. Regierungsarchiv zu Merseburg vorhandenen Originalzeichnungen und Notizen, welche auf hohen Befehl 1750 davon angefertigt worden sind, vollständig herausgegeben von Hofrath Dr. Dorow. Halle: E. Anton.

Emberling G. 2002
Political control in an early state: The eye temple and the Uruk expansion in Northern Mesopotamia. In *Of Pots and Plans: Papers on the Archaeology and History of Mesopotamia and Syria presented to David Oates in Honour of his 75th Birthday*. London: Nabu publ., pp. 82–90.

Fleck L. 1993
Entstehung und Entwicklung einer wissenschaftlichen Tatsache: Einführung in die Lehre vom Denkstil und Denkkollektiv. Frankfurt am Mein: Suhrkamp.

Frangipane M. 2016
The development of centralised societies in Greater Mesopotamia and the foundation of economic inequality. In *Arm und Reich – Zur Ressourcenverteilung in prähistorischen Gesellschaften: 8. Mitteldeutscher Archäologentag vom 22. bis 24. Oktober 2015 in Halle*, H. Meller, H.-P. Hahn, R. Jung, R. Risch (eds.). Halle: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; Landesmuseum für Vorgeschichte, pp. 1–21. (Tagungen des Landesmuseums für Vorgeschichte Halle; Bd. 14/II).

Frank A.G., Gills B.K. 1992
The five-thousand year world system: An interdisciplinary introduction. *Humboldt Journal of Social Relations*, vol. 18: 1–79.

Furholt M. 2008
Culture history beyond cultures: The case of the Baden Complex. In *The Baden Complex and the Outside World*, M. Furholt, M. Szmyt, A. Zastawny (eds.). Bonn: Rudolf Habelt, pp. 13–24.

Furholt M. 2018
Massive migrations? The impact of recent aDNA studies on our view of third millennium Europe. *European Journal of Archaeology*, vol. 21 (2): 159–191. DOI: https://org/10.1017/eaa. 2017.43

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

Geels F.W. 2002
Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy*, vol. 31: 1257–1274.

Geels F.W., Schot J. 2007
Typology of sociotechnical transition pathways. *Research Policy*, vol. 36: 399–417.

Gimbutas M. 1994
Das Ende Alteuropas. Der Einfall der Steppennomaden aus Südrußland und die Indogermanisierung Mitteleuropas. Innsbruck: Verl. des Inst. für Sprachwissenschaft der Univ. Innsbruck.

Gladilin V.N. 1966/1969
Die Festbider der Kamenaja Mogila in der Ukraine. *Jahrbuch für prähistorische und ethnographische Kunst*, Bd. 22.

Glob P.V. 1968
Vorzeitdenkmäler Dänemarks. Neumünster: Wachholtz.

Govedarica B. 2002
Die Majkop-Kultur zwischen Europa und Asien: Zur Entstehung einer Hochkultur im Nordkaukasus während des 4. Jts. v. Chr. In *Mauerschau: Festschrift für Manfred Korfmann*, Bd. 2. Remshalden-Grumbach: Verl. B.A. Greiner, pp. 781–799.

Govedarica B. 2004
Zepterträger – Herrscher der Steppen: Die frühen Ockergräber des älteren Äneolithikums im karpatenländischen Gebiet und im Steppenraum Südost- und Osteuropas. Mainz am Rhein: Verl. Ph. von Zabern.

Haak W., Lazaridis I., Patterson N., Rohland N., Mallick S., Llamas B., Brandt G., Nordenfelt S., Harney E., Stewardson K., Fu Q., Mittnik A., Bánffy E., Economou C., Francken M., Friederich S., Garrido Pena R., Hallgren F., Khartanovich V., Khokhlov A., Kunst M., Kuznetsov P., Meller H., Mochalov O., Moiseyev V., Nicklisch N., Pichler S.L., Risch R., Rojo Guerra M.A., Roth C., Szécsényi-Nagy A., Wahl J., Meyer M., Krause J., Brown D., Anthony D., Cooper A., Alt K.W., Reich D. 2015
Massive migration from the steppe was a source for Indo-European languages in Europe. *Nature*, vol. 522: 207–211. DOI: 10.1038/nature14317

Hansen S. 2010
Communication and exchange between the Northern Caucasus and Central Europe in the fourth millennium BC. In *Von Majkop bis Trialeti: Gewinnung und Verbreitung von Metallen und Obsidian in Kaukasien im 4.–2. Jt. v. Chr.*, S. Hansen, A. Hauptmann, I. Motzenbäcker, E. Pernicka (eds.). Bonn: Verl. Dr. R. Habelt, pp. 297–316. (Kolloquien zur Vor- und Frühgeschichte; No. 13).

Hansen S. 2011
Technische und soziale Innovationen in der zweiten Hälfte des 4. Jahrtausends v. Chr. In *Sozialarchäologische Perspektiven: Gesellschaftlicher Wandel 5000–1500 v. Chr.: Zwischen Atlantik und Kaukasus*, S. Hansen, J. Müller (eds.). Mainz: Verl. Ph. von Zabern, pp. 153–191. (Archäologie in Eurasien; No. 24).

Hansen S. 2013
The birth of the hero: The emergence of a social type in the 4th millennium BC. In *Unconformist Archaeology: Papers in Honour of Paolo Biagi*, E. Starnini (ed.). Oxford: Archaeopress, pp. 101–112. (BAR Intern. Ser., No. 2528).

Hansen S. 2014a
The 4th Millennium: A Watershed in European Prehistory. In *Western Anatolia Before Troy: Proto-Urbanisation in the 4th Millennium BC: Proc. of the Intern. Symp. Held at the Kunsthistorisches Museum Wien, Vienna, Austria, 21–24 November 2012*. Vienna: Austrian Academy of Sciences, pp. 243–260. (Oriental and European Archaeology; vol. 1).

Hansen S. 2014b
Gold and silver in the Maikop Culture. In *Metalle der Macht – Frühes Gold und Silber: 6. Mitteldeutscher Archäologentag vom 17. bis 19. Oktober 2013 in Halle*, H. Meller, R. Risch, E. Pernicka (eds.). Halle: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; Landesmuseum für Vorgeschichte, pp. 389–410. (Tagungen des Landesmuseums für Vorgeschichte Halle; Bd. 11/II).

Hansen S. 2016
Innovationen und Wissenstransfer in der frühen Metallurgie des westlichen Eurasiens. In *Interactions, Changes and Meanings: Essays in Honour of Igor Manzura on the Occasion of his 60th Birthday*, S. Țerna, B. Govedarica (eds.). Kishinev: Stratum Plus, pp. 107–120.

Hansen S. 2017
The iconography of inequality. In *Rebellion and Inequality in Archaeology: Proc. of the Kiel Workshops "Archaeology of Rebellion" (2014) and "Social Inequality as a Topic in Archaeology" (2015)*, S. Hansen, J. Müller (eds.). Bonn: Verl. Dr. R. Habelt, pp. 113–134.

Hansen S. 2018
Arbeitsteilung, soziale Ungleichheit und Surplus in der Kupferzeit an der Unteren Donau 4600–4300 v. Chr. In *Überschuss ohne Staat – Politische Formen in der Vorgeschichte: 10. Mitteldeutscher Archäologentag vom 19. bis 21. Oktober 2017 in Halle*, H. Meller, D. Gronenborn, R. Risch

(eds.). Halle: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; Landesmuseum für Vorgeschichte, pp. 1–25. (Tagungen des Landesmuseums für Vorgeschichte Halle; Bd. 18).

Hansen S., Helwing B. 2016

Die Anfänge der Silbermetallurgie in Eurasien. In *Von Baden bis Troia: Ressourcennutzung, Metallurgie und Wissenstransfer: Eine Jubiläumsschrift für Ernst Pernicka*, M. Bartelheim, B. Horejs, R. Krauß (eds.). Rahden: Verl. M. Leidorf, pp. 41–58.

Harrison R., Heyd V. 2007

The transformation of Europe in the third millennium BC: The example of 'Le Petit-Chasseur I + III' (Sion, Valais, Switzerland). *Prähistorische Zeitschrift*, Bd. 82: 129–214.

Iessen A.A. 1935

K voprosu o drevneishey metallurgii medi na Kavkaze. *Izvestiya GNIMK*, iss. 120: 7–237.

Izbitser E. 2003

Art of the early city-states. In *Art of the First Cities: The Third Millennium B.C. from the Mediterranean to the Indus*, J. Aruz, R. Wallenfels (eds.). New York: The Metropolitan Museum of Art, pp. 289–290.

Jeunesse C. 2014

Tumulus royaux et agglomérations géantes dans le Chalcolithique d'Europe orientale (cultures de Maikop et de Tripolje): Comment les "sociétés villageoises" chalcolitique succombent à la démesure. In *Entre archéologie et écologie, une Préhistoired de tous le milieu: Mélanges offerts à Pierre Pétrequin*, R.-M. Arbogast, A. Greffier-Richard (eds.). Besançon: Presses universitaires de Franche-Comté, pp. 331–344.

Jeunesse C. 2015

L'Italie et l'émergence de l'idéologie du guerrier dans la seconde moitié du 4ème millénaire av. J.-C. In *Preistoria e Protostoria del Veneto*, G. Leonardi, V. Tiné (eds.). Firenze: Istituto Italiano di Preistoria e Protostoria, pp. 187–200.

Kantorovich A.R., Maslov V.E., Petrenko V.G. 2013

Pogrebeniya maikopskoy kultury kurgana No. 1 mogilnika Marinskaya-5. In *Materialy po izucheniyu istoriko-kulturnogo naslediya Severnogo Kavkaza*, iss. 11. Moscow: Pamyatniki ist. mysli, pp. 71–108.

Kemp B. 2000

The Colossi from the Early Shrine at Coptos in Egypt. *Cambridge Archaeological Journal*, vol. 10: 211–242.

Klimscha F. 2017

Transforming technical know-how in time and space: Using the digital atlas of innovations to understand the innovation process of animal traction and the wheel. *eTopoi – Journal for Ancient Studies*, vol. 6: 16–63.

Kohl Ph.L. 2007

The Making of Bronze Age Eurasia. Cambridge: Cambridge Univ. Press.

Kohl Ph., Trifonov V. 2014

The Prehistory of the Caucasus: Internal developments and external interactions. In *The Cambridge World Prehistory*, C. Renfrew, P. Bahn (eds.). Vol. 3: West and Central Asia and Europe, pt. 7. Cambridge: Cambridge Univ. Press, pp. 1571–1595.

Kondratieff N.D. 1926

Die langen Wellen der Konjunktur. *Archiv für Sozialwissenschaft und Sozialpolitik*, Bd. 56: 573–609.

Korenevskiy S.N. 2011

Drevneishiy metall Predkavkazya. Moscow: Taus.

Korenevskiy S.N. 2012

Rozhdeniye kurgana. Moscow: Taus.

Kristiansen K., Allentoff M., Frei K., Iversen R., Johannsen N., Kroonen G., Paspieszny Ł., Price T., Rasmussen S., Sjögren K.-G., Sikora M., Willerslev E. 2017

Re-theorizing mobility and the formation of culture and language among the Corded Ware Culture in Europe. *Antiquity*, vol. 91: 334–347.

Lazaridis I., Patterson N., Mittnik A., Renaud G., Mallick S., Kirsanow K., Sudmant P.H., Schraiber J.G., Castellano S., Lipson M., Berger B., Economou C., Bollongino R., Fu Q., Bos K.I., Nordenfelt S., Li H., De Filippo C., Prüfer K., Sawyer S., Posth C., Haak W., Hallgren F., Fornander E., Rohland N., Delsate D., Francken M., Guinet J.-M., Wahl J., Ayodo G., Babiker H.A., Bailliet G., Balanovska E., Balanovsky O., Barrantes R., Bedoya G., Ben-Ami H., Bene J., Berrada F., Bravi C.M., Brisighelli F., Busby G.B.J., Cali F., Churnosov M., Cole D.E.C., Corach D., Damba L., Van Driem G., Dryomov S., Dugoujon J.-M., Fedorova S.A., Gallego Romero I., Gubina M., Hammer M., Henn B.M., Hervig T., Hodoglugil U., Jha A.R., Karachanak-Yankova S., Khusainova R., Khusnutdinova E., Kittles R., Kivisild T., Klitz W., Kučinskas V., Kushniarevich A., Laredj L., Litvinov S., Loukidis T., Mahley R.W., Melegh B., Metspalu E., Molina J., Mountain J., Näkkäläjärvi K., Nesheva D., Nyambo T., Osipova L., Parik J., Platonov F., Posukh O., Romano V., Rothhammer F., Rudan I., Ruizbakiev R., Sahakyan H., Sajantila A., Salas A., Starikovskaya E.B., Tarekegn A., Toncheva D., Turdikulova S., Uktveryte I., Utevska O., Vasquez R., Villena M., Voevoda M., Winkler C.A., Yepiskoposyan L., Zalloua P., Zemunik T., Cooper A., Capelli C., Thomas M.G., Ruiz-Linares A., Tishkoff S.A., Singh L., Thangaraj K., Villems R., Comas D., Sukernik R., Metspalu M., Meyer M., Eichler E.E., Burger J., Slatkin M., Pääbo S., Kelso J., Reich D., Krause J. 2013

Ancient human genomes suggest three ancestral populations for present-day Europeans. *Nature*, vol. 513: 409–413. https://doi.org/10.1038/nature13673

Masson V.M. 1997

Maikopskiye lidery rannikh kompleksnykh obshchestv na Severnom Kavkaze. In *Drevniye obshchestva Kavkaza v epokhu paleometalla (ranniye kompleksnye obshchestva i voprosy kulturnoi transformatsii)*. St. Petersburg: IIMK RAN, pp. 60–84. (Arkheologicheskiye izyskaniya; iss. 46).

McGovern P.E., Hartung U., Badler V.R., Glusker D., Exner L. 1997

The beginnings of winemaking and viniculture in the ancient Near East and Egypt. *Expedition*, vol. 39: 3–21.

McMahon A. 2009

The lion, the king and the cage: Late Chalcolithic iconography and ideology in Northern Mesopotamia. *Iraq*, vol. 71: 115–124.

McMahon A. 2013

Tell Brak: Early Northern Mesopotamian Urbanism, Economic Complexity and Social Stress, fifth–fourth millennia BC. In *100 Jahre Archäologische Feldforschungen in Nordost-*

Syrien – Eine Bilanz, D. Bonatz, L. Martin (eds.). Wiesbaden: Harrassowitz Verl., pp. 67–80.

Mensch G. 1975

Das technologische Patt: Innovationen überwinden die Depression. Frankfurt am Mein: Umschau.

Munchaev R.M. 1975

Kavkaz na zare bronzovogo veka: Neolit, eneolit, rannyaya bronza. Moscow: Nauka.

Nadler M. 2011

Spätneolithische Stelen und Petroglyphen? Zu einer Neubewertung der sog. Zeichensteingräber im mittleren Regnitztal. In *Varia Neolithica VII: Dechsel, Axt, Beil & Co – Werkzeug, Waffe, Kultgegenstand?: Aktuelles aus der Neolithforschung*, H.-J. Beier, R. Einicke, E. Biermann (eds.). Langenweißbach: Beier und Beran, pp. 183–210.

Nelson R.R., Winter S.G. 1977

In search of a useful theory of innovation research. *Policy*, vol. 6: 36–76.

Nelson R.R., Winter S.G. 1982

An Evolutionary Theory of Economic Change. Cambridge: Belknap Press of Harvard Univ. Press.

Nissen H.J., Damerow P., Englund R.K. 1991

Frühe Schrift und Techniken der Wirtschaftsverwaltung im alten Vorderen Orient: Informationsspeicherung und -verarbeitung vor 5000 Jahren. Berlin: Max-Planck-Institut für Bildungsforschung.

Oates J., McMahon A., Karsgaard Ph., Quntar S.Al, Ur J. 2007

Early Mesopotamian urbanism: A new view from the north. *Antiquity*, vol. 81: 585–600.

Pearson H.W. 1957

The Economy has no Surplus. Critique of a Theory of Development. In *Trade and Market in the Early Empires: Economies in History and Theory*, K. Polanyi, C. Arensberg, H. Pearson (eds.). Chicago: Henry Regnery Company, pp. 320–339.

Piotrovsky Y.Y. 1998

Periodizatsiya yuvelirnykh izdeliy v Tsirkumpontiyskoy provintsii (eneolit – rannyaya bronza). In *Shliman. Peterburg. Troya*. St. Petersburg: Slaviya, pp. 82–92.

Pitskhelauri K. 2012

Uruk Migrants in the Caucasus. *Bulletin of the Georgian Academy of Sciences*, vol. 6: 153–161.

Pollock S. 2017

Working Lives in an Age of Mechanical Reproduction: Uruk-Period Mesopotamia. In *The Interplay of People and Technologies: Archaeological Case Studies on Innovation*, S. Burmeister, R. Bernbeck (eds.). Berlin: Edition Topoi, pp. 205–224. (Berlin Studies of the Ancient World; vol. 43).

Rasmussen S., Allentoft M.E., Nielsen K., Orlando L., Sikora M., Sjögren K.-G., Pedersen A.G., Schubert M., Van Dam A., Kapel O.Ch.M., Nielsen H.B., Brunak S., Avetisyan P., Epimakhov A., Khalyapin M.V., Gnuni A., Kriiska A., Lasak E., Metspalu M., Moiseyev V., Gromov A., Pokutta D., Saag L., Varul L., Yepiskoposyan L., Sicheritz-Pontén T., Foley R.A., Lahr M.M., Nielsen R., Kristiansen K., Willerslev E. 2015

Early divergent strains of *Yersinia pestis* in Eurasia 5,000 years ago. *Cell*, vol. 163: 571–582.

Reich D. 2018

Who We Are and How We Got Here: Ancient DNA and the New Science of the Human Past. New York: Pantheon Books, Oxford: Oxford Univ. Press.

Reichel C. 2006

Urbanism and warfare: The 2005 Hamoukar, Syria: Excavations. *The Oriental News and Views*, vol. 189: 1–11.

Reinhold S., Gresky J., Berezina N., Kantorovich A.R., Knipper C., Maslov V.E., Petrenko V.G., Alt K.W., Belinsky A.B. 2017

Contextualising innovation: Cattle owners and wagon drivers in the North Caucasus and beyond. In *Appropriating Innovations: Entangled Knowledge in Eurasia 5000–1500 BCE: Papers of the Conf., Heidelberg, 15–17 Jan. 2015*. Oxford: pp. 78–97.

Rezepkin A.D. 2000

Das frühbronzezeitliche Gräberfeld von Klady und die Majkop-Kultur in Nordwestkaukasien. Rahden: Verl. M. Leidorf. (Archäologie in Eurasien; Bd. 10).

Rezepkin A.D. 2012

Novosvobodnenskaya kultura (na osnove materialov mogilnika "Klady"). St. Petersburg: Nestor-Istoriya. (Trudy IIMK RAN; vol. XXXVII).

Robb J. 2009

People of stone: Stelae, personhood, and society in prehistoric Europe. *Journal of Archaeological Method and Theory*, vol. 16: 162–183.

Rogers E.M. 1995

Diffusion of Innovations. New York: Free Press a division of Simon & Schuster, Inc.

Rossel S., Marshall F., Peters J., Pilgram T., Adams M.D., O'Connor D. 2008

Domestication of the donkey: Timing, processes, and indicators. *Proceedings of the National Academy of Sciences*, vol. 105: 3715–3720.

Rostovtzeff M. 1922

Iranians and Greeks in South Russia. Oxford: At The Clarendon Press.

Sagona A. 2018

The Archaeology of the Caucasus: From Earliest Settlements to the Iron Age. Cambridge: Cambridge Univ. Press. (Cambridge World Archaeology).

Salavert A. 2008

Olive cultivation and oil production in Palestine during the Early Bronze Age (3500–2000 B.C.): The case of Tel Yarmouth, Israel. *Vegetation History and Archaeobotany*, vol. 17, suppl. 1: 53–61.

Schumpeter J.A. 1939

Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process. New York, London: McGraw-Hill Book Company.

Scott J.C. 2017

Against the Grain: A Deep History of the Earliest States. Yale: Yale Univ. Press.

Sherratt A. 1981

Plough and pastoralism: Aspects of the secondary products revolution. In *Pattern of the Past: Studies in Honour of David Clarke*, I. Hodder, G. Isaac, N. Hammond (eds.). Cambridge: Cambridge Univ. Press, pp. 261–305.

Shishlina N.I., Orfinskaya O.V., Golikov V.P. 2003
Bronze Age textiles from the North Caucasus: New evidence of fourth millennium BC fibres and fabrics. *Oxford Journal of Archaeology*, vol. 22 (4): 331–344.

Sigrist Ch. 1979
Regulierte Anarchie: Untersuchungen zum Fehlen und zur Entstehung politischer Herrschaft in segmentären Gesellschaften Afrikas. Frankfurt am Mein: Syndikat.

Stein G.J. 2012
The development of indigenous social complexity in Late Chalcolithic Upper Mesopotamia in the 5th–4th millennia BC: An initial assessment. *Origini*, vol. 34: 125–151.

Stöllner Th. 2014
Gold in the Caucasus: New research on gold extraction in the Kura-Araxes Culture of the 4th Millennium and the early 3rd Millennium. In *Metalle der Macht – Frühes Gold und Silber: 6. Mitteldeutscher Archäologentag vom 17. bis 19. Oktober 2013 in Halle*, H. Meller, R. Risch, E. Pernicka (eds.). Halle: Landesamt für Denkmalpflege und Archäologie Sachsen-Anhalt; Landesmuseum für Vorgeschichte, pp. 71–110. (Tagungen des Landesmuseums für Vorgeschichte Halle; Bd. 11/II).

Szmyt M. 2014
Fourth-third millennium BC stone cist gravec between the Carpathians and Crimea. An outline of issues. *Baltic-Pontic Studies*, vol. 19: 107–147.

Testart A. 2004
La servitude volontaire. Vol. I: Les morts d´accompagnement. Paris: Errance.

The Oxford Handbook of Innovation. 2004
J. Fagerberg, D.C. Mowery, R.R. Nelson (eds.). Oxford: Oxford Univ. Press.

Tobler A.J. 1950
Excavations at Tepe Gawra, vol. II. Philadelphia: Univ. of Pennsilvania Press.

Trifonov V.A. 1998
Peredneaziatskiye prototipy maikopskikh izobrazheniy lvov: Stil i khronologiya. In *Ermitazhnye chteniya pamyati B.B. Piotrovskogo: K 90-letiyu so dnya rozhdeniya: Tezisy dokl*. St. Petersburg: pp. 93–97.

Ur J.A. 2010
Cycles of civilization in Northern Mesopotamia, 4400–2000. *Journal of Archaeological Research*, vol. 18: 387–431.

Vierzig A. 2017
Menschen in Stein: Anthropomorphe Stelen des 4. und 3. Jahrtausends v. Chr. zwischen Kaukasus und Atlantik. Bonn: Verl. Dr. R. Habelt.

Wang C.-C., Reinhold S., Kalmykov A., Wissgott A., Brandt G., Jeong C., Cheronet O., Ferry M., Harney E., Keating D., Mallick S., Rohland N., Stewardson K., Kantorovich A.R., Maslov V.E., Petrenko V.G., Erlikh V.R., Atabiev B.Ch., Magomedov R.G., Kohl P.L., Alt K.W., Pichler S.L., Gerling C., Meller H., Vardanyan B., Yeganyan L., Rezepkin A.D., Mariaschk D., Berezina N., Gresk J., Fuchs K., Knipper C., Schiffels S., Balanovska E., Balanovsky O., Mathieson I., Higham T., Berezin Y.B., Buzhilova A., Trifonov V., Pinhasi R., Belinskij A.B., Reich D., Hansen S., Krause J., Haak W. 2019
Ancient human genome-wide data from a 3000-year interval in the Caucasus corresponds with eco-geographic regions. *Nature Communications*, vol. 10 (1). https://doi.org/10.1038/s41467-018-08220-8

Warmuth V., Eriksson A., Bower M.A., Canon J., Cothran G., Distl O., Glowatzki-Mullis M.-L., Hunt H., Luís C., do Mar Oom M., Tupac Yupanqui I., Zabek T., Manica A. 2011
European domestic horses originated in two Holocene refugia. *PLoS ONE*, vol. 6 (3): e18194. DOI: 10.1371/journal.pone.0018194

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The Ishkinino Bronze Age Mining Complex in the Southern Urals: Radiocarbon Dating

This article presents the results of radiocarbon dating of buried soils beneath the dumps of ancient mines in the Ishkinino cobalt and copper pyrite deposit area, in the Southern Urals. The conserved upper horizons of stratigraphic sequences underlying the dumps of four mines were subjected to radiocarbon analysis. For comparison, samples from Bronze Age sites in the same area were used. Chronological ranges of the Yamnaya, Sintashta cultures, and Kozhumberdy cultural group were evaluated. Calibrated intervals of the buried soils from the Ishkinino mines show a good agreement with the respective intervals relating to human and animal bones from nearby Bronze Age cemeteries and settlements. The early stage of the mines (2200–1840 BC) corresponds to the Sintashta culture. Most geological and archaeological features at Ishkinino date to 1780–1130 BC, the same as the Kozhumberdy settlement and cemeteries representing the Alakul tradition. As the results suggest, radiocarbon dating of the buried soils underlying the mine dumps is relevant to the absolute and relative chronology of ancient mining—especially when archaeological contexts are of little help.

Keywords: *Bronze Age, Southern Urals, Ishkinino archaeological area, copper mine, radiocarbon dating.*

Introduction

Dating of geoarchaeological features relating to mining and primary processing of copper ores is one of the most complicated research issues in studying Bronze Age metal production. Usually, researchers have to deal with indirect data obtained by archaeometry methods. In exceptional cases, archaeologists excavating ancient mines manage to discover cultural layers or separate artifacts, including tunneling tools that directly point to the development of mining sites in the Bronze Age.

This necessitates the elaboration of an effective method for comprehensive research of ore-mining, which would make it possible to define objective criteria for the functioning of ancient mines during the Bronze Age. A positive research experience was obtained when studying the Ishkinino archaeological microregion in the eastern part of Orenburg region, the Southern Urals. This article is devoted to solution of the said problem, relating to radiocarbon dating of buried soils beneath the dumps of ancient mines.

Brief description of the research range

A cycle of special studies is devoted to the characteristics of the Ishkinino archaeological microregion sites (Tkachev, 2005, 2011, 2012; Zaykov, Yuminov, Tkachev, 2012; Plekhanova, Tkachev, 2013; and others). This obviates the need for detailed description of them. Therefore, I confine myself to some brief remarks on the complexes that constitute the source base for radiocarbon dating.

The Ishkinino archaeological microregion is situated in the middle reaches of the Sukhaya Guberlya River,

Archaeology, Ethnology & Anthropology of Eurasia 47/3 (2019) 38–47 E-mail: Eurasia@archaeology.nsc.ru

near the Ishkinino village of the Gaisky District of the Orenburg Region. It is formed by a compact group of sites: the Ishkinovka settlement, the Ishkinovka I–III cemeteries, and a series of localities containing Bronze Age ceramics of Aulgan I–IV and Sukhaya Guberlya I–IV (Fig. 1). The studies have demonstrated that all of these are interrelated and confined to the Ishkinino copper mines, being in this case the dominant element of the ore-mining and -smelting production structure. The Ishkinino mining complex of the Bronze Age is the largest and most structurally complicated geoarchaeological feature in the Southern Urals. At least 10 ancient mine-openings, and a production and processing site (Fig. 2, *1*), have been revealed within the ore field*.

The dumps of mines No. 6–8 and vertical opening No. 9 (possibly, a narrow slit-like mining ditch) were cut by trenches that opened buried soils (Fig. 2, *2–5*). Collected samples were used to conduct paleosol and palynological studies, as well as radiocarbon dating of the upper horizons of soils buried under the mine dumps.

The development of the Ishkinino copper mines in the Bronze Age was associated with the Ishkinovka settlement located 500 m north-northwest, on the opposite bank of the Aulgan creek. This settlement belongs to the Kozhumberdy cultural group representing the Alakul tradition (Fig. 3, *11–35*). Samples of animal bones were collected from the cultural layer of the site for radiocarbon dating.

Funerary complexes belonging to the Yamnaya (Pit-Grave) culture of the Early Bronze Age (EBA) (Fig. 3, *1–3*), the Sintashta culture of the Middle/Late Bronze Age (Fig. 3, *4–6*), and the Kozhumberdy cultural group of the Late Bronze Age (LBA) (Fig. 3, *7–10*) were studied at the Ishkinovka I–III cemeteries. For radiocarbon dating, one burial was selected from each of the said cultural formations at Ishkinovka I. As a result, six dates were obtained.

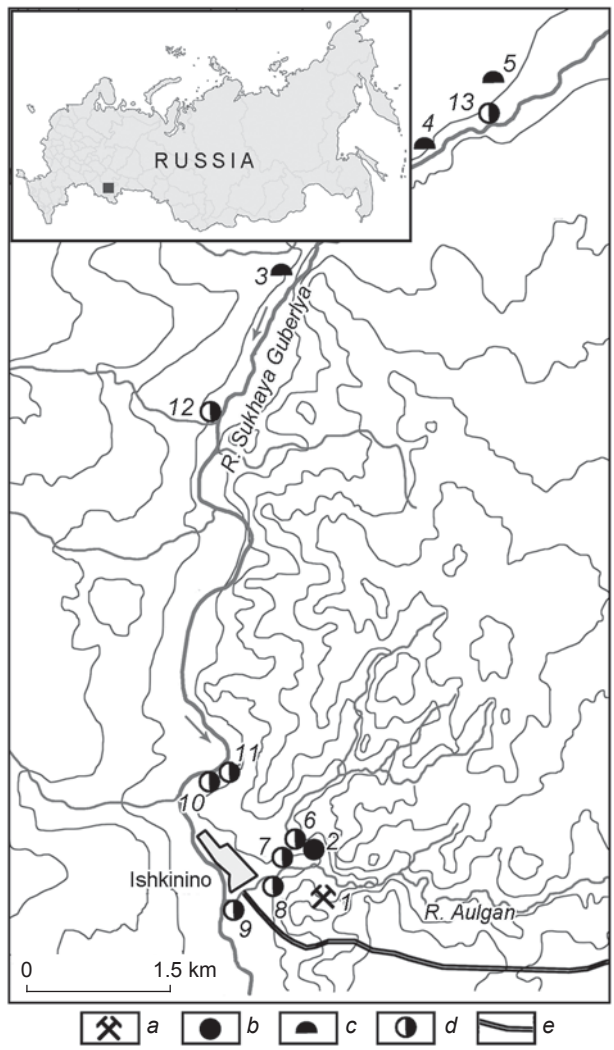

Fig. 1. Locations of the Ishkinino archaeological microregion sites.
a – mines; *b* – settlement; *c* – cemetery; *d* – location of artifacts; *e* – road. *1* – Ishkinino mines; *2* – Ishkinovka; *3* – Ishkinovka I; *4* – Ishkinovka II; *5* – Ishkinovka III; *6* – Aulgan I; *7* – Aulgan II; *8* – Aulgan III; *9* – Aulgan IV; *10* – Sukhaya Guberlya I; *11* – Sukhaya Guberlya II; *12* – Sukhaya Guberlya III; *13* – Sukhaya Guberlya IV.

Results of radiocarbon dating

During the studies under my supervision in the Ishkinino archaeological microregion, we managed to form a series of 13 radiocarbon dates (see *Table*). All dates are being published for the first time, which constitutes independent scientific value. Thus, we turn to the issue of determining the radiocarbon age of the mine-openings at the Ishkinino copper mines. This is a nontrivial research procedure for the mining sites.

Radiocarbon dates obtained by measuring various organic materials were used for comparative analysis. Human and animal bones, ceramics, and buried soils served as dated samples. The fact that the majority of analyses were performed by G.I. Zaitseva in the Archaeological Technology Laboratory of the Institute for the History of Material Culture RAS according to a common methodology (the analyses are designated by the Le code in the table and graphs) can be considered as a positive point. One date on ceramics was obtained through the mediation of P.F. Kuznetsov in the Kiev Radiocarbon Laboratory (Ki index). The only AMS-date (Hela index) obtained in the Dating Laboratory (now Laboratory of Chronology), Finnish Museum of Natural

*Notably, this article uses a revised numbering of the Ishkinino mining features, which is somewhat different from the earlier published one (Zaykov, Yuminov, Tkachev, 2012: Fig. 3).

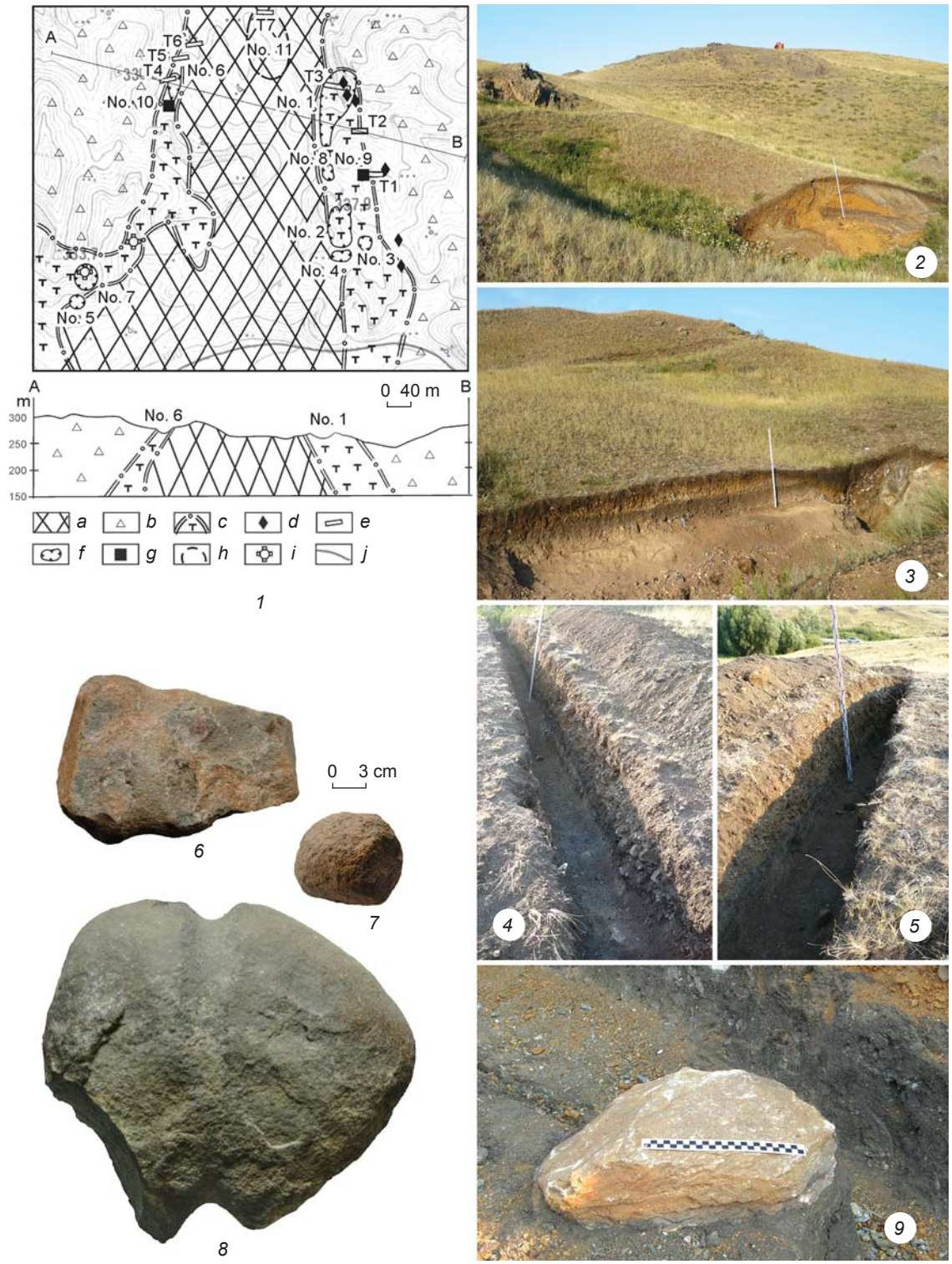

Fig. 2. Ishkinino ore-mining complex.

1 – location map of ancient mine-openings, an enrichment site and ore-bearing zones at the Ishkinino deposit area (after (Zaykov, Yuminov, Tkachev, 2012, Fig. 3) as supplemented) (*a* – ultrabasic rocks, *b* – volcanomictic breccias, *c* – contours of ore-bearing zones with accompanying talc-carbonate rocks, *d* – sampling points of ore grab samples, *e* – trenches dug out in 2001, *f* – contours of ancient mines, *g* – vertical mine-openings, *h* – enrichment site, *i* – locations of single gold grains, *j* – Gai– Ishkinino motorway; *2–5* – stratigraphic sequences of the dumps of mine-openings: *2* – mine No. 6, *3* – vertical opening No. 9, *4* – mine No. 8, *5* – mine No. 7; *6–9* – stone tools from the Ishkinino mines: *6*, *8* – hammers, *7* – ore-breaker stone, *9* – anvil.

Fig. 3. Materials of the Ishkinino archaeological microregion sites dated by the radiocarbon method.
7–3 – Ishkinovka I, kurgan 3, burial 7 (Yamnaya culture); *4–6* – Ishkinovka I, kurgan 3, burial 6 (Sintashta culture); *7–10* – Ishkinovka I, kurgan 2, burial 1 (Kozhumberdy cultural group); *11–35* – the Ishkinovka settlement (Kozhumberdy cultural group).

Results of radiocarbon dating of the Ishkinino archaeological microregion sites

No.	Locality (cultural attribution)	Laboratory code	Material	^{14}C-date, BP	Calibrated values, yrs BP	
					σ (68.2 %)	2σ (95.4 %)
1	Ishkinovka I, kurgan 3, burial 7 (Yamnaya culture, EBA)	Le-8839	Human bone	4040 ± 100	2860–2810 (8.9 %) 2750–2720 (4.0 %) 2700–2460 (55.3 %)	2890–2300 (95.4 %)
2	″	Hela-3560 (AMS)	″	3927 ± 74	2560–2530 (5.7 %) 2500–2290 (62.5 %)	2620–2190 (95.4 %)
3	Ishkinovka I, kurgan 3, burial 6 (Sintashta culture, LBA)	Le-8924	Animal bone	3421 ± 120	1900–1600 (65.1 %) 1590–1560 (3.1 %)	2040–1440 (95.4 %)
4	″	Le-8925	Human bone	3560 ± 110	2110–2100 (0.9 %) 2040–1740 (67.3 %)	2210–1620 (95.4 %)
5	″	Ki-18021	Ceramics	3870 ± 70	2470–2280 (63.6 %) 2250–2230 (4.6 %)	2570–2530 (1.8 %) 2500–2140 (93.6 %)
6	Ishkinovka settlement, square Г-2, level 35 (Kozhumberdy cultural group, LBA)	Le-8854	Animal bone	3020 ± 150	1430–1050 (68.2 %)	1620–890 (95.4 %)
7	Ishkinovka settlement, square Г-2, level 70 (Kozhumberdy cultural group, LBA)	Le-8855	″	3190 ± 100	1620–1380 (63.2 %) 1340–1310 (5.0 %)	1730–1720 (0.3 %) 1700–1210 (95.1 %)
8	Ishkinovka settlement, excavation 3 (Kozhumberdy cultural group, LBA)	Le-9342	″	2940 ± 200	1400–920 (68.2 %)	1690–760 (95.4 %)
9	Ishkinovka I, kurgan 2, burial 1 (Kozhumberdy cultural group, LBA)	Le-9680	Human bone	3380 ± 110	1880–1840 (4.9 %) 1820–1800 (1.3 %) 1780–1520 (62.0 %)	1950–1430 (95.4 %)
10	Ishkinino mines, mine No. 6	Le-8849	Buried soil	4240 (3240)* ± 100	1640–1410 (68.2 %)	1760–1260 (95.4 %)
11	″ , mine No. 8	Le-8851	″	4030 (3030)* ± 100	1410–1120 (68.2 %)	1510–1000 (95.4 %)
12	″ , mine No. 7	Le-8852	″	4370 (3370)* ± 100	1870–1850 (1.4 %) 1780–1520 (66.8 %)	1920–1440 (95.4 %)
13	″ , mine No. 9	Le-8853	″	4730 (3730)* ± 120	2300–1950 (68.2 %)	2480–1870 (93.2 %) 1850–1770 (2.1 %)

*Values corrected for the radiocarbon age of the ten-centimeter layer of the chernozem upper horizon (ca 1000 years) are specified in brackets (Chichagova, 1985: 84, 85, tab. 26).

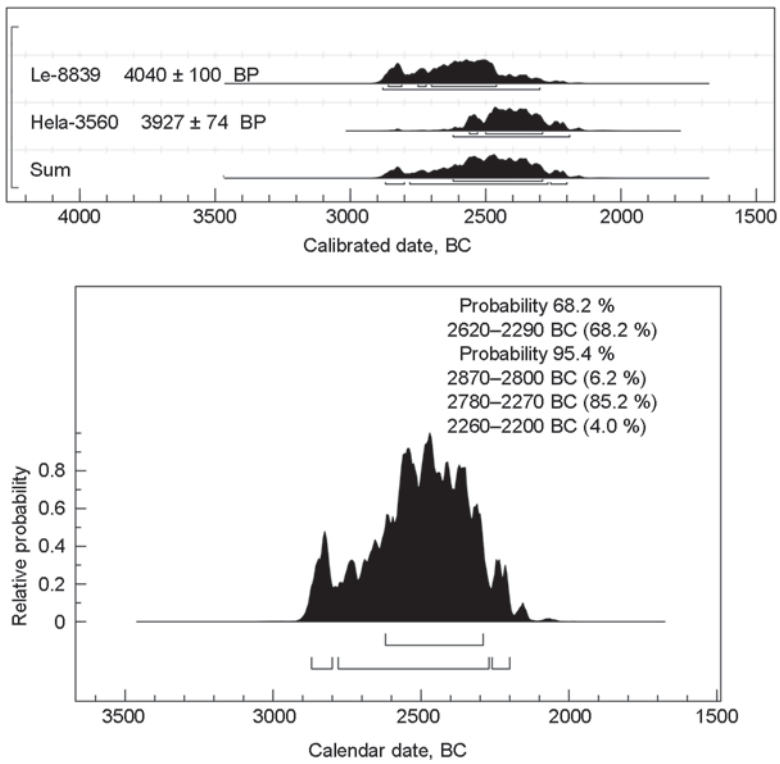

Fig. 4. Graphs of summation of probabilities for calibrated radiocarbon dates on burial 7, kurgan 3 of the Ishkinovka I cemetery (Yamnaya culture).

History, University of Helsinki, was kindly furnished by N.L. Morgunova.

The radiocarbon dates were calibrated with the OxCal 4.3.2 program of the Oxford Laboratory (Bronk Ramsey, 2017). The statistical procedures used values with a probability of 68.2 %, which produced more compact intervals. Summation of the obtained intervals available in the previous version of the OxCal 3.10 program proved to very efficient (Bronk Ramsey, 2005). In these cases, to achieve better results, more accurate calibration curve IntCal13 was used (Reimer et al., 2013).

Comparative materials

Before turning to the results of radiocarbon dating of buried soils beneath the dumps of the Ishkinino mines, it is necessary to consider a series of dates obtained for funerary and settlement complexes in their neighborhood. The initial stage of the Bronze Age is presented in our sample by two radiocarbon dates for a Yamnaya culture burial (see *Table*, Ishkinovka I, kurgan 3, burial 7). The results of measurements using conventional benzene technology (Le-8839) virtually coincide with the mass series of radiocarbon dates obtained by the same procedure for the Late Yamnaya sites (developed stage B) in the Cis-Urals steppe region (Morgunova, 2014: Tab. 16). The second date (Hela-3560), determined by the AMS-method, proved to be 90 years younger, and it has a narrower confidence interval. Meanwhile, they demonstrate reasonably good convergence, which is clearly illustrated by partial coincidence of the calibrated age intervals. This allowed us the use a function for summing conventional dates. A quite symmetrical graph of probability sums (2620–2290 / 2870–2200 BC), which was finally obtained*, generally corresponds to the normal distribution (Fig. 4). Obtaining a combined date in the OxCal 4.3.2 program led to comparable results (2580–2340 / 2840–2280 BC), which made it possible to do away with this procedure as a duplicate in this case.

The next chronological echelon is composed of the dates obtained for the Sintashta burial (see *Table*, Ishkinovka I, kurgan 3, burial 6). The use of a summation algorithm has allowed us to build a double-peaked asymmetric graph with two calibrated intervals of 2470–2230 and 2010–1640 BC, with a probability of 68.2 % (Fig. 5). The first of these was obtained through the date on ceramics, and the second one by summing two dates on human and animal bones. The last interval actually coincides with the Sintashta

*The first interval – σ (68.2 %), the second interval – 2σ (95.4 %).

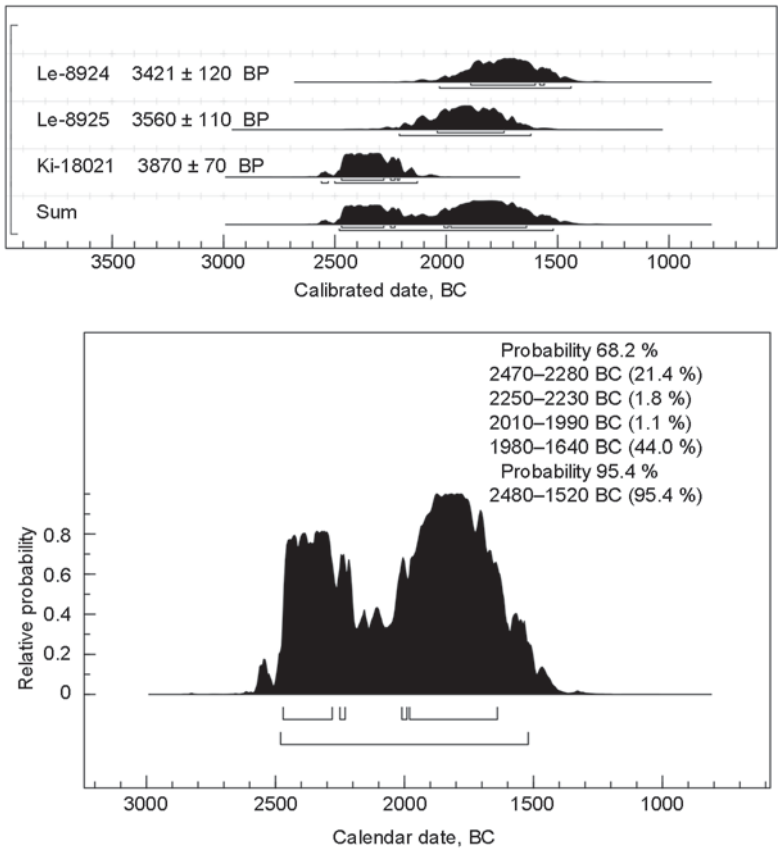

Fig. 5. Graphs of summation of probabilities for calibrated radiocarbon dates on burial 6, kurgan 3 of the Ishkinovka I cemetery (Sintashta culture).

chronological framework that was reliably established on the basis of mass data (30 dates) (Epimakhov, 2007: 403, fig. 1, *I)*. At the same time, the obtained results once again compel us to pay attention to the difficulties that arise during radiocarbon dating of ceramics, which are related to the presence of different carbon sources (Kulkova, 2014).

Using human and animal bones, it was possible to obtain four dates (see *Table*) for the Kozhumberdy cultural group complexes of the Alakul tradition (see Fig. 3, *7–35*). Summation of probabilities of the calibrated values resulted in building a uniform symmetric graph and determining the interval of 1690–1120 BC (Fig. 6). At the same time, these four dates form two non-contemporaneous pairs, which is in good agreement with the radiocarbon chronology of Kozhumberdy antiquities of the Ural-Mugodzhar region. The chronological framework for these antiquities was determined to be within 1750–1100 BC, with the possibility of distinguishing two phases delimited by approximately 1400 BC (Tkachev, 2016).

Thus, the following calibrated intervals were obtained by the results of radiocarbon dating of the Bronze Age sites of the Ishkinino archaeological microregion: the Yamnaya culture (EBA) – 2620–2290 BC, the Sintashta culture (LBA) – 2010–1640 BC, and the Kozhumberdy cultural group (LBA) – 1690–1120 BC.

Archaeological context and radiocarbon dating of geoarchaeological features

Notably, there is archaeological evidence of the functioning of the Ishkinino mines in the Bronze Age. At the dumps of ancient mines and enrichment site, stone hammers, a grinder, and an anvil were found (see Fig. 2, *6–9*). Ore fragments, smelter slags, stone anvils, pestles, hammers, blanks for tunneling bone wedges, and other evidence of ore-mining and -smelting production were discovered in the Ishkinovka settlement cultural layer (see Fig. 3, *11–13*, *20–22*). Archaeometric studies have revealed the identity of composition of chromite ores and slugs, as well as the presence of copper sulphides and iron phosphides with increased nickel content in the reguli found in slags. This confirmed the use of the Ishkinino deposit ores by the Ishkinovka population (Zaykov, Yuminov, Tkachev, 2012).

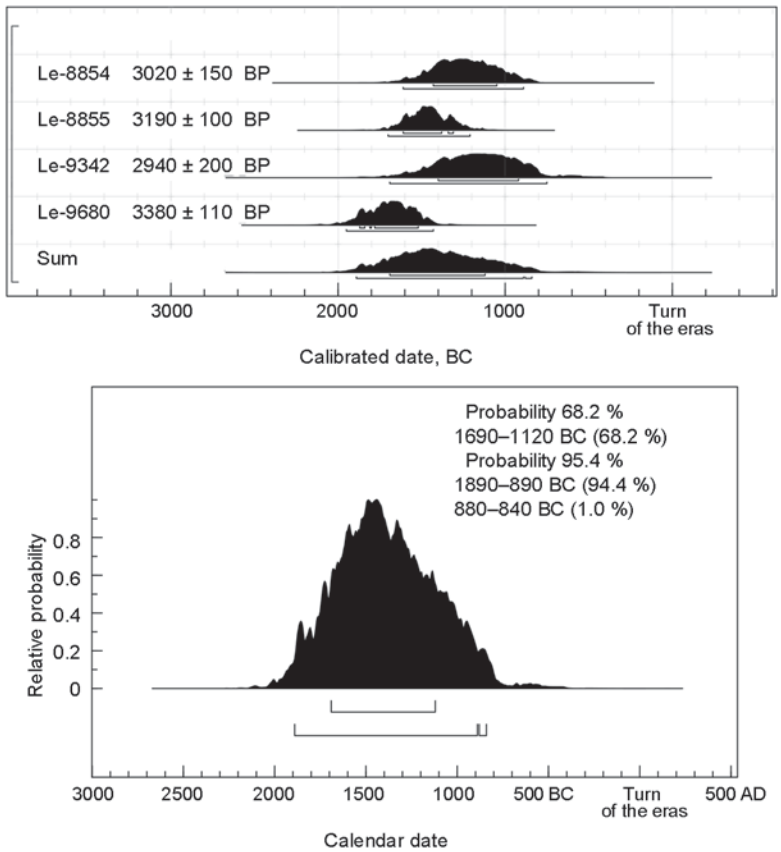

Fig. 6. Graphs of summation of probabilities for calibrated radiocarbon dates on burial 1, kurgan 2 of the Ishkinovka I cemetery (Kozhumberdy cultural group).

Preceding the presentation of buried soil radiocarbon dating results, it should be made clear that this type of source has a number of special features to be taken into account when performing statistical procedures and interpreting the obtained data. The technique of handling radiocarbon dates on buried soils differs considerably from the algorithm for actions relating to the dating results of other materials. In case of the Ishkinino samples, the problem is somewhat alleviated, since these are ordinary chernozems, whose properties have been thoroughly studied by paleopedologists. According to the procedural requirements, it is necessary to subtract the radiocarbon age of the buried soil humic substances from the obtained ^{14}C-date. It is approximately 1000 years for the upper 10 cm thickness of chernozems (Chichagova, 1985: 84, 85, tab. 26; Morgunova et al., 2003: 266–267).

As already mentioned, buried soil samples were collected beneath the dumps of four mine-openings in the Ishkinino mine area (see Fig. 2, *1–5*). These proved to be quite suitable for radiocarbon dating. All conventional dates have yielded calibrated age intervals within the Bronze Age (see *Table*). Ancient soil under the dump of small mine No. 8 (Le-8851), dated to within 1410–1120 BC, makes it possible to assign this mining-site to the late phase of the Kozhumberdy cultural group. A sample taken beneath the dump of mine No. 6 (Le-8849) has yielded an interval of calibrated values within 1640–1410 BC, which corresponds to the early phase of this group.

The results of the radiocarbon dating of two other samples cannot be interpreted so unambiguously (possibly owing to the errors in the method itself). The calibrated interval of buried soil beneath the dump of mine No. 7 (Le-8852: 1870–1520 BC) overlaps equally the late part of the Sintashta range and the early part of the Kozhumberdy. But all the same, correlation of this mine with the latter seems to be more justified. This conclusion is also confirmed by the nearly full coincidence between the conventional dates and calibrated intervals of the soil sample and Kozhumberdy burial 1, kurgan 2 of the Ishkinovka I cemetery (Le-9680: 1880–1520 BC) (see *Table*).

Vertical opening No. 9, where sulfide ores were produced, is the most ancient site among the geoarchaeological features of the Ishkinino mining complex. The interval of calibrated values of buried soil sample collected beneath its dump (Le-8853: 2300–1950 BC)

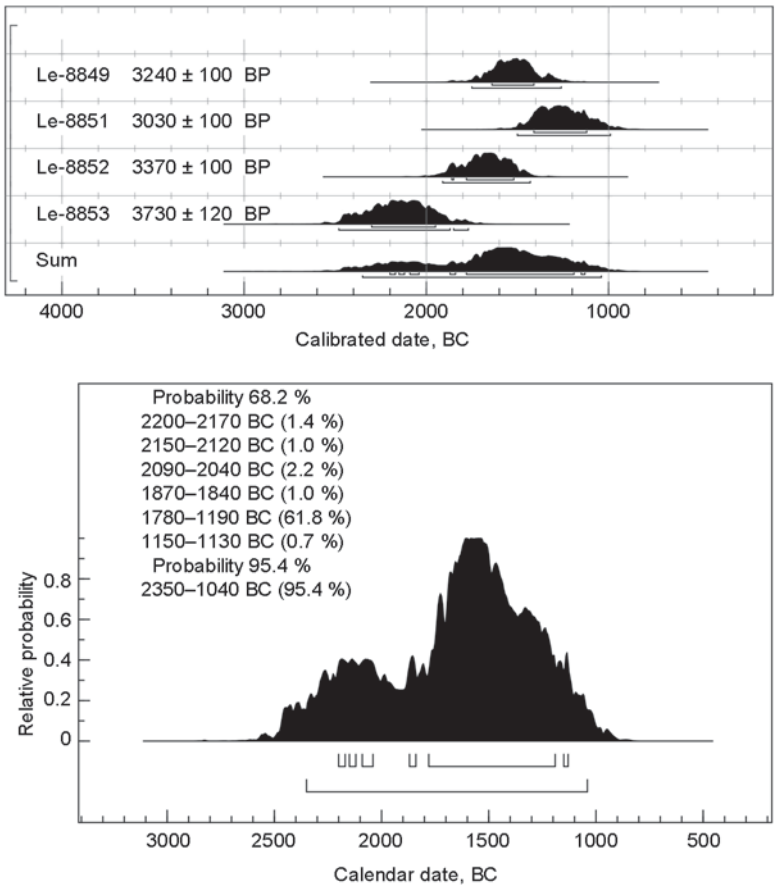

Fig. 7. Graphs of summation of probabilities for calibrated radiocarbon dates on buried soils beneath the dumps of Ishkinino mine-openings.

overlaps the early phase of the Sintashta range only in its later part. And yet, it is most realistic to define this opening as belonging to the Sintashta culture.

Summation of probabilities for calibrated radiocarbon dates on buried soils became the next stage of analysis. As a result of this procedure, a double-peaked asymmetric graph with two intervals of values was built (Fig. 7). The first interval (2200–1840 BC) can generally be referred to the Sintashta period of Ishkinino mining complex use, while the second (1780–1130 BC) refers to the Kozhumberdy one.

The existence of at least two developmental stages of the Ishkinino cobalt and copper pyrite deposit area in the Bronze Age is also confirmed by the stratigraphy of the northern dump of mine No. 1; this is the largest dump wherein inter-overlapping dumped strata were recorded. These latter are divided by the buried soil interlayer that had been formed during a long interval between the operational stages (Zaykov et al., 2005: 107–108, fig. 8; Zaykov, Yuminov, Tkachev, 2012: 40–41, fig. 4, 5).

Conclusions

To sum up the above, a number of resulting propositions can be stated.

1. Radiocarbon dating of buried soils beneath the dumps of mine-openings has confirmed the development of the Ishkinino cobalt and copper pyrite deposit area in the Late Bronze Age. The initial stage of mines' functioning is associated with the Sintashta culture of the turn of the middle and late periods of the Bronze Age, while the next stage belongs to the time of the Kozhumberdy cultural group representing the Alakul tradition.

2. The obtained data on the radiocarbon age of buried soils from geoarchaeological production features correlate well with the radiocarbon dating results (from human and animal bones) of the funerary sites and the settlement relating to the Ishkinino mines.

3. Radiocarbon dating of buried soils preserved under man-made strata of mining complexes can be employed as an efficient universal method for determining the age and functioning stages of mining sites irrespective of their

cultural and chronological position; which is particularly relevant in cases of the uncertain archaeological context of such features.

Acknowledgements

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References

Bronk Ramsey C. 2005
OxCal 3.10. URL: http://c14.arch.ox.ac.uk/oxcal3/oxcal.htm (Accessed October 4, 2018).

Bronk Ramsey C. 2017
OxCal 4.3. URL: http://c14.arch.ox.ac.uk (Accessed October 1, 2018).

Chichagova O.A. 1985
Radiouglerodnoye datirovaniye gumusa pochv: Metod i ego primeneniye v pochvovedenii i paleogeografii. Moscow: Nauka.

Epimakhov A.V. 2007
Otnositelnaya i absolyutnaya khronologiya sintashtinskikh pamyatnikov v svete radiokarbonnykh datirovok. *Problemy istorii, filologii, kultury*, No. 17: 402–421.

Kulkova M.A. 2014
Radiouglerodnoye datirovaniye drevney keramiki. *Samarskiy nauchniy vestnik*, No. 3 (8): 115–122.

Morgunova N.L. 2014
Priuralskaya gruppa pamyatnikov v sisteme volzhsko-uralskogo varianta yamnoy kulturno-istoricheskoy oblasti. 2nd edition, amended. Orenburg: Izd. Orenburg. Gos. Ped. Univ.

Morgunova N.L., Khokhlova O.S., Zaitseva G.I., Chichagova O.A., Golieva A.A. 2003
Rezultaty radiouglerodnogo datirovaniya arkheologicheskikh pamyatnikov Yuzhnogo Priuralya. In *N.L. Morgunova, A.A. Golieva, L.A. Kraeva, D.V. Meshcheryakova, M.A. Turetsky, M.V. Khalyapin, O.S. Khokhlova. Shumayevskiye kurgany*. Orenburg: Izd. Orenburg. Gos. Ped. Univ., pp. 264–274.

Plekhanova L.N., Tkachev V.V. 2013
Fiziko-khimicheskiye svoystva pochv mnogosloynogo poseleniya epokhi bronzy v okrestnostyakh goroda Gai. *Povolzhskaya arkheologiya*, No. 4 (6): 225–234.

Reimer P.J., Bard E., Bayliss A., Beck J.W., Blackwell P.G., Bronk Ramsey C., Buck C.E., Cheng H., Edwards R.L., Friedrich M., Grootes P.M., Guilderson T.P., Haflidason H., Hajdas I., Hatté C., Heaton T.J., Hoffmann D.L., Hogg A.G., Hughen K.A., Kaiser K.F., Kromev B., Manning S.W., Niu M., Reimer R.W., Richards D.A., Scott E.M., Southon J.R., Staff R.A., Turney C.S.M., van der Plicht J. 2013
IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. *Radiocarbon*, vol. 55 (4): 1869–1887.

Tkachev V.V. 2005
Periodizatsiya i khronologiya pamyatnikov epokhi bronzy Ishkininskogo arkheologicheskogo mikrorayona v Vostochnom Orenburzhye. In *Voprosy istorii i arkheologii Zapadnogo Kazakhstana*, iss. 4. Uralsk: Zap.-Kazakh. obl. tsentr ist. i arkheol., pp. 182–198.

Tkachev V.V. 2011
Ishkininskiy arkheologicheskiy mikrorayon epokhi bronzy: Struktura, periodizatsiya, khronologiya. *KSIA*, iss. 225: 220–230.

Tkachev V.V. 2012
An Alakul funeral and ritual site in the Eastern Orenburg Region. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 40 (1): 49–57.

Tkachev V.V. 2016
Radiouglerodnaya khronologiya kozhumberdynskoy kulturnoy gruppy na zapadnoy periferii alakulskogo areala. *Vestnik arkheologii, antropologii i etnografii*, No. 3 (34): 68–77.

Zaykov V.V., Yuminov A.M., Dunaev A.Y., Zdanovich G.B., Grigoriev S.A. 2005
Geologo-mineralogical studies of ancient copper mines in the Southern Urals. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4: 101–114.

Zaykov V.V., Yuminov A.M., Tkachev V.V. 2012
Copper mines, chromite copper ores and slags of the Ishkinino Bronze Age archaeological microregion, the Southern Urals. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 40 (2): 37–46.

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An Early Iron Age Foundry at Kargat-4, Southwestern Siberia

During the excavations at an Early Iron Age site of Kargat-4 in central Baraba, a foundry was discovered. The complex consisted of a melting-furnace in the center of a dwelling, and several utility pits. We give a detailed description of these features, their associated artifacts, and the archaeological context. Among the items from the infill are fragments of at least five clay molds, three crucibles, drops of spilt bronze, a fragment of a nozzle, and bronze tongs. The casting-kit included three stone utensils—two whetstones and a hammer. All the molds were destined for casting-celts. The best-preserved mold had two halves, which were found inside a dwelling (in a utility pit and at the entrance) and outside it. For each artifact a detailed description, the results of the analysis, and parallels are provided. The techniques of manufacturing molds and crucibles, such as those found at the site, are reconstructed. These are shown to have originated in areas situated west or southwest of Kargat-4. During the Early Scythian age, they were practiced in northern Kazakhstan and the Trans-Urals, and they were apparently introduced to central Baraba by people of the Bolshaya Rechka culture during the Bronze-to-Iron-Age transition, as evidenced by the Berlik and Krasnoozerka cultures.

Keywords: *Early Iron Age, Baraba forest-steppe, settlement, foundry, melting-furnaces, bronze-casting.*

Introduction

The settlement of Kargat-4 is located on a cape formed by the bank of the Kargat River and floodplain terrace of Lake Chicha, which in ancient times was a part of Lake Chany, 3.8 km to the west-northwest of the village of Zdvinsk, in the Zdvinsky District of the Novosibirsk Region (Fig. 1). The site was discovered in 1975 by V.A. Zakh (Molodin, Novikov, Sofeikov, 2000: 60) and was investigated in 1981 by an expedition from the Institute of History, Philology, and Philosophy of the Siberian Branch of the USSR Academy of Sciences (today IAET SB RAS) led by N.V. Polosmak*. The most striking and extraordinary feature of the settlement was an industrial complex for manufacturing metal products, which consisted of a melting-furnace and several utility pits. Therein, features of bronze-casting production were found, including fragments of clay casting-molds, crucibles, and drops of spilt bronze.

*The authors thank N.V. Polosmak for the opportunity to use her field materials.

Archaeological context of finds

Visually, the settlement looked like a row of three shallow depressions located along the shoreline of Lake Chicha. According to pottery evidence, it was attributed to the Bolshaya Rechka culture of the Early Iron Age, representing one of the most western sites of that type. The settlement was dated to the 5th–3rd centuries BC (Polosmak, 1987: 90). Two dwellings from the settlement have been investigated (Ibid.: 46–50). Traces of intense bronze-casting have been found only in dwelling No. 2.

Dwelling No. 2 was a subrectangular pit oriented to the cardinal points (Fig. 2) and measuring 8.2 × 9.4 m. The walls were vertical; the bottom was even. The depth from the level of sterile soil was 0.25 m. The pit was filled with black sandy loam. On the eastern side, a corridor-shaped exit 7 m long and 1 m wide was adjacent to the dwelling; its depth from the level of sterile soil was 0.3 m. Rows of post pits, which used to support the frame of the walls, were 0.15–0.25 m in diameter and 0.1–0.27 m deep. These were found along the walls of the pit in the dwelling and corridor. Two pits remaining from the supporting posts of the roof were in the center of the pit. The dwelling could have been a frame-and-post structure. Its filling contained a stone flake, two bone arrowheads, a horn clasp, an iron clip, and clay spindle whorls (Ibid.: Fig. 69, *2*, *5–7*, 77, *2–5*). Traces of production activities were found in the form of slag, copper splashes, and also fragments of crucibles and casting-molds.

The production complex consisted of a melting-furnace located in the central part of the pit, and several utility pits. The furnace was a rounded depression 0.85 m in diameter and 0.25–0.28 m in depth from the floor level, filled with calcined soil with inclusions of burnt bones and lenses of ash. A clay spindle whorl was also found in the infill (Fig. 3, *4*). At the edge of the northeastern wall of the furnace, two drops of split bronze and another spindle whorl were found (Fig. 3, *5*). The composition of the findings suggests that the furnace had multiple functions: it was used not only for cooking and lighting, but also for melting metal and firing technical ceramics. Notably, a large number of spindle whorls (at least 6 items) were found in the bronze-casting area, while the neighboring dwelling No. 1 contained none. Since the opinion about the connection of the spindle and thread with the furnace and forge and metal-casting cult has already been suggested in the literature (Chindina, 2000: 271), it is impossible not to mention the presence of spindle whorls in priestly male burials of the Bolshaya Rechka culture (Troitskaya, 1987: 59–62; Troitskaya, Borodovsky, 1994: 80).

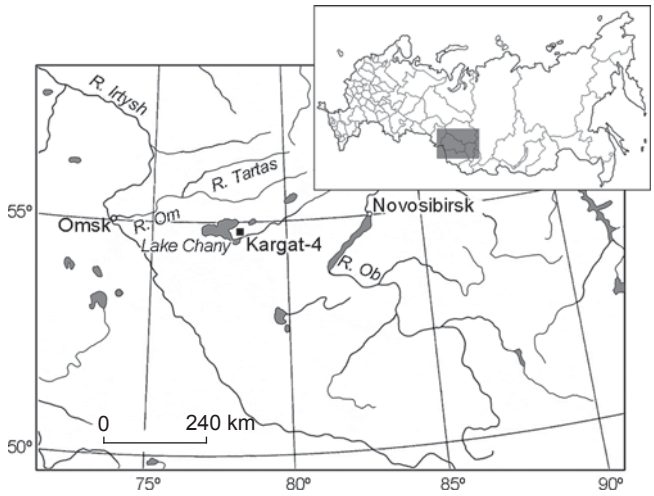

Fig. 1. The settlement of Kargat-4.

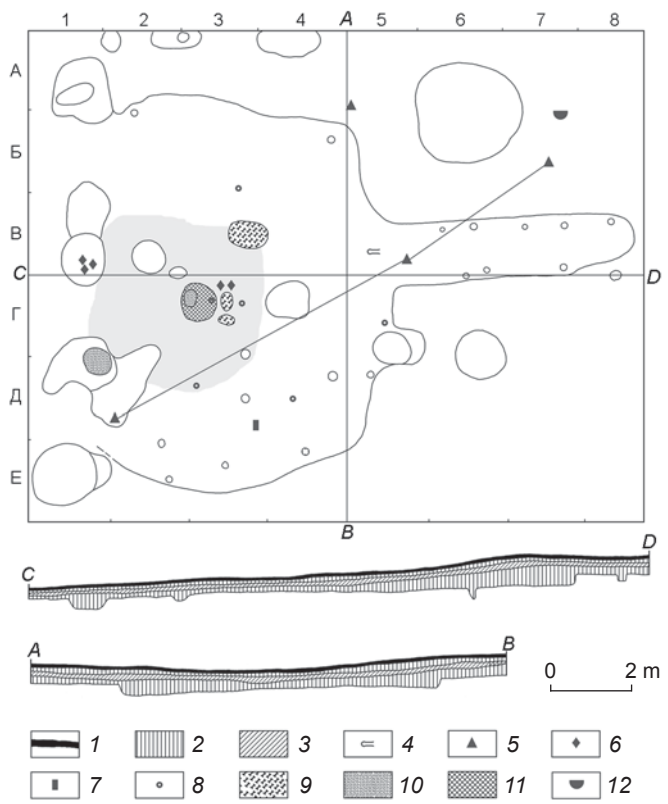

Fig. 2. Bronze-casting area in dwelling No. 2 in plan view and in cross section.
1 – sod layer; *2* – black sandy loam; *3* – whitish layer (mineral salts); *4* – bronze tongs; *5* – fragment of a mold; 6 – drop of bronze; *7* – whetstone; *8* – spindle whorl; *9* – accumulation of animal bones; *10* – ash; *11* – furnace; *12* – fragment of a crucible.

Two pits filled with bones and located in the center of the dwelling were also a part of the bronze-casting complex. The first pit was located 0.14 m east of the furnace; it was an oval depression elongated along the

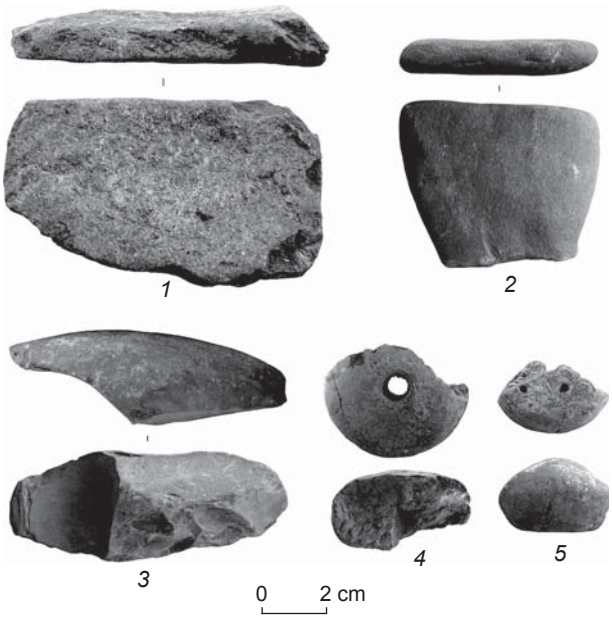

Fig. 3. Finds from bronze-casting area in dwelling No. 2. *1*, *2* – stone whetstones; *3* – fragment of a stone hammer; *4*, *5* – clay spindle whorls.

north–south and measuring 0.21 × 0.42 m with a depth of 0.21 m. The second pit also had oval shape, and was oriented west–east. Its size was 0.16 × 0.35 m.

The production complex also included the third pit filled with animal bones. This was located 1.14 m northeast of the furnace. The pit had an oval shape elongated along the east-west axis. Its size was 0.64 × 1.0 m; the depth from floor level was 0.23 m. In the metalworking of the Early Iron Age in Siberia, animal bones were often used as high-temperature fuel (Grishin, 1980: 94–95; Troitskaya, Borodovsky, 1994: 54); they could have also been used as flux (CaO) lowering the melting temperature (Beltikova, 1986: 74–75). Accordingly, pits with bones were typically present at the production sites of the time. The total mass of the stocked bones was often significant, ranging from 3–5 to 10 kg. At the Bolshaya Rechka sites of the Upper Ob region, for example, at the settlement of Ordynskoye-9, in dwellings No. 1 and 7, such pits have been found near the melting-furnaces (Troitskaya, Durakov, 1999: 132; Troitskaya, 2005: 65, fig. 1, *g*).

Judging by the infill (fragments of molds, drops of bronze, ash), two utility pits that served as garbage containers were also associated with the bronze-casting area. One was found 2 m west of the furnace; it had an elongated oval shape and measured 2.56 × 1.0 m, and 0.28 m deep. The pit was filled with black sandy loam with inclusions of ash and soot. Three bronze splashes were also found there. The second pit was located 1.2 m southwest of the furnace. It had irregular shape, and measured 2.25 × 2.1–1.0 m and 0.3 m deep. The pit was filled with black sooty loam with large lenses of ash. Fragments of ceramics, animal bones, and a fragment of a mold for the casting of celts were found in the pit.

On the territory of the bronze-foundry, items belonging to production equipment were discovered, including a fragment of a nozzle, bronze tongs, and fragments of at least five molds and three crucibles.

Description and analysis of bronze-casting equipment

Bronze tongs of the spring type were found at the floor level in the pre-entrance part of the dwelling. The tongs were 22 cm long and were made of a bent forged bronze rod, square in cross-section and measuring 0.4 × 0.6 cm in the middle part.

Casting-molds included 12 fragments of not less than five items. All of these were intended for casting-celts.

Only the upper halves of two molds have survived. One of these was intended for the casting of celts with oval sockets (Fig. 4, *2*). The size of the half was 4.5–5.5 × 2.2–2.4 cm. The thickness of the wall along the upper edge of the socket was 0.5 cm.

Celts were also cast in the second mold. The imprint of a socket and a short sprue, square in cross-section, have been preserved (Fig. 4, *1*). The size of the socket was 4.0 × 2.2 cm. The length of the sprue channel was 1 cm; its cross-section was 0.6 × 0.3 cm. Both of the above molds were made of clay with added organic material.

A third mold has come down to us in the form of a small fragment of the middle part of its body (Fig. 4, *3*). It was intended for the casting of celts octagonal in cross-section. Judging by the imprint of wood structure surviving on the inner surface of the working chamber, the mold was made according to the wooden model.

Fourth mold is represented by a fragment of the lower part of the mold half with the imprint of a semicircular wedge-shaped blade of celt (Fig. 4, *4*). The convergence angle of the blade planes reached 30˚.

The fifth mold (the best preserved) consists of two halves (Fig. 5). Its fragments were found inside the dwelling in the utility pit, at the exit, and outside in the accumulation of garbage at the eastern wall. The dispersion of mold fragments may indicate the main directions of movements by the dwelling's inhabitants in the course of their economic activities (see Fig. 2).

Judging by the negative space of the working chamber, a wedge-shaped celt with a sub-oval socket was cast in the mold. The width of the blade was 3.7 cm. The height of the preserved part was 6.3 cm. The size of the socket was 4.5 × 2.2 cm. Celts of this type are known from the materials of the Bolshaya Rechka culture of the Upper Ob region (Troitskaya, Borodovsky, 1994: Pl. XXIII, *2*).

Their manufacture by the Bolshaya Rechka artisans is evidenced by the find from the settlement of Verkh-Tula (Ibid.: Pl. XI, *4*). The halves of the mold were made of clay with the addition of organic material. The outer surface was covered with a layer of liquid clay applied using fingers and wood chips—fingerprints and elongated parallel grooves left by the wood chips can be seen.

All the molds of the Kargat-4 bronze-casting complex were made of clay fabric of the same composition. The stability of the recipe most likely indicates a high degree of production specialization. The recipe of clay + organic material in the bronze foundry of the population of the Ob-Irtysh forest-steppe is traditional. It has been found in this region at the sites of the Late Bronze Age and transitional period (Mylnikova, Durakov, 2008: 66).

The molds found on the territory of the production area were most likely made in the following way. First, the lower half was shaped: the model of the future product was pressed into a piece of molding material. The mold on the back and the parting were evened up and packed down by hands, which resulted in a protuberance of extruded molding-material formed around the working chamber. The parting of the mold acquired a distinctive convex uneven surface with traces of smoothing of plastic material (see Fig. 5, *A*). The half was dried, after which the model was again inserted inside and pieces of clay were placed over and around the model, thus producing the second half. The surface of the parting in the second half was completely determined by the configuration of the first half; therefore, the place of their joint often had an uneven wavy shape (see Fig. 5, *B*) with a distinctive lapping of molding-material (see Fig. 5, *C*).

This molding-method required careful drying, since in the case of uneven shrinking, or the slightest warping, the halves would not fit together. When assembling the mold, the displacement of its parts along the plane of the parting was practically eliminated. At the final stage of the work, the outer side of the mold was covered with a thin layer of liquid clay, which might have held the halves together. The finished mold was fired in a reducing mode in closed furnace.

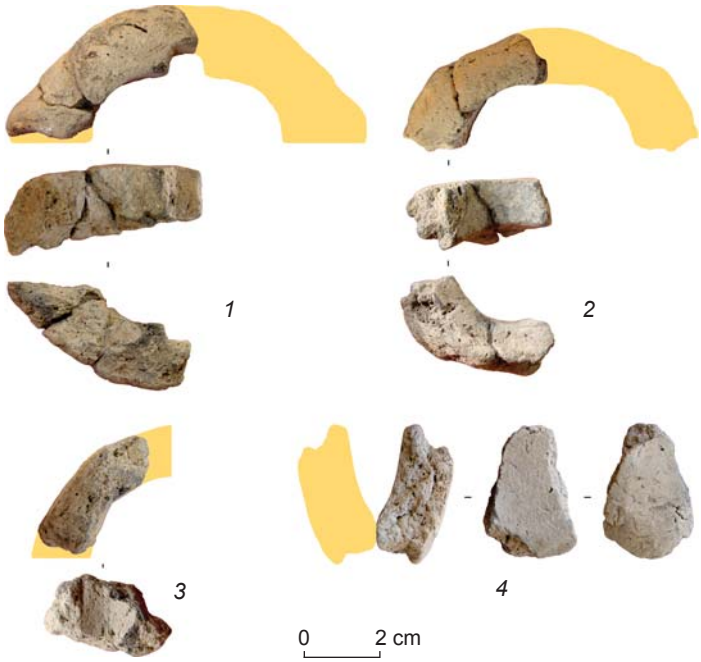

Fig. 4. Fragments of clay molds from bronze-casting area in dwelling No. 2.

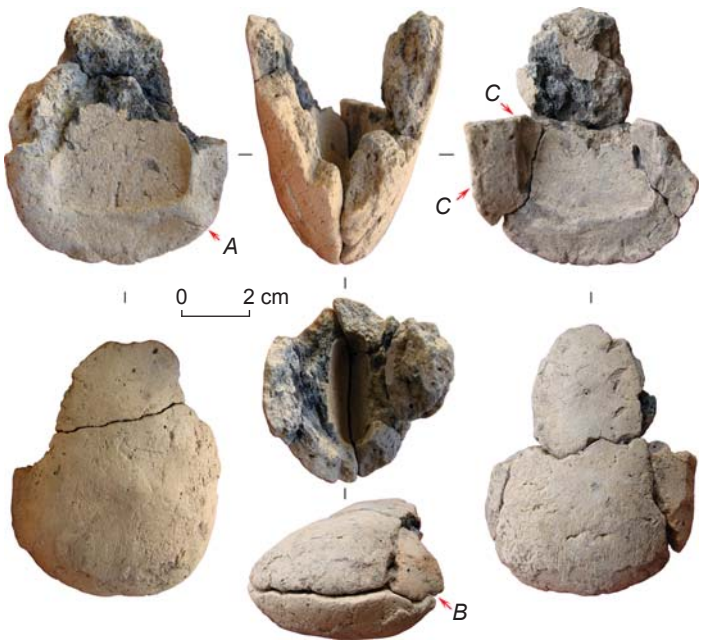

Fig. 5. Mold for casting celts.
A – parting of the mold with traces of smoothening of plastic material; *B* – uneven wavy joint of mold halves; *C* – lapping of molding material formed during making the second half.

The above technology was used in manufacturing a part of the molds discovered in the foundry at the settlement of Blizhnie Elbany XII, located in the Upper Ob region and belonging to the Biysk stage of the Bolshaya Rechka culture (Gryaznov, 1956: 88–89, pl. XXIII, *4–10*, XXIV, *1–6*, *9*). Notably, such technology was fundamentally different from the production methods typical of the cultures inhabiting the Ob-Irtysh interfluve. For example, a series of molds made on the model plate was discovered in a foundry of the Early Iron Age at the settlement of

Sergino-2 on the Om River (Kobeleva et al., 2015: 269–270). This particular method had a centuries-old tradition in the Ob-Irtysh interfluve and was the main method in both the Late Bronze Age in the Irmen (Mylnikova, Chemyakina, 2002: 20, 61–62, fig. 10, *2*, *3*, *5*; Mylnikova, Durakov, 2008: 63–66) and Late Irmen metal production (Chicha…, 2009: 228; Kobeleva, Durakov, 2016: 308), and in the earlier times in the Samus and Krotov metal production (Durakov, Kobeleva, 2017: 23).

In its origin, the method of molding used in the foundry at the Kargat-4 settlement is associated with western or southwestern territories. For instance, it was used in northern Kazakhstan in the Early Scythian period by the artisans of the Novoshulbinskoye settlement (Ermolaeva et al., 1998: 41–42, fig. 1, *2*, *3*). In the Ishim region, the same production technique appeared in the materials of the Zhuravlevo complex at the Borki-1 fortified settlement (Zakh et al., 2015: 12). It also appears in the Trans-Urals at the sites of the Itkul culture. Clay molds of Itkul bronze foundries have uneven wavy line connecting the halves, and traces of wooden spatula (Beltikova, 1993: 70). In northern Kazakhstan and the Trans-Urals, such molding was used in the Late Bronze Age by the carriers of the Berlik and Krasnoozerka cultures.

The molding-method under consideration appeared in the central Baraba only during the transitional period from the Bronze to the Iron Age, as evidenced by the Berlik and Krasnoozerka materials (Chicha…, 2009: 229). The method of processing the outer surface of casting-molds and some crucibles from Kargat-4 with liquid clay over dried surface shows similarities to the method of "roughing" the surface of the Berlik pottery.

Crucibles. Fragments of three crucibles have been found. The first fragment was a round thick-walled cup (Fig. 6, *2*). Only a part of the slagged wall 2.5 cm thick has been preserved. The rim was round; its inner part was strongly slagged. The outer surface was covered with a layer of liquid clay coating applied with wood chips. The reconstructed diameter of the vessel in the area of the rim was 10 cm. The volume of the cup was at least 100 cm^3. The crucible was made of clay with the addition of small amount of organic materials. Sand that was present in clay fabric in small amounts was most likely a natural admixture in the clay.

Only a fragment has survived from the second crucible (Fig. 6, *1*). The inner part was highly fire-damaged and had inclusions of metal drops. The wall's thickness was 1.5 cm; the reconstructed diameter was 9.0–9.5 cm. The usable volume was not less than 75–80 cm^3. According to the composition of the clay fabric, the second crucible was very different from the first crucible: it was made of clay with the addition of large amount of sand. The use of such a composition can be explained by the desire to obtain a heat-resistant material and prevent destruction of the crucible during overheating.

The third crucible can be completely reconstructed (Fig. 6, *3*) as a cup with a round bottom and a diameter of 7.5 cm. The thickness of the walls was 0.5 cm. The reconstructed usable volume was 75–77 cm^3. The crucible was made of clay with an artificial addition of sand. Thin-walled crucibles are not typical of the Bolshaya Rechka metalworking industry, but have been found in the Sargatka bronze foundry workshop at the settlement of Om-1 (Mylnikova, Chemyakina, 2002: 61–62). Given the presence of the Sargatka pottery in dwelling No. 1 at Kargat-4 (Polosmak, 1987: 101–102, fig. 79; Molodin, Novikov, Sofeikov, 2000: 175), it can be assumed that the local artisans were familiar with the foundry traditions of the carriers of the Sargatka culture.

Nozzle is represented by a small fragment of a clay tube (Fig. 6, *4*). The length of the preserved part was 1.9 cm. Wall-thickness varied from 0.3–0.5 cm. The reconstructed diameter of the nozzle was 2.6 cm. The diameter of the channel for air injection was 1.6–1.7 cm. The nozzle was made on a template from one piece of clay. Judging by the traces of strong thermal impact, the item was calcined to a red-brick color.

It should be mentioned that all technical ceramics of the workshop (molds, crucibles,

Fig. 6. Foundry equipment of production area in dwelling No. 2.
1–3 – fragments of crucibles, 4 – fragment of clay nozzle.

and nozzle) were made of molding-materials of a special composition that were not used for producing household utensils.

Three stone ***whetstones*** belonged to the set of production equipment for bronze casting area. The first and largest whetstone is a slate plate with traces of abrasive activities (see Fig. 3, *1*). On one side, there is weak damage: apparently, the item occasionally served as an anvil. The length of the plate was 9.5 cm; its width was 5.4 cm, and its thickness 0.9–1.5 cm. The second whetstone, of trapezoidal shape, was also made of slate (see Fig. 3, *2*). The length of the trapezoid along the midline was 5 cm; its width was 6.3–4.0 cm, and its thickness 0.5–0.9 cm. Traces of wear can be seen on all planes. The third whetstone was made of a fragment of a stone shaft-hole hammer (see Fig. 3, *3*). Its length was 8.7 cm and its maximum width was 3 cm.

Conclusions

The settlement of Kargat-4 was undoubtedly one of the centers of bronze production in the Early Iron Age of Western Siberia. Traces of foundry activities at the Bolshaya Rechka sites are concentrated only in some dwellings or in the areas between the dwellings. This was observed in the Baraba forest-steppe at the settlement of Kargat-4, as well as in the Ob region at the settlements of Ordynskoye-9, Milovanovo-3A, and Blizhnie Elbany XII. Such a distribution of finds may reflect specialization and individual-and-family organization of production.

A group specialized in manufacturing metal could have emerged from the main collective of the community. Owing to specific aspects of production, such a group existed separately, but was included in constant economic relations not only with the inhabitants of the village, but also with the neighboring collectives, including those composing the carriers of the Sargatka culture.

The materials of the bronze casting-complex under consideration confirm the specialized nature of production. This is indicated by a large number of molds intended for casting similar items (celts), the use of spacious crucibles (75–100 cm^3) and specialized tools (blacksmith tongs, molding models), and the stable composition of molding-materials.

The molding-technology observed at the Kargat-4 settlement looks similar to the production traditions of the cultures of northern Kazakhstan and the Trans-Urals. It was most likely brought to the central Baraba from the area inhabited by the carriers of the Bolshaya Rechka culture. As a result, at least in the initial period of that expansion, two bronze foundry traditions coexisted on the territory of the Ob-Irtysh interfluve, which differed in their method of manufacturing casting-molds. One (indigenous) tradition involved molding according to the model on the model board. The other tradition, brought from the neighboring territories, was aimed at producing molds according to the model without the model board, with subsequent bonding of the halves with coating on the outside.

References

Beltikova G.V. 1986
Itkulskoye I gorodishche — mesto drevnego metallurgicheskogo proizvodstva. In *Problemy uralo-sibirskoy arkheologii*. Sverdlovsk: Ural. Gos. Univ., pp. 63–79.

Beltikova G.V. 1993
Liteiniye formy itkulskogo ochaga metallurgii (VII–III vv. do n.e.). In *Znaniya i navyki uralskogo naseleniya v drevnosti i srednevekovye*. Yekaterinburg: Nauka, pp. 38–75.

Chicha – gorodishche perekhodnogo ot bronzy k zhelezu vremeni v Barabinskoy lesostepi. 2009
V.I. Molodin, G. Parzinger, S.K. Krivonogov, A.Y. Kazansky, M.A. Chemyakina, G.G. Matasova, A.N. Vasilevsky, A.S. Ovcharenko, A.E. Grishin, N.V. Ermakova, M.I. Dergacheva, I.N. Fedeneva, O.A. Nekrasova, L.N. Mylnikova, I.A. Durakov, L.S. Kobeleva, A.V. Zubova, T.A. Chikisheva, D.V. Pozdnyakov, A.S. Pilipenko, A.G. Romashchenko, I.V. Kulikov, V.F. Kobzev, O.I. Novikova, S.K. Vasiliev, Y. Schneeweiss, K. Privat, V.V. Boldyrev, V.A. Drebushchak, T.N. Drebushchak, E.I. Derevianko, A.P. Borodovsky, D. Bournarit, I. Reiche, S.V. Kuzminykh, Z.V. Marchenko. Novosibirsk: Izd. IAET SO RAN.

Chindina L.A. 2000
Zagadki Khronosa i Kikimory. In *Sravnitelno-istoricheskoye i tipologicheskoye izucheniye yazykov i kultur (XXII Dulzonovskiye chteniya)*, pt. 2. Tomsk: Izd. Tom. Gos. Ped. Univ., pp. 268–274.

Durakov I.A., Kobeleva L.S. 2017
Tekhnicheskaya keramika krotovskoy kultury Tsentralnoy Baraby. *Vestnik Tomskogo gosudarstvennogo universiteta*. Istoriya, No. 49: 23–25.

Ermolaeva A.S., Ermolenko L.N., Kuznetsova E.F., Teplovodskaya T.M. 1998
Poseleniye drevnikh metallurgov VIII–VII vv. do n.e. na semipalatinskom pravoberezhye Irtysha. In *Voprosy arkheologii Kazakhstana*, iss. 2. Almaty: Gylym, pp. 39–46.

Grishin Y.S. 1980
Drevnyaya dobycha medi i olova. Moscow: Nauka.

Gryaznov M.P. 1956
Istoriya drevnikh plemen Verkhney Obi po raskopkam bliz s. Bolshaya Rechka. Moscow, Leningrad: Izd. AN SSSR. (MIA; No. 48).

Kobeleva L.S., Durakov I.A. 2016
Liteyniye formy pozdneirmenskoy kultury. In *Problemy arkheologii, antropologii, etnografii Sibiri i sopredelnykh territoriy*, vol. XXII. Novosibirsk: Izd. IAET SO RAN, pp. 307–310.

Kobeleva L.S., Durakov I.A., Molodin V.I., Demakhina M.S. 2015
Kompleksniye issledovaniya gorodishcha Sergino-2 na reke Omi. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXI. Novosibirsk: Izd. IAET SO RAN, pp. 267–271.

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

Arkheologicheskiye pamyatniki Zdvinskogo rayona Novosibirskoy oblasti. Novosibirsk: Nauch.-proizvod. tsentr po sokhr. istoriko-kulturnogo naslediya.

Mylnikova L.N., Chemyakina M.A. 2002

Traditsii i novatsii v goncharstve drevnikh plemen Baraby (po materialam poselencheskogo kompleksa Om-1). Novosibirsk: Izd. IAET SO RAN.

Mylnikova L.N., Durakov I.A. 2008

Proizvodstvennaya ploshchadka poseleniya Berezoviy Ostrov-1. In *Etnokulturniye protsessy v Verkhnem Priobye i sopredelnykh regionakh v kontse epokhi bronzy*. Barnaul: Kontsept, pp. 56–68.

Polosmak N.V. 1987

Baraba v epokhu rannego zheleza. Novosibirsk: Nauka.

Troitskaya T.N. 1987

Yavleniye travestizma v skifo-sibirskom mire. In *Skifo-sibirskiy mir. Iskusstvo i ideologiya*. Novosibirsk: Nauka, pp. 59–63.

Troitskaya T.N. 2005

Novoye zhilishche rannego zheleznogo veka Verkhnego Priobya. *Vestnik arkheologii, antropologii i etnografii*, No. 5: 64–66.

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

Bolsherechenskaya kultura lesostepnogo Priobya. Novosibirsk: Nauka.

Troitskaya T.N., Durakov I.A. 1999

Bronzoliteynoye proizvodstvo v Novosibirskom Priobye v V–IV vv. do n.e. (po materialam poseleniy). In *Voprosy arkheologii i istorii Yuzhnoy Sibiri*. Barnaul: Alt. Gos. Univ., pp. 131–139.

Zakh V.A., Ilyushina V.V., Tigeeva E.V., Enshin D.N., Kostomarov V.M. 2015

Zakrytiy zhuravlevskiy kompleks gorodishcha Borki 1 v Nizhnem Priishimye. *Vestnik arkheologii, antropologii i etnografii*, No. 2 (29): 4–14.

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Sibirskoye I: A Late Irmen Site on the Irtysh Steppe

This article describes the findings at Sibirskoye I, a Late Bronze to Early Iron Age site in the steppe part of the Irtysh basin. The history of its excavations is outlined. A detailed description of its ceramics, including sherd accumulations and fragments of 44 vessels, is provided. We analyze paste composition, provenance of clay, and temper. The principal raw material was high-quality western Siberian montmorillonite and hydromicaceous clay. The temper, preventing cracks and waste, consisted of grog, sand, and organic matter. Shaping techniques are described. On the basis of their proportions, groups of vessels are established, and their decoration is analyzed. Decorative motifs combine those typical of the Late Irmen pottery, and those denoting the Irmen and Krasnoozerska cultures. The Sibirskoye I ceramics are paralleled by those from Om-1 and Chicha-1. Certain categories of ware are imported. The planigraphy and the distribution of ceramics suggest that this was a ritual site. The ceramics and the site as a whole were attributed to the Late Irmen culture, dating to the transitional stage from the Late Bronze to the Early Iron Age. Sibirskoye I is the westernmost Irmen site—the first one discovered on the Irtysh. Judging from parallels with sites having a reliable chronology, we date it to 900–700/600 BC.

Keywords: *Ritual site, Late Bronze-Early Iron Age transition, ceramics, Irtysh steppe.*

Introduction

The Sibirskoye I site was discovered in the Novovarshavsky District of the Omsk Region, 1.4 km north-north-west of the Sibirskoye settlement (5.5 km south-east of the Bogdanovka village) (Fig. 1, *1*). This area belongs to the northern steppe sub-zone. The main waterway of the basin is the Irtysh River. The rock terrace of the Irtysh left bank is 2–6 km away from the present-day river-bed, where it forms a swamped floodplain full of watercourses, oxbows, and peatifying lakes of oxbow origin. Soils are mainly clayey and loamy (Bolshanik, Igenbaeva, 2006).

The site was discovered by V.T. Petrin in 1975, when it was named "Sibirskoye I settlement" (1975); in 1983, it was surveyed by S.V. Sotnikova. The scholars created approximate plans, carried out photo-recording, and collected surface finds. Petrin opened up a probe trench. Noteworthy among the artifacts collected by Sotnikova is a bronze knife (1983). The site was dated to the Middle-Late Bronze Age. According to the program of archaeological site certification in the Omsk Region, in

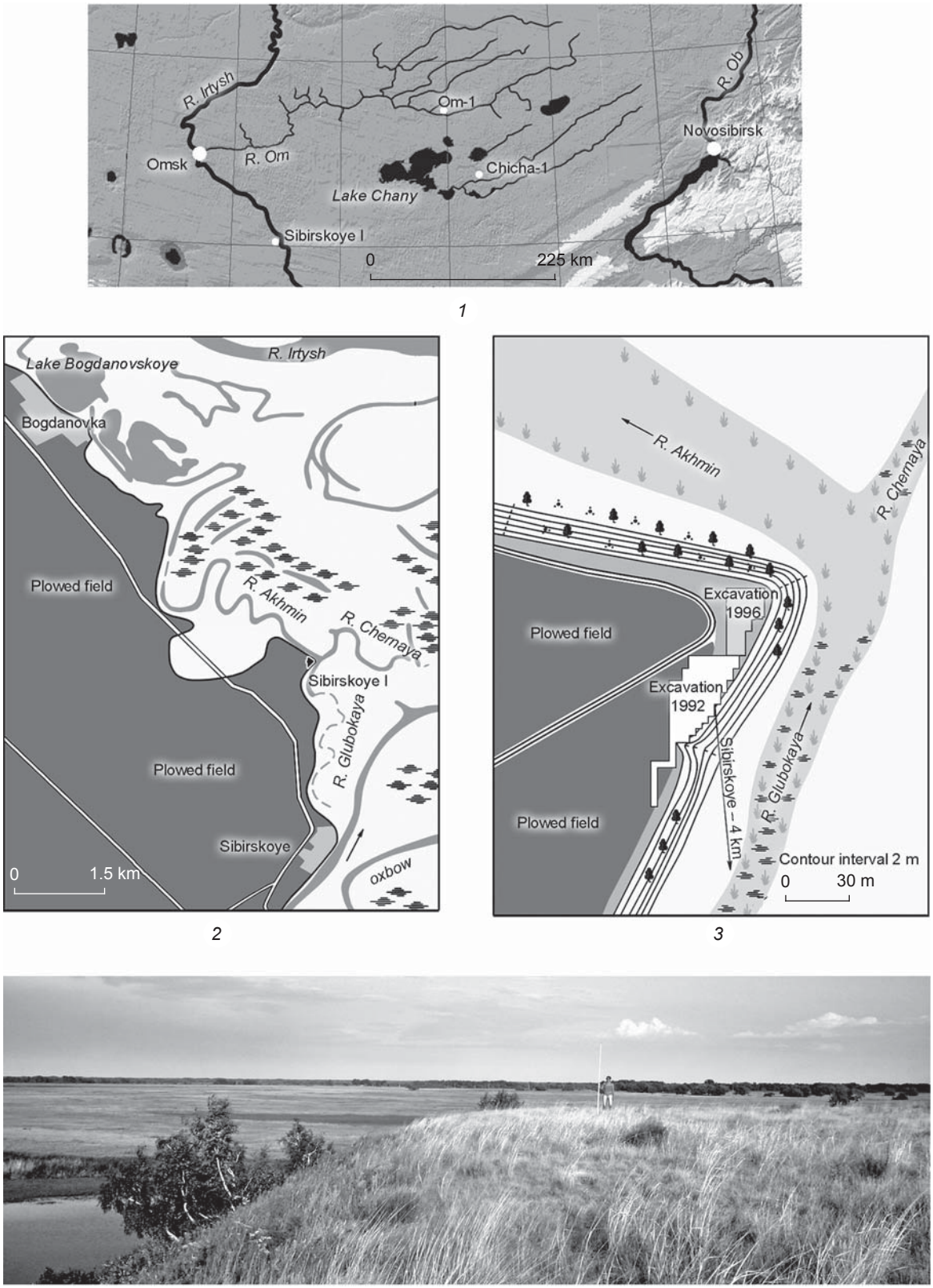

Fig. 1. Location map of the Sibirskoye I site (*1*), terrain schematic map (*2*), plan of the site (*3*), view of the site from the west (*4*).

1991, A.Y. Trufanov conducted revision at the Sibirskoye I settlement (1991). He prepared a theodolitic plan (Fig. 1, *2*, *3*) and carried out rescue excavations of the Sibirskoye VI cemetery, discovered to the south of the settlement. In grave No. 1 at Sibirskoye VI, skeletons of three people buried during the Andronovo period (late 3rd millennium to early 2nd millennium BC) were found. Grave No. 2 was let into it not earlier than the 8th–7th centuries BC. In 1992, Trufanov finished the study of the cemetery, and in 1996, he conducted excavations of the Sibirskoye I site (1992, 1996).

The settlement is located on the edge of the first fluvial terrace of the Irtysh's left bank. Changing from a northeastern direction to a west-northwestern one, the terrace forms an acute-angled promontory at this place. Its height is 12 m. The terrace's slopes are well-turfed, overgrown with bushes and single birch-trees. A field road runs along the terrace edge; and near its foot, three oxbows merge together—the Glubokaya, Chernaya, and Akhmin watercourses (Fig. 1, *3*, *4*). Until recently, the main part of the promontory has been ploughed, while the remaining (poorly turfed) part has been exposed to the considerable wind erosion typical for the steppe areas of Western Siberia.

During the 1992 and 1996 excavations, an area of 1510 m^2 was uncovered. Within the promontory and to the south of it, a rather intricate complex of non-contemporaneous sites was found: the Sibirskoye I settlement (Fig. 2, *1*), whose cultural attribution remained unclear till the beginning of excavations in 1996; the Sibirskoye VI cemetery, preliminarily dated to the period from the Middle Bronze Age to the Early Iron Age; the burial complex "kurgan"* 1 belonging to the beginning of the Early Iron Age; and three in-line pits, which contained fragments of Alakul ceramics.

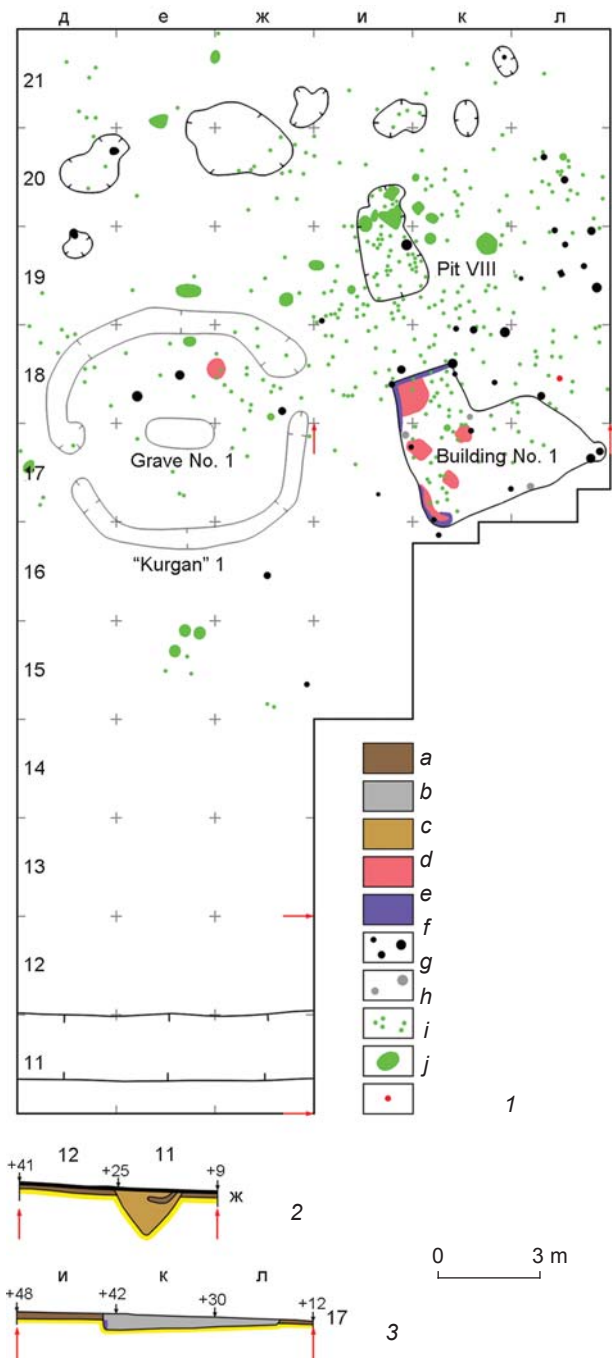

Fig. 2. Northern part of the Sibirskoye I excavation area. *1* – layout of the excavation area: *a* – gray-brown sandy loam; *b* – dark-gray sandy loam; *c* – gray-yellow sandy loam; *d* – charred earth; *e* – charcoal; *f* – pole pits; *g* – pole pits, not deepened into subsoil; *h* – pottery fragments; *i* – pottery accumulations; *j* – clay figurine; *2* – ditch section of the eastern wall (along the N-S line); *3* – section of building No. 1 along the W-E line.

Settlement features

The Sibirskoye I settlement was excavated within an area of about 340 m^2. The planigraphy data suggest that the greater portion of the site has been studied (see Fig. 1, *2*). The study has revealed remains of deepened building No. 1, nine large pits of various dimensions and configurations, and 24 pole pits unrelated to the structure of building No. 1.

Building No. 1 (see Fig. 2, 3). This was located in the northeastern corner of the excavation area. The foundation trench had a trapezoidal shape; its maximum dimensions were 2.85 × 5.80 m, the area is 17.5 m^2. The northwestern protrusion, being a continuation of the western wall of the excavation area, is interpreted as an exit. The exit is 1.9 × 2.4 m wide and about 1.7 m long. Taking into account the proposed exit, the maximum dimensions of the dwelling are 4.7 × 5.8 m.

*Despite the apparent signs of a kurgan (small ditches, a grave at the center of the burial space), the feature had no tumulus.

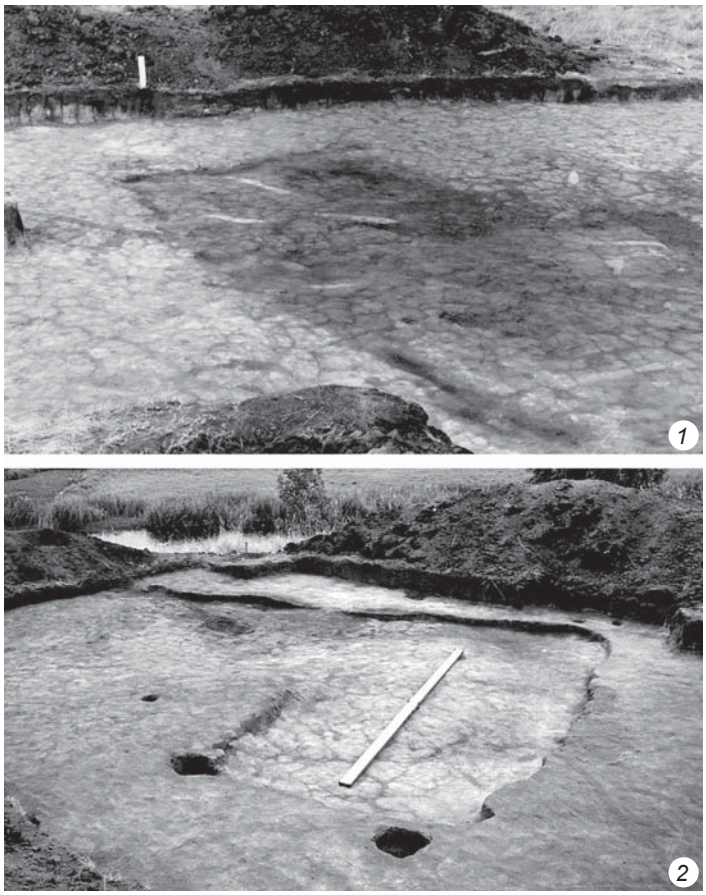

Fig. 3. Building No. 1.
1 – before excavation of filling, view from the SW; *2* – trench of building No. 1 after excavation of filling, view from the NW.

The maximum trench depth ranged from 0.05 to 0.40 m; its maximum values were established at the western wall of the dwelling, and its minimum ones at the eastern wall. The trench was filled mainly with dark gray humus. Black coaly strips 0.1–0.2 m wide were recorded along the northwestern and southwestern corners (see Fig. 2, *2*). In the western half of the trench, orange spots of calcined soil up to 0.30–0.35 m thick were traced. Large coal stains occurred all over the place. The character of layer in the trench suggests that the building stopped functioning as a result of fire.

43 ceramic fragments, 11 animal bones, and 3 stones were found during excavation of the trench filling. These finds were concentrated in the western part, including at the exit.

Pits in the territory of building No. 1. After excavation of the filling and subsoil cleaning (see Fig. 2, *1*), 15 pole pits 0.10 to 0.28 m in diameter were studied in the building area and its immediate vicinity. Their depth ranged from 0.03 to 0.33 m, being 0.17 m on average. The pits were located at the corners and along the walls of the trench, while a pair of pits was generally located in a corner. The last feature suggests the frame-pillar structure of the building walls.

Eight pits forming a wavy chain were located in the northern part of the excavation area. Only one of them, almost undeepened into the subsoil, was located south of "kurgan" 1, thus marking the southern boundary of the settlement. Pit VIII, oriented along the SSE–NNW line and having dimensions of 1.9 × 3.5 m and a depth up to 0.12 m, has been discovered at the center of the site. Three pits in the northern part had sub-oval shapes, the others were amorphous. The minimum dimensions of the pits were 0.65 × 0.95 m, the maximum 2.3 × 3.4 to 3.5 m. All the pits were shallow: only two were over 0.10 m deep, the others were 0.05 m deep on average.

Pits beyond building No. 1 (24 units). These were concentrated in the eastern part of the excavation area, near the edge of the terrace. Only two single pits were recorded in the southern part of the site. Four pole (?) pits, obviously traces of some structures, were within the area of large pits. Three small pits recorded in the area of "kurgan" 1 have, most probably, no relation to the burial complex. They contained pottery fragments (including accumulations), and were included in the overall planigraphy of the features and finds of the settlement. Undoubtedly, some features belonging to the Late Bronze Age were destroyed during construction of the burial complex; this is evidenced by ceramic items in the ditch filling of kurgan 1. The majority of pits have a round-in-plan shape, two of them are oval, and one has distinct rectangular contours. Their depth varied from 0.08 to 0.35 m. The depths of small pits within the large pits were considerably smaller (less than 0.10 m), while the average depth of the other 20 pits was more than 0.17 m.

The excavation area's stratigraphy is as follows: turf was virtually absent as a separate layer, owing to continuous wind erosion. The cultural layer at the site is represented by a dense grayish-brown loam, whose thickness was 0.2–0.3 m on average, but did not reach 0.15 m in certain areas. The underlying layer is a dense yellow loam (see Fig. 2, *2*, *3*).

Ceramic assemblage of the site

The planigraphy of the ceramics has been determined according to the locations of individual finds. Beyond building No. 1, the maximum concentration of separate fragments has been recorded in the central and eastern parts of the excavation area. It coincides with localization of ceramic accumulations containing the majority of

vessels reconstructed in the course of artifacts' treatment and conservation. It must be emphasized that only the walls of vessels, often with the bottoms, were restored. The maximum concentration of accumulations was observed above pit VIII and nearby (see Fig. 2, *1*). Separate fragments were outside the accumulations.

The ceramic assemblage of Sibirskoye I contains 44 vessels*. Among these, 7 vessels have been reconstructed fully, 18 vessels partially (up to the maximum extension of the body); others were represented only by rims (some of them contained a part of shoulder) (Fig. 4–9). The ceramics were studied using binocular microscopy (Bobrinsky, 1978). The materials were divided into groups by the recipes of their paste. Five samples were subjected to petrographic analysis.

The pottery pastes of Sibirskoye I were based on loams with 13–18 % admixtures of silt and fine-aleuritic particles, predominantly quartzite. The clay part consists of mixed-layered formations, such as hydromica with admixture of montmorillonite or (singly) chlorite. The cement structure is aleuropelitic.

The following recipes for pastes have been identified: Clay + Grog; Clay + Grog + Sand; Clay + Grog + Sand + Organic matter (organic matter traces); Clay + Grog + Organic matter. Grog consists of dark-brown, brown, reddish-brown, or black sherds with wide-tabular, tabular, irregular, long-tapered shapes. The sherds are 0.2–2.2 mm in size; their content in samples is 3–18 %, mostly 12–15 %. In almost all examined samples, the presence of grog in grog was noted. In this case, the grog cement (clay base) composition is similar to that of the initial sample. The following recipes of grog-in-grog pastes are recorded: Clay + Grog + Sand, Clay + Sand.

Sand occupies 15–32 % of the microsection area (mainly 15–18 %). The sand grains are 0.05–0.6 mm in size (from very fine to large ones), i.e. they are unsorted and distributed over the microsection in a weak nest-like manner. The sand grains are semi-angular, angular, and semi-rounded. They are dominated by quartz; the number of feldspars is smaller; microquartzites and clay chloritized debris of the bulk of acid effusives are recorded more rarely; debris of mica, epidote, protobase are single**.

Thus it can be assumed that potters used rather high-quality western Siberian montmorillonite and hydromicaceous clay; the raw material was characterized by good moldability and plasticity; its content in the pottery pastes is 60–70 %. A mineral additive of 30–40 % allowed the items made of raw materials sensitive to drying and firing with manifestations of cracking (Gidroslyudisty mineral, (s.a.): 21) to be fired without cracks and waste. The quality of the paste was also improved by organic matter, recorded in 72 % of studies samples.

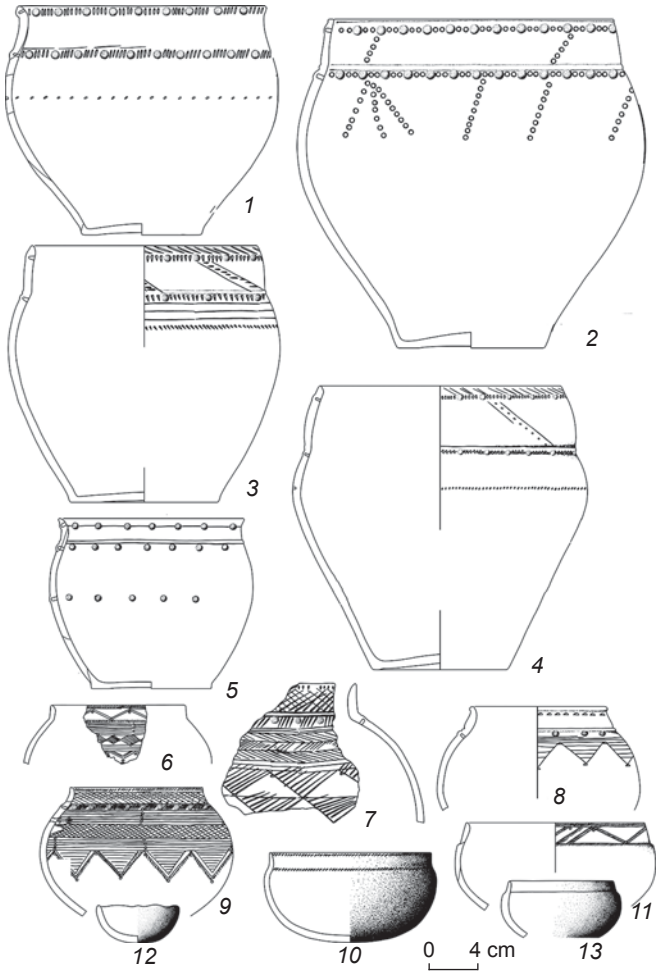

Fig. 4. Ceramics from Sibirskoye I.
1–5 – group I, subgroup 1; *6–9* – group I, subgroup 2; *10–13* – group II.

Studying fractures of vessels has demonstrated that the vessels whose sherds were used as additives, were manufactured following the same traditions of paste formulation as the later ware, for the paste of which they served as raw materials. However, the paste of some items contains grog. It was based on the sherds of items whose paste was determined as not typical for this site (Clay + Sand). This suggests that in everyday life, "foreign" ware was used, whose fragments could serve for the creation of own new ware. Besides, the absence of ware with the Clay + Sand paste at the site means that the vessels manufactured by adding grog with such a recipe are not local (were imported).

*The number of vessels was determined according to the fragments that included the upper portion. Calculation using the body and bottom fragments may result in an increase of this factor, but the degree of its confidence will be lower.

**The petrographic determinations were made by petrographer I.Y. Vilkovskaya.

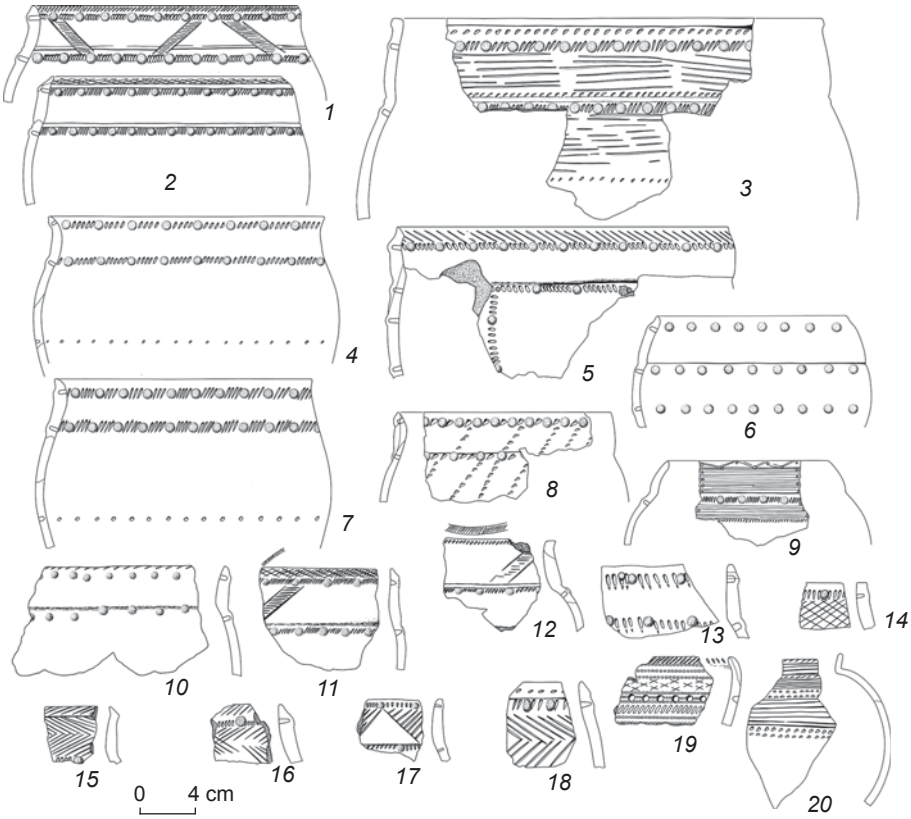

Fig. 5. Ceramics from Sibirskoye I. *1–8*, *10–19* – group I, subgroup 1; *9*, *20* – group I, subgroup 2.

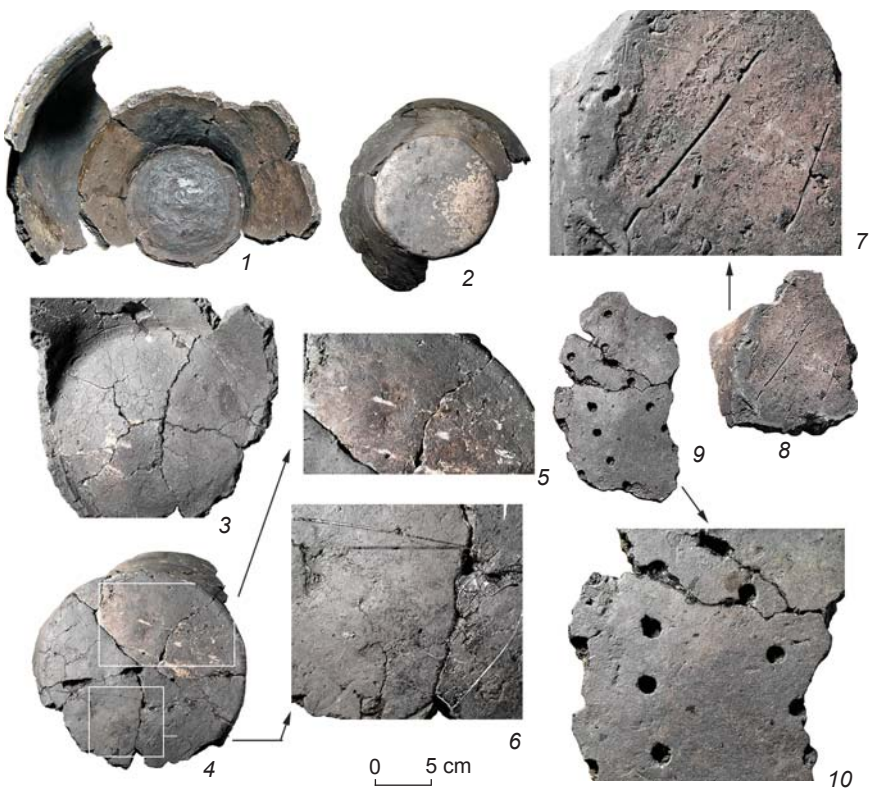

Fig. 6. Bottoms of vessels from Sibirskoye I.

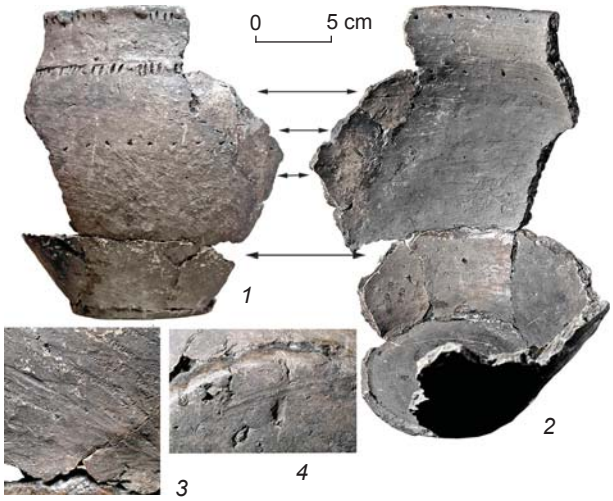

Fig. 7. Ceramics from Sibirskoye I.

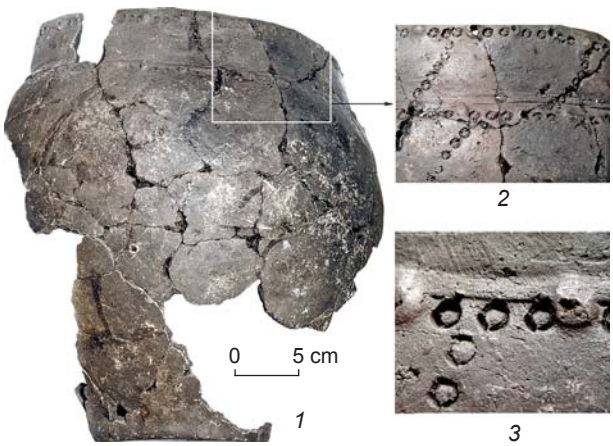

Fig. 8. Ceramics from Sibirskoye I.

The items were manufactured using the base-shaping method (see Fig. 6–8). A bottom-cake was either coiled or pressed out of one lump of clay. Two methods for connection of the bottom and the lower portion of a vessel were distinguished:

1) A band was placed on the bottom. The joint was luted in place from inside with a spatula having a rounded working-portion, or with the artisan's finger. Inside the vessel, along the bottom perimeter, a groove with a rounded bed 0.5–1.0 cm in diameter or an even smooth corner can be observed (see Fig. 6, *1*, *2*, *7–10*; 7, *2*, *4*);

2) A lower band was set against the bottom-cake (see Fig. 6, *3–6*). The vessels under consideration, unlike the items from other assemblages of that time (Mylnikova, 2015a, b; Chicha…, 2009; Papin, Shamshin, 2005), have different bending-angles between the body and the bottom.

The body of the vessel was manufactured using coiling technique. The bands 2.5–3.5 cm wide were connected to each other by overlapping (see Fig. 7, *1*, *2*; 8, *1*). The neck was created from one band, and was butted with the body. The necks of all recorded shapes were made using this method (see Fig. 4, 5).

An item was put into a certain shape already in the shaping process. The surface of the manufactured vessel was treated from both sides. Several methods of such treatment were identified: a) using a hard tool (a chip?, a wooden knife) that left long, narrow, horizontal grouped grooves on the surface (see Fig. 6, *7*, *8*; 7, 8); b) by artisan's hands—prints of dermal ridges are recorded on both surfaces of vessels; c) using a hard burnisher, whose traces are recorded in the form of long, unidirectional, most frequently horizontal, grooves 0.2–0.4 cm wide, with shallow beds (see Fig. 7, *1*). The final treatment of a vessel's outer surface was performed by hand (leather?) (see Fig. 9, *1*, *2*). Burnishing was generally applied to the rim cut from the outside, often to the inner surface of items (see Fig. 8, *1*, *2*), and more rarely to the bottom (see Fig. 6, *2*). If both surfaces of items were burnished (see Fig. 9, *3–6*), then only one burnishing technique was used. The outer surface of the bottom was treated using circular movements along the perimeter. At center of the

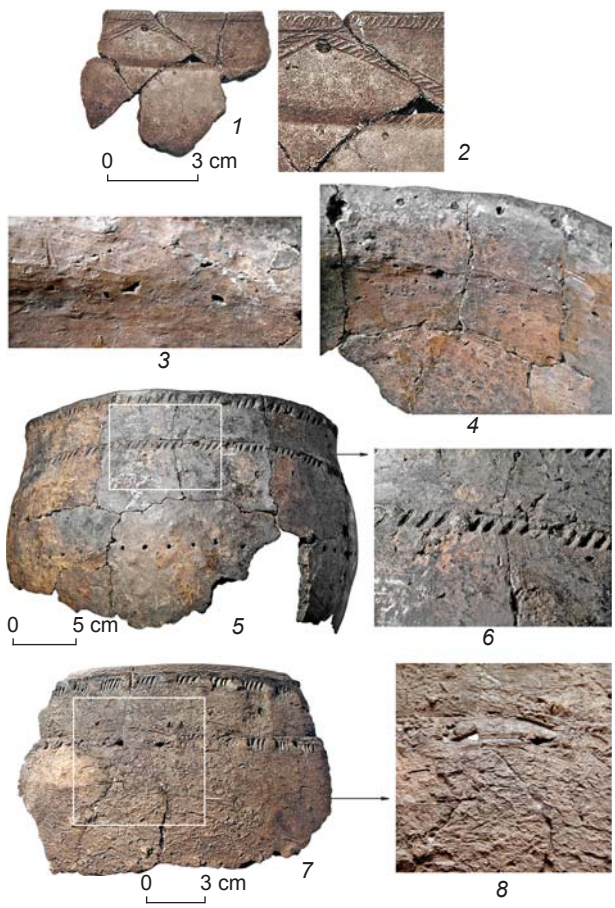

Fig. 9. Ceramics from Sibirskoye I.

bottom, only two-direction movements were carried out: right-left. In 16.6 % of vessels, the ornament was applied before burnishing: in some samples, "offset" of elements is recorded. Some vessels show an intentionally "aged", "shaggy" (the term was used by: (Gening, Stefanov, 1993; Chlenova, 1997)) surface, with irregularities, scores, undulations, or lumps of clay (see Fig. 9, *7*, *8*).

The ceramic collection of the site is not numerous and lacks full samples; however, it can be assumed that its major part consists of flat-bottomed vessels; all studied shapes are pot-like. The collection shows necks of two dimensional ranges: low and medium. The neck of each vessel at the majority of sites pertaining to the transitional stage from the Bronze to the Early Iron Age can be assigned to a specific type, since despite their visible resemblance they are individual: extending upwards (see Fig. 4, *1*, *5*; 5, *4*, *7*), straight, convex "Molchanovo"-type (see Fig. 4, *2–4*; 5, *3*, *5*, *8*, *9*), narrowing upwards (see Fig. 4, *4*; 5, *6*, *9*), and intricate (straight with a folded inward rim, whose outer edge forms a platform) (see Fig. 5, *5*, *7*, *8*, *10*, *11*, *15*, *16*). Sometimes, the shape of the neck was formed by pasting an additional clay batch inside the neck (in this case, the neck had a thickening in its central portion) or outside (the neck was separated from the body with a "small ledge") (see Fig. 5, *8*, *10*, *12*).

The vessels with pot-like shapes (apart from the flat bowl (see Fig. 4, *12*) excluded from further calculations) can be divided into two groups.

Group I (90.9 %). Vessels of large and medium size, with equal proportions (HI* 0.85–0.99) (calculations were made according to the method of V.F. Gening (1973)). According to the neck breadth index, all of them have broad necks. However, two subgroups are clearly distinguishable within this dimensional category (NBI 0.66–1.00).

Subgroup 1 (85.0 %) (see Fig. 4, *1–5*; 5, *1–8*, *10–19*). This subgroup includes ware with an NBI in the interval of 0.78–0.94. In this collection, these are maximally broad-necked vessels. The NBI for the majority of vessels is within 0.82–0.86. Five pots contain a preserved flat bottom. According to the bottom width index, all vessels are wide-bottomed. The BWI of three vessels is within 0.45–0.52 (see Fig. 4, *1*, *2*, *4*), and the BWI of two others, with wider bottoms, is 0.39–0.40 (see Fig. 4, *3*, *5*). As noted above, the morphology of the necks is diverse. In most cases, the neck is distinctly separated from the shoulder, and is visually determined as high*. The rims also have variable shapes: pointed, rounded, or (more rarely) straight. The rim edge can be folded outward, skewed outward or inward, have a buildup on the outer side, etc.

The ware of this group is nonuniform in size. In terms of rim diameter, the items can be divided into three groups: the first 14.0–16.0, the second 17.5–21.0, and the third 25.0–33.0 cm. The indisputable predominance of the second dimensional group is noteworthy (about 70 %). The thickness of body walls depends weakly on the vessel's size, and reaches 6–8 mm. Meanwhile, the thickness of neck walls of many vessels exceeds the body wall thickness by 1–3 mm. Such items, on their necks folded outward, show a thickening in the lower portion, typical of the Late Irmen morphological tradition (see Fig. 4, *8*; 5, *7*, *8*, *10*, *12*).

Subgroup 2 (15.0 %) (see Fig. 4, *6–9*; 5, *9*, *20*). Ware with NBI 0.65-0.70. These are items with noticeably narrowed necks, also rather variable in shape, including a shortened one (?). The shape of the bottom is unknown, but in one case it definitely tends towards a rounded one (see Fig. 4, *9*). The rim diameter for vessels of this subgroup is 11.5–12.0 cm, the thickness of body walls 5.0–6.0 mm.

In half the vessels of group I (with preserved necks), the inner side, at the transition from neck to shoulder, shows a rib, the presence of which is obviously independent of the vessel's degree of profiling (Fig. 4, *3*, *7*; 5, *3–6*, *9*, *12*, *13*). In the same selection, 36.7 % of pots have a small shaped fillet within this area on the outer side (see Fig. 4, *2*, *5*, *7*, *8*; 5, *1–5*, *12*).

Group II (9.1 %). Vessels with necks, squat (HI ~0.52), broad-necked, with a ledge at the transition from neck to shoulder (see Fig. 4, *11–13*). The general morphology of items belonging to this group implies the presence of a rounded or flattened bottom. The neck is either vertical or inclined inward. The rim diameter is 9.0–15.5 cm, the thickness of body walls 4.5–7.0 mm.

The ornament shows a combination of the Later Irmen ornamental motifs with the Irmen and Krasnoozerka ones. The degree of ornamentation on the ware is low. The vessels of group I, subgroup 1 have sparse ornamentation; even if it descends to the shoulder, it has the form of separate "lines". Ornamentation on the vessels of group I, subgroup 2 is denser; the patterns reach the zone of the maximum body width. In one vessel, it also descend lower

*HI – height index = H/D max.b; NHI – neck height index = NH/RD; NBI – neck breadth index = (RD + ND)/2 D max.b; NPI – neck profile index = 5(RD - ND)/NH; BHI – body height index = (SH + BsH)/D max.b; SHI – shoulder height index = SH/BsH; SCI – shoulder convexity index = (D max.b - ND)/2 SH; BWI – bottom width index = (D max.b - BsD)/2BsH (Gening, 1973). RD – rim diameter; ND – neck diameter; D max.b – maximum diameter of body; BsD – base diameter; H – height of vessel; NH – neck height; SH – shoulder height; BsH – base height.

*Of special interest are vessels where the outline of the inward inclined neck, irrespective of its shape, is approximate to the shoulder line. In this case, the shape of a vessel is similar to a closed jar-shape (see Fig. 5, *2*, *6*, *9*).

(see Fig. 4, *6*, *7*, *9*). Three items have an ornamented rim-cut (see Fig. 5, *11*, *12*).

The ornamental traditions of the Irmen culture are evidenced by cross-hatched geometrical figures on the ware of both groups: in 12 vessels of group I (30.0 %) and in one vessel of group II. Geometrical patterns cover the outer surface of the neck, and more rarely of the shoulder. The neck may be decorated with a net, a zigzag, or have no ornament (Fig. 4, *6–9*).

Necks are ornamented with inclined cross-hatched bands, running in parallel and/or forming a zigzag (see Fig. 4, *3*, *4*, *11*; 5, *1*, *11*, *12*); cross-hatched triangles with their tops downwards are recorded only on one vessel (see Fig. 5, *17*). Cross-hatched geometrical patterns descend to the body on one pot of group I (in the form of diagonal bands), and on four pots of subgroup 2 (in three cases, these are triangles with their tops downwards (see Fig. 4, *7–9*), and in one case they are rhombs (see Fig. 4, *6*)).

Netlike patterns typical of the Irmen ware (Molodin, 1985; Matveev, 1993) occur on eight vessels of group I (20.0 %). These generally occupy the entire neck surface (see Fig. 4, *7*, *9*; 5, *14*), and more rarely are located near the rim-cut (see Fig. 5, *2*, *11*), which should be interpreted as a Late Irmen variation.

Also noteworthy is the presence of so-called circlet imprints (made by a hollow bone?) on four vessels of subgroup 2 (see Fig. 4, *6*, *9*, *11*; 5, *9*), where they accentuate the corners of geometrical figures, and connect horizontal lines; and also on one vessel of subgroup 1 (see Fig. 4, *2*).

The ornamental traditions of the Krasnoozerka culture take the form of zones of horizontal smoothly-stamped imprints (see Fig. 5, *3*, *9*, *20*) on four vessels of group I (10.0 %). Such patterns are typical of the Late Krasnoozerka culture ware from the Inberen VI fortified settlement **(**the Irtysh basin**)** (Abramova, Stefanov, 1985: Fig. 7, *1*, *3*, *8*, *13*) and the Novotroitskoye I settlement **(**the Irtysh basin**)** (Trufanov, 1990: Fig. 35–37). The collection also contains a proper Krasnoozerka rim fragment with a cross-shaped ornament (see Fig. 5, *19*).

The major part of the ware is decorated in accordance with *the Late Irmen ornamental tradition*, special features of which were distinguished by M.P. Gryaznov for the Bolshaya Rechka stage of the Bolshaya Rechka culture (1956), and by V.I. Molodin for the Baraba sites (1979: 111): with a double row of punched nodes (along the neck and the rim edge), which were separated by smoothly-stamped "cut marks", ranging from two to eight in number (see Fig. 4, *1–4;* 5, *1–5*, *7*, *11***)**. Single rows of punched nodes with spacing (on the neck) have been reliably recorded only on six vessels (see Fig. 4, *7–9*; 5, *9*, *12*, *15*). In certain cases, comb imprints (see Fig. 5, *13*), single holes (see Fig. 5, *8*), pits, or paired circlet imprints (see Fig. 4, *2*) serve as separators. Notably, such ornamentation (pushed-out stamp decoration with spacing) is only encountered on ware of group I; it occurs on 67.5 % of vessels. Five vessels have only rows of punched nodes (see Fig. 4, *5*; 5, *6*, *10*), which is typical of the shaping of ware from the epoch preceding the Early Iron Age.

Elements of the Late Irmen ornamentation are short (more rarely, long) imprints made by an inclined, or upright, smooth stamp, which frame the rim edge. These have been traced on 50 % of the vessels (see Fig. 4, *3*, *4*, *6*, *7*, *9*, *11*; 5, *1*, *3*, *5*, *10*, *12*, *20*). Possibly, rare herringbone patterns should also be classified as Late Irmen features (see Fig. 4, *7*; 5, *16*, *18*).

When characterizing ornamentation, it is necessary to pay attention to an extremely rare use of the "comb" technique; this occurs only on one vessel (see Fig. 5, *13*); and to single cases of the decoration of a bottom with pits (Fig. 6, *9*, *10*).

The correspondence between the shapes and the ornamentation of items has been traced. Ornaments composed of two rows of punched nodes with spacing under the rim and above the neck (rarely, with one more row of punched nodes along the body) are typical for pot-shaped vessels with weakly profiled shoulders and necks of middle height.

The collection can be divided into two groups according to the style of ornamentation. One of these includes items with geometric netlike patterns made according to the Irmen tradition, and also showing elements of the Krasnoozerka traditions. This group can be referred to as ornamentally saturated. The other group of items does not contain such patterns, and so can be called extremely poor (see, e.g., Fig. 4, *1*, *5*, *10*, *13*; 5, *4*, *7*, *10*, *13*).

In general, in terms of cultural attribution, the ceramic collection is monolithic. It should be defined as the Late Irmen. Nearly direct analogs to certain vessels of the collection under study can be found in the Om-1 settlement complex (Mylnikova, Chemyakina, 2002) and the Late Irmen group of the Chicha-1 fortified site (Chicha…, 2001, 2004, 2009). Like other collections of the transitional stage from the Bronze to the Early Iron Age (Zimina, Mylnikova, 2006; Kaydalov, 2013; Kaydalov, Sechko, 2006; Kolontsov, Sofeikov, 1987; Molodin, 1985; Mylnikova, 2015b; Mylnikova, Papin, Shamshin, 2003; Mylnikova, Chemyakina, 2002; Papin, 2002a, b; 2003; Papin, Shamshin, 2005; Troitskaya, Mzhelskaya, 2008; Trufanov, 1990; Sherstobitova, 2008; Chicha…, 2004, 2009), the Sibirskoye I ceramic collection exhibits foreign cultural traits: for example, items bear traces of a specific "aged" treatment of the surface, typical of the Berlik group (Molodin, 2008b; Mylnikova, 2015a; Molodin, Mylnikova, Durakov et al., 2009; 2012), although no vessels belonging to the Berlik culture were found at the settlement. The Krasnoozerka features (including a convex neck), occurring on 27.5 % of the group I vessels, harmonize with the Late Irmen

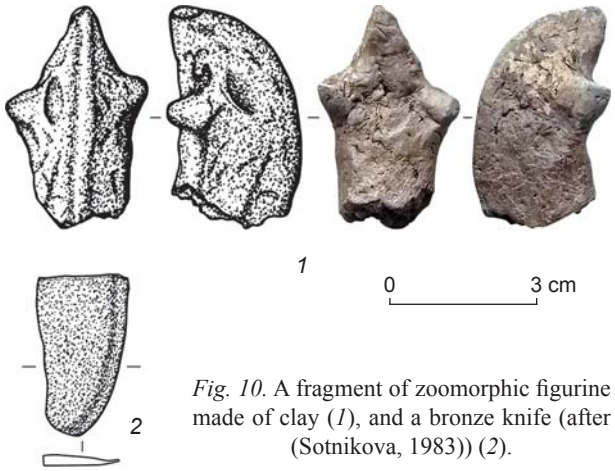

Fig. 10. A fragment of zoomorphic figurine made of clay (*1*), and a bronze knife (after (Sotnikova, 1983)) (*2*).

morphological specifics and ornamentation. This special feature (i.e. the inclusion of some foreign cultural elements in their own compositions), typical of the Late Irmen culture, was recorded in ceramics from other complexes; for example, Chicha-1, Om-1, Linevo-1, Myknikovo (Mylnikova, 2015b; Mylnikova, Papin, Shamshin, 2003; Mylnikova, Chemyakina, 2002; Papin, 2002a, b; 2003; Papin, Shamshin, 2005; Chicha…, 2004, 2009).

It is important to note that 0.9 m to the NE of building No. 1, a fragment of a zoomorphic clay figurine was found* (Fig. 10, *1*), typical of the Late Irmen settlement complexes of Baraba (Molodin, Chemyakina, Partsinger et al., 2003: Fig. 2).

The bronze knife found by S.V. Sotnikova in 1983 (Fig. 10, *2*) is classified as a wide-edge knife with a tapered nose. Similar items are known at Chicha-1 (Molodin, Partsinger, Efremova et al., 2003: Fig. 2, *4–6*) and Novotroitskoye I (Trufanov, 1990: Fig. 66).

Conclusion

In the beginning of the 21st century, the study of sites of the transitional stage from the Bronze to the Early Iron Age in the forest-steppe zone of Western Siberia is marked by an increase of the source base, and by considerable achievements in solving the Late Bronze Age issues. The data on each new site studied contribute to the correct understanding of the period's history. The results of analyses of ceramic assemblages hold a prominent place in the evidence base. To a large extent, exactly the observations on the character of the ceramics distribution in the excavation area of the Sibirskoye I site, in combination with other results of studies, gave A.Y. Trufanov, the leader of the excavations, the idea that identification of the site as a settlement needed correction.

The Late Irmen site of Sibirskoye I, with only one building (having a small area, slightly deepened, and without a hearth), 55 finds in the trench filling, and an almost complete absence of cultural layer beyond its limits, can be considered completely studied. Initially, the small thickness of the cultural layer was explained by wind erosion, which is typical for steppe areas and stems from black storms caused by the plowing of virgin lands. However, the removal of a layer by the wind has had no influence on the number of finds therein; they are few, with the exception of accumulations*. The planigraphy of the revealed features is also unusual. Small pits beyond building No. 1, as well as large pits in the northern part of the site, are located randomly. All the above allows the site to be interpreted as a ritual place, generally similar to the sites known in the northern Irtysh basin (Trufanov, 1983; Potemkina, Korochkova, Stefanov, 1995). In view of this, it is important to note that specialized ritual sites, as became clear recently, are typical of the Irmen culture, too. They have been revealed in the Baraba area (Molodin, Efremova, 2015; Efremova, Molodin, 2018) and in the Barnaul region of the Ob (Papin, 2000; Papin, Fedoruk, 2017). At Sopka-2, a ritual complex of the Irmen culture (Baraba forest-steppe) was located in the area of a cemetery. There were systematic pole pits at a round-shaped ground occupied by the complex. Ceramic vessels were found within the complex (Efremova, Molodin, 2018; Molodin, Efremova, 2015: 71). At the Maly Gonbinsky Kordon-1 site, in the Barnaul region of the Ob, near ritual structure 1/3, a burial ground was also situated, whose ceramic complex (Papin, 2000) is similar to finds from Sibirskoye I. There is a known Late Bronze ritual complex belonging to the Pakhomovo culture at Tartas-1; its ceramics are identical to the materials from the settlement under study (Efremova, Molodin, 2018; Efremova et al., 2017; Molodin, Nagler, Hansen et al., 2012; Molodin, Kobeleva, Nagler et al., 2013; Molodin, Durakov, Kobeleva et al., 2014; Selin, 2018). The Chicha-1 fortified site, according to Molodin, appeared in the Irmen period, like the sanctuary (Molodin, 2008a: 163; Molodin, Partsinger, 2009: 72).

So far, Late Irmen sites have been known in Baraba, Kulunda, and the forest-steppe Ob region. Nowadays, Sibirskoye I is the westernmost Irmen site and the first one discovered on the Irtysh. Development of the Irmen culture at its late stage in the forest-steppe Irtysh basin, as well as in other regions, depended on interaction with people of foreign cultural traditions (Molodin, Mylnikova, 2011; Mylnikova, 2015a, b; Trufanov, 1988). The southernmost site of the Irmen culture "Rozanovskoye" variant—the Achair V fortified site—is located

*The second figurine is represented by a very small fragment.

*The osteological material of the site has not been determined. It is scarce and loosely distributed. In the accumulations, mandibles of large herbivores occur.

55 km upstream of the Irtysh from the Om River mouth (Polevodov, 1995). The distance between it and the Sibirskoye I settlement is about 90 km. No Late Bronze Age sites are known in this area; and it is not clear so far, where the boundary between these two closely related cultural formations passed.

The date of the Sibirskoye I site can be determined approximately, by analogy with well-excavated and dated Late Irmen complexes, among which Chicha-1 holds a central position. The proposed chronology of the Late Irmen complexes found at this site (Molodin, 2008a; Molodin, Partsinger, 2009; Schneeweiss et al., 2018) suggests that the Sibirskoye I ritual site existed in the 9th to 8th (7th) centuries BC. The settlement itself functioned within this period, obviously for a rather short time.

In terms of culture, the materials from Sibirskoye I are closest to those from Om-1 (Mylnikova, 2015a; Mylnikova, Chemyakina, 2002: Fig. 27–31). This closeness is evident at the level of production technology (recipes for pastes, methods of manufacture, surface treatment), morphology, and ornamentation of vessels. The materials from Chicha-1 also contain similar ware (Chicha , 2009), though it is not so noticeable against the background of morphological and ornamental variability of the items.

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References

Abramova M.B., Stefanov V.I. 1985

Krasnoozerskaya kultura na Irtyshe. In *Arkheologicheskiye issledovaniya v rayonakh novostroyek Sibiri*. Novosibirsk: Nauka, pp. 103–130.

Bobrinsky A.A. 1978

Goncharstvo Vostochnoy Evropy. In *Istochniki i metody izucheniya*. Moscow: Nauka.

Bolshanik P.V., Igenbaeva N.O. 2006

Ekologo-landshaftnoye rayonirovaniye Omskogo Priirtyshya. *Geografiya i prirodniye resursy*, No. 3: 37–41.

Chicha – gorodishche perekhodnogo ot bronzy k zhelezu vremeni v Barabinskoy lesostepi (perviye rezultaty issledovaniy). 2001

V.I. Molodin, G. Parzinger, Y.N. Garkusha, Y. Schneeweiss, A.E. Grishin, O.I. Novikova, N.S. Efremova, M.A. Chemyakina, L.N. Mylnikova, S.K. Vasiliev, G. Becker, Y. Fassbinder, A.K. Meinstein, P.G. Dyadkov. Novosibirsk: Izd. IAET SO RAN. (Materialy po arkheologii Sibiri; iss. 1).

Chicha – gorodishche perekhodnogo ot bronzy k zhelezu vremeni v Barabinskoy lesostepi. 2004

V.I. Molodin, G. Parzinger, Y.N. Garkusha, Y. Schneeweiss, A.E. Grishin, O.I. Novikova, M.A. Chemyakina, N.S. Efremova, Z.V. Marchenko, A.P. Ovcharenko, E.V. Rybina, L.N. Mylnikova, S.K. Vasiliev, N. Beneke, A.K. Meinstein, P.G. Dyadkov, N.A. Kulik. Vol. 2. Novosibirsk: Izd. IAET SO RAN. (Materialy po arkheologii Sibiri; iss. 4).

Chicha – gorodishche perekhodnogo ot bronzy k zhelezu vremeni v Barabinskoy lesostepi. 2009

V.I. Molodin, G. Parzinger, S.K. Krivonogov, A.Y. Kazansky, M.A. Chemyakina, G.G. Matasova, A.N. Vasilievsky, A.S. Ovcharenko, A.E. Grishin, N.V. Ermakova, N.I. Dergacheva, I.N. Fedeneva, O.A. Nekrasova, L.N. Mylnikova, I.A. Durakov, L.S. Kobeleva, A.V. Zubova, T.A. Chikisheva, D.V. Pozdnyakov, A.S. Pilipenko, A.G. Romashchenko, I.V. Kulikov, V.F. Kobzev, O.I. Novikova, S.K. Vasiliev, Y. Schneeweiss, K. Privat, V.V. Boldyrev, V.A. Drebushchak, T.N. Drebushchak, E.I. Derevianko, A.P. Borodovsky, D. Bourgarit, I. Reiche, S.V. Kuzminykh, Z.V. Marchenko. Vol. 3. Novosibirsk: Izd. IAET SO RAN.

Chlenova N.L. 1997

Pamyatniki kontsa epokhi bronzy v Zapadnoy Sibiri. Moscow: Pushchin. nauch. tsentr RAN.

Efremova N.S., Molodin V.I. 2018

Raznovidnosti ritualnykh pamyatnikov na yuge Zapadno-Sibirskoy ravniny (neolit–pozdnee Srednevekovye). In *Problemy arkheologii, antropologii, etnografii Sibiri i sopredelnykh territoriy*, vol. XXIV. Novosibirsk: Izd. IAET SO RAN, pp. 246–250.

Efremova N.S., Mylnikova L.N., Molodin V.I., Vasiliev S.K., Durakov I.A., Selin D.V. 2017

Ritualniye kompleksy vostochnogo variant pakhomovskoy kultury: Noviye kontseptsii interpretatsii. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXIII. Novosibirsk: Izd. IAET SO RAN, pp. 314–317.

Gening V.F. 1973

Programma statisticheskoy obrabotki keramiki iz arkheologicheskikh raskopok. *Sovetskaya arkheologiya*, No. 1: 114–136.

Gening V.F., Stefanov V.I. 1993

Poseleniya Chernoozerye I, Bolshoy Log i nekotoriye problemy bronzovogo veka lesostepnogo Priirtyshya. In *Pamyatniki drevney kultury Urala i Zapadnoy Sibiri*. Yekaterinburg: Ural. Gos. Univ., pp. 67–111. (Vestnik arkheologii Urala; iss. 22).

Gidroslyudisty mineral. (s.a.)

Bolshaya entsiklopedia nefti i gaza. URL: https://www.ngpedia.ru/id157078p2.html (Accessed February 20, 2019).

Gryaznov M.P. 1956

Istoriya drevnikh plemen Verkhney Obi po raskopkam bliz s. Bolshaya Rechka. Moscow, Leningrad: Izd. AN SSSR. (MIA; No. 48).

Kaydalov A.I. 2013

Gorodishche Ust-Utyak-1 kak istochnik po izucheniyu kulturno-istoricheskikh protsessov na territorii Srednego Pritobolya v perekhodnoye vremya ot bronzy k zhelezu i epokhu rannego srednevekovya: Cand. Sc. (History) Dissertation. Kemerovo.

Kaydalov A.I., Sechko E.A. 2006

Materialy perekhodnogo vremeni ot bronzy k zhelezu gorodishcha Ust-Utyak-1 (po rezultatam issledovaniy 2002–2004 gg.). *Vestnik arkheologii, antropologii i etnografii*, No. 7: 76–84.

Kolontsov S.V., Sofeikov O.V. 1987
K voprosu o proiskhozhdenii "pozdneirmenskikh" tipov keramiki gorodishcha Chicha. In *Problemy arkheologii stepnoy Evrazii*. Kemerovo: Kem. Gos. Univ., pp. 110–112.

Matveev A.V. 1993
Irmenskaya kultura v lesostepnom Priobye. Novosibirsk: Novosib. Gos. Univ.

Molodin V.I. 1979
Nekotoriye problem perekhodnogo ot bronzy k zhelezu vremeni v Novosibirskom Priobye i lesostepnoy Barabe. In *Problemy skifo-sibirskogo kulturno-istoricheskogo edinstva: Tezisy dokl. Vsesoyuz. arkheol. konf*. Kemerovo: pp. 110–112.

Molodin V.I. 1985
Baraba v epokhu bronzy. Novosibirsk: Nauka.

Molodin V.I. 2008a
Periodizatsiya, khronologiya i kulturnaya identifikatsiya pamyatnika Chicha (Barabinskaya lesostep). In *Vremya i kultura v arkheologo-etnograficheskikh issledovaniyakh drevnikh i sovremennykh obshchestv Zapadnoy Sibiri i sopredelnykh territoriy: Problemy interpretatsii i rekonstruktsii: Materialy XIV Zap.-Sib. arkheol.-etnogr. konf*. Tomsk: pp. 155–163.

Molodin V.I. 2008b
K vorposu o vydelenii berlikskoy kultury. In *Integratsiya arkheologicheskikh i etnograficheskikh issledovaniy*. Omsk: Izd. Om. Gos. Ped. Univ.; Nauka, pp. 78–81.

Molodin V.I., Chemyakina M.A., Parzinger G., Novikova O.I., Efremova N.S., Grishin A.E., Marchenko Z.V. 2003
Glinyaniye skulpturki gorodishcha Chicha-1. In *Istoricheskiy opyt khozyaistvennogo i kulturnogo osvoyeniya Sibiri*, bk. 1. Barnaul: Izd. Alt. Gos. Univ., pp. 333–340.

Molodin V.I., Durakov I.A., Kobeleva L.S., Efremova N.S., Demakhina M.S. 2014
Issledovaniye kultovykh sooruzheniy pakhomovskoy kultury (vostochniy variant). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XX. Novosibirsk: Izd. IAET SO RAN, pp. 215–219.

Molodin V.I., Efremova N.S. 2015
Ritualniy kompleks irmenskoy kultury: Semanticheskiye rekonstruktsii (po materialam mogilnika Sopka-2). In *Arkheologicheskiye izyskaniya v Zapadnoy Sibiri i na sopredelnykh territoriyakh*. Novosibirsk: Izd. Novosib. Gos. Ped. Univ., pp. 71–77.

Molodin V.I., Kobeleva L.S., Nagler A., Durakov I.A., Efremova N.S., Nenakhov D.A., Demakhina M.S., Mylnikova L.N., Hansen S. 2013
Kultoviye kompleksy vostochnogo areala pakhomovskoy kultury na mnogosloinom pamyatnike Tartas-1. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XIX. Novosibirsk: Izd. IAET SO RAN, pp. 265–269.

Molodin V.I., Mylnikova L.N. 2011
Severniye traditsii v keramicheskom proizvodstve kultur ot bronzy k zhelezu vremeni lesostepnogo poyasa Zapadnoy Sibiri (kak pokazatel migratsionnykh potokov). In *Ekologiya drevnikh i traditsionnykh obshchestv*, iss. 4. Tyumen: IPOS SO RAN, pp. 191–200.

Molodin V.I., Mylnikova L.N., Durakov I.A., Kobeleva L.S. 2009
Sinkretichnaya keramika gorodishcha Chicha-1. In *Etnicheskiye vzaimodeistviya na Yuzhnom Urale*. Chelyabinsk: Izd. Tsentr. Yuzhno-Ural. Gos. Univ., pp. 73–78.

Molodin V.I., Mylnikova L.N., Durakov I.A., Kobeleva L.S. 2012
Statistical analysis of spatial distribution of ceramics from Late Bronze Age/Early Iron Age sites in southwestern Siberia. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 40 (3): 38–58.

Molodin V.I., Nagler A., Hansen S., Durakov I.A., Kobeleva L.S., Efremova N.S., Novikova O.I., Mylnikova L.N., Vasiliev S.K., Vasilieva Y.A., Kovyrshina Y.N., Kudinova M.A., Mosechkina N.N., Nenakhov D.A., Nesterova M.S., Salnikova I.V. 2012
Ritualniye kompleksy vostochnogo varianta pakhomovskoy kultury na pamyatnike Tartas-1 (Ob-Irtyshskaya lesostep). In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XVIII. Novosibirsk: Izd. IAET SO RAN, pp. 231–236.

Molodin V.I., Parzinger G. 2009
Khronologiya pamyatnika Chicha-1. In *Chicha – gorodishche perekhodnogo ot bronzy k zhelezu vremeni v Barabinskoy lesostepi*, vol. 3. Novosibirsk: Izd. IAET SO RAN, pp. 51–77.

Molodin V.I., Parzinger G., Efremova N.S., Grishin A.E., Novikova O.I., Chemyakina M.A. 2003
Kollektsiya bronzovykh izdeliy gorodishcha Chicha-1. In *Istoricheskiy opyt khozyaistvennogo i kulturnogo osvoyeniya Sibiri*, bk. 1. Barnaul: Izd. Alt. Gos. Univ., pp. 323–333.

Mylnikova L.N. 2015a
Keramika perekhodnogo vremeni ot bronzovogo k zheleznomu veku lesostepnoy zony Zapadnoy Sibiri: Dialog Kultur: D. Sc. (History) Dissertation. Novosibirsk.

Mylnikova L.N. 2015b
O modelyakh vzaimodeistviya nositeley avtokhtonnoy i inokulturnykh goncharnykh traditsiy v perekhodnoye vremya ot bronzovogo k zheleznomu veku lesostepi Zapadnoy Sibiri. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XXI. Novosibirsk: Izd. IAET SO RAN, pp. 346–349.

Mylnikova L.N., Chemyakina M.A. 2002
Traditsii i novatsii v goncharstve drevnikh plemen Baraby (po materialam poselencheskogo kompleksa Om-1). Novosibirsk: Izd. IAET SO RAN.

Mylnikova L.N., Papin D.V., Shamshin A.B. 2003
Ceramic complex of the Mylnikovo settlement in the Altaian forest-steppe Ob river region dating to the Bronze-Early Iron Age transition period. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 3: 93–111.

Papin D.V. 2000
Kultovoye sooruzheniye perekhodnogo vremeni ot epokhi bronzy k rannemu zheleznomu veku v lesostepnom Altaiskom Priobye. In *Drevniye svyatilishcha: Arkheologiya rituala i voprosy semantiki*. St. Petersburg: Izd. SPb. Gos. Univ., pp. 86–88.

Papin D.V. 2002a
Znacheniye severnykh ornamentalnykh traditsiy v formirovanii kultur perekhodnogo vremeni ot epokhi bronzy k rannemu zheleznomu veku. In *Severniy arkheologicheskiy kongress 9–14 sent., Khanty-Mansiysk: Tezisy dokl*. Yekaterinburg: pp. 66–68.

Papin D.V. 2002b
Problemy transformatsii pozdnebronzovykh kultur v perekhodnoye vremya ot epokhi bronzy k rannemu zheleznomu

veku na Verkhney Obi. In *Stepi Evrazii v drevnosti i srednevekovye: Materialy Mezhdunar. nauch. konf., posvyashch. 100-letiyu so dnya rozhd. M.P. Gryaznova*, bk. 1, pt. 1. St. Petersburg: pp. 206–208.

Papin D.V. 2003

Problema slozheniya arkheologicheskikh kultur v perekhodnoye vremya ot epokhi bronzy k rannemu zheleznomu veku na Verkhney Obi. In *Istoricheskiy opyt khozyaistvennogo osvoyeniya Zapadnoy Sibiri*, bk. 1. Barnaul: Izd. Alt. Gos. Univ., pp. 341–343.

Papin D.V., Fedoruk A.S. 2017

Kultovoye sooruzheniye na territorii poseleniya Maliy Gonbinskiy Kordon 1/3 (Barnaulskoye Priobye). *Vestnik Novosibirskogo gosudarstvennogo universiteta*. Ser.: Istoriya, filologiya, vol. 16. No. 5: Arkheologiya i etnografiya: 41–49.

Papin D.V., Shamshin A.B. 2005

Barnaulskoye Priobye v perekhodnoye vremya ot epokhi bronzy k rannemu zheleznomu veku. Barnaul: Izd. Alt. Gos. Univ.

Petrin V.T. 1975

Otchet ob arkheologicheskoy razvedke na territorii Omskoy oblasti v 1975 g. Arkhiv IA RAN. R-1, No. 5303.

Polevodov A.V. 1995

Otchet ob arkheologicheskikh rabotakh v Krutinskom i Omskom rayonakh Omskoy oblasti v 1995 g. Arkhiv MAE OmGU. F. II, D. 106-1.

Potemkina T.M., Korochkova O.N., Stefanov V.I. 1995

Lesnoye Tobolo-Irtyshye v kontse epokhi bronzy (po materialam Chudskoy Gory). Moscow: PAIMS.

Schneeweiss Y., Becker F., Molodin V.I., Parzinger G., Marchenko Z.V., Svyatko S.V. 2018

Radiouglerodnaya khronologiya protsessa zaseleniya pamyatnika Chicha i bayesovskaya statistika dlya otsenki preryvistogo perekhoda ot epokhi pozdney bronzy k rannemu zheleznomu veku (Zapadnaya Sibir). *Geologiya i geofizika*, vol. 59 (6): 792–813.

Selin D.V. 2018

Epokha finalnoy bronzy v pravoberezhnom Priirtyshye (vostochniy variant pakhomovskoy kultury). Cand. Sc. (History) Dissertation. Novosibirsk.

Sherstobitova O.S. 2008

Posuda so smeshannymi kulturnymi priznakami: K voprosu o spetsifike vzaimodeistviya kultur na territorii Srednego Priirtyshya v epokhu pozdney bronzy. In *VII istorich. chteniya pamyati Mikhaila Petrovicha Gryaznova*. Omsk: Omsk. Gos. Univ., pp. 129–137.

Sotnikova S.V. 1983

Otchet o razvedke levogo berega r. Irtysh v Novovarshavskom i Tavricheskom rayonakh Omskoy oblasti [v 1983 g.]. Arkhiv MAE OmGU. F. II, D. 36-1.

Troitskaya T.N., Mzhelskaya T.V. 2008

Keramika zavyalovskogo tipa v Novosibirskom Priobye. In *Etnokulturniye protsessy v Verkhnem Priobye i sopredelnykh regionakh v kontse epokhi bronzy*. Barnaul: Kontsept, pp. 115–121.

Trufanov A.Y. 1983

Zhertvennoye mesto Khutor Bor I (o kulturno-khronologicheskom svoyeobrazii pamyatnikov epokhi bronzy lesnogo Priirtyshya). In *Etnokulturniye protsessy v Zapadnoy Sibiri*. Tomsk: Izd. Tom. Gos. Univ., pp. 63–76.

Trufanov A.Y. 1988

O sudbakh irmenskoy kultutry. In *Khronologiya i kulturnaya prinadlezhnost pamyatnikov kamennogo i bronzovogo vekov Yuzhnoy Sibiri: Tezisy dokl. i soobshch. k nauch. konf. (23–25 marta 1988 g.)*. Barnaul: IIFF SO AN SSSR, Alt. Gos. Univ., pp. 115–117.

Trufanov A.Y. 1990

Kultury epokhi pozdney bronzy i perekhodnogo vremeni k zheleznomu veku v lesostepnom Priirtyshye: Cand. Sc. (History) Dissertation. Kemerovo.

Trufanov A.Y. 1991

Otchet ob arkheologicheskikh issledovaniyakh v Nizhneomskom Novovarshavskom i Tavricheskom rayonakh Omskoy oblasti v 1991 g. Arkhiv MAE OmGU. F. II, D. 79-1.

Trufanov A.Y. 1992

Otchet o rabotakh v Krutinskom, Novovarshavskom i Bolsherechenskom rayonakh Omskoy oblasti v 1992 g. Arkhiv MAE OmGU. F. II, D. 83-1.

Trufanov A.Y. 1996

Otchet o rabotakh v Novovarshavskom rayone Omskoy oblasti v 1996 g. Arkhiv MAE OmGU. F. II, D. 129-1.

Zimina O.Y., Mylnikova L.N. 2006

Pottery from the Eastern Variation of the Itkul Culture (Based on Finds from the Yurtoborovsky Archaeological Microregion in the Lower Pritobolie). *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4: 96–114.

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Cultural Interaction Patterns in the Bronze Age: Ritual Bronze Artifacts from Korea and Japan

This study focuses on ritual bronze items that are very informative for reconstructing cultural ties and migrations between Korea and Japan from 400 BC to 300 AD. Their large-scale introduction to Korea is related to the culture of Korean-type daggers, whose distribution center was located in northwestern Korea. We give a detailed description of Bronze Age artifacts, including weapons and ritual items from that area. These occur mostly in single burials of complex construction, possibly attesting to high social status. In Japan, Korean-type artifacts first appear in northern Kyushu during the Yayoi age, in burials with wooden coffins and urns. The analysis of molds for casting narrow-bladed daggers, socketed spearheads, and picks suggests that Korean-type items spread from northern Kyushu. Late Yayoi ritual bronze artifacts include mostly mirrors of the Han type, evidently indicating migrations from the mainland.

Keywords: *Ritual bronze items, Bronze Age, Korea, Japan, cultural interaction.*

Introduction

The Bronze Age was an important period in the history of the peoples who lived in East Asia. At this time, first metal (bronze) items appeared in the cultures of the region. Tools and implements made from stone and bone continued to be used for household needs; their manufacturing techniques continued to be improved, and their typological composition expanded. Bronze items were not widely used in all areas of life in the society. Prestigious and ceremonial paraphernalia, such as weaponry, jewelry, etc., were made from bronze. Owing to their distinctive appearance, non-utilitarian bronze items serve as ethnic and cultural markers, making it possible to establish migration routes for individual human groups and ways of cultural exchange.

The beginning of wide proliferation of bronze ritual items on the Korean Peninsula is closely related to the so-called culture of narrow-bladed bronze daggers or the culture of Korean-type daggers (4th–1st centuries BC) (Lee Chong-gyu, 2007: 120–124). Its initial center was located in the territory of Wiman Joseon in the basin of the Taedong River in northwestern Korea (Butin, 1982: 259); but gradually narrow-bladed daggers and other ritual bronze items spread to the south of the peninsula, mainly to the basins of the Geumgang River (Chungcheongnam-do province) and Yeongsangang River (Jeollanam-do province) (Hanguksa, 1997: 61). Over time, ritual items of the culture of narrow-bladed daggers began to be used in other parts of the East Asian region. Certain items of this category have been found in the Russian Primorye (Okladnikov, Shavkunov, 1960: 283; Kang In-uk, Cheon Seon-haeng, 2003: 6–8). A relatively large amount of evidence associated with Korean-type bronze ritual items has been found in Japan. Bronze ritual items are the unique sources of information on the early contacts of the population inhabiting the Korean Peninsula with the Japanese Islands.

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Bronze ritual items in Korea

Early sites with bronze ritual items (4th to 3rd centuries BC) in South Korea have been discovered in the basin of the Geumgang River. One of these sites (*Goejeong-dong*) has been discovered within the boundaries of Daejeon city during land-surveying, and was investigated by the team from the National Museum of the Republic of Korea in 1967. The site is a partially destroyed single burial; a stone box measuring 2.2 × 0.5 × 1.0 m in size was composed of amorphous rock debris, and was located in a funnel-shaped soil pit (2.5 × 0.73 × 2.7 m). The stone structures of the bottom and cover have not been found. The upper part of the pit filling was made up of rock fragments—possibly, the remains of a structure above the grave that might have been a stone mound. Wood decay (probably, the remains of wooden coffin) has been found at the bottom of the burial. The burial goods of the complex included pottery and items of bronze and stone (see Fig. 1). The pottery complex consisted of a vase-like vessel with a black polished surface, and a pot-like vessel with round pasted band on the rim. Ritual bronze artifacts were represented by a narrow-bladed dagger, decorative handle onlays (3 spec.), bells (2 spec.), gong, mirrors with thick linear geometric ornaments (2 spec.), and a shield-like item. Three stone arrowheads and two jade *kogok* (*magatama*) pendants have also been found (Yi Un-chang, 1968: 76–91).

Inventory complexes of similar composition have been discovered at Namsong-ri and Dongseo-ri sites.

The *Namsong-ri* site near Asan city was discovered during construction work in 1976 and was examined by the team from the National Museum of the Republic of Korea. A burial in the form of a stone box made of flagstone (2.8 × 0.8–0.9 × 0.7 m), which was built in a funnel-shaped soil pit (the size in the upper part was 3.1 × 1.8 m; depth was 2 m), was found at the site. Large number of stones that could have composed the mound was found in the upper part of the pit filling. Wood decay (the remains of a coffin) was found in the filling of the stone box. The grave goods included ritual bronze items: narrow-bladed daggers (9 spec.), shield-like item, decorative handle onlays (3 spec.)—one of them depicted a roe deer, and mirror with thick linear ornament (2 spec.). A bronze celt-axe, chisel, jade *kogak* pendant, and 103 tubular beads were also found at the site (Han Byeong-sam, Lee Geon-mu, 1977: 6–14).

The *Dongseo-ri* site was discovered in 1978 during construction work near Yesan city. It is not possible to determine the layout and exact size of the site owing to its severe damage. According to indirect features, it was most likely a stone box with an earthen floor, and without an additional cover. Judging by the large number of rock fragments, the burial had a stone mound. The set of the

Goods of the burial from Goejong-dong (Republic of Korea) (Lee Chong-gyu, 2007) (*1*); goods of the burial from Chopo-ri (Republic of Korea) (Ibid.) (*2*); ritual weapons from the sites in northern Kyushu Island (Japan) (Itokoku rekishihakubutsukan, 2012) (*3*); bronze mirror from the Hirabaru cemetery (Fukuoka prefecture, Japan, collection of the Itoshima Historical Museum) (Ibid.) (*4*); *dotaku* bronze bell from Hatsukayama (Nara prefecture) (The Museum…, 2012) (*5*).

grave goods included bronze ritual items, jade beads (126 spec.), stone polished arrowheads (5 spec.), vase-like vessel with black polished surface, and fragments of a vessel with rounded pasted band on the rim. Ritual bronze items included narrow-bladed daggers (9 spec.), decorative handle onlays (3 spec.), a pipe-shaped item (presumably a part of the headdress of the buried person's), mirrors with thick and thin linear ornaments, and a gong (Ji Gon-gil, 1978: 153–161).

More sophisticated complexes with bronze ritual items have been found at the Daegok-ri and Chopo-ri sites (3rd to 2nd centuries BC), in the basin of the Yonsangan River.

The *Daegok-ri* site was discovered in 1971 during construction work. The site was a burial in a stepped earthen pit. The size of the pit at its upper part was 3.3 × 1.8 × 0.85 m, and at the floor level 2.1 × 0.8 × × 0.6 m. A massive fragment of a wooden item measuring 0.9 × 0.45 m (probably the remains of coffin) was found in the eastern part of the pit. The set of the grave goods included ritual bronze artifacts: narrow-bladed daggers (3 spec.), mirrors with thin linear ornaments (2 spec.), and 2- and 8-pointed bells (4 spec.). A bronze celt-axe and chisel were also found there (Cho Hyun-jong, Jang Je-geun, 1996: 567–571).

The *Chopo-ri* site was discovered in 1987 during construction work in one of the villages in Hampyeong County. The team from the Gwangju National Museum carried out archaeological rescue works at the site. It was found out that the site was a burial in a funnel-shaped earthen pit (2.6 × 0.9 m) with stone box (1.9 × 0.55 × 0.55 m). Wood decay (presumably, the remains of wooden coffin) was discovered on the floor of the burial. Judging by large number of stone fragments in the filling of the pit, it used to be a mound over the burial. The set of the grave goods consisted of 26 items (see Fig. 2). The category of ritual bronze items included narrow-bladed daggers with decorative pommels (2 spec.), a Chinese-type dagger with a *tosyg* handle, picks (3 spec.), a socketed spearhead, a bell-shaped scepter pommel; 1-, 2- and 8-pointed bells (3 spec.), and mirrors with thin linear ornaments (3 spec.) have been found. A bronze celt-axe, a mortise chisel, and two chisels were also found in the burial (Ibid.: 571–577).

The *Hapsong-ri* site was discovered in 1989 during plowing of the territory for planting crops in Buyeo County of the Chungcheongnam-do province. Archaeological rescue works were carried out at the site by the team from the Buyeo National Museum, but it was not possible to find out the details of its structure during these works, since the item was almost completely destroyed. According to the researchers, the item was a single burial in a wooden coffin or earthen pit without additional structures, covered by stone mound. The set of ritual bronze items gathered during the rescue operations included narrow-bladed daggers (2 spec.), a pick, bells (2 spec.), fragments of a disk-shaped item, fragments of mirror with geometric ornament made in thin lines, and an item of unclear function, which looked like votive pick. The goods associated with the site also included two iron celt-axes, a chisel, fragments of black polished pottery, and eight tubular jade beads (Lee Geon-mu, 1990: 25–30).

In recent years, several more sites with ritual bronze artifacts have been discovered on the Korean Peninsula. In 2014–2015, during archaeological rescue excavations at the site of Hoam-dong, located in the boundaries of Chungju city in the Chungcheong-bukto province, the Central Korean Cultural Heritage Center investigated three burials. One of those burials that contained the largest amount of grave goods was a funnel-shaped earthen pit measuring 1.75 × 0.82 m, 1.75 m deep. Wood decay found on its floor indicated the presence of a wooden coffin, which used to be in the pit. Given the numerous fragments of stone in the filling of the pit, it can be assumed that a mound used to cover the burial. Burial goods consisted of ritual bronze items: narrow-bladed daggers (7 spec.), a mirror with thin linear ornament, a pick, socketed spearheads (3 spec.), and bronze working tools, such as a celt-axe, mortise chisels (4 spec.), and chisels (2 spec.), as well as a vessel with a polished black surface, and fragment of a porcelain item (Kim Moo-joong et al., 2017: 35–67).

In 2015, the team from the Buyeo National Research Institute of Cultural Heritage, studied the *Cheongsong-ri* site in Buyeo County of the Chungcheong-bukto province. It was found out that the site was a heavily destroyed single burial in an earthen pit (at the time of the study, the size was 1.64 × 0.8 × 0.2 m), possibly with a wooden coffin. There was no stone mound above or around the burial; however, three pieces of limestone, located near one wall of the pit, suggest its presence. The floor of the pit did not have additional structures. Artifacts made from bronze, jade, and stone (31 spec.) were found in and beyond the burial. The set of ritual bronze items included a narrow-bladed dagger, decorative pommels of daggers (2 spec.), socketed spearheads (4 spec.), a mirror with thin linear ornament, and the scepter pommel. The grave goods also contained bronze tools (celt-axe, mortise chisel, and two chisels), jewelry (14 jade tubular beads), and four stone arrowheads (Lee Ju-heon et al., 2017: 44–45, 58–96, 112–130, 141–181).

Thus, the complex of ritual bronze artifacts found on the Korean Peninsula can be divided into two groups: the first includes weaponry and accompanying items (narrow-bladed daggers, socketed spears, picks, handle onlays), and the second includes ritual paraphernalia and elements of the outfit (mirrors, gongs, bells, small bells, shield-like items, pipe-shaped items, and staff pommels). All artifacts are associated with single burials of sophisticated structure in deep stepped earthen pits

with a wooden coffin and stone mound. Judging by the design of the burial and composition of the funeral goods, such burials were intended for people who had a high social status and played an important role in the community rituals.

Bronze ritual items in Japan

The earliest bronze ritual items in Japan, called "Korean-type items", have been found in the north of Kyushu Island. The time of their appearance there corresponds to the late early to early middle stages of Yayoi period (mid 3rd century BC). The finds from burial 3 at the cemetery of Yoshitake-Takaki in Fukuoka prefecture are of interest to our overview. A large number of burials in pottery vessels and wooden coffins have been found in the flat-grave burial ground that was a part of the Iimori complex. Such a combination of burial structures was typical for this period. Burial 3 was a burial in an earthen pit with a wooden coffin. It contained the richest grave goods complex, including two bronze narrow-bladed daggers, a pick, a socketed spearhead, a mirror with thin linear ornament, a jade *magatama* pendant, and 95 tubular jasper beads (Yoshitake-takaki, 1986: 8). According to K. Mizoguchi, the person buried in the grave had a special status, since the grave goods of the burial differed from the grave goods found in other graves. A mirror and numerous beads, which probably used to be assembled into a necklace, can be considered to be the markers of religious authority, while several weapons indicate community leadership or community authority (Mizoguchi Koji, 2002: 154). During the Yayoi period, many areas of life were ritualized. If during Jomon period the main reflection of ritual content was pottery, in Yayoi period these were metal items, primarily made from bronze.

The same set of items (bronze narrow-bladed daggers, socketed spearheads, mirrors with thin linear ornaments, and jade *magatama* pendants), as from burial 3, was found in burials in pottery vessels at the Uki-Kunden cemetery in Saga prefecture (Hanguksa, 1997: 314–315). The scholars attributed the site to Middle Yayoi period (The Cambridge History…, 1993: 275). Korean-made bronze swords were found at the Okamoto-cho and Kasuga sites in Fukuoka prefecture, and Yasunagata and Tosu in Saga prefecture.

According to some scholars, a set consisting of a bronze mirror, a dagger or a sword, and *magatama* pendants, which appeared in some burials, is similar in its composition to the "three regalia" symbols of power, which appeared later (Ibid.: 274). Since these burials were attributed to the time of the emerging state entities and struggle for power, when several political centers existed in Kyushu and southwestern Honshu, we may assume that this set of items could have been the sign of the emerging special symbols—ritual attributes. Mirror, sword, and jasper pendants as a symbol of the imperial power are mentioned in "Nihonshoki"—one of the earliest written sources: the goddess Amaterasu gave them to her grandson and first emperor Ninigi-no-mikoto when he was sent to Earth (Nihonshoki, 1997: 128). Subsequently, the mirror became the most important sacred item of the Ise Shrine—the main temple of goddess Amaterasu; the sword became the sacred item of the Atsugi Shrine, and jasper pendants were considered to be the talismans of the Imperial House.

Bronze ritual items found at the early sites of Kyushu Island reveal both similarities and significant differences with their Korean prototypes. On the Korean Peninsula, bronze narrow-bladed weapons are unknown in the burials in pottery vessels. In Japan, the Korean-type bronze items have been found both in burials with wooden coffins, typical of the Korean Peninsula, and in the burials in urns which are the predominant type of burial. The grave goods with bronze ritual items at the Japanese sites included narrow-bladed daggers, picks, socketed spearheads, and mirrors with thin linear ornaments (see Fig. 3). Bells, small bells, and scepter pommels, which appeared at the Korean sites, were absent from the sites of the Early Yayoi period.

Casting-moulds for manufacturing bronze narrow-bladed daggers have been found at the Katsuma and Otani sites in Fukuoka prefecture, and Soza in Saga prefecture; also socketed spearheads at the Soza and Yoshitake-Takaki sites in Fukuoka prefecture, and picks at the Nabeshima site in Saga prefecture. These finds indicate that the center of bronze casting, specialized in manufacturing the items of the Korean type, emerged on Kyushu Island (Hanguksa, 1997: 314). Thus, early cultural contacts between the populations of Korea and Japan in the Bronze Age were manifested not only by migrations and direct borrowing of individual elements of culture, but also by borrowing new technologies.

Further transformation of bronze daggers and spearheads of the Korean type in Japan was associated with the increased size and width of the blade. This might have served the purpose of their improvement as ritual and ceremonial items (Jo Jin-seon, 2016: 136). It should be mentioned that narrow-bladed weaponry in Korea was also a part of the category of ritual items, but their proportions did not change over time. With morphological changes, the role of these items in the ritual might have been transformed, and they started to occur not only in burials, but also in hoards (Miyazato Osamu, 2012: 3).

At the beginning of the Late Yayoi period, the complex of ritual bronze items at the Japanese sites included mirrors not of the Korean, but of the Han type. One of the most famous and important locations of bronze mirrors is

the Hirabaru site in the north of Kyushu Island (see Fig. 4) (Harada Dairoku…, 2011: 34). A large number of goods, particularly bronze mirrors and *magatama* beads, were found in the burial chamber of burial mound No. 1. Forty mirrors were reconstructed from the fragments; the largest mirror reached 46.5 cm in diameter and weighted about 8 kg (Itokoku rekisihakubutsukan, 2012: 26). Some of the mirrors were Chinese imported products; the others were produced locally. Thus, the Korean prototypes of mirrors were apparently replaced by more prestigious Chinese (Han) prototypes.

Bells became most widespread since the Middle to Late Yayoi period in Japan among bronze ritual items of the Korean origin. The conditions of discovering *dotaku* bells, as well as variety of their sizes and decorative elements, make it possible to conclude that they must have had their own ritual function unrelated to funeral practices (see Fig. 5). *Dotaku* bells most often occurred individually or as "hoards"—clusters of several dozen bells, located outside the settlements and not accompanied by any structures.

Conclusions

The study of ritual bronze items found on the sites of the Bronze Age in Korea and Japan (4th century BC to 3rd century AD) identified the main stages and forms of interaction between the two cultures in the period under consideration. In the early stage of the Bronze Age, bronze items in Korea and Japan were closely related to the funeral rite, since the finds occurred in single burials. Such burials might have belonged to the people of high social status. The great similarity between the evidence and geographical proximity of their areas of distribution suggests that some groups of population would migrate from the southwestern part of the Korean Peninsula to the west of the Japanese archipelago at the time under consideration. These movements seem to have contributed to the transition of new technologies. The technology of manufacturing bronze ritual items developed on its own in Japan. New forms of products were created there on the basis of Korean and later Chinese prototypes. The role of these items in ritual practices also changed: their association with the funeral rite and the individual social status of the buried person gradually changed, and, on the contrary, their importance in community rituals and cults increased.

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References

Butin Y.M. 1982
Drevniy Choson (istoriko-arkheologicheskiy ocherk). Novosibirsk: Nauka.

Cho Hyun-jong, Jang Je-geun. 1996
Jeonnam-ui seokgwanmyo mokgwanmyo [Stone and Wooden Cist Tombs of Chonnam province]. In *Jeonnam-ui godae myoje (bonmun)* [Ancient Tombs of Chonnam province (texts)]. Mokpo: Mokpo daehakgyo bakmulgwan, pp. 567–580. (In Korean).

Han Byeong-sam, Lee Geon-mu. 1977
Namseongri seokgwanmyo [Excavation of a Bronze Age Tomb at Namsong-ri in Asan]. Seoul: Gukrip jungang bakmulgwan. (In Korean).

Hanguksa — cheongdonggi munhwa-wa cheolgi munhwa. 1997
[History of Korea – Bronze and Early Iron Age Culture]. Vol. 3. Seoul: Guksa pyeonchan wiwonhoe, pp. 7–322. (In Korean).

Harada Dairoku. 2011
Showa-wo kaketa kokogakusha [Archaeologists of Showa Period (Harada Dairoku)]. Itoshima: Deisujapan kabushiki kaishaya. (In Japanese).

Itokoku rekishihakubutsukan. 2012
[The Historical Museum of Itokoku]. Itoshima: Deisujapan kabushiki kaishaya. (In Japanese).

Ji Gon-gil. 1978
Yesan Dongseo-ri seokgwanmyo chulto cheongdong ilgwaryumul [A Bronze Age Tomb and Its Burial Goods at Dongso-ri in Yesan]. *Baekje yeongu*, No. 9: 151–181. (In Korean).

Jo Jin-seon. 2016
Sehyeong donggeom munhwa-ui ilbonyeoldo pageup sigi-wa gyeongro [The Spreading Time and Route of the Slender Bronze Daggers Culture to Japanese Archipelago]. In *Godae dongbuga minjog-ui gogo-wa yeoksa* [The Archaeology and History of Ancient People in Northeast Asia]. Seoul: Kyunghee daehakgyo, pp. 133–158. (In Korean).

Kang In-uk, Cheon Seon-haeng. 2003
A Study on the Sites with Slender Daggers, Primorie Krai, Russia. *Hanguk sanggosa hakbo*, No. 42: 1–34. (In Korean).

Kim Moo-joong, Lee Seong-yong, So Jun-seop, Lee Myeong-su. 2017
Chungju jonghap seupocheutaun joseong buji nae Chungju hoamdong yujeok [Hoamdong Site Located in the Area Designated for Construction of the Sports Complex at Chungju]. Cheongju: Jungwon munhwajae yeonguwon. (In Korean).

Lee Chong-gyu. 2007
Chogi cheolgisidae [The Early Iron Age]. In *Hanguk gogohak gangui*. Seoul: Sahoe pyeongron, pp. 107–136. (In Korean).

Lee Geon-mu. 1990
Buyeo Hapsongri yujeok chulto ilgwaryumul [Assemblage of Artifacts from Hapsongri, Buyeo]. *Gogohakji*, No. 2: 23–67. (In Korean).

Lee Ju-heon, Lee Seong-jun, Hong Balkeum, Ahn So-mang, Kim Seong-tae, Lee Ga-yeong. 2017
Buyeo Cheongsong-ri yujeok [The Site of Cheongsong-ri at Buyeo]. Buyeo: Gukrip Buyeo munhwajae yeonguso. (In Korean).

Miyazato Osamu. 2012

Ilbonyeoldo yayoisidae cheongdonggijesa-wa gukga hyeongseong [The Bronze Tools and State Formation in Japanese Archipelago]. *Dongyanghak*, No. 51: 1–12. (In Korean).

Mizoguchi Koji. 2002

An Archaeological History of Japan: 30,000 BC to 700 AD. Philadelphia: Univ. of Pennsylvania Press.

Nihonshoki. 1997

Annaly Yaponii, vol. 1. St. Petersburg: Giperion.

Okladnikov A.P., Shavkunov E.V. 1960

Pogrebeniye s bronzovymi kinzhalami na reke Maikhe (Primorye). *Sovetskaya arkheologiya*, No. 3: 282–288.

The Cambridge History of Japan. 1993

Cambridge: Cambridge Univ. Press. (Ancient Japan; vol. 1).

The Museum. Archaeological Institute of Kashihara, Nara prefecture. 2012

Kashihara: Kashihara Museum.

Yi Un-chang. 1968

Daejeon Goejeong-dong cheongdonggi munhwa-ui yeongu [Remains of the Bronze Age Excavated in Goejong-dong, Taejon city]. *Asea yeongu*, vol. 11 (2): 75–99. (In Korean).

Yoshitake-takaki. 1986

Yayoijidai maisouiseki-no chosagaio [Yayoi Period Burial Sites Studying Report]. Fukuoka-shi kyoikuiinkai. Fukuoka: Nishinihonshimbun insatsu. (In Japanese).

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An Early Iron Age Camp of Reindeer Hunters in the Bolshezemelskaya Tundra, Nenets Autonomous Okrug

This study outlines the findings of excavations at More-Yu II—a site in the northern Bolshezemelskaya tundra. The habitation-layer, with numerous charcoal lenses, was discovered inside the layer of buried soil, which was overlaid by eolian sand. Most of the finds are ceramics and animal bones; arrowheads, adornments, tools, and ritual items are very rare. On the basis of palynological and faunal analyses, environmental changes from the time of Subboreal warming until the end of the Subatlantic period are reconstructed. The temperature regime during the formation of cultural deposits was unstable. The principal subsistence strategy was reindeer hunting. The age distribution of the hunted reindeer suggests that habitation periods coincided with cold seasons. Radiocarbon dates generated from reindeer bones point to the Early Iron Age. The camp dwellers were native reindeer hunters inhabiting the tundra belt of northeasternmost Europe. Ceramics representing the More-Yu type belong to the early stage of the Subarctic Pechora culture. They mark the Arctic component that became part of the northern Glyadenovo population, abruptly changing the Finno-Permic culture of the taiga part of the Pechora basin in Cis-Urals.

Keywords: *Northeastern Europe, Early Iron Age, settlement, reindeer.*

Introduction

The circumpolar zone of northeastern Europe is among the Russian regions with insignificantly studied archaeological records: archaeological works in this region are only carried out occasionally.

The source of information on Iron Age archaeology in the northeasternmost tundra area of Europe includes the finds from not more than 20 archaeological sites where excavations of culture-bearing strata were carried out. These sites, of varying degrees of examination, have yielded archaeological materials attributable to a wide

chronological range between the second half of the 1st to the first half of the 2nd millennia AD. The majority of the finds are ceramics; hence, it is rather difficult to determine the chronological range of the identified cultural types and separate complexes. The materials from the site of More-Yu II in the Bolshezemelskaya tundra deserve special attention, because the excavation data provide a basis for more accurate determination of the age of sites located in high latitudes.

Description of the site

The site of More-Yu II is located in the north of the Bolshezemelskaya tundra, at a distance of about 60 km from the southeastern coast of the Barents Sea. This is a region of relic spruce-fir-birch sparse forest on the 30 m promontory (which is bounded by hollows) on the right-side bank of the More-Yu River (Fig. 1). In 1967, some artifacts were collected from the surface of the blown-out depressions where the More-Yu site was located (Kanivets, 1967: 18; Murygin, 1990). The area of surface finds was excavated in 1987–1988 and 1991. The research data of 1987–1988 were partially described (Murygin, 1992: 68–75, fig. 30–32). In 2007, the site was examined by the archaeologists from the Arkhangelsk Regional Studies Museum (Edovin, 2007).

The top soil of the bank is subjected to soil-blowing. The excavation area of about 1014 m^2 was established on the intact surface, 150–200 m from the edge of the terrace (Fig. 2). Within the study-area, cultural remains were found below the eolian sand layer, which was up to 170 cm thick. The cultural remains were embedded in the layer of buried soil up to 12 cm thick. The finds, including fragmented vessels, potsherd accumulations, and faunal remains, were concentrated mostly around fireplaces.

Within the excavated culture-bearing layer, two types of archaeological items of anthropogenic origin were recorded.

1. **Fireplaces** (Fig. 2). In total, ten ash and charcoal lenses were uncovered. The lenses are filled mainly with fragments of pottery, and animal bones. Two fireplaces had been destroyed by blow-outs (I and IX). Those that were preserved are subdivided into two groups. The *first group* (III, IV, XIII, and X) includes spots of dense black concentrations of ash and charcoal, sub-rectangular

Fig. 1. Location of the More-Yu II site.

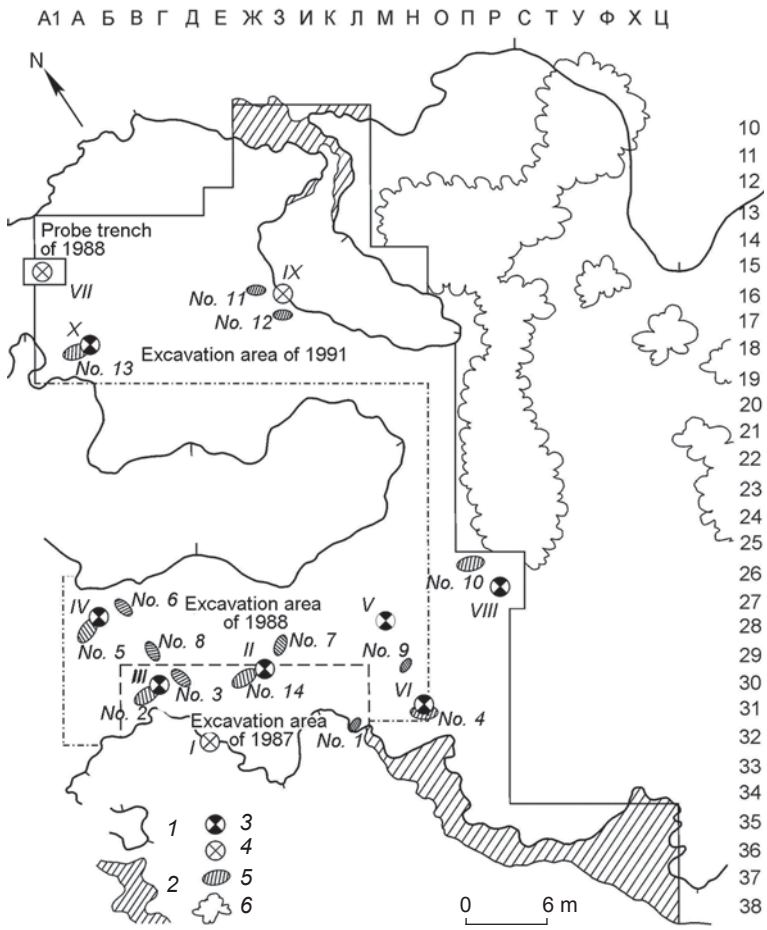

Fig. 2. Map showing locations of the excavation areas of More-Yu II.
1 – border of the steep blow-out gully; *2* – remains of the culture-bearing layer in gully; *3* – preserved fireplaces; *4* – destroyed fireplaces; *5* – animal bone accumulations; *6* – bushes. Fireplaces are marked with Roman numerals; bone-accumulations with Arabic numerals.

in shape, with clear boundaries with surrounding sandy deposits. The *second group* (II, V–VII) includes amorphous spots of loose, grayish-brown concentrations of ash and charcoal, without clear boundaries with sand deposits. Fireplaces II and VIII each showed a lens of caked sand.

2. **Spots of humic sand** (Fig. 2). Thirteen areas of brown sand, varying in shape and size, were identified. These commonly contained raw animal bones and ceramic fragments. The areas differed in their proportions of ceramic and bone materials. In humic spots 2, 4, and 5, the proportion of bones was significant, while that of ceramic fragments was minor. Humic spots 1, 3, 6, 7, 10–13 contained a lot of ceramic fragments, including fragmented vessels, while raw bones were few. The greatest concentration of raw animal bones (No. 14), overlying a thin charcoal lens, was uncovered next to the edge of fireplace II (Fig. 2). Below the bone concentration, a large broken vessel was found.

Within the excavation area, a sub-rectangular depression (6.3 × 3.3–3.6 m) was found (Murygin, 1992: Fig. 31, 32, prof. III). It revealed a spotty concentration of mixed sands. The depression might have been man-made or have been formed naturally by the water flowing down the slope of the terrace.

Artifact inventory

Arrowheads. These were made of iron. The first arrowhead is faceted, tanged, and awl-shaped, with a squared cross-section and an ordinary stopper (Fig. 3, *9*). It is similar to the arrowheads of type 90, which emerged at the beginning of our era and survived till the 14th century (Medvedev, 1966: 59, pl. 30, D, *82*). The arrowhead was found in the humic spot 5. The second arrowhead is flat, tanged, and elongated-triangular (Fig. 3, *13*). Judging by the West Siberian archaeological materials, such arrowheads were used starting from the late 1st millennium AD till the ethnographically modern period (Soloviev, 1987: Pl. III, *24*, *25*). This arrowhead was found in fireplace VI. The third arrowhead is flat, tanged, with two barbs and without a stopper (Fig. 3, *12*). It is similar to the arrowheads of type 29, which were used between the 1st century BC and the 14th century AD (Medvedev, 1966: 44, pl. 18, *10*). It was found in fireplace VI. The fourth arrowhead is wedge-shaped, with a flat tang (Fig. 3, *11*). Its blades are convex, the shoulders concave, smoothly turning into the tang; low crests are visible on both surfaces of the arrowhead. This arrowhead was found in fireplace III.

Tools. The first tool is an abrader or a stone (schist) burnisher (Fig. 3, *18*). It was found in humic spot 5. The second tool is a trapezoidal bone "spatula" with an arch-shaped top and a straight base (Fig. 3, *17*). Its flat surface is ground; the opposing long sides show cut scars. The piece was found in humic spot 13.

Adornments. The first adornment is a glazed faience (?) bead, ribbed-rounded, turquoise blue, trapezoidal in cross-section (Fig. 3, *1*). It shows parallels with similar adornments from the northern Black Sea region (Alekseeva, 1975: Pl. 5, *30*). Similar beads made of Egyptian faience belong to type 16d; these were found mostly in the burials of the 1st–2nd centuries AD, with some pieces belonging to the 1st century BC, and to the 3rd–4th centuries AD (Ibid.: 34). A similar bead found in the Bichevnik I settlement in the Middle Pechora was attributed to the artifact set of the first half to the middle of the 1st millenium AD (Turkina, 2015: 83, fig. 5, *6*). The bead was found in square H/26. The second adornment is a yellowish glass bead fragment (Fig. 3, *2*), found in fireplace VIII. The third is a fragment of a yellow glass bead (Fig. 3, *3*), found in fireplace IV. The fourth and fifth are two small, bi-trapezoidal bronze beads (Fig. 3, *4*, *5*), found in fireplace IV. The sixth piece in this set is a fragment of a tubular bead (Fig. 3, *6*); remains of the "ears" and concentric decoration in the form of two relief bands are visible on its exterior surface. The item was found in fireplace VIII. The seventh adornment is a bronze pendant (Fig. 3, *7*). Its base is round, openwork, in the form of several wire rings soldered one into another, with a soldered hanging loop at the top. The piece was found in square M/15.

Ritual items. The first one is a bronze zoomorphic ritual item (Fig. 3, *8*). It is an unfinished cast with a short sprue at its base. It was found in humic spot 5. Similar items have been reported from ritual features in the Kheibidya-Pedar sanctuary (Murygin, 1992: Fig. 14; 15, *16–22*) and the sanctuaries of Bolvanski Nos I (Khlobystin, 1993: Fig. 1, *32*) and Sirtya-Sale (Khlobystin, 1991: 31–32, fig. 10, 11, 13; Baryshev, 2011: Fig. 42, *4–7*). The second item is an amulet (?) of a bear canine tooth (Fig. 3, *16*). It shows signs of treatment and a few notches. The item was found in square C/27. The culture-bearing layer also yielded 48 indefinable iron fragments, 5 drops of non-ferrous metal, a stone tablet with use-wear signs, two bone fragments with use-wear signs, and 21 pieces of slag.

Among surface artifacts from the disturbed fireplace I (see Fig. 2), there were an iron awl (see Fig. 3, *15*) and a defective (?) cast or a blank of a thick bronze arrowhead with a non-projecting, interior socket, blades, and a small hole close to the pointed tip (see Fig. 3, *14*). The last-named item is comparable to bronze arrowheads of type XIII, which were used by the Sarmatian tribes of the Volga and Cis-Ural regions in the 4th to 2nd centuries BC (Ivanov, 1984: 7–9, fig. 2, *23*, *24*, *26*, *27*). Surface artifacts from the disturbed fireplace IX (see Fig. 2) contain a fragment of a bronze three-bladed arrowhead (see Fig. 3, *10*).

Fig. 3. Artifacts from More-Yu II.
1–5 – beads; *6* – tubular bead; *7* – pendant; *8* – cult item; *9–14* – arrowheads; *15* – awl; *16* – animal's canine tooth (amulet?); *17* – "spatula"; *18* – burnisher (?); *19–33* – vessel fragments: *19* – group VII, *20* – I, *21–28* – II, *29–33* – III. *1–3* – glass; *4–8*, *10*, *14* – bronze; *9*, *11–13*, *15* – iron; *16*, *17* – bone; *18* – stone; *19–33* – ceramics.

Ceramics. The total collection of ceramic fragments includes 10,272 specimens. On the basis of the ornamented fragments, not less than 126 vessels were identified* (Fig. 3, *19–33*; 4). The potsherds were classified into seven formal-typological groups by their features of ornamental motifs, the locations of ornaments in the upper parts of the bodies of vessels, and the peculiarities of vessels' shapes. In terms of planigraphy, none of the groups stands out in the excavation area.

Group I (2 spec., see Fig. 3, *20*). Vessels show ornaments only on the rims. ***Group II*** (10 spec.; see Fig. 3, *21–28*). Outer surfaces of vessel-bodies do not show pits as ornamental elements. ***Group III*** (5 spec.; see Fig. 3, *29–33*). The special feature of ornamentation is the presence of pits inside vessels. ***Group IV*** (4 spec.; Fig. 4, *1*, *2*). Vessels are decorated only on the outside, with horizontal lines of pits at the base of the neck. ***Group V*** (81 spec.). Vessels are subdivided into two varieties on the basis of the location of ornament. *Variety V.1* (Fig. 4, *3–6*). Ornament is located only on the neck, above the line of pits, under the rim. *Variety V.2* (Fig. 4, *7–23*, *26–33*). Ornament is located on the shoulders and necks of vessels. ***Group VI*** (7 spec.; Fig. 4, *24*, *25*). The vessels differ from those of Group V in the form of their upper portion (evenly thick, and a straight or everted neck), while their elements and patterns of ornament are similar. ***Group VII*** is represented by only one vessel with a characteristic protrusion on the rim (see Fig. 3, *19*).

Quite few vessels were reconstructed (fully or partially). These include closed bowls with narrowed mouths and without necks; a bowl-shaped vessel with a narrowed mouth, a nearly globe-shaped body, and a short, evenly thick and everted neck; and semi-ovoid vessels with pointed bottoms and thickened necks. The ceramic collection is dominated by fragments illustrating the shape of the upper portions of the vessels. The vessels with thickened necks prevail (58.2 %). Vessels with another shape of the upper part are rare: without neck – 19.1 % (or and straight-walled bowls); with everted necks – 14.5 %; with straight or inclined necks – 8.2 %. Rim diameters were established in 50 vessels: 8–10 cm – 3 spec., 12–18 cm – 10 spec., 20–29 cm – 16 spec., and 30–40 cm – 21 spec. All the vessels are hand-made. The clay is dominated by admixture of grus with varying grain-size. One vessel was made of clay with an admixture of grog (?) (see Fig. 4, *3*). No less than 36 vessels show traces of smoothing through combing on the interior and/or exterior surfaces; soot deposits were noted on 22 vessels.

Vessel rims are as follows: rounded (43 spec., 39.1 %); flattened, beveled inside (48 spec., 43.6 %) and beveled outside (2 spec., 1.8 %); horizontally cut (9 spec.; 8.2 %); and flattened and rounded (8 spec.; 7.3 %). Ornaments were made with a cogged stamp (82.7 %), oblique or upright (12.7 %) stamp; or in the form of chevron or arch (70.0 %). The rims were often decorated with deep incisions, resulting in a "serrated" surface; the incisions invaded the interior or exterior neck surfaces close to the edge. Finger impressions were noted on 17.3 % of all the ceramics.

Closed bowls with unprofiled edges and bowl-shaped vessels with profiled edges of group V are most numerous in the collection (73.6 %, see Fig. 4, *3–23*, *26–33*). The main features of these vessels are: 1) thickened, straight, or slightly folded inward, short neck; 2) mineral admixture in the clay; 3) deep pits at the neck base on the outside; 4) horizontal cannelures; 5) cogged stamp imprints; 6) the ornamentation zone is located on the upper part of vessel; the richly decorated specimens show dense concentrations of various motifs; 7) over- and under-framing of the ornamentation zone with zig-zag motifs; multi-zone ornamentation of neck with various motifs; location of motifs between and inside cannelures; 8) ornament patterns include combinations of deep pits, grooves-cannelures, cogged stamp imprints (including two-cogged oval and straight); along with lines of vertical and oblique imprints and zigzag, there are horizontal imprints and zigzag with one doubled side and with prominent ends, resembling horizontal S- and Z-shaped motifs; 9) pit-comb-cannelure ornamentation style.

Vessels of groups V and VI (6.4 %; see Fig. 4, *24*, *25*) share certain characteristic features; the two groups make 80 % of the total number of ceramics, and determine the ethnic-cultural specificity of the site. It does not seem to be a great mistake to attribute also vessels of groups I, II, and IV (see Fig. 3, *20–28*; 4, *1*, *2*) to this definitive collection.

Discussion of the materials

Analysis of the archaeological materials of the 1st millennium AD from the tundra zone of the Pechora basin in Cis-Urals attests to their cultural homogeneity within the framework of the high-latitude archaeological culture of the *Subarctic type* (Murygin, 1992). The area of this culture distribution is bounded by the Subarctic Pechora zone in the west and the Yamal tundra in the east, where the late types of ceramics show a certain similarity with the Tiutei-Sale pottery.

On the basis of the More-Yu II materials, the *More-Yu cultural type* was identified as a stage of the Subarctic Iron Age culture; the time of this stage was initially attributed to the mid-1st millennium AD, and subsequently to the late 4th to 6th centuries AD (Murygin, 1992: 163; 1997: Fig. 18). The results of the radiocarbon dating of bone-

*The total of 110 specimens with the best-preserved ornamented zones have been recorded.

Fig. 4. Vessel-fragments from More-Yu II.
1, *2* – group IV; *3–23*, *26–33* – V; *24*, *25* – VI.

Radiocarbon dates obtained from reindeer bones from More-Yu II (studies of 1987–1988 and 1991)

Sample No.	Lab code	^{14}C-date, yrs BP	Calendar date	
			± 1σ (68.2 %)	± 2σ (95.4 %)
1	SPb-1059	1950 ± 50	18 (1.2%) – 15 cal BC 1 (56.7 %) – 90 cal AD 100 (10.2%) – 123 cal AD	54 cal BC (94.2 %) – 172 cal AD 193 (1.2 %) – 210 cal AD
2	SPb-1447	2227 ± 75	381 (16.1%) – 341 cal BC 328 (52.1 %) – 204 cal BC	408 (94.3 %) – 89 cal BC 75 (1.1%) – 58 cal BC
3	SPb-2804	1240 ± 25	690 (47.0 %) – 749 cal AD 761 (12.4 %) – 777 cal AD 793 (4.5 %) – 802 cal AD 845 (4.4 %) – 855 cal AD	685 (65.5 %) – 780 cal AD 788 (29.9 %) – 875 cal AD
4	SPb-2805	2012 ± 35	48 cal BC (65.7 %) – cal AD 43 (2.5 %) – 47 cal AD	109 cal BC (95.4 %) – 70 cal AD
5	SPb-2806	2447 ± 35	743 (20.9 %) – 687 cal BC 665 (7.0 %) – 645 cal BC 551 (40.3 %) – 429 cal BC	755 (24.9 %) – 680 cal BC 671 (15.3 %) – 607 cal BC 597 (55.2 %) – 409 cal BC
6	SPb-2807	2667 ± 40	891 (7.5 %) – 880 cal BC 845 (60.7 %) – 799 cal BC	901 (95.4 %) – 795 cal BC
7	SPb-2808	9257 ± 100	8606 (68.2 %) – 8343 cal BC	8735 (95.4 %) – 8286 cal BC

remains made it possible to reconsider the age of the site*. Seven age intervals were obtained (see *Table*).

The dates generated on samples 1, 2, 4, and 5 do not allow us to determine correctly the chronology of the formation of the culture-bearing layer. However, these dates provide grounds to attribute the More-Yu II site to the early Iron Age. The period of the site's existence was determined by extreme age assessments (by ± 2σ) as the 6th century BC to the 2nd century AD. Given such a long chronological interval, it can be assumed that the site was inhabited recurrently. The set of non-ceramic artifacts, whose common lower chronological boundary dates back to the range from the late 1st millennium BC to the turn of the eras (early 1st millennium AD), does not contradict the chronological attribution proposed above.

It does not seem possible to explain the discrepancies between the radiocarbon dates of samples 3, 6, and 7 and the abovementioned dates. These dates are not applicable to the site's age assessment primarily because they do not conform to the available archaeological materials. The typological homogeneity of the majority of the recovered ceramics could hardly remain intact throughout many centuries, beginning with the 10th to 8th centuries BC (sample 6) till the 7th to 8th centuries AD (sample 3), as well as the Early Mesolithic period (sample 7).

No direct parallels to the More-Yu ceramic complex have been reported from areas beyond the tundra region in the northeastern Europe. We believe that according to such features as the mineral admixture in the paste, the thickened edge, and the pit-comb-cannelure ornamentation style, the More-Yu complex shows similarity to the pottery from the Bolshezemelskaya tundra sites dating to the second half of the 1st millennium AD to the early 2nd millennium AD (for example, Khutiyunkose and Komatyvis (Murygin, 1992)), and from some sites on the Yamal Peninsula (Brusnitsyna, Oshepkov, 2000: Pl. I, fig. 30, *1*, *2*; 31, *2*, *3*; Zeleny Yar…, 2005; Lashuk, 1968: Fig. 2; Morozov, 2003; Plekhanov, 2013: 158–160, fig. 2; "Ushedshie v kholmy…", 1998: 36–37, fig. 20; Chernetsov, 1935: Pl. II, *1–21*; 1953: Fig. 6; 1957: Pl. XXV). The parallels in the vessels' shapes and ornamentation patterns were noted with the early pottery from the Northern Cis-Urals, as well as the medieval pit-comb-fluted ceramics from the Lower Ob and the Polui River (the settlement of Ust-Vasyegan-1; archaeological sites cluster at Zeleny Yar) (Zeleny Yar…, 2005; Chikunova, 2017: 155, fig. 1); approximately 250 km up the Ob from the abovementioned sites (the settlement of Peregrebnoye-4) (Morozov, 2003), and others. Absolute parallels to the Late Bolshezemelskaya and Yamal (Tiutei-Sale type) ceramics have been reported from the vast region reaching the western coast of the Gyda Peninsula (Skochina, Enshin, 2017: 41, fig. 1, *2*). Even given the incompleteness and insufficient equivalence of the pottery from the Ob-Yamal archaeological cultures, it could hardly be denied that the set of main features of the *More-Yu type* ceramics beyond the northeasternmost

*The analysis was executed in the Isotope Center of the Herzen State Pedagogical University of Russia in St. Petersburg.

European tundra zone is represented only in the pottery from the West Siberian sites of the Iron Age, and the cannelure feature is noted in even earlier complexes*.

Notably, cannelures, as one of the most significant features in the ornamentation of Belshezemelskaya ceramics, were recorded in the Early Iron Age cultures of the northwestern Russia: Late Beloye More, Late Kargopol, and Luukonsaari. The Karelian archaeologists regard cannelures exclusively as a chronological feature marking links with the Glyadenovo antiques of the Pechora-Vychegda region (Zhulnikov, 2005: 38).

The homogenous ceramic complex of More-Yu II contains vessels that most likely originated in Trans-Urals. These include vessels of group III, with pits on the interior surface close to the rim (punched nodes) (see Fig. 3, *29–33*). Pottery of this type is scarce in collections from the Iron Age sites in the Pechora and Vychegda taiga zone, and in the northeasternmost tundra zone of Europe. Such an ornamental pattern, widespread in the West Siberian cultures, can be regarded as a borrowed feature of the Trans-Urals tradition in the ceramics of the Pechora basin in Cis-Urals. The vessel with protrusions ("ears") on the rim (group VII; see Fig. 3, *19*) is atypical for More-Yu II, and in general for the Iron Age of the northeastern Europe. Similar vessels were found in the damaged tundra sites of Korotaikha 268/59, Korotaikha 292/82, Padimei-vis 227/18, and Padimei-vis 240/31 (Chernov, 1985: Pl. 16, *13*, 14). In the taiga zone, these are represented in the Ananyino complex at the site of Shoinaty II (Korolev, 1997: Fig. 18, *13*) and in burial 1 of the Early Anayino Period (the 8th to 7th centuries BC) at the same site (Korolev, 2002: 35, 36, fig. 34, *7*). The artifacts collected by V.I. Kanivets in 1967 included a pot-shaped ceramic vessel with a ring-shaped handle at the rim, with three button-like protrusions (Murygin, 1992: Fig. 48, *1*). A miniature bronze imitation of a cone-shaped cauldron with trihedral handles and a marked tray was found at the Kheibidya-Pedar sanctuary (Ibid.: Fig. 21, *42*). It cannot be ruled out that these items were imitations of the metal cauldrons of nomadic tribes of the Eurasian steppes of the Scythian-Sarmatian Period. These can be regarded as the evidence of penetration of features of the southern cultures into the Subarctic European zone.

The aging of the More-Yu finds and, consequently, of the *More-Yu cultural type* in general, affects various issues relating to the Iron Age archaeology of the northeastern Europe, and possibly also contiguous regions. It seems reasonable to touch upon the concept of the formation of certain cultural types in the southern regions of the Pechora basin (Murygin, 1992).

At the turn of the Iron Age and the Middle Ages, in the areas of the boreal belt in the northeastern Europe, new cultural types were formed owing to the active contacts between the local populations and the newcomers (Murygin, 2013). The changes occurring in the northeastern periphery of the Glyadenovo cultural area (Pechora basin) were indicated by the formation, by the mid-1st millennium AD, of the *Bichevnik cultural type* on the basis of the Pidzh culture (one of the cultures belonging to the Glyadenovo cultural community). One of the authors believes that population groups from the Bolshezemelskaya tundra also participated in the initial stage of development of the Bichevnik cultural type (Murygin, 1992). The tundra tribes migrated to the regions southwards from the Arctic Circle because of the climate's cooling during the Subboreal to Subatlantic transition period.

Critical to the understanding of this phase of the Iron Age in the northeastern Europe is that the infiltration of foreign population into the area of the Glyadenovo culture in the Pechora basin (and possibly Vychegda basin) was a long-term process (probably starting from the last quarter of the 1st millennium BC), taking place only in one, albeit declining, forest zone landscape. The Glyadenovo ceramics with cannelures occurred in Pechora sites as early as in the late 3rd to 2nd centuries BC [Vaskul, 1997: 379], which time can be regarded as the start of the migration-process.

The proposed cultural-historical pattern and its substantiation have one weak point. The Arctic component of the Bichevnik cultural type should be older than the type itself. This was not consistent with the original date, according to which the Arctic component was roughly synchronous with the Bichevnik relics. The results of radiocarbon analysis of the cultural remains have eliminated this contradiction and supported the proposed pattern of culture genesis of the Bichevnik population in the Pechora taiga area.

Conclusions

More-Yu II is currently the earliest and most thoroughly studied archaeological one-layer site attributed to the aboriginal culture of the Subarctic type of the Iron Age in the northeasternmost part of European Russia. The ^{14}C-dating results attribute the site to the Early Iron Age. Earlier, no reliable evidence on the existence of local population settlements in the European tundra belt during that period of time had been available. Study of the archaezoological assemblage* showed that the subsistence strategy of the inhabitants of More-Yu II was

*The issue of the origin of the fluted ornamentation in the West Siberian ceramics is still debatable; see, e.g., (Zykov, 2012: 55–58).

*Archaezoological collection is kept on the Museum of the IPAE UB RAS.

reindeer (*Rangifer tarandus*) hunting. In the assemblage of mammal bones, the species was identified for 3496 bones (67.6 % of the total number), among which 97.0 % were reindeer bones. Of the total of 142 identified mammal individuals, 132 were defined as reindeer. The majority of individuals were mature when butchered—older than 5 years of age (77 %). The time of butchering can be determined roughly. The hunting season was identified only for three individuals: it lasted from late fall to early spring. Because no bird remains were found at the site, but there are some fur-bearing animal bones—sable (*Martes zibellina*) and Polar fox (*Alopex lagopus*)—it can be suggested that the animal bone assemblages were accumulated in winter. The site was apparently a seasonal camp for reindeer hunters, used mostly during winter time.

Study of the archaeological sources allowed us to identify the Early Iron Age materials in the medieval Bolshezemelskaya tundra ceramic complexes, including the ceramic-types of *More-Yu*, *Khutiyunkose*, and *Komatyvis* (Murygin, 1992). Such Early Iron Age materials represent the Arctic component of the *Bichevnik cultural type*. These people of the Subarctic zone, thanks to centuries-long infiltration southwards from the North Circle, had dramatically changed by the mid-1st millennium AD the traditional pottery produced by the Finno-Permic (Glyadenovo) population of the taiga part of the Pechora basin.

Gradual out-migration of part of the Arctic population to the more southern areas of the Pechora basin was due to deterioration of climatic conditions in northeastern Europe during the early Subatlantic period. Notably, such climatic changes have a strong negative impact on subsistence strategies in the Arctic zone, and cause an increase in migration mobility of living beings as a form of adaptation to environmental variability (Krupnik, 1989). According to the results of palynological analysis, the period of formation of anthropogenic finds, coinciding with the early stage (zone SA-1) of the Subatlantic period, was characterized by the unstable temperature regime. Spore and pollen assemblages, based on the palynological data, identified in the culture-bearing soil horizon, show both relatively warm and humid conditions, and climate deterioration at and around the site.

These data are consistent with the known scheme of the zonal division of the Holocene in the northeastern part of European Russia. Within the boundaries of the Subatlantic period, the time of use of the More-Yu II site almost corresponds to the Early Subatlantic, which accounts for the continuing deterioration of the climate. Among other consequences, there was a shift of landscape zones in the meridional direction, and expansion of the tundra zone with the shift of the forest boundary by 150 km southwards from the modern one (Nikiforova, 1982: 156, 160). This basic position is supported in more recent works on paleoclimatology. The publications by L.V. Filimonova and V.A. Klimanov (2005), and A.G. Isachenko (2013) justified the provision that at the early stage (zone SA-1, 2500–1800 BP), the Subatlantic climatic conditions were more severe than was previously believed (Nikiforova, 1982). Throughout its duration, the temperature regime changed several times. The Early Subatlantic began with strong cooling circa 2500 BP, which fact has been recorded all over the territory of Russia. Then, there were two warm periods (about 2300 and 2000 BP), separated by a period of cooling with a peak around 2200–2100 BP.

The genesis of the Iron Age Bolshezemelskaya ceramics of the Subarctic type is not clear. Cultures of the Late Bronze to Early Iron Ages of the Subarctic Pechora area, representing the local basis of subsequent cultural formations in this territory, were not reflected in the archaeological sources, nor were their materials identified in the available collections. The issue of the development of the cannelure ceramic complex in the Subarctic European area is still debatable: this was either due to large-scale changes in the Ob Basin in the 1st millennium BC to early 1st millennium AD, or to the convergent development in line with indigenous traditions.

Any reliable evidence on the direct correlation of the circumpolar Subarctic Cis-Urals culture with any of the Trans-Urals Iron Age cultures has not been established so far. However, the noted typological affinity of the Ob-Yamal pottery to the ceramics of Bolshezemelskaya tundra makes it possible to outline roughly the eastern and western boundaries of the dispersal area of similar traditions of ornamentation. We suggest that during the range from the second stage of the Early Iron Age to the turn of 1st to 2nd millennium AD, a vast territory of Subarctic and Arctic regions of the Lower Ob, Yamal, and Bolshezemelskaya tundra was populated by closely related tribes. Among them, the North European group had common origin and traditions with the West-Siberian (Ancient Ugrian, Ancient Samoyedic, and Ugric-Samoyedic) ethno-cultural area.

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References

Alekseeva E.M. 1975
Antichniye busy Severnogo Prichernomorya. Moscow: Nauka. (SAI; iss. G1-12).

Baryshev I.B. 2011
Yazycheskiye svyatilishcha ostrova Vaigach. Moscow: Institut Naslediya.

Brusnitsyna A.G., Oschepkov K.A. 2000
Pamyatniki arkheologii Srednego Yamala (levoberezhye nizhnego techeniya r. Yuribey). In *Drevnosti Yamala*, iss. 1. Yekaterinburg, Salekhard: UrO RAN, pp. 79–111.

Chernetsov V.N. 1935
Drevnyaya primorskaya kultura na poluostrove Yamal. *Sovetskaya etnographiya*, No. 4/5: 109–133.

Chernetsov V.N. 1953
Drevnyaya istoriya Nizhnego Priobya. In *Drevnyaya istoriya Nizhnego Priobya*. Moscow: Nauka, pp. 7–71. (MIA; No. 35).

Chernetsov V.N. 1957
Nizhneye Priobye v I tysacheletii n.e. In *Kultura drevnikh plemen Priuralya i Zapadnoy Sibiri*. Moscow: Nauka, pp. 136–245. (MIA; No. 58).

Chernov G.A. 1985
Atlas arkheologicheskikh pamyatnikov Bolshezemelskoy tundry. Moscow: Nauka.

Chikunova I.Y. 2017
Srednevekoviy keramicheskiy kompleks gorodishcha Ust-Vasiyogan 1 (2013–2015 gg.). In *I Mezhdunar. konf. "Arkheologiya Arktiki" (19–22 noyabrya, Salekhard): Tezisy dokl*. Yekaterinburg: pp. 155–158.

Edovin A.G. 2007
Otchet o razvedke arkheologicheskogo otryada AOKM na territorii Arkhangelskoy oblasti i Nenetskogo avtonomnogo okruga v 2007 g. Arkhiv AOKM. F. 3, Inv. 1.

Filimonova L.V., Klimanov V.A. 2005
Izmeneniye kolichestvennykh pokazateley paleoklimata v srednetayezhnoy podzone Karelii za posledniye 11 000 let. In *Trudy Karel. nauch. tsentra RAN*, iss. 8. Petrozavodsk: pp. 112–120.

Isachenko A.G. 2013
Paleogeograficheskiye i etnoistoricheskiye predposylki istoricheskoy geografii oblasti poslednego oledeneniya Russkoy ravniny. St. Petersburg: Nauka, pp. 1–17. (Izv. RGO; vol. 145, iss. 3).

Ivanov V.A. 1984
Vooruzheniye i voyennoye delo finno-ugrov Priuralya v epokhu rannego zheleza (I tys. do n.e. – pervaya polovina I tys. n.e.). Moscow: Nauka.

Kanivets V.I. 1967
Otchet o rabote I Pechorskogo arkheologicheskogo otryada v 1967 g. Arkhiv Komi NTs UrO RAN. F. 1, Inv. 13, D. 161, 162.

Khlobystin L.P. 1991
Kultoviye pamyatniki ostrova Vaigach. In *Pamyatniki Arkhangelskogo Severa*. Arkhangelsk: Severo-Zapad. kn. izd., pp. 23–38.

Khlobystin L.P. 1993
Svyatilishcha Vaigacha. In *AD POLUS: Arkheologicheskiye izyskaniya*, iss. 10. St. Petersburg: Farn, pp. 15–18.

Korolev K.S. 1997
Naseleniye sredney Vychegdy v drevnosti i srednevekovye. Yekaterinburg: UrO RAN.

Korolev K.S. 2002
Ugdymskiy arkheologicheskiy kompleks na sredney Vychegde (epokha zheleza). Syktyvkar: Izd. Komi NTs UrO RAN.

Krupnik I.I. 1989
Arkticheskaya etnoekologiya. Moscow: Nauka.

Lashuk L.P. 1968
Sirtya – drevniye obitateli subarktiki. In *Problemy antropologii i istoricheskoy etnografii Azii*. Moscow: Nauka, pp. 178–193.

Medvedev A.F. 1966
Ruchnoye metatelnoye oruzhiye (luk i strely, samostrel) VIII–XIV vv. Moscow: Nauka. (SAI; iss. E1-36).

Morozov V.M. 2003
O dvukh keramicheskikh kompleksakh Nizhnego Priobya, 2003. *Arkheologiya Yamala*. GKU YANAO "Tsentr izucheniya Arktiki". URL: http://yamalarchaeology.ru/index.php/texts/archeol/98-morozov-v-m-2003 (Accessed December 6, 2018).

Murygin A.M. 1990
Poseleniye More-yu v Bolshezemelskoy tundre. *KSIA*, No. 200: 60–66.

Murygin A.M. 1992
Pechorskoye Priuralye: Epokha srednevekovya. Moscow: Nauka.

Murygin A.M. 1997
Pamyatniki pozdnego zheleznogo veka lesnoy i tundrovoy polosy Pechorskogo Priuralya. In *Arkheologia Respubliki Komi*. Moscow: DiK, pp. 478–560.

Murygin A.M. 2013
Migratsii kak sposob vzaimodeistviya naseleniya krainego severo-vostoka yevropeiskoy chasti Rossii v rannem srednevekovye. *Vestnik Tomskogo gosudarstvennogo universiteta.* Istoriya, No. 3 (23): 254–258.

Nikiforova L.D. 1982
Dinamika landshaftnykh zon golotsena severo-vostoka Yevropeiskoy chasti SSSR. In *Razvitiye prirody territorii SSSR v pozdnem pleistotsene i golotsene*. Moscow: Nauka, pp. 154–162.

Plekhanov A.V. 2013
Yamalskaya Arktika v epokhu srednevekovya: Pamyatniki v zone tipichnoy tundry. In *Arkheologia Severa Rossii ot epokhi zheleza do Rossiyskoy imperii: Materialy Vseros. nauch. arkheol. konf. (Surgut, 1–4 okt. 2013 g.)*. Yekaterinburg, Surgut: pp. 157–165.

Skochina S.N., Enshin D.N. 2017
Arkheologicheskiye issledovaniya na severo-zapadnom poberezhye Gydanskogo p-ova. In *I Mezhdunar. konf. "Arkheologiya Arktiki" (19–22 noyabrya, Salekhard): Tezisy dokl*. Yekaterinburg: pp. 40–43.

Soloviev A.I. 1987
Voyennoye delo korennogo naseleniya Zapadnoy Sibiri: Epokha srednevekovya. Novosibirsk: Nauka.

Turkina T.Y. 2015
Poseleniye Bichevnik I na sredney Pechore. Pervobytniye i srednevekoviye drevnosti Yevropeiskogo Severo-Vostoka.

Syktyvkar: IYALI Komi NTs UrO RAN, pp. 80–88. (MAESV; iss. 19).

"Ushedshie v kholmy". 1998

Kultura naseleniya poberezhiy Severo-Zapadnogo Yamala v zheleznom veke. *Arkheologiya Yamala*. GKU YANAO "Tsentr izucheniya Arktiki". URL: http://www.yamalarchaeology.ru/index.php/texts/archeol/100-ushedshie-v-kholmy-1998 (Accessed December 6, 2018).

Vaskul I.O. 1997

Pamyatniki glyadenovskoy kulturnoy obshchnosti. In *Arkheologiya Respubliki Komi*. Moscow: DiK, pp. 349–399.

Zeleny Yar: Arkheologicheskiy kompleks epokhi srednevekovya v Severnom Priobye. 2005

N.V. Fedorova (ed.). Yekaterinburg, Salekhard: UrO RAN.

Zhulnikov A.M. 2005

Poseleniya epokhi rannego metalla Yugo-Zapadnogo Pribelomorya. Petrozavodsk: Paritet.

Zykov A.P. 2012

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

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The Bear Cult and Kurgans of the Scythian Elite

This study, based on artifacts from high-ranking kurgans of the northern Black Sea region (700–300 BC), addresses the understudied ursine motif in Scythian culture and its relevance for the ancient inhabitants of this region and of the adjacent territories. It is a widely held view that images of the brown bear had been borrowed from the Ananyino culture of the Kama. A variation of this motif is described and its chronology is assessed. Two principal iconographic versions are known in Scythian art—the animal is shown either en face (in the so-called sacrificial position), or drinking (in profile, with a bowed head). Such ursine representations occur most often on gold-plated ritual bowls and ornaments of the horse harness. Both the chronology and the distribution range of these artifacts disagree with the idea that the bear motif was borrowed from forest cultures. Rather, it appears to be inherently Scythian, having originated around 700 BC, together with other images of the animal style. Apparently, some form of the bear cult was practiced by the Scythian elite.

Keywords: *Cult, bear, kurgan, Scythia, image, motif, worship.*

Introduction: Research history

Scythian culture and art (in the "animal style") have always been at the center of Russian scholarly attention. Notably, as early as December 1972, the All-Union Conference on Scythian-Sarmatian Archaeology was organized in Moscow, devoted exclusively to a single but very important topic—the Scytho-Siberian animal style. Leading Soviet experts in Scytho-Sarmatian art exchanged their often differing views on this vast and complex topic. The conference resulted in the publication of a very important book, "The Scytho-Siberian Animal Style in the Art of the Peoples of Eurasia" (Skifo-sibirskiy zverinyi stil…, 1976). This topic has not lost any of its relevance, even today. In addition to numerous articles, several monographs on the specific aspects of Scytho-Siberian art have been published (Perevodchikova, 1994; Korolkova, 2006; Cheremisin, 2008; and others). Nevertheless, this extremely extensive and multifaceted problem is still far from being fully understood.

One of the images occurring in the Scytho-Siberian art is the topic of this study. This is the bear motif in the steppe and forest-steppe Scythia, very rarely mentioned in the studies on the Scythian animal style. Since the 1950s–1980s, a deep conviction has been formed among the Soviet specialists of Scythian studies that this motif had practically nothing to do with Scythia. Quite rare representations of a bear, which were found in some Scythian burials (mostly in the Dnieper-Don forest-steppe region) were either simply ignored or unconditionally attributed to the influence of the Ananyino culture of the Kama region and other cultures of the Urals and Siberia.

What were these views based on? It seems three important circumstances played a role here: first, the universal conviction (of the people of the 20th century) that bears, strong and dangerous predators, lived and still live until this day mainly in taiga, in the remote forest areas, which are prevalent in the northern Urals and Siberia; second, the distribution of the bear cult (or

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"Bear Festival"), which is well known from the works of ethnographers among the indigenous peoples of the northern forest territories of Russia; and third, almost complete (until recently) lack of any information on any "ursine" theme in the archaeology of the steppe and forest-steppe Scythia.

We should start with the habitation area of bears in the past—in both ancient and medieval times—as well as in present. This is brief information from an encyclopedia: "Once the brown bear was common throughout Europe, including England and Ireland; in the south its habitation area reached Northwestern Africa (the Atlas Mountains), and in the east it reached Japan through Siberia and China. Brown bears had probably reached Northern America about 40,000 years ago from Asia through the Bering Strait, and over time widely inhabited the western part of the continent, from Alaska to the north of Mexico. At present, brown bears have been exterminated in most of their previous areas of habitation" (Ivanov, Toporov, 1982: 128–129).

However, we are primarily interested in the steppe and forest-steppe areas of the northern Black Sea region. Could brown bears inhabit, for example, the Black Sea coastal steppe? It is known, judging by the current paleogeographical studies, that in the Early Iron Age, forest vegetation reached the Black Sea and the Sea of Azov coasts along the valleys of large rivers like the Don, Dnieper, Southern Bug, Dnestr, as well as small rivers, even in the purely steppe zone of the northern Black Sea region. It is enough to recall the deep forests of Hylaia in the mouth of the Dnieper-Borysthenes, described by Herodotus. What is there to say about extensive broadleaved forests of the Dnieper-Don forest-steppe, where until recently giant oaks with trunks of over one meter in diameter used to grow!*. Naturally, all sorts of animals were abundant there (wild boars, deer, fallow deer, etc.), including bears. For example, bears were seen in the immediate vicinity of Voronezh as late as the late 18th century (Rossiya…, 1902: 76).

Biologist V.S. Baigusheva, who constantly worked with archaeologists in the Lower Don region, notes that bear bones were found even at such steppe sites as Sarkel and Azak. "Floodplain and creek forests in the lower reaches of the Don do not exclude the presence of bears, especially since these omnivorous beasts had something to eat in this area" (Baigusheva, 2006: 348). This is also confirmed by the zoologist V.G. Geptner: "The bears undoubtedly lived in the shrubs of the South Russian river valleys… and in the steppe creeks and reeds of this area. In the lower reaches of the Don River, these animals were still found in the 8th–12th centuries. <…> Ecologically, bears are very flexible and could have inhabited not only areas with very meager vegetation, as in Kazakhstan, but also shrubbery and bushes along river valleys, and even the steppe" (Mlekopitayushchiye…, 1972: 256). Judging by the available data, bears once lived not only in Eastern, but also in Central and Southern Europe. For instance, an advanced bear cult existed in antiquity at the southernmost tip of the European continent—in Greece, where bears were closely associated with goddess Artemis. Every year, splendid feasts were celebrated in her honor, where this animal was offered as a sacrifice. A tame bear was constantly kept in the temple of Artemis. On especially solemn occasions, priestesses of this goddess dressed in clothes made of bear skins. The name Artemis itself is derived from the Ancient Greek word "bear" (Sokolova, 2000: 129). There is still a cult of the bear among the Ossetians who live in the Caucasus Mountains and are the direct descendants of the Scythians (Chibirev, 2008: 167).

Thus, at least in ages past, the "bears–north–taiga" association needs to be seriously adjusted. Formerly, this formidable predator inhabited the whole of Eurasia, which was reflected in the folklore and religious beliefs of many tribes and peoples of the past (Ivanov, Toporov, 1982). Therefore, it is difficult to imagine that the people who lived in Eastern Europe (the northern Black Sea region) in the first millennium BC and who often (willingly or unwillingly) encountered this largest and most dangerous predator in Europe, would not reflect the image of bear in their beliefs, rituals, and art.

The quantity of facts associated with our theme has also significantly expanded today: new archaeological finds have been made relating to the bear cult in Scythian kurgans on the Middle and Lower Don River, as well as steppe and forest-steppe regions of the Dnieper River. In order to successfully address this issue within Scythia, it is necessary to establish major types in the bear motif of Scytho-Siberian art, to identify a chronological framework of their existence, and to calculate the number of corresponding items for each area of their distribution.

The bear motif in the Scythian antiquities

In the Scythian burial complexes, the earliest image of the bear in its full form was first found in the Kelermes kurgan 4 of the second half of the 7th century BC (Fig. 1). This is a silver gilded mirror of the Greek-Eastern (Ionian) production, in which a figure of a walking bear clearly stands out among representations of various gods, people, and animals. The central part of the composition shows the winged goddess Cybele with panthers in her hands, whose functions strongly resembled the Scythian Argimpas—the goddess of fertility of the animal and

*According to biology, acorns of oak forests constitute (and constituted earlier) a significant part of the vegetable diet of brown bears.

human worlds. According to specialists, in this case the Greek artisan was guided by the requests of a Scythian customer (Alekseev, 2012: 108). However, this is the Northern Caucasus, the archaic stage of the Scythian culture, and the product of foreign, not Scythian jewelers. Later, the main center of Scythia shifted to the northern Black Sea region.

In the Scythian steppe, the bear motif was recorded in the kurgan of Chabantsova Mogila of the 5th century BC, near the town of Ordzhonikidze, in Dnepropetrovsk Region of the Ukraine. In the central tomb (almost completely looted), animal bones (remains of sacrificial food), fragments of iron lamellar armor, a bone handle of a knife, a bronze arrowhead, and a golden casing of a wooden bowl have been found. The representation of a bear standing upright, in profile, with its head down, was made with the stamp on one of the plates of the casing (Fig. 2, *1*).

A bear head is represented four times *en face* (Fig. 3) on a wild boar tusk from the Kiev Historical Museum (an incidental find from the forest-steppe Dnieper River region, the village of Malye Budki, Sumy Region, the Ukraine). E.V. Yakovenko, who described this item, believed that the bear was represented in the "sacrificial position" and, following the tradition, associated the item with the influence of the Ananyino culture (1969: 201).

In the lateral tomb of the Solokha kurgan (near the village of Velikaya Znamenka, Kamensko-Dneprovsky District, Zaporozhye Region, the Ukraine), with the intact burial of the Scythian "king" (390–380 BC), a gold casing of a wooden vessel with a handle in the form of the bear head was found (Fig. 4). When describing this item, A.Y. Alekseev mentioned that "handles in the form of an animal's heads or figures are relatively rare finds in the kurgans of European Scythia of the 5th–4th centuries BC, but these have also

Fig. 1. Cast silver mirror covered with electrum plates. Kelermes kurgan 4, second half of the 7th century BC. *1* – reverse side of the mirror with representations; *2* – detail of the mirror with a figure of the walking bear.

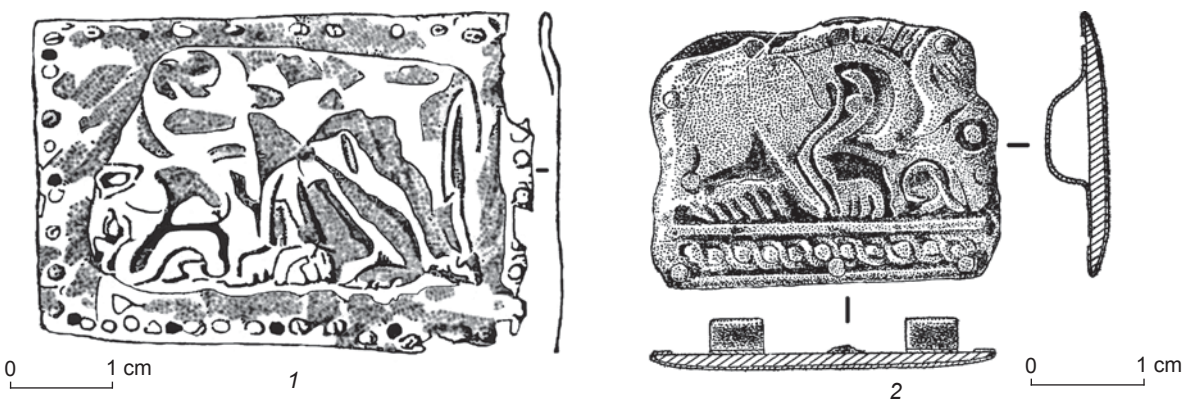

Fig. 2. Golden casing of a wooden vessel with a bear figure from the kurgan of Chabantsova Mogila, 5th century BC (after (Mozolevsky, 1980: 83)) (*1*), and bronze plaque with an image of predator (bear?), covered with silver foil, from the kurgan of Zheltokamenka, 4th century BC (*2*).

Fig. 3. Tusk of a wild boar with representations of four bear's heads in the "sacrificial position" (en face). Random find, Sumy Region, the Ukraine, 5th century BC (after (Scythian Gold…, 1999)).

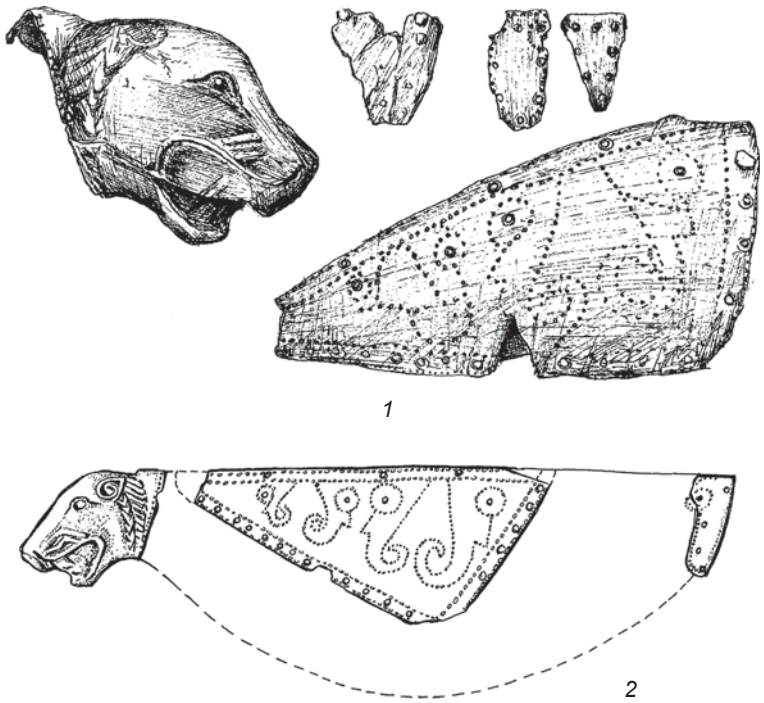

Fig. 4. Gold casing of a wooden vessel, and its handle in the form of a bear's head. Solokha kurgan, lateral tomb, early 4th century BC (after (The Golden Deer…, 2000)).
1 – drawing of the items; *2* – vessel reconstruction.

been found outside this region. It is possible that such vessels are of eastern origin for Scythia" (2012: 146–147). One could object to this well-known scholar's suggestion by pointing out that gold plates of cult wooden vessels with handles in the form of figures of animals and birds have been found (albeit not so often) in the burials of the Scythian elite (their rarity could have largely resulted from the total looting of Scythian graves in the ancient times) (Mantsevich, 1966: 23–25). However, a gold casing from the Chabantsovaya Mogila shows a representation of the standing bear profile. Complete parallels to this image are present on gold fittings of handles of wooden vessels from the Aleksandropol "royal" kurgan (Lugovaya Mogila) in the Dnepropetrovsk Region, and from kurgan 1 of the Chastye Kurgany group near the city of Voronezh (Fig. 5). A similar vessel to the Solokha vessel in the form of a bear figure has been found in the Filippovka "royal" kurgan 1 in the Orenburg Region (Fig. 6), belonging to the Sauromatian-Sarmatian culture of the Iranian-speaking nomads from the southern Urals. Four bronze plaques with a silver cover representing the figure of the bear (?) have been found in the "royal" kurgan of Zheltokamenka of the 4th century BC in the steppe Scythia (Mozolevsky, 1982: 221).

Generally, cult wooden vessels with gold casings, on which the images of animals, birds, or fantastic animals (griffins) were stamped, are not rare finds in the kurgans of steppe Scythia of the 5th–4th centuries BC, despite their total looting. Another thing is the image of bear, which is still found quite rarely at the local archaeological sites.

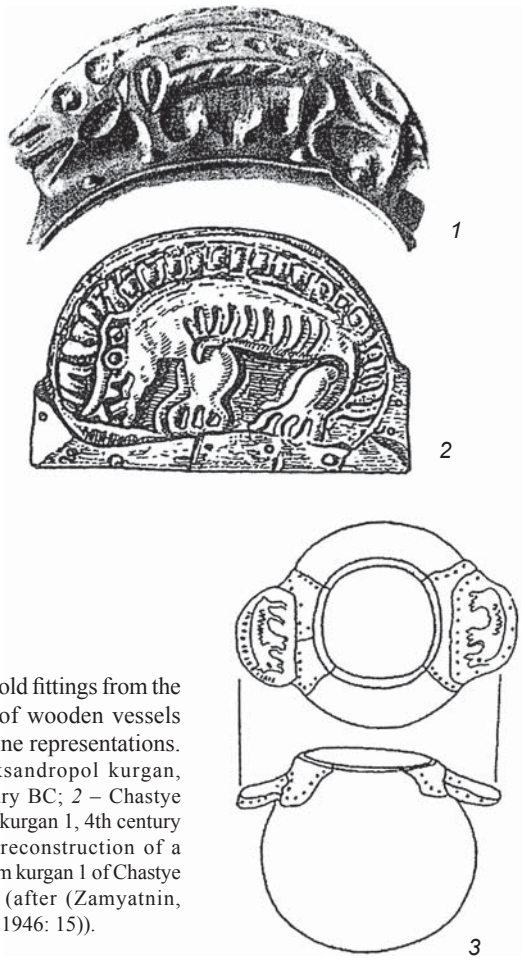

Fig. 5. Gold fittings from the handles of wooden vessels with ursine representations. *1* – Aleksandropol kurgan, 4th century BC; *2* – Chastye Kurgany, kurgan 1, 4th century BC; *3* – reconstruction of a vessel from kurgan 1 of Chastye Kurgany (after (Zamyatnin, 1946: 15)).

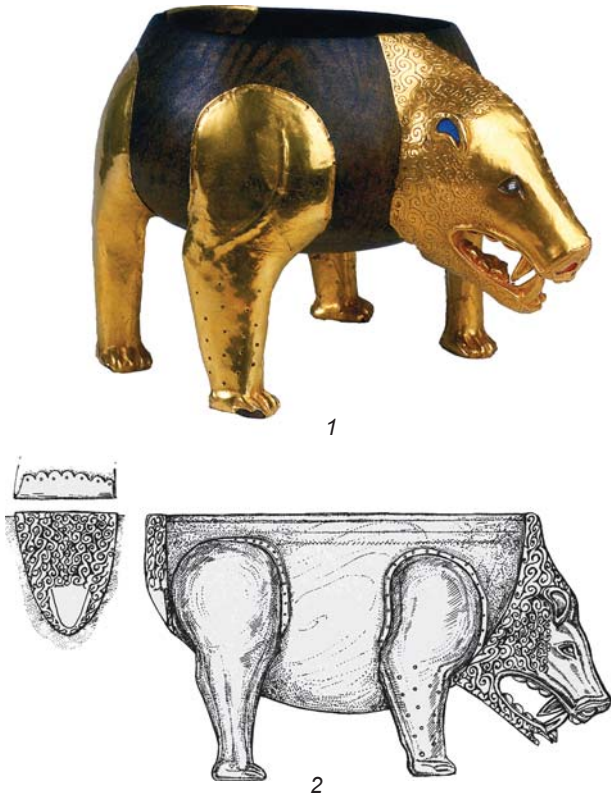

Fig. 6. Wooden vessel with gold fittings in the form of a bear. Filippovka cemetery, kurgan 1, early 4th century BC (after (The Golden Deer…, 2000)).
1 – reconstruction of the vessel using composite materials; *2* – graphic reconstruction.

The assumption concerning the existence of some form of bear cult not only in the forest-steppe, but also in the Scythian steppe, has recently received additional confirmation, after the publication of evidence from the elite kurgan of Bliznets-2 (near Dnepropetrovsk), dated to the late 5th century BC (Romashko, Skory, 2009: 68–69). The kurgan was thoroughly looted both in the ancient times and in the 19th century. In the burial of a noble Scythian steppe dweller, five claws of a brown bear were found (the length of the largest was 6.2 cm; that of the smallest 3.6 cm). These were recovered from the filling of an interior grave pit, next to each other. The authors indicated that such finds were very rare in the graves of the Scythian period, and were made only in few forest-steppe sites: tomb No. 2 of the Repyakhovataya Mogila kurgan, near the village of Matusov, in the Tyasmin River basin (six bear claws with drilled round holes, which used to function as bridle adornments); kurgan 2 at the Lyubotin cemetery, in the Seversky Donets River basin (a bear claw cased in gold foil, with a hole for hanging, i.e. an amulet) of the late 7th to early 6th century BC; and the central grave of the Bolshoy Ryzhanovsky kurgan of the early 3rd century BC*, in the interfluve of the Gniloy and Gorkiy Tikich Rivers (four claws located on three sides of the skeleton of a noble Scythian warrior). “In the cases described above, bear claws, like the teeth of a bear and a wolf, should probably be interpreted in the same way as canine teeth and boar tusks, which are quite common in kurgans of the Scythian time, for example, in the Dnieper right bank forest-steppe area of the Kiev region, but are less frequently found in the steppe zone of the northern Black Sea region, which are correctly and unambiguously identified as apotropaic amulets with magical powers. Obviously, the claws of such a mighty beast as a bear were to serve as apotropaia—a reliable defense for the deceased from evil forces. In our case, we have a different, extremely interesting and unusual situation for Scythian burials. Since all five claws of the bear lay… in the same place, close, or rather, together (and this is after the robbery of the burial!), we may consider them as the remains of a *bear paw* [my italics – **V.G.**].

*According to a number of authoritative scholars, this grave should be dated to 315–300 BC (note of the authors).

This find makes it possible to recall a group of bronze adornments of a horse bridle—plaques in the form of a "bear paw", which became widespread in the 5th century BC. Like a number of other items in animal style, which decorated the bridle, these had sacred and magical function. It is tempting to suggest that bear paws might have been used in the Scythian environment as apotropaic amulets, and served as a prototype for creating metal amulets-phylacteries…" (Ibid.).

Indeed, bronze plaques of horse bridle in the form of human hand (as some scholars believe), or bear paw (according to other scholars) have been found in the kurgans of the 5th–4th centuries BC of the forest-steppe and (less often) in the Scythian steppe. It is not difficult to explain the ambiguity of interpretation: there are five fingers both on the human hand and on bear paw. Moreover, the rather crude casting of such items does not contribute to a clear distinction. It is true that in very rare cases (at high magnification), one may even see nails, which means that it was clearly a human hand. However, most often the "hand" looks exactly like bear paw; in most cases, it is the right hand/paw. There are dozens of such finds in the forest-steppe of Scythia (Mogilov, 2008: 47, 232). Interestingly, most often, the ends of the fingers are pointed and rather resemble the claws of the bear. The interpretation of such plaques as the images of a bear paw was mentioned by A.A. Bobrinsky (1905: 7) and S.V. Makhortykh (2006: 57–59).

The representation of a bear in the "sacrificial position" (head full-face lying on its front paws) stands out among the "bear" motifs in the Scytho-Siberian art. Such placement of a bear's head and paws on a wooden deck, or on a special platform, and festive ceremonies around it, was one of the culminating points of the Bear Festival, which had survived among many Finno-Ugric peoples of the Urals and Siberia almost until the late 19th to early 20th century (Alekseenko, 1960).

For a long time, it was believed that the motif of the bear in the "sacrificial position" was purely Finno-Ugric, since such representations, mostly in the form of bronze plaques, often occurred at the end of the Ananyino and especially in the Pyany Bor periods (see, e.g., Glyadenovo bone bed in the Kama region (Spitsyn, 1901)). Two such bronze plaques were accidentally found at the Ananyino cemetery of the 6th–4th centuries BC (Vasiliev, 2004: 281, fig. 6).

However, it is remarkable that the motif of the bear in the "sacrificial position" also occurs in Scythia: on a golden plaque from kurgan 402 of the 5th century BC near the village of Zhurovka in Chigirinsky Uyezd of the Kiev Governorate, on the right bank areas of the Dnieper forest-steppe (Fig. 7, *2*); on two bronze plaques of the horse bridle from kurgan 11 also of the 5th century BC near the village of Olefirshchina in Poltava region, in the interfluve of the Vorskla and Psla Rivers (Kulatova, Lugovaya, Suprunenko, 1993: 23, fig. 9, *7*, *8*); and on two bronze plaques incidentally found in Crimea (one at the village of Batalnoye on the Kerch Peninsula, the other in the southeastern Crimea), both dated to the late 5th century BC (Fig. 7, *4*, *5*). The fact that the "bear motif" on the Crimean peninsula is far from being accidental is also evidenced by great number of bronze adornments of horse bridle in the form of "bear paws" (Skory, Zimovets, 2014: 125–127), which abundantly occur in the Scythian burial complexes of the Dnieper forest-steppe.

It is also curious that the Scythian kurgans on the Middle Don River do not contain a single plaque with a representation of a bear in the "sacrificial position", and there are practically no bronze "bear paws". However, precisely this area of Scythia had the closest trade and cultural ties with the Kama and Ural regions. Though, such finds have been made (and they were not unique) in the Dnieper forest-steppe and Crimea.

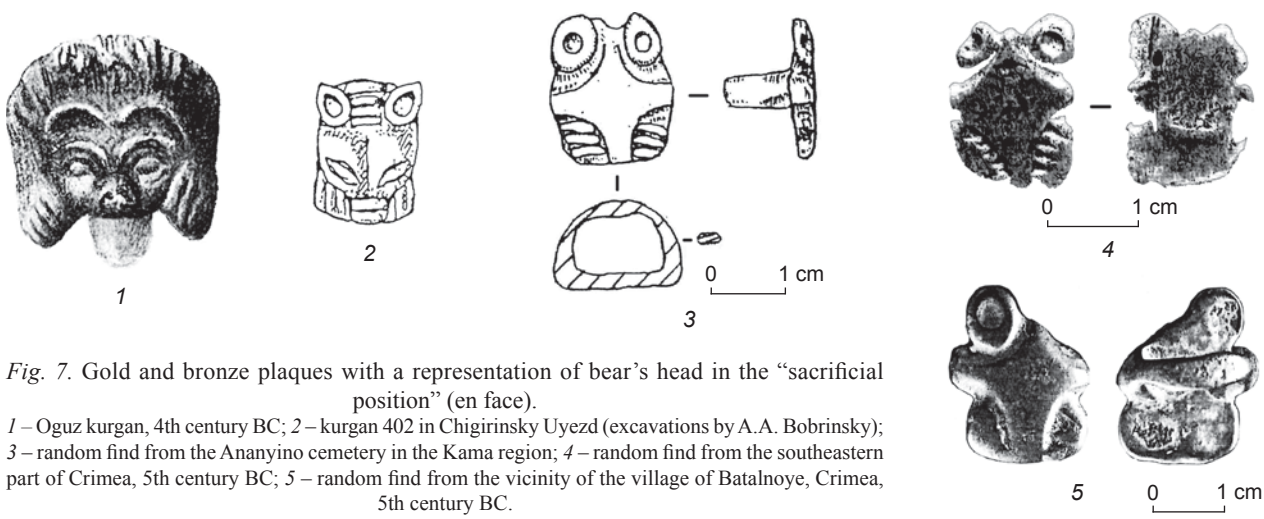

Fig. 7. Gold and bronze plaques with a representation of bear's head in the "sacrificial position" (en face).

1 – Oguz kurgan, 4th century BC; *2* – kurgan 402 in Chigirinsky Uyezd (excavations by A.A. Bobrinsky); *3* – random find from the Ananyino cemetery in the Kama region; *4* – random find from the southeastern part of Crimea, 5th century BC; *5* – random find from the vicinity of the village of Batalnoye, Crimea, 5th century BC.

The question is how cultural influences from the Finno-Ugric world could have penetrated into Scythia, especially in terms of chronology. Bronze plaques with the image of a bear's head in the "sacrificial position" in the Kama region were first represented by a random find (Ananyino cemetery), dated widely within the 6th–4th centuries BC (Fig. 7, *3*). Such plaques flourished in the late 4th to 2nd century BC and later. Scythian finds of this kind were confidently dated to the 5th century BC.

What conclusions can be made on the basis of the above facts? First, ursine representations on toreutics and bear claws-amulets for a horse harness appeared among the Scythians at the dawn of their history, in the archaic period. This has been confirmed by the already mentioned finds: a silver gilded mirror from Kelermes kurgan 4 of the second half of the 7th century BC; and six bear claws with holes for hanging to horse bridle from tomb 2 in Repyakhovataya Mogila of the late 7th century BC. It is known that the Scythians came to the northern Black Sea region "from the depths of Asia", where their ancestral homeland was. Discussions about its location still go on, although such eminent scholars as M.I. Rostovtsev, A.I. Terenozhkin, and A.Y. Alekseev with high degree of confidence placed the ancestral home of the Scythians in Central Asia, that is, in the territory of Tuva, Northern Kazakhstan, and the Altai (Rostovtzeff, 1929: 26; Terenozhkin, 1971: 19–22; Alekseev, 2003: 38–42). Vast forests and magnificent wooded mountains characterize this area—the habitat of many animals (including brown bears). Therefore, even in the earliest times, before moving to the west (to the northern Black Sea region and the Caucasus), the ancestors of Scythians could have used bear image in art and in some forms of its worship.

Notably, traces of bear worship in Scythia have been found in the burial complexes of the highest Scythian elite and even in the "royal" kurgans of the late 5th to 4th centuries BC: Solokha (lateral tomb)—early 4th century BC; Aleksandropol (Lugovaya Mogila)—third quarter of the 4th century BC; Zheltokamenka—340–320 BC (see Fig. 2, *2*); Oguz (a huge kurgan with a lateral tomb)—third quarter of the 4th century BC (see Fig. 7, *1*), and Bolshoy Ryzhanovsky—last two decades of the 4th century BC. The burial of a noble young man in the Bliznets-2 kurgan on the outskirts of Dnepropetrovsk, may belong to the same group. Here it is necessary to give some additional explanations.

Ukrainian archaeologists V.A. Romashko and S.A. Skory studied the Bliznets-2 kurgan in May–June 2007. At the start of archaeological work, the kurgan was 7.05 m above the surface. The top of the mound was cut off in the 19th century by a huge looters' trench by not less than 1 m. Therefore, the initial height of the kurgan was probably over 8 m. Its diameter, recorded by the stone crepidoma, was 42–43 m (Romashko, Skory, 2009: 93). Thus, Bliznets-2 is one of the largest Scythian elite kurgans of the 5th century BC in the northern Black Sea steppe and the largest in the northern part of the region above the Dnieper Rapids. V.A. Romashko and S.A. Skory noted: "Given these parameters, the Bliznets-2 kurgan should be attributed to the third group of kurgans of the Scythian elite, according to B.N. Mozolevsky (1979: 152, tab. 4), which had the height of 8–11 m and in social terms could have been the burial places of members of the royal family or kings who governed the constituent parts of Scythia…" (Ibid.).

The high social status of the person buried in the Bliznets-2 kurgan is also manifested by the size of the grave (catacomb), showing the labor costs for its construction: its depth was 7.5 m, the area of the burial chamber was 34 m^2, and the area of the entrance pit was about 7.3 m^2. The total area of the burial structure was 41.6 m^2 (Ibid.: 94). The tomb of the person was accompanied by three burials of horses (yet, with very

Fig. 8. Scenes of the "royal" mounted bear hunt (after (Frakiyskoye zoloto…, 2013)).
1 – silver gilded dish, Bulgaria, 4th century BC; *2* – silver gilded plaque, Bulgaria, 4th century BC.

inexpensive iron bits and psalia). The deceased lay in a wooden sarcophagus, decorated with carved ivory plates with very fine engraving, depicting various scenes from the life and myths of the Greeks, such as the Dionysian symbols, cheetahs, chariots, dancing Maenads, Eros, Hermes, etc. Romashko and Skory thus wrote: "All the above makes it possible to consider the kurgan as *a burial place of the person of the royal rank* [my italics – **V.G.**], made in the late 5th century BC. We think that this opinion is confirmed by the engraved representation of a shooting archer, wearing barbarian clothes, on the gold ring, in which one may see the scene of the 'royal' shooting reflected in the mythology of many peoples of antiquity and having ritual and magical meaning…" (Ibid.: 98). Moreover, the authors believe that in the Bliznets-2 kurgan Orik was buried. Orik was the younger son of the Scythian king Ariapif, who (unlike his brothers Skil and Octmasad) had never been the king of all Scythia, but ruled only one of its parts (Ibid.: 109–112).

Conclusions

It seems that finding some tangible traces of worshipping the bear in the most elite—and in some cases even "royal"—kurgans of Scythia is hardly accidental. Among the Scythian elite, this image occurs most frequently on two types of items: ritual wooden bowls with gold casings, and as an apotropaic adornment on horse harness. In this regard, it should be mentioned that in the neighboring Thrace, with which the highest circles of the Scythian elite had close family (dynastic marriages) and cultural ties, in order to achieve supreme power, one had to take a serious test: to defeat a dangerous beast (a bear, wolf, or wild boar) with a spear and while riding a horse. The scenes of the bear hunt of a mounted Thracian protagonist are represented on the toreutics of the 4th century BC (Fig. 8). In Scythian iconography, a similar subject has been especially vividly represented on silver gilded, two-handed cups from the "royal" kurgan of Solokha, depicting mounted Scythians hunting lions and fantastic monsters.

References

Alekseenko E.A. 1960
Kult medvedya u ketov. *Sovetskaya etnographiya*, No. 4: 90–104.

Alekseev A.Y. 2003
Khronografiya Evropeiskoy Skifii. St. Petersburg: Izd. Gos. Ermitazha.

Alekseev A.Y. 2012
Zoloto skifskikh tsarey v sobranii Ermitazha. St. Petersburg: Izd. Gos. Ermitazha.

Baigusheva V.S. 2006
Ornitofauna i teriofauna Priazovya po materialam arkheologicheskikh raskopok. In *Istoriko-arkheologicheskiye issledovaniya v g. Azove i na Nizhnem Donu v 2005 g.*, iss. 22. Azov: Azov. muzei-zapovednik, pp. 341–356.

Bobrinsky A.A. 1905
Otchet o raskopkakh, proizvedennykh v 1903 g. v Chigirinskom uyezde Kiyevskoy gubernii. *Izvestiya Imperatorskoy arkheologicheskoy komissii*, iss. 14: 1–43.

Cheremisin D.V. 2008
Iskusstvo zverinogo stilya v pogrebalnykh kompleksakh ryadovogo naseleniya pazyrykskoy kultury. Novosibirsk: Izd. IAET SO RAN.

Chibirev L.A. 2008
Traditsionnaya dukhovnaya kultura osetin. Moscow: ROSSPEN.

Frakiyskoye zoloto iz Bolgarii: Ozhivshiye legendy. 2013
Moscow: Kuchkovo pole.

Ivanov V.V., Toporov V.N. 1982
Medved. In *Mify narodov mira*, vol. II. Moscow: Sov. entsikl., pp. 128–130.

Korolkova E.F. 2006
Zveriniy stil Evrazii: Iskusstvo plemen Nizhnego Povolzhya i Yuzhnogo Priuralya v skifskuyu epokhu (VII–IV vv. do n.e.). St. Petersburg: Peterburg. Vostokovedeniye.

Kulatova I.N., Lugovaya L.N., Suprunenko A.B. 1993
Kurgany skifskogo vremeni mezhdurechya Vorskly i Psla. Moscow: Vseros. fond razvitiya nauki; Poltava: Poltav. krayeved. muzey.

Makhortykh S.V. 2006
Skifska vuzda Pereshchepinskogo mogilnika. In *Bilske gorodishche ta iogo okruga*. Kiev: Shlyakh, pp. 57–76.

Mantsevich A.P. 1966
Derevyanniye sosudy skifskoy epokhi. In *ASGE*. Leningrad: Izd. Gos. Ermitazha, pp. 23–38.

Mlekopitayushchiye Sovetskogo Soyuza. 1972
V.G. Geptner, A.A. Sludsky. Vol. II, pt. 2. Moscow: Vyssh. shk.

Mogilov A.D. 2008
Sporyadzhennya konya skifskoy dobi u lisostepu Skhidnoy Yevropii. Kiev, Kamenets-Podolsky: Inst. arkheologii AN Ukrainy.

Mozolevsky B.M. 1979
Tovsta Mogila. Kiev: Nauk. dumka.

Mozolevsky B.N. 1980
Skifskiye kurgany v okrestnostyakh g. Ordzhonikidze na Dnepropetrovshchine (1972–1975 gg.). In *Skifiya i Kavkaz*. Kiev: Nauk. dumka, pp. 70–154.

Mozolevsky B.N. 1982
Skifskiy "tsarskiy" kurgan Zheltokamenka. In *Drevnosti Stepnoy Skifii*. Kiev: Nauk. dumka, pp. 179–221.

Perevodchikova E.V. 1994
Yazyk zverinykh obrazov: Ocherki iskusstva yevraziyskikh stepey skifskoy epokhi. Moscow: Vost. lit.

Romashko V.A., Skory S.A. 2009
Bliznets-2: Skifskiy aristokraticheskiy kurgan v Dneprovskom pravoberezhnom Nadporozhye. Dnepropetrovsk: Porogi.

Rossiya: Polnoye geograficheskoye opisaniye nashego otechestva. 1902
P.P. Semenov and A.P. Semenov (eds.). Vol. 2. St. Petersburg: Izd. A.F. Devriena.

Rostovtzeff M.I. 1929
The Animal Style in South Russia and China. Princeton, New Jersey: Princeton Univ. Press. (Princeton Monographs in Art and Archaeology; vol. XIV).

Scythian Gold: Treasures from Ancient Ukraine. 1999
New York: Harry N. Abrams Inc. Publishers.

Skifo-sibirskiy zverinyi stil v iskusstve narodov Evrazii. 1976
Moscow: Nauka.

Skory S.A., Zimovets R.V. 2014
Skifskiye drevnosti Kryma: Materialy odnoy kollektsii. Kiev: Vidavets Oleg Filyuk.

Sokolova Z.P. 2000
The bear cult. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 2: 121–130.

Spitsyn A.A. 1901
Glyadenovskoye kostishche. *Zapiski Russkogo arkheologicheskogo obshchestva*, vol. XII (1/2): 228–269.

Terenozhkin A.I. 1971
Skifskaya kultura. In *Problemy skifskoy arkheologii*. Moscow: Nauka, pp. 15–23. (MIA; No. 177).

The Golden Deer of Eurasia. 2000
New York: The Metropolitan Museum of Art.

Vasiliev S.A. 2004
Ananyinskiy zveriniy stil: Istoki, osnovniye komponenty i razvitiye. *Arkheologicheskiye vesti*, No. 11: 275–297.

Yakovenko E.V. 1969
Klyki s zoomorfnymi izobrazheniyami. *Sovetskaya arkheologiya*, No. 4: 200–208.

Zamyatnin S.N. 1946
Skifskiy mogilnik “Chastiye kurgany” pod Voronezhem (raskopki Voronezhskoy uchenoy arkhivnoy komissii 1910–1915 gg.). *Sovetskaya arkheologiya*, No. VIII: 9–50.

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An Early Jurchen Text Among Rock Representations Near the Arkhara River in the Amur Basin (History, Research Results, and New Evidence)

Results of field surveys of an inscription on a rock near the Arkhara River, carried out in 2003 and 2014–2018, are outlined. Some graphemes from it are written in red, others in black. The black ones, first discovered in 2003, make up a coherent whole—a hieroglyphic text arranged in three columns consisting of 7, 10, and 7 signs. In 2004, it was proposed that the text was written in the Jurchen hieroglyphic script. In 2014, this hypothesis, based on historical and archaeological evidence, received linguistic support, and the text was translated. Judging by the available date, it was written on December 1, 1127, and is demonstrated to be the earliest Jurchen inscription known to date. The text mentions the author's name—Shin Terin, and says that he arrived in the Targhando mouke (military-administrative region). Apart from the text written in black, certain graphemes written in red are arranged in a linear sequence, suggesting that this is a text too. For the first time, one of the "red" graphemes is published and shown to belong to Jurchen script. The results suggest that the Arkhara rock gallery includes Jurchen inscriptions that are highly relevant to Jurchen linguistics, toponymy, social and cultural history.

Keywords: *Petroglyphs, Arkhara River, grapheme, writing system, Jurchen.*

Introduction

Information about the written characters on the rocks was first published by the Russian explorers of Siberia Nikolai Spathari (late 17th century), Ph.J. von Strahlenberg, P.S. Pallas, G.F. Miller, and others (18th century) (Spathari, 1882: 85; von Strahlenberg, 1730: Tab. VII, XI–XII; Pallas, 1786: 474; Miller, 1999: 519–533). In the early 19th century, a great contribution to the study of "letters and inscriptions" on stones was made by G.I. Spassky. He drew attention to the fact that these written characters resembled "Mongolian and Tatar" letters and the "Manchu script", and their sources and parallels should not be sought in European types of letters, but "in Oriental ancient and new letters" (Spassky, 1818: 80). The studies of A.P. Okladnikov on the territories close to the Amur region have great importance for the topic of our article. Okladnikov discovered rock characters similar in type to the old Mongolian script or representing an "imitation of runic letters" (see, e.g., (Okladnikov, Zaporozhskaya, 1970: 165)). Fragments of written characters on these territories were also found by A.V. Tivanenko (see, e.g., (Tivanenko, 2011)).

Thus, characters written next to rock representations are a fairly common and well-studied phenomenon in North and Central Asia. In the Far East, in the basin of the Amur River, they are extremely rare.

This article presents information about a written text discovered in 2003 at the archaeological site of Arkharinskaya Pisanitsa (Arkhara rock art site). The research is based on the author's field materials gathered

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during the expeditions in 2003 and in 2014–2018. During the field work, the rock representations were documented by contact and non-contact methods: they were drawn on plastic film, copied on paper, and were photographed in various digital formats, including RAW. In the laboratory, digital copies were processed using image-editing software. Written characters on the rock were interpreted following traditional methods of source and textual analysis, as well as semiotics.

Research history

The archaeological monument of the Arkhara rock art site is located on the right bank of the Arkhara River, 48 km upstream of the village of Gribovka, and 97 km upstream of the confluence of the Arkhara and Amur rivers (Fig. 1). Rock signs were written on granite outcrops of the hillside, which steeply descend to the river. The height of the rock outcrops was about 10 m in its upper part, from which the stone wall gradually decreased in height in both directions. The length of the outcrop was about 50 m; surfaces with representations were located on a section 30 m long at a height ranging from 2 to 8 m. The signs were made with red paint (ocher) of various shades and black paint (Fig. 2).

Rock representations had been known to Russian dwellers since they had settled along the banks of the river in the second half of the 19th century. The first rock representations at the Arkhara were described by Saenko (unfortunately, his initials are unknown) in a brief (half page) note (1930). The first scholarly description

Fig. 1. Map showing the location of the Arkhara rock art site.

of the site was given by V.E. Larichev, who examined the petroglyphs during the Far Eastern Archaeological Expedition of 1954, directed by Okladnikov. The survey results are presented in a most complete form in the expedition journal (Okladnikov, Larichev, 1999). Larichev, at that time a student at the Department of the History of China at the Oriental Faculty of the Leningrad State University, noticed several written characters, which he interpreted as Chinese, among a large number of figurative and non-figurative images, including characters written in "dark paint" (black? – **A.Z.**): "the

Fig. 2. The Arkhara rock art site. General view. Photo from a drone. 2017.

Chinese character *byen* for 'wood'" (*ben* 本 'tree trunk, root' or *mu* 木 'tree'. – **A.Z.**) and "2 rows of Chinese characters" written in "black ink, cursive script, and not very clearly". Among the latter, Larichev could discern only the character "mountain" (*shan* 山. – **A.Z.**) (Ibid.: 26). The images were not reproduced and information about them did not appear in publications by the members of the expedition of 1954.

In 1968, A.I. Mazin continued to work at the site. He recorded, described, and first published most of the images. In total, he identified 360 images painted on the rock with "red or light red ocher", which were "homogeneous" in style and time of creation (Mazin, 1986: 82–95). In that publication, as in his other studies, Mazin did not mention any written characters.

A new stage in the study of the site began in 2003. In August, 2003, the author of this article together with an employee of the Amur State University (hereafter AmSU) R.A. Kobyzov surveyed the site. All petroglyphs available for examination were recorded on photo and video; some of the images were sketched and traced on paper. The entire array of petroglyphs was divided according to the principle of color classification into two groups—"red" and "black" signs. Both groups included signs, which differed not only in form, but also in their essential features. The presence of essentially different signs on the rock predetermined the structuring of all images into two types: ideograms and characters. The concept of the *ideogram* has been quite often used for describing rock representations (Leroi-Gourhan, 2009: 260–263; 274–275; and others). We should note that we interpret the term *ideogram* in a broader sense than A. Leroi-Gourhan did. An ideogram is a conventional graphic sign—a symbol representing a concept or idea of an object in visual form. Each ideogram contains a special meaning and can function separately from other ideograms, and thus it may not belong to a language. Accordingly, the ideogrammatic signs are not connected by linear relationships into a specific order and do not form an ordered semantic system that codifies a statement. Figurative and non-figurative representations act as ideograms in the context of the study of petroglyphs. It is important that ideograms are not a script in the strict meaning of this term. Leroi-Gourhan drew attention to this fact: "Paleolithic representations cannot be viewed as signs of 'pre-writing'… in order to be such, they have to constitute a linearly organized assemblage of symbols. However, the Paleolithic representations in the first links of the chain are important for clarifying the first attempts at speech transmission" (Ibid.: 260).

Several types of scripts are known. One of them (pictorial script) is the most relevant for our discussion. Pictorial characters are conventional signs, graphic elements of writing as a way of visualizing language and speech.

In the study of the Arkhara rock art site, we are dealing with representations that belong to the types of ideogrammatic signs and hieroglyphic signs. Both types were identified already when examining the "red" and "black" images in 2003.

Hieroglyphic characters (graphemes) constitute a small, yet very important part of the group of "red" images, but prevail in the group of "black" images. Going back to the records of Larichev, we may observe that the Chinese character mentioned by him in the journal, read as *ben* with the meaning of 'tree' (as indicated by the author) has not been found in dictionaries of the Chinese language. Since Larichev did not provide the graphic form of the character in his journal, it may be assumed that he had in mind either the character *ben* 本 (the exact meaning 'root, foundation, base, firm law, unchangeable norm, source, beginning, antiquity, nature, paternal clan, ancestors, direct descendants, gratefulness to the ancestors; homeland, native places; family name Ben' (Bolshoy kitaisko-russkiy slovar…, 1984: 741–744)), or character 木 similar in graphic form, the first and main meaning of which is 'tree' (Ibid.: 699–701). We did not find a character in the form of 本 or 木 on the rock, but we identified a character with graphic form somewhat between the Chinese characters *ben* 本 and *mu* 木: as opposed to the character *mu*, it has a lower horizontal line. However, unlike the character *ben*, the horizontal line does not intersect the vertical line, but is located at its base. We could not find such a character in large dictionaries of Chinese characters. It is possible that either this character was written on the rock without following the rules of calligraphy (in this case, it is a variant of the character *mu* or *ben*), or does not belong to the Chinese script at all (Fig. 3).

No images have been found on the rock that, according to the journal, made up "2 rows of Chinese characters" written in "black ink, cursive script, and not very clearly (only the character 'mountain' – shan, was clear)" and appeared "in the central part where the representations were most densely located" (Okladnikov, Larichev, 1999: 26). They may have been lost since the time of their inspection in 1954. However, there are graphemes of a different configuration. In 2003, 24 graphemes written in black paint (ink) that form a coherent whole consisting of three vertical columns or rows, were identified on one of the stone surfaces to the right of the center. The area of the characters was 15 × 25 cm. The size of each graphic element on average was 2 × 2 cm. There were seven characters in the right column, ten characters in the central column, and seven characters in the left column (Fig. 4). The paint was applied to the surface with a brush.

Already at the stage of visual examination, it was obvious that the images organized in a linear composition represented a kind of writing with hieroglyphic characters,

and constituted a complete text. Judging by the execution technique, the graphemes were written by the hand of a skilled artisan who could confidently write in some style of hieroglyphic script.

The main problem was to establish the type of hieroglyphic writing, and to translate the text. Already in the first publication on this inscription, it was argued that the text could have belonged to the Khitan or Jurchen scripts, but most likely to the Jurchen script (Zabiyako, Kobyzov, 2004: 133).

Our research approach was based on the following points. The graphemes were drawn over petroglyphs that had been painted with ocher. The petroglyphs depicted in red paint (ocher) belong to the Early Iron Age–Early Middle Ages. The "black" graphemes could not be earlier than the red-painted petroglyphs and thus earlier than the Middle Ages. Notably, the inscription is patinated—covered with "rock varnish", which emerges over the paint layer a fairly long time after the paint is applied. Accordingly, the inscription could not have been made in the Late Middle Ages, and the age of the characters should be about 800–1000 years.

At that time, hieroglyphic writing of three types (Chinese, Khitan, and Jurchen) could have been used in the Amur region. Chinese characters were excluded from consideration owing to dissimilarity with the characters of the Arkhara inscription. The use of the Khitan script is unlikely. In the 10th century, a significant part of the Amur region became included in the Khitan sphere of influence. The Khitan people were a Mongol-speaking ethnic group that created the Liao Empire (907–1125) in the east of Asia. The Khitan large script was created in the Khitan State in 920, and Khitan small script was created ca 925. The graphic features of both types of Khitan scripts were based on Chinese characters (Terentiev-Katansky, 1990: 68–70; Zaitsev, 2011: 146–147). However, the Khitan people did not leave any obvious traces of statehood, with which writing is usually associated, on the left bank of the Upper and Middle Amur region.

The ethnic core of the Jurchen people emerged in Northeast China. In about the 9th century, some Jurchen groups migrated to the banks of the Amur River, where by the end of the 10th–early 11th century, they created the highly advanced culture of the Amur Jurchen people. In the Amur region, the Jurchen people have left abundant evidence of their life, such as settlements, fortified settlements, and burial grounds (Derevianko, 1981; Bolotin et al., 1998). As V.E. Medvedev observed, the Amur Jurchen people, "took a rightful place among the peoples of East Asia at the beginning of the second millennium" (1977: 158).

In the 10th century, a significant part of the Jurchen people became dependent on the Khitan people, and experienced the influence of the Liao statehood and

Fig. 3. A grapheme from the "black" group.

Fig. 4. Graphemes. Jurchen text. 2014.

culture. In 1115, the leader Aguda united the Jurchen tribes, ousted the Khitan people from the territory of Manchuria, and created the Jin State (1115–1234). The Amur region was located on the eastern periphery of this Jin State. According to the Chinese historical sources, in 1119 the Jurchen people created their first writing system that later became known as the Jurchen large script, and in 1138 they created a second system—the so-called Jurchen small script (Vorobiev, 1983: 151–152). Since most of the examples of Jurchen writing that have survived were written by the script of only one type, the question of identifying its type has long been and still remains debatable. Some

scholars, for example A.M. Pevnov, call the script of these writings small (2004: 44); others, such as Aishingyoro Uruhichun and Yoshimoto Michimasa, considered it to be the large script (2017). Notably, according to their writing style, the graphemes of the Jurchen script recorded in the surviving writings are similar to the characters of the Khitan large script and the regular script style (*kaishu*) of the Chinese script (Kiyose Gisaburo, 1977: 22; Vorobiev, 1983: 151–152; Terentiev-Katansky, 1990: 77–80; Zaitsev, 2011: 141–148). We are following V.P. Zaitsev (2011: 141) calling this style the "Jurchen script" without indicating its type.

The involvement of the Jurchen ethnos and the Jin Empire in the medieval history and culture of the Amur region suggests that the text found on the rocks of the Arkhara site is Jurchen in origin. However, Jurchen texts are very rare.

Scholars have in their disposal a very limited number of texts written in Jurchen script. Thus, in 1842, N.Y. Bichurin stated, "The Gyin House (Jin 金. – **A.Z.**), which emerged in Ningut, was the first to invent letters for the Tungus language and, possessing North China and Mongolia for over a hundred years, used its own script in written relations. <…> With the fall of the Gyin House, all writings and translations written in the Tungus language and even the script itself completely disappeared, so not a single monument of the written language of the 12th century could be found among the Tungus tribes so far" (2002: 232–233).

Since the mid 19th century, the situation with the discovery and scholarly reconstruction of the examples of the Jurchen writing has significantly improved, but so far the number of monuments of Jurchen writing available to scholars is very small. The information on their number varies: this depends on which texts a particular scholar includes or excludes from consideration for various reasons. We have inscriptions both on stone and metal, and documents on paper. According to Pevnov, the body of the Jurchen epigraphy of the 12th–15th centuries is represented by: 1) nine texts carved on stone, on steles or simply on rock faces, including six texts found in China, two in North Korea, and one in Russia, 2) "concise inscriptions or individual characters drawn on raw or fired clay of vessels (prior to firing, the characters were apparently written by the potter; inscriptions on the finished vessels were probably made by their owners)", 3) "written characters on some seals, inkstone, brands, stamps, various iron objects and, finally, on such a unique object as a silver paiza", and 4) "characters, probably of the Jurchen script, on the edges of bronze mirrors" (2004: 44–45, 48, 49). Despite the fact that the information of Pevnov on the texts of the first type is based on the book of the Japanese scholar Kiyose Gisaburo Norikura, "Study of the Jurchen Language and Writing: Reconstruction and Decoding" (1977) and is somewhat outdated, it still allows us to get an idea of the number of monumental inscriptions available to scholars.

In his work, Kiyose Gisaburo provided additional evidence about these texts and indicated their location: several were discovered in Northeast China in the Jilin and Shandong Provinces, and near the city of Kaifeng (Henan Province); one inscription on a rock face, and one on a stele have been preserved in Korea, and a stele with a pecked inscription was set on the Tyr cliff, in the Lower Amur River region. The last stone-written Jurchen text on the list of the Japanese scholar (Tsagan Obo) was found in the Xilingol Aimag in Inner Mongolia in 1945, but nothing more is known about this text (Kane, 1989: 69). According to Kiyose Gisaburo, the earliest text (stele in the memory of the victory of Aguda, the future first emperor, Jin, over the Khitans; the left bank of the Lalin River, Fuyu County in Jilin Province) was dated to the 28th day of the 7th lunar month of 1185; the latest text (stele in honor of the construction and restoration of the temple of Yǒngníng Sì; the Tyr cliff) was dated to the 22nd day of the 9th lunar month of 1413 (Kiyose Gisaburo, 1977: 23–25; Golovachev et al., 2011: 96, 132). One of the undated Jurchen texts mentioned by Kiyose Gisaburo was subsequently attributed to the period before 1185. It was cited on the Gyeongwon stele in honor of construction of a Buddhist temple, which was dated to 1138–1153 (Kane, 1989: 59–62). Notably, in addition to these and several other inscriptions (Ibid.: 69) discovered after the publication of Kiyose's book, texts written in the Jurchen script with ink on stone are also known. Such is, for example, the inscription on the wall inside the White Pagoda (Chinese *báitǎ*白塔) in Hohhot (Ibid.: 77).

Thus, the inscriptions on steles and rock surfaces are a part of the body of the Jurchen writing culture. However, all inscriptions on stone in the Jurchen script known by 2003 were discovered in locations far from the left bank of the middle Amur River and the Arkhara River.

For conducting linguistic research and decoding the text, in 2003–2014 we established contacts with Russian experts in the Jurchen language and writing, Jurchen and Manchu scholars, and Sinologists. However, final identification of our text as Jurchen and translating it at this research stage proved to be difficult. At the Third Scholarly Conference on the History of Northeast China in Dalian (October 31, 2014), we showed the inscription to Jin Shi, an expert in Jurchen and Manchu studies, who confirmed that the graphemes constituted the written signs of the Jurchen large script. For continuing the study of the text, Jin Shi suggested giving the text to a major specialist on the Jurchen language and writing Prof. Aishingyoro Uruhichun (Aisin Gioro Ulhicun in Manchu) from the Ritsumeikan University in Kyoto.

Aishingyoro Uruhichun was given the photographs of rock representations and their tracings made in 2003, and our publications on the inscription, specially translated into Chinese by Wang Jianlin.

To finally establish the authenticity of the inscription, accuracy and completeness of its copying, the Laboratory of Archaeology and Anthropology of the AmSU in 2015 conducted an international expedition, which included A.P. Zabiyako (head), Wang Jianlin, and A.O. Belyakov (laboratory employees) on the Russian side, and Aishingyoro Uruhichun and Kai He on the Japanese side. Visual inspection and photographing of the inscription have made it possible to confirm the authenticity of the graphemes as an example of the Jurchen writing, completeness of their recording, and adequacy of translation.

After completing the field part of the study, the Russian participants made plans with their Japanese colleagues for further processing of joint field materials and publishing the entire set of scholarly results in the form of a collective monograph in the Russian and Japanese languages. For preparing the monograph, the Russian side gave Aishingyoro Uruhichun the publications (translated into Chinese by Wang Jianlin) devoted to the Arkhara rock representations, revealing the history of the Amur Jurchen people, as well as information about the climatic and landscape conditions of the region, and other materials. All of this information was included in the monograph by Aishingyoro Uruhichun and Yoshimoto Michimasa (2017), published without discussion with the Russian side. This book is certainly an important contribution to the study of the Jurchen language and writing. Unfortunately, it contains significant inaccuracies in the presentation of the history of research on the Arkhara rock inscription; there is no comprehensive historiography on the topic of researching the text; and some Russian materials that were not intended for publication were published.

In 2016–2018, employees of the Laboratory of Archaeology and Anthropology of the AmSU continued to study this unique monument together with Russian and foreign experts. Historical and philological research of new and previously identified epigraphic evidence (texts written in the Jurchen script) in the framework of these studies, has been carried out by V.P. Zaitsev—an employee of the Institute of Oriental Manuscripts of the Russian Academy of Sciences.

Results and discussion

The most important result of studying the petroglyphs of the Arkhara site was the discovery in 2003 and final identification in 2014 of the text from the "black" group as an example of the Jurchen script, and its subsequent deciphering, translation, and interpretation. Twenty four characters of the Jurchen script have been identified and reconstructed (decrypted from the cursive form and correlated with the evidence from other texts written in the Jurchen script) in the cursive text consisting of three vertical lines, which should be read from right to left: seven, ten, and seven characters in the first, second, and third line of the text, respectively (Aishingyoro Uruhichun, Yoshimoto Michimasa, 2017: 30) (Fig. 5).

In the phonetic reconstruction of the Jurchen written characters by Aishingyoro Uruhichun, the Arkhara text looks as follows: (1) pulan imula ʃundʒa ania (2) taryando i oson muə pərgilə gai-man (3) dʒua bia oniohon inəŋgi ʃin-tərin (Ibid.: 31–32). This text was translated and interpreted in the following manner (the interpretations and comments of the researcher on the translation are given in square brackets; Russian edition and translation were made by Zaitsev) (Ibid.: 32–51):

(1) the fifth year [of the reign under the *Tianhui* regnal name of the Jin Emperor Taizong = 金太宗 天 會, which is under the cyclic signs], *ding-wei* [Chinese丁未; Jurchen *pulan imula*, literally, 'red goat'];

(2) reached the lower [reaches] of a small river [Jurchen *oson muə*, literally, 'small water'; points to the Arkhara River, the left tributary of the Amur River] in Targhando [Jurchen *taryando*; in Chinese transcription, *Taliando* 塔里安 朶; in Japanese transcription *Targhando* タ ル ア ン ド; in the Jin period, the name of *mouke* (Chinese 謀 克)—a subordinate district, militarized or territorial community in the place where the rock was located];

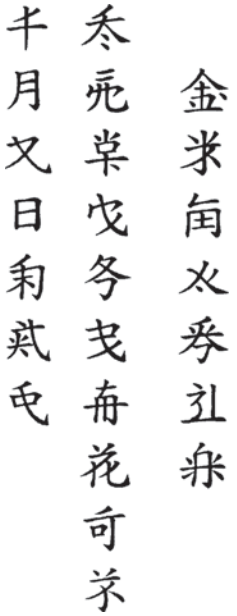

Fig. 5. Reconstruction of the text by Aishingyoro Uruhichun.

(3) tenth moon, nineteenth day. Shin Terin [Jurchen *ʃin-tərin*; in Chinese transcription, *Shēntēlín*忒 鄰 鄰; in Japanese transcription *Sintokurin* 申 忒 鄰].

In the literary translation: "[In] the fifth year [of the reign under the Tianhui regnal name of the Jin Emperor Taizong, which is under the cyclic signs], *ding-wei* reached the lower reaches of a small river [Arkhara] in [*mouke*] Targhando. [In] the nineteenth day of the tenth lunar month, [recorded by] Shin Terin".

Some aspects of reconstructing such hardly legible characters as well as translation and dating by Aishingyoro Uruhichun were critically analyzed by the British scholar E. West, who emphasized the need to clarify the features of individual graphemes as well as their phonetic reconstruction and meaning (2018). We should mention that the work of the Japanese scholars, besides our preliminary tracings of the inscriptions of 2003 (for some reason mistakenly dated July, 2014), did not contain other tracings (Aishingyoro Uruhichun, Yoshimoto Michimasa, 2017: 30). Thus, other researchers are not able to establish on the basis of which tracings of the Arkhara text (certainly not always surely distinguishable in the photographs) the reconstruction was carried out, and to double-check the result. From our point of view, unfortunately, the monograph lacks an important intermediate link between the photograph of the text *in situ* and its published reconstruction: the author's tracing of the text, which would form the basis of the reconstruction. We should agree that the linguistic remarks and original interpretations by the West are largely true. However, now we are following the published version by the Japanese linguist.

The text indicates when the inscription was made—on the 19th day of the 10th lunar month of the 5th year of reign under the *Tianhui* regnal name of the Jin Emperor Taizong, which corresponds to November 24, 1127 according to the Julian calendar, and December 1, 1127 according to the Gregorian calendar (Liangqian…, 1956: 226, 418). If the deciphering of Aishingyoro Uruhichun is correct, then, according to its date, the text on the rock of Arkhara is the earliest of all texts in the Jurchen script known to scholars. As it has been noted, before the discovery of the Arkhara text, the text on the Kyŏngwŏn stele (Chinese, Qingyuanjun Nüzhen guoshu bei 慶源郡女真國書碑), dated to 1138–1153, was considered to be the earliest (Kane, 1989: 59–62). The Arkhara text is separated from the Kyŏngwŏn text by 11–26 years. The time when the Jurchen script was created in 1119 and the inscription on the rock at the Arkhara are only about eight years apart. This makes it possible to consider the Arkhara inscription a unique monument of writing.

The Arkhara text is one of the earliest written sources discovered on the left bank of the Amur River and in the Russian Far East. On the lower Amur River in the early (not later than the early 12th century) Jurchen burial grounds, Medvedev has found fragments of vessels and bronze mirrors with Chinese characters and unidentified characters, and an inkstone (1986: 9–10, 15, 65). In Primorye, pottery and a silver *paiza* with Jurchen graphemes have been discovered (Pevnov, 2004). Thus, before the discovery of the Arkhara inscription, scholars had only archaeological evidence, individual written characters, and information from the Chinese chronicles on the history of that vast region prior to the early 12th century. Now scholars have a dated written text of local origin at their disposal.

The text indicates that a man named Shin Terin visited the Arkhara River in the territory of *mouke* Targhando in the autumn of 1127. Judging by the form of the characters painted on the rock, he was skilled in using a brush and writing in the new script. Obviously, Shin Terin was well-educated, and was a Jin official who was carrying out some kind of assignment on the left bank of the middle Amur River. "The History of Jin" (Jin Shi 金 史)—the Chinese dynasty chronicle of the Jurchen state—makes no mention of the name "Shin Terin" and *mouke* Targhando, nor of the mission to the Arkhara. Certainly, not all events were reflected in official historiography, especially in the subsequent official histories (Zheng Shi 正史) compiled after the fall of the dynasties. Shin Terin's activities could have been related to the local centers of the Jurchen administration. The largest Jurchen fortress closest to the mouth of the Arkhara was the fortress on Mount Shapka. The studies by the Russian archaeologists have established that the Shapka settlement was one of the Jurchen trading, artisanal, administrative, and military centers that controlled the nearby territory (Derevianko, 1988; Nesterov et al., 2011).

The use by Shin Terin of the Jurchen script, which had been created only a few years before his visit to Arkhara, can be considered an indicator that the author of the text was close to the capital's circles, where he managed to learn a new type of script, or alternatively, of fast and wide spread of the Jurchen script up to the eastern borders of the Jin Empire—the left bank of the Amur River.

The Arkhara text is an important source for reconstructing the historical toponymy of the region: it indicates that in the 12th century, in the lower reaches of the Arkhara River, there was a militarized or territorial community (*mouke*), called Targhando by the Jurchen people (for the *mengan* system and *mouke* among the Jurchen people, see (Vorobiev, 1975: 55–57, 75–76, 130–134, 150, etc.)). This evidence supplements the information on the borders of the territory of settlement and migration of the Jurchen people in the period of the Jin Empire as well as the spread of their culture to the adjacent regions of East and Northeast Asia. The discovery of the inscription and its translation expand

the linguistic capacities for studying the Jurchen people, in particular, the lexical composition of their language and aspects of their writing.

It is important that the published Jurchen text from the "black" group is not the only one from the site. In 2003, graphemes were discovered in the "red" group of rock representations. Since 2003, their identification, recording, and interpretation have been underway. In this article, for the first time we introduce one of the graphemes from the "red" group. It does not differ from the graphemes of the "black" group in terms of size, style, and execution technique. In our opinion, it is a grapheme of the Jurchen script (Fig. 6).

Since the entire text of the "red" group has not yet been reconstructed, an accurate interpretation of this individual sign is difficult. Nevertheless, as a justification for our conclusion, we can point to the similarity between the graphic form of this character and the fourth character in the second line of the Arkhara inscription (see Fig. 5), which according to the interpretation of Aishingyoro Uruhichun is an indicator of the Genitive (its cursive form is decrypted as the Jurchen grapheme *i* 𘈩). Therefore, it is likely that the character being published is a grapheme of the Jurchen script with the same frequency (see (Kiyose Gisaburo, 1977: 63, No. 25; Pevnov, 2004: 154, V-52)). It also coincides with a grapheme in the cursive Jurchen text from the collection of the Institute of Oriental Manuscripts of the Russian Academy of Sciences in St. Petersburg (Kara, Kychanov, Starikov, 1972: 398, cols. 3, 6, 7; 399, lines 1, 2, 5) (Fig. 7, 8).

Prospects for further research should involve clearing all surfaces with representations from natural (vegetation) and anthropogenic (visitors' inscriptions) layers, recording all signs, and making complete identification of the graphemes from the "black" and "red" groups, their translation, and interpretation.

Conclusions

The Arkhara rock art site contains over 350 figurative and non-figurative representations, and it is one of the richest petroglyphic monuments of Northeastern and Eastern Eurasia. The inscription discovered on the cliff above the Arkhara River in 2003 and translated in 2014 is the earliest known Jurchen text, making the Arkhara site a unique historical object. The Arkhara inscription, dated to 1127, is a crucial contribution to the small body of texts that have survived since the creation of the Jurchen script in 1119. The content of the inscription expands our knowledge about the historical toponymy of the region, territorial, political, and social organization of the Jurchen people living in the Amur region, and boundaries of the written culture of the Jin Empire. Identification of new Jurchen graphemes in the group of

Fig. 6. A grapheme from the "red" group of rock representations at the Arkhara site. 2014.

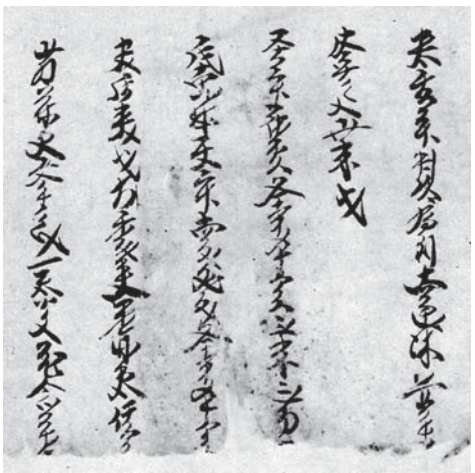

Fig. 7. Handwritten Jurchen text on paper from the collection of the Institute of Oriental Manuscripts of the Russian Academy of Sciences in St. Petersburg (Tangut Fund, inv. No. 3775-1).

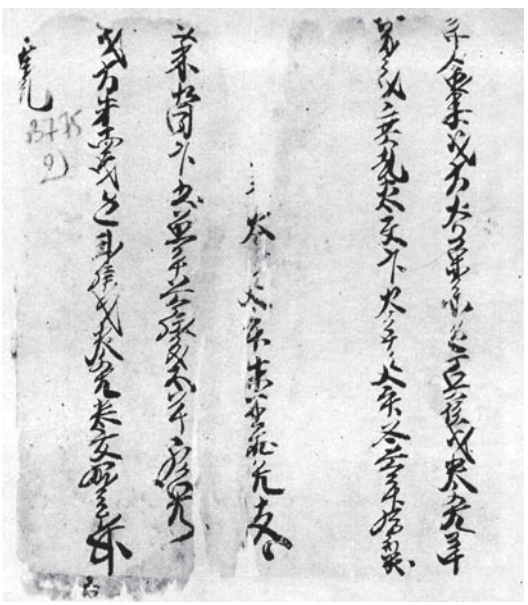

Fig. 8. Handwritten Jurchen text on paper from the collection of the Institute of Oriental Manuscripts of the Russian Academy of Sciences in St. Petersburg (Tangut Fund, inv. No. 3775-2).

the "red" signs will hopefully give new information on the Jurchen people, their history and culture.

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References

Aishingyoro Uruhichun, Esimoto Michimasa. 2017
Roshia, Aruhara kahan no Joshin daiji bokusho: Joshin, Kittan moji iseki o tadotte [Inscription Written in Ink, in Jurchen Large Script, from Arkhary River, Russia: In Search for Remaining Traces of the Jurchen and Khitan Scripts]. Kyoto: Hōyū shoten. (In Japanese).

Bichurin N.Y. 2002
Statisticheskoye opisaniye Kitaiskoy imperii: in 2 pts. Moscow: Vostochniy Dom. (Klassika otechestvennogo i zarubezhnogo vostokovedeniya).

Bolotin D.P., Nesterov S.P., Sapunov B.S., Zaitsev N.N., Sapunov I.B. 1998
Rezultaty issledovaniy gorodishcha i mogilnika u s. Pryadchino Amurskoy oblasti. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. IV. Novosibirsk: Izd. IAET SO RAN, pp. 201–206.

Bolshoy kitaisko-russkiy slovar po russkoy graficheskoy sisteme. 1984
In 4 vols. I.M. Oshanin (ed.). Vol. 3. Moscow: Nauka, Gl. red. vost. lit.

Derevianko E.I. 1981
Plemena Priamurya. I tysyacheletiye nashey ery: Ocherki etnicheskoy istorii i kultury. Novosibirsk: Nauka.

Derevianko E.I. 1988
Gorodishche na gore "Shapka". In *Epokha kamnya i paleometalla aziatskoy chasti SSSR*. Novosibirsk: Nauka, pp. 110–126.

Golovachev V.T., Ivliev A.L., Pevnov A.M., Rykin P.O. 2011
Tyrskiye stely XV veka: Perevod, kommentarii, issledovaniye kitaiskikh, mongolskogo i chzhurchzhenskogo tekstov. St. Petersburg: Nauka.

Kane D. 1989
The Sino-Jurchen Vocabulary of the Bureau of Interpreters. Bloomington, Indiana: Indiana Univ., Research Inst. for Inner Asian Studies. (Uralic and Altaic Ser.; vol. 153).

Kara D., Kychanov E.I., Starikov V.S. 1972
Pervaya nakhodka chzhurchzhenskikh rukopisnykh tekstov na bumage. In *Pismenniye pamyatniki Vostoka*. Moscow: Nauka, Glav. red. vost. lit., pp. 223–228, 398–399. (Istoriko-filologicheskiye issledovaniya; ezhegodnik 1969).

Kiyose Gisaburo N. 1977
A Study of the Jurchen Language and Script. Reconstruction and Decipherment. Kyoto: Hōritsubunka-sha.

Leroi-Gourhan A. 2009
L'art pariétal. Langage de la préhistoire. Grenoble: Éd. J. Millon.

Liangqian nian zhong xili duizhao biao. 1956
[A Sino-Western calendar for two thousand years 1–2000 AD]. Xue Zhongsan, Ouyang Yi he bian (comp.). Beijing: Shenghou, dushu, xinzhisanlian shudian. (In Chinese).

Mazin A.I. 1986
Tayezhniye pisanitsy Priamurya. Novosibirsk: Nauka.

Medvedev V.E. 1977
Kultura amurskikh chzhurchzheney: Konets X – XI vek (Po materialam gruntovykh mogilnikov). Novosibirsk: Nauka.

Medvedev V.E. 1986
Priamurye v kontse I – nachale II tys. (chzhurchzhenskaya epokha). Novosibirsk: Nauka.

Miller G.F. 1999
Istoriya Sibiri, vol. 1. 2nd edition. Moscow: Vost. lit.

Nesterov S.P., Zaitsev N.N., Volkov D.P., Mironov M.A. 2011
Arkheologicheskiye issledovaniya gorodishcha na gore Shapke v Amurskoy oblasti v 2009–2011 godakh. In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territoriy*, vol. XVII. Novosibirsk: Izd. IAET SO RAN, pp. 217–221.

Okladnikov A.P., Larichev V.E. 1999
Arkheologicheskiye issledovaniya v basseyne Amura v 1954 godu. In *Traditsionnaya kultura vostoka Azii*, iss. 2, D.P. Bolotin, A.P. Zabiyako (eds.). Blagoveshchensk: Izd. Amur. Gos. Univ., pp. 4–29.

Okladnikov A.P., Zaporozhskaya V.D. 1970
Petroglify Zabaikalya, pt. 2. Leningrad: Nauka.

Pallas P.S. 1786
Puteshestviye po raznym mestam Rossiyskogo gosudarstva po poveleniyu Sankt-Peterburgskoy imperatorskoy akademii nauk, pt. 2, Bk. 2. St. Petersburg: Imp. Akademiya nauk.

Pevnov A.M. 2004
Chteniye chzhurchzhenskikh pismen. St. Petersburg: Nauka.

Saenko. 1930
"Pisaniy kamen". In *Zapiski Amurskogo okruzhnogo muzeya i krayevededcheskogo obshchestva*, iss. 1. Blagoveshchensk: p. 34.

Spassky G. 1818
O drevnikh sibirskikh nachertaniyakh i nadpisyakh. In *Sibirskiy vestnik, izdavaemiy Grigoriyem Spasskim*, pt. 1. St. Petersburg: Tip. Ios. Ioannesova, pp. 71–85.

Spathari N.G. 1882
Puteshestviye cherez Sibir ot Tobolska do Nerchinska i granits Kitaya russkogo poslannika Nikolaya Spafariya v 1675 godu. Dorozhniy dnevnik Spafariya. St. Petersburg: Tip. V. Kirshbauma.

Terentiev-Katansky A.P. 1990
S Vostoka na Zapad. Iz istorii knigi i knigopechataniya v stranakh Tsentralnoy Azii VIII–XIII vekov. Moscow: Nauka, Gl. red. vost. lit. (Kultura narodov Vostoka: Materialy i issledovaniya).

Tivanenko A.V. 2011

Drevnyaya pismennost Sibiri. Osnovniye printsipy deshifrovki naskalnoy piktografii. Chita: Ekspress-izdatelstvo.

Von Strahlenberg Ph.J. 1730

Das Nord- und Östliche Theil von Europa und Asia. Stockholm: Verlegung des Autoris.

Vorobiev M.V. 1975

Chzhurchzheni i gosudarstvo Tszin (X v. – 1234 g.). Istoricheskiy ocherk. Moscow: Nauka, Gl. red. vost. lit.

Vorobiev M.V. 1983

Kultura chzhurchzheney i gosudarstva Tszin (X v. – 1234 g.). Moscow: Nauka, Gl. red. vost. lit.

West A. 2018

Jurchen inscription on the River Arkhara. *BabelStone Blog*. March 31. URL: http://www.babelstone.co.uk/Blog/2018/03/jurchen-inscription-on-river-arkhara.html (Accessed February 23, 2019).

Zabiyako A.P. 2008

Pisanitsy i pismennost. In *Istoriya Amurskoy oblasti s drevneishikh vremen do nachala XX veka*, A.P. Derevianko, A.P. Zabiyako (eds.). Blagoveshchensk: Amur. Gos. Univ., pp. 160–164.

Zabiyako A.P., Kobyzov R.A. 2004

Petroglify Arkhary: Istoriya izucheniya i problema interpretatsii. In *Migratsionniye protsessy na Dalnem Vostoke (s drevneishikh vremen do nachala XX v.): Materialy Mezhdunar. nauch. konf. (Blagoveshchensk, 17–18 maya 2004 g.)*. Blagoveshchensk: pp. 130–135.

Zabiyako A.P., Kobyzov R.A. 2008

Petroglify Zapadnogo Priamurya: Noviye materialy i interpretatsii (po materialam polevykh issledovaniy 2003–2007 gg.). In *Traditsionnaya kultura vostoka Azii*, iss. 5. Blagoveshchensk: Amur. Gos. Univ., pp. 232–246.

Zaitsev V.P. 2011

Rukopisnaya kniga bolshogo kidanskogo pisma iz kollektsii Instituta vostochnykh rukopisey RAN. *Pismenniye pamyatniki Vostoka*, No. 2 (15): 130–150.

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Evidence Relating to the Christian Missions in the Trans-Urals and Northwestern Siberia (8th to 16th Centuries)

This study addresses the possible activity of early Christian missions among the Vogul (Mansi) of the Urals, Trans-Urals, and northwestern Siberia between the 8th–16th centuries. Three stages in their history are described. The first (700–1000 AD) was marked by the import of Central Asian silver dishes (patens) reproducing Biblical themes and Christian symbols. Specimens from Grigorovskoye, Anikovskoye, and from Malaya Ob were cast in the Nestorian communities of Semirechye. The imported paten-dishes gave rise to the tradition of offering food to deities on metal dishes. The second stage (1200–1400 AD) began when silver plaques depicting the famous iconographic subject ("The Miracle of the Martyr Demetrius of Thessaloniki Defeating King Kaloyan of Bulgaria") were imported to the region. The third stage (15th and 16th centuries) correlates with the Russian expansion to Siberia and attempts to Christianize the local peoples. Symbols such as tin plaques were distributed to be worn by them. Apparently, most plaques represent the Biblical King David, and were manufactured by Russians in the late 1400s to early 1500s. In the 16th century, plaques with the figure of St. George appeared in Siberia. The analysis of items showing Biblical and hagiographical characters and analysis of their distribution in northwestern Siberia suggests that Christian missions were unable to oust paganism from the region. Russian religious items were used in rituals of the native peoples mostly if they represented horsemen, because these seemed to allude to the son of the Ob Ugric supreme deity Mir-Susne-Khum, also depicted as a horseman.

Keywords: *Christianity, mission, silver, Urals, Siberia, Khanty, Mansi.*

Introduction

As is known, before the arrival of the Russian people to the Urals and Western Siberia, the local population was pagan. The earliest information about the baptism of several princely families mentions the late 16th–17th centuries; the baptism mainly involved the ruling circles of the town of Koda (principality) (Novitsky, 1941: 73; Bakhrushin, 1935: 60; Perevalova, 2004: 62–64). Further Christianization of the Ostyaks and Voguls was associated with the decree of Peter the Great, relating to the baptism of foreigners and active missionary activities of Philotheus Leschinsky, carried out in 1706–1727 (Sulotsky, 1915: 30–49; Perevalova, 2004: 65–70).

This article suggests that Christian missions left their traces in the Urals and northwestern Siberia even earlier—in the 8th–16th centuries. These traces primarily involve metal items (bowls, dishes, medallions, and plaques) with the representations of Old Testament scenes and figures of Christian saints and martyrs. The territorial scope of this article is determined by the history of the Mansi settlement. Today, they mostly live in the Khanty-Mansi

Autonomous Okrug–Yugra and the Sverdlovsk Region. Mansi place-names make it possible to establish the area formerly inhabited by them: until the 14th century, the ancestors of the Mansi (the Voguls) lived much further to the west—in the Cis-Urals and the Middle Urals (Narody…, 2005: 199, 211–217).

Silver bowls of the 6th–10th centuries depicting Old Testament scenes and Christian symbols

Five such bowls found in the Urals and the northwestern Siberia are currently known.

The paten-dish "Angels flanking the Cross" (diameter 18.6 cm) was purchased before 1868 in Berezovo (presently, an urban-type settlement in the Khanty-Mansi Autonomous Okrug–Yugra) (Khvolson, Pokrovsky, Smirnov, 1899: 7, fig. 3; Smirnov, 1909: cat. 37); it is kept in the State Hermitage Museum. Y.I. Smirnov believed that the dish was cast by the Syrian Christians in the 6th century in Mesopotamia or Persia, or, in a broader sense, within the Sassanid State (Khvolson, Pokrovsky, Smirnov, 1899: 8). Representation of the Cross flanked by two angels on the dish constitutes the composition "Adoration of the Cross" or "Glory to the Cross", reproducing another Cross made from precious materials and located in a special place called the "Angelic Victorious Place" in the Jerusalem Church of the Holy Sepulchre. The composition "Adoration of the Cross" was popular among the Nestorian Syrians who lived in Mesopotamia (Sokrovishcha…, 1996: 70).

A **silver paten-dish** (diameter 23 cm) with scenes from the Gospels was found in 1897 near the village of Grigorovskoye in the Solikamsky Uyezd of the Perm Governorate; it is kept in the State Hermitage Museum and was first described in 1899 with comments by Y.I. Smirnov, D.A. Khvolson, and N.V. Pokrovsky, who described it as a Nestorian dish made by the Christians in Iran (Khvolson, Pokrovsky, Smirnov, 1899: 1–45). Today, it is believed that the dish was cast in Semirechye in the 9th–10th centuries (Darkevich, Marshak, 1974: 215).

The compositions of the "Ascension", "Myrrh-bearing Women at the Tomb", and the "Crucifixion" are represented on the front side of the dish in three interlacing medallions; the compositions of "Daniel in the Lion's Den", the "Denial of Peter", and the "Guards at the Tomb of the Lord" were depicted in free spaces, and the Cross was engraved in the center of the dish. The inscriptions on the dish are made in Syriac. Smirnov suggested that the Grigorovskoye dish, like the dish with the angels flanking the Cross, was used for some ecclesiastical purposes, possibly for the particles of the Holy Gifts under the guise of bread, which means that functionally these dishes were patens (Khvolson, Pokrovsky, Smirnov, 1899: 32–34).

The **Anikovskoye dish** (diameter 23.5–23.9 cm) from the collection of the State Hermitage Museum was found in 1909 near the village of Bolshe-Anikovskaya in the Cherdynsky Uyezd of the Perm Governorate (Darkevich, 1976: 28–29) (Fig. 1, *a*). The image of a fortress surrounded by ten riders on both sides is depicted in the center of the front side. The figures of three warriors are shown in the upper part of the building; the heads of four more people can be seen in watchtowers. The figures of seven musicians with raised up trumpets and a man holding a box on his shoulders are represented in the middle of the composition. A woman with raised arms is shown in the window above the entrance to the fortress.

B.I. Marshak convincingly argued that the front side of the dish represents events from the Book of Joshua, modified in the Central Asian environment. In his opinion, the sequence of these events is shown from the bottom up. The siege of Jericho is represented below with Rahab the Harlot depicted in a window set in the city wall; above this, the Ark of the Covenant is carried out accompanied by seven priests with "seven trumpets of rams' horns"; even higher, the capture of the Canaan city and Joshua who stopped the moon and sun (Marshak, 1971: 11). Marshak believed that the dish was cast in the 9th–10th centuries in Semirechye according to a cast from an original of the 8th century (Ibid.). His version was supported by V.P. Darkevich (1976: 28–29).

The **Nildino dish** (diameter 23–24 cm), the twin of the Anikovskoye dish, is dated to the 8th–early 9th century, and belongs to the production of artisans' workshops from Central Asia (Fig. 1, *b*). It was discovered in 1985 at the Mansi sacred site in the basin of the Severnaya Sosva River (Berezovsky District, Khanty-Mansi Autonomous Okrug–Yugra). The local population revered this silver dish for the representation of the deities of their pantheon, including Polum-Torum—the "Pelym god" and his son (Gemuev, 1988). The legend of finding this dish during fishing, which was recorded by V.N. Chernetsov in the 1930s, said that "seven dishes, all of which were the same" were found among the fish after fishing with a net, and that "the rest of the dishes were taken to other places…" (Istochniki…, 1987: 265).

Silver dish with the image of the Biblical kings (diameter 24 cm), which was made in the 8th–9th centuries in Central Asia, was discovered at the Khanty sacred place in the Malaya Ob Basin (Berezovsky District, Khanty-Mansi Autonomous Okrug–Yugra). It played an important role in religious rituals of the Northern Khanty: during the ceremony, pieces of sacrificial bread which could be taken by the elders or orphan guests who were present, were placed onto it

Fig. 1. The Anikovskoye (*a*) and Nildino (*b*) silver dishes.

Fig. 2. Dish representing the Biblical Kings David and Solomon used during a sacrificial ceremony.

(Baulo, 2000: 143) (Fig. 2). A scene associated with the legendary rulers of the Kingdom of Israel and Judea is represented on the front side of the dish: David, enthroned, is holding a musical instrument in his hands; Solomon is to his right, and Bathsheba, David's wife and Solomon's mother, is to his left.

Thus, by now, five silver dishes of the 6th–10th centuries depicting Old Testament scenes and Christian symbols have been found in the Urals and northwestern Siberia; the Mansi legend recorded by Chernetsov mentions six other dishes. Four of the dishes cast in the 8th–10th centuries in craftsmanship centers of Central Asia are united by episodes of the Old Testament represented on them, and therefore these items can be considered testimonies of the early period of Christianity in that region. The dish-paten "Angels flanking the Cross", which had belonged to Christian Syrians, is earlier (6th century), and its place of production is to the south and east of Semirechye—in Mesopotamia or Persia. In fact, we can speak about a certain route from east to west,

by which precious items with Christian symbols were transported: Syria – Mesopotamia – Iran – Central Asia – the Urals – Trans-Urals.

It is known that the Nestorian movement to the east began after the deposition of Nestorius at the Third Ecumenical Council in 431. His views were met with support in East Syria and influenced the Persian Christian Church. Christianity penetrated Persia quite early in the beginning of the 4th century. Several Persian bishops took part in the Council of Nicaea in 325. After 431, when the Nestorian doctrine was anathematized, most of its followers fled to Persia, where their numbers and influence gradually increased (Khvolson, Pokrovsky, Smirnov, 1899: 3). In 499, Nestorianism was proclaimed the official doctrine of the Persian Christians. The Nestorian communities of Iran enjoyed the patronage of the Sassanian kings, and later of the Arab rulers (Darkevich, 1976: 100, 103).

By the early 6th century, a Christian Nestorian community headed by a bishop was also present in Samarkand (Belenitsky, 1954: 37). In the history of Semirechye, the period from the late 8th until the first half of the 10th century witnessed the success of Christianity. At the turn of the 8th and 9th centuries, Nestorian clergy succeeded in Christianizing the king of the Qarluqs who reigned in this region, and in organizing a diocese (Darkevich, Marshak, 1974: 219). In Khwarazm, Christian colonies existed in the 7th–8th centuries (Srednyaya Aziya…, 1999: 26, 46).

In the 6th–10th centuries, pilgrims would bring Syrian and Palestinian amulets, as well as larger items, from their trips to the Holy Land, and later these gifts ended up in the Nestorian monasteries of Central Asia and in the hands of the Persian Christians (Khvolson, Pokrovsky, Smirnov, 1899: 12; Darkevich, Marshak, 1974: 214). Syrian missionaries reached Central Asia and Eastern Turkistan, where they preached their doctrines (Darkevich, 1976: 100).

Starting in the 6th–7th centuries, merchants from Sogdia and Khwarazm began to make their way to the north, including the Upper Kama River region. They were mainly interested in walrus tusks, hunting birds (falcons), and furs. At the turn of the 7th–8th centuries, the Ob region started to become involved in trade with the south through the Kama River region (Sokrovishcha…, 1996: 6–9).

It can be assumed that Christian missionaries, carrying silver dishes with Biblical themes, also moved along with merchants with trade caravans to the north. It is difficult to judge how successful these missions were, but some formal ritual activities could have become rooted in the foreign ethnic environment. In fact, the silver dish at the Khanty sanctuary fulfilled the functional purpose of the paten—the sacrificial bread was placed on it.

Silver plaques with representation of a rider defeating a warrior

In recent years, several silver round plaques united by a common military subject have been discovered in the Urals and northwestern Siberia. The most common type of these items is a plaque made of thin silver plate with a diameter of 7.4 cm; its bent edges fasten a copper wire, which acts as a frame. A rider is depicted in the center: the horse is in profile view; the man is full face. He is holding a bridle in his left hand and a spear in his right hand. A warrior with a saber in his right hand is lying under the horse.

Two such plaques were found in the 1970s by the residents of the village of Shuryshkary in Shuryshkarsky District of the Yamalo-Nenets Autonomous Okrug, at the archaeological site of Belaya Gora. One plaque entered the funds of the Museum of Nature and Man (Khanty-Mansiysk) (Komova, Pristupa, 2012: 128–129) (Fig. 3); another one (distinguished by the presence of a loop for hanging) entered the funds of the Shemanovsky Museum and Exhibition Complex (Salekhard) (Fedorova, 2005: 20). Several more similar plaques are known, which were mainly found during unauthorized excavations (Rudenko, 2015: 96, ill. 184). A larger item (diameter 12.5 cm) with a similar subject from a private collection originates from an unknown archaeological site near the village of Urol (Cherdynsky District, Perm Region). This is a fairly thick round plaque consisting of several layers of silver and having a bronze loop for hanging (Fig. 4).

A similar subject (a rider striking a warrior lying on the ground with a spear) is present in the iconography known as “The Miracle of St. Demetrius of Thessaloniki”. A text

Fig. 3. Small silver plaque with the representation of a rider defeating a warrior.

Fig. 4. Silver plaque with the representation of a rider defeating a warrior.

of the second half of the 13th century tells about Tsar Ivan Kaloyan, the ruler of Bulgaria. In 1207, he besieged the city of Thessaloniki, but suddenly died or was killed; after that, the siege of the city ended. According to the legend, the Great Martyr Demetrius came to the tent of Kaloyan at night and pierced him with a spear in his heart (Ivanova et al., 2007: 155–170). Representations of this miracle started to appear in the second half of the 13th century. They show the Great Martyr Demetrius in military attire on a horse, holding a spear in his hand, with which he is killing the Tsar Kaloyan, who has fallen to the ground. In Old Russian art, this iconography can be found in scenes on hagiographical icons since the late 15th century, but in that version, Demetrius strikes with a spear Kaloyan who is riding a white horse (Ibid.).

Thus, if we assume that silver plaques with the image of the rider and defeated warrior show simplified iconography of "Demetrius of Thessaloniki defeating Tsar Kaloyan", the production of plaques should be dated to the 13th–15th centuries, and their Russian origin should be excluded. It is difficult to accurately establish the place of their production.

Russian tin plaques of the late 15th–16th century with Christian subjects

The author of this article has already written about a group of Russian round tin plaques demonstrating the image of King David, which were found on a cape near the village of Manya (Berezovsky District of the Khanty-Mansi Autonomous Okrug–Yugra). This place correlates with the Iskarsky fortified settlement. "In old times, it was inhabited both by the Voguls and Zyrians who at first traded here with these Voguls" (Sibir…, 1996: 245). In total, six plaques with a diameter of 4.4 cm were found. They are of three types: with the image of King David who jumped on a lion and is tearing its mouth; with a composition representing King David on the throne, and two men holding goblets in their hands (the feast of King David can be recognized in this composition), and with the images of a double-headed eagle, Star of David, and three birds. Fragments of two similar tin plaques (a feast scene, "King David and the Lion") were discovered in 2006 in a sacred barn of the Khanty in the Shuryshkarsky District of the Ymalo-Nenets Autonomous Okrug. Analysis has made it possible to suggest the Russian origin of these items and the time of their casting as not earlier than the late 15th to early 16th century (Baulo, 2014). This group should also include a tin plaque 5.4 cm in diameter with a loop, recently found in Oktyabrsky District of the Khanty-Mansi Autonomous Okrug–Yugra. The rider is depicted on the front side, killing a snake with a spear, and can be correlated with St. George (Fig. 5).

It may be assumed that the tin plaques with the representations of King David and St. George mentioned above were cast in fairly large quantities by Russian artisans, and were intended for delivery to Siberia at the late 15th–16th century in the attempts to convert the Voguls to the Orthodox faith. The loops of the plaques made it possible to wear them around the neck. Plaques with the image of St. George could have been perceived by the Ostyaks and Voguls in a way compatible with their own religious and mythological beliefs, since any image of a man on horseback was associated for them with the sacred image of a popular deity, the son of the supreme god Numi-Torum—the Heavenly Rider Mir-Susne-

Fig. 5. Small plaque with the representation of St. George killing a snake.

Khum. Even at a later time, in the early 19th century, Russian artisans continued to actively use the image of St. George on silver saucers, which were produced in the workshops of Tobolsk at the request of non-Russians (Gemuev, Baulo, 1999: 54–57).

Conclusions

The evidence presented in this article suggests that Christian missions began their work in the Urals and northwestern Siberia at a relatively early period. They might have moved together with the trade caravans of the Sogdian and Khwarazmian merchants, which were discovering northern trade routes beginning in the 7th–8th centuries. In chronological terms, we can distinguish three stages of possible activities on the part of Christian missions.

The first stage (8th–10th centuries) was associated with importing silver dishes with Biblical themes and Christian symbols to the north. These were mainly vessels cast in the Nestorian communities of Semirechye. Imported dish-patens could have contributed to the emergence of the tradition of offering sacrificial food (later, bread) to the deities on metal dishware (silver dishes) among the Siberian peoples.

The second stage (13th–14th centuries) was associated with importing silver plaques of various diameters, the subject of which could have reproduced the well-known legend of Great Martyr Demetrius of Thessaloniki, who killed the Bulgarian Tsar Kaloyan, to the Urals and Trans-Urals. It is difficult to establish the production place of such items, but the suggested hypothesis excludes Russian workshops.

The third stage (late 15th–16th centuries) can be associated with the advancement of the Russian people to Western Siberia and attempts to Christianize the local population. These attempts could have involved distribution of Christian symbols—tin plaques to be worn with subjects associated with King David and St. George.

It is difficult to say to which extent Christian subjects could have entered the local mythology, since it is problematic to date the legends and tales of the Khanty and Mansi which have reached our days. At the very least, traces of Christian subjects are obvious in the northern Mansi folklore recorded in the second half of the 19th century; they concern, for example, legends about the creation of man, the flood from heaven, and the conflict between God and the devil (see, e.g., (Gondatti, 1888: 48–50)).

Possible activities of Christian missions in the Urals and northwestern Siberia in the early stages did not achieve their main goals: the overwhelming part of the imported paraphernalia ended up at sacred places of the Ob Ugrians, while religious and mythological beliefs continued to bear a pagan character.

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References

Bakhrushin S.V. 1935
Ostyatskiye i vogulskiye knyazhestva v XVI–XVII vv. Leningrad: Izd. Inst. narodov Severa.

Baulo A.V. 2000
Silver plate from the Malaya Ob. *Archaeology, Ethnology and Anthropology of Eurasia*, No. 4: 143–153.

Baulo A.V. 2014
Metal plaques from the fortified settlement Old Iskarra: Attribution and subjects. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 42 (4): 120–124.

Belenitsky A.M. 1954
Voprosy ideologii i kultov Sogda (po materialam pyandzhikentskikh khramov). In *Zhivopis drevnego Pyandzhikenta*. Moscow: Izd. AN SSSR, pp. 25–82.

Darkevich V.P. 1976
Khudozhestvenniy metall Vostoka: Proizvedeniya vostochnoy torevtiki na territorii yevropeiskoy chasti SSSR i Zauralya. Moscow, Leningrad: Nauka.

Darkevich V.P., Marshak B.I. 1974
O tak nazyvayemom siriyskom blyude iz Permskoy oblasti. *Sovetskaya arkheologiya*, No. 2: 213–222.

Fedorova N.V. 2005
Srednevekovoye serebro Volzhskoy Bolgarii. In *Svetozarnaya Kazan: Albom-katalog vystavki*. St. Petersburg: Artego, pp. 20–21.

Gemuev I.N. 1988
Eshche odno serebryanoye blyudo iz Severnogo Priobya. *Izvestiya SO AN SSSR*. No. 3: Ser. istorii, filologii i filosofii, iss. 1: 39–48.

Gemuev I.N., Baulo A.V. 1999
Svyatilishcha mansi verkhovyev Severnoy Sosvy. Novosibirsk: Izd. IAET SO RAN.

Gondatti N.L. 1888
Sledy yazycheskikh verovaniy u inorodtsev Severo-Zapadnoy Sibiri. Moscow: [Tip. Potapova].

Istochniki po etnografii Zapadnoy Sibiri. 1987
N.V. Lukina, O.M. Ryndina (publ.). Tomsk: Izd. Tom. Gos. Univ.

Ivanova O.V., Turilov A.A., Lukashevich A.A., Preobrazhensky A.S. 2007
Dimitriy Solunskiy. In *Pravoslavnaya entsiklopediya*, vol. XV. Moscow: Tserk.-nauch. tsentr “Pravoslavnaya entsiklopediya”, pp. 155–195.

Khvolson D.A., Pokrovsky N.V., Smirnov Y.I. 1899
Serebryanoye siriyskoye blyudo, naidennoye v Permskom kraye. St. Petersburg: [Tip. Imp. Akad. nauk]. (Materialy po arkheologii Rossii; No. 22).

Komova N.G., Pristupa O.I. 2012
Serebro drevney Yugry: Katalog. Khanty-Mansiysk; Yekaterinburg: Basko.

Marshak B.I. 1971
Sogdiyskoye serebro. Moscow: Nauka.

Narody Zapadnoy Sibiri: Khanty. Mansi. Selkupy. Nentsy. Entsy. Nganasany. Kety. 2005
I.N. Gemuev, V.I. Molodin, Z.P. Sokolova (eds.). Moscow: Nauka.

Novitsky G. 1941
Kratkoye opisaniye o narode ostyatskom. Novosibirsk: Novosibgiz.

Perevalova E.V. 2004
Severniye khanty: Etnicheskaya istoriya. Yekaterinburg: UrO RAN.

Rudenko K.A. 2015
Bulgarskoye serebro. Kazan: Zaman. (Drevnosti Bilyara; vol. 2).

Sibir XVIII veka v putevykh opisaniyakh G.F. Millera. 1996
In *Istoriya Sibiri: Pervoistochniki*, iss. VI. Novosibirsk: Sib. khronograf.

Smirnov Y.I. 1909
Vostochnoye serebro: Atlas drevney serebryanoy i zolotoy posudy vostochnogo proiskhozhdeniya, naidennoy preimushchestvenno v predelakh Rossiyskoy imperii. St. Petersburg: Imp. arkheol. komissiya.

Sokrovishcha Priobya. 1996
St. Petersburg: Formika.

Srednyaya Aziya v rannem srednevekovye. 1999
Moscow: Nauka.

Sulotsky A. 1915
Zhizn svyatitelya Filofeya, mitropolita Sibirskogo i Tobolskogo, prosvetitelya sibirskikh inorodtsev. Shamordino Kaluzhskoy gubernii: [Tip. Kazanskoy Amvrosievskoy zhenskoy pustyni].

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Ivan Lepyokhin's Expedition to the Middle Volga*

This study describes Ivan Lepyokhin's journey to the Middle Volga as part of the 1768–1774 Academic Expedition. All the 18th-century expeditions from the Academy of Sciences were aimed at colonizing new territories, especially the eastern ones, exploring their landscapes, natural resources, and inhabitants. The article focuses on the team working in the Cheremshan basin. The description of findings is arranged in five sections, following Lepyokhin's classification: landscape, population, clothing, occupations, and rituals. For the first time, a complete, updated, and verified list of settlements visited by the expedition members is provided. The role of the Imperial St. Petersburg Academy of Sciences Director, Count Vladimir Orlov, in the organization of the expedition is described. The author disproves the opinion regarding the authorship of the anonymous article "Brief Report about the Simbirsk Governorship" published in the "Mesyatsoslov" journal in 1786. The authors to whom the article was attributed include Lepyokhin, Maslenitsky, and Ozeretskovsky, but the textological analysis of the article and of a manuscript at the Russian State Archives of Military History suggests that this is a collective digest of manuscripts by Milkovich and Maslenitsky.

Keywords: *1768–1774 Academic Expedition, Ivan Lepyokhin, Middle Volga, Cheremshan River basin, ethnography.*

Introduction

By and large, the main task of all academic expeditions in the 18th century was appropriating the lands of the state, describing the landscape, flora, and fauna, as well as studying the population patterns of the territories. The state needed to occupy empty lands, extract natural resources from them, and grow crops, which naturally needed a workforce. Settlers sometimes did not limit themselves to the granted lands and whenever they could, seized nearby land plots or lands belonging to the indigenous population. Non-Russians did the same. Thus, the plot near the village of Shlanga in the Simbirsky Uyezd "was seized without authorization by eighteen fugitive Chuvash peasants from various uyezds of the Kazan Governorate, led by Krymka, the son of Ivash. They have already built their shacks on the captured land, plowed arable areas, and sowed rye" (Gromova, 2010: 47). As a result, the Chuvash village of Krymovo emerged in this place.

This topic has become the subject of several studies. However, none of them were directly related to the analysis of the Middle Volga materials recorded by the unit under the leadership of Ivan Lepyokhin. Thus, the book of N.G. Fradkin provided a general overview of the life and work of this scholar (1953). T.A. Lukina predominantly focused on Ivan Lepyokhin's research on Siberia, giving only a summary of the ethnography of the peoples living in the Volga region (1965), while L.D. Bondar analyzed the Urals stage of the expedition (2018).

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Locations of the survey

We should first indicate the settlements of the Middle Volga region, surveyed by the unit of Ivan Lepyokhin from August 25th, 1768 to May 20th, 1769 (within the present-day administrative and territorial entities; present-day names are given in parenthesis)*:

Orenburg Region
Severny District
Tatarsky Bakai village (Bakaevo settlement)
Sok-Karmala settlement (Severnoye settlement)

Penza Region
Lopatinsky District
Genaralshchino village (Generalshchino settlement)

Republic of Tatarstan
Alekseevsky District
Chuvashsky Bilyar settlement (Bilyar fortified settlement)
Tatarsky Bilyar village (Bilyarsk settlement)
Bugulminsky District
Bugulma suburb (Bugulma town)
Karabash (Karabash urban settlement)
Spaskoye settlement (Spasskoye settlement)
Tatar village of Dymskaya (Tatarskaya Dymskaya settlement)
Leninogorsky District
Karatai (Zai-Karatai settlement)
Kuakbash (Kuakbash settlement)
Nurlatsky District
Bekulovo village (Bikulovo village)
Bilyar settlement (Bilyar-Ozero settlement)
Karaulnaya Gora village (Karaulnaya Gora village)
Kikly village (Burmetyevo settlement)
Chuvash village of Yakushkin (Yakushkino settlement)
Spassky District
Bulgar fortified settlement (Bolgar town)
Tetyushsky District
Tetyushi suburb (Tetyushi town)
Cheremshansky District
Cheremshanskaya fortress (Cheremshan settlement)

Samara Region
Bezenchuksky District
Perevolka settlement (Perevoloki settlement)
Kamyshlinsky District
Tatar village of Baitugan (Tatarsky Baitugan settlement)
Tatar village of Kamyshly (Kamyshla settlement)
Klyavlinsky District
Mordovian village of Sosny (Novye Sosny settlement)
Stary Betermish village (Stary Baitermish settlement)
Koshkinsky District
Mordovskaya Karmala village (Staraya Karmala settlement)
Novaya Maksimkina village (Maloye Maksimkino village)
Krasnoyarsky District
Novyi Buyan (Novyi Buyan settlement)
Rakovka village (Bolshaya Rakovka settlement)
Staryi Buyan village (Staryi Buyan settlement)
Sergievsky District
Orlyany (Verkhnyaya Orlyanka settlement)
Sergievsk suburb (Sergievsk settlement)
Spaskoye settlement (Spasskoye settlement)
Chornovikh village (Chernovka settlement)
Yakushkino village (Staroye Yakushkino settlement)
Stavropolsky District
Rezan settlement (Bolshaya Ryazan settlement)
Stavropol city (Tolyatti city)
Staraya Brusyana settlement (Brusyany settlement)
Chuvashskoye Syurikovo village (Sevryukaevo settlement)
Syzransky District
Sisran city (Syzran city)
Chelno-Vershinsky District
Sedelkino/Sidelkino/Mordovskoye Sedelkino settlement (Sidelkino settlement)
Staraya Tayaba (Staraya Tayaba settlement)
Shigonsky District
Usolye settlement (Usolye settlement)
Chuvashskoye Taidakovo village (Taidakovo Usolye settlement)

Ulyanovsk Region
Sinbirsk city (Ulyanovsk city)
Melekessky District
Nikolskoye settlement (Nikolskoye-na-Cheremshane settlement)
Mordovian village of Birlya (Birlya settlement)
Russky Melekes village (Russky Melekes settlement)
Chuvashsky Melekes village (Dimitrovgrad city)
Chuvash village of Suskan (Chuvashsky Suskan settlement)
Novomalyklinsky District
Tatar village of Abtreikina (Abdreevo settlement)
Besovka settlement (Staraya Besovka settlement)
Malykla Novaya (Novaya Malykla settlement)
Sentemir (Stary Santimir settlement)
Chuvashskaya Malykla village (Staraya Malykla settlement)

*The main sources for compiling this list were diary records and traveling reports (Dnevnik…, 1768–1772; Prikhodo-raskhodnaya kniga…, 1768–1772; Lepyokhin, 1771), as well as maps and reference books of administrative and territorial entities.

Chuvashskaya Yakushkina village (Nizhnyaya Yakushka settlement)
Chuvashsky Salavan (Novocheremshansk urban settlement)
Terengulsky District
Chuvash village of Baidulina (Baidulino settlement)
Yasashnaya Tashla (Yasashnaya Tashla settlement)
Ulyanovsky District
Gorodishchi settlement (Gorodishche village)
Klyuchishchi settlement (Bolshie Klyuchishchi settlement)
Cherdaklinsky District
Brendino settlement (Bryandino settlement)
Matyushkino settlement (Staroye Matyushkino settlement)
Sukhodol settlement (Sukhodol settlement)
Cherdaki settlement (Cherdakly urban settlement)
Krasny Yar village (Krasny Yar settlement)
Chuvash village of Karmayur (Chuvashsky Kalmayur settlement)

Landscape

Concerning the area under discussion, it should be mentioned that in the 18th century, a part of the Chuvash people from the right bank of the Volga moved to the Cheremshan River basin—virtually to the lands inhabited by their historical ancestors the Suvars in the late 9th to early 10th century (Salmin, 2017: 49–50, 57–58). People were also resettled to free lands from other regions of Russia. Fortresses were built there to protect the southern frontiers.

The diary of Ivan Lepyokhin is noteworthy for the fact that while writing down his traveling route, he immediately included notes about the area, which described the local landscape, for example, "From the Chuvash [village of – *translator's note*] Melekes, we drove through the aforementioned vast pine forest, where in two versts, the Cheremshan oxbow lake was located, which now constitutes a swamp overgrown with forest. After traveling for about three versts from the oxbow lake, we crossed the Cheremshan River and drove to the Cheremshan meadow side. Vast and rich fields appeared on the meadow sides, and accumulations of groves, all filled with wild roses, were on the right side. The Chuvash village of Yakushkina, located 10 versts away, served as a base for us. A small river called the Avrel [Avral – **A.S.**] flows through this village out of a spring near the Tatar village of Abtreikina into the Cheremshan River" (Lepyokhin, 1771: 129).

In the area around the Cheremshanka River, travelers often encountered "hilly places rich with black soil", lakes, rivers, and swamps. Crucian carp of "great size and taste" lived in the lakes. Travelers went for 10–15 miles across "steppe area", and "small groves, for the most part". "One and a half versts from Baidulin, there was a ridge of low mountains, stretching as a band for about ten versts. <…> Lady's slippers (Cypripedium calceolus)… and large lilies of the valley (Hemoracallis liliastrum) grew abundantly on the mountain. <…> Urban spurge (Euphorbia segetalis) and hairy spurge (Euphorbia pilosa) grew in low places" (Ibid: 317–320). Or: "It was a very smooth steppe road, and it was completely plowed" (Dnevnik…, 1768–1772: Fol. 50). On the bank of Cheremshan River, the travelers found a great number of rose bushes and wild hops. And in another area, they "could not find anything except a great number of hops" (Ibid.: Fol. 51v).

Thus, we have the first reliable description of landscapes near the Cheremshan River, as well as the flora and fauna of the present-day Ulyanovsk and Samara Regions, and the Republic of Tatarstan as things stood in the second half of the 18th century. As scholars have rightly pointed out, many species of flora and fauna in these places have now either completely disappeared or are on the verge of extinction. "These representatives of the animal world include the Russian desman" (Gurkin, 2011: 191). According to Ivan Lepyokhin, almost all floodplain lakes near Simbirsk were abundantly inhabited by the Russian desman. Extinct species also include beluga, sturgeon, sterlet, and starred sturgeon.

Population

Simultaneously with the construction of the Simbirsk Great Abatis Line in 1648, the population was resettled to the region. Until that time, there were almost no Russian villages there. Even the villages of the original inhabitants (the Chuvash people, Mordvins, and Tatars) were not continuous. Occasionally, there were "guarding posts"—"posts for observing enemy movements, and 'wild fields' and 'empty lands' spread over immense spaces inside the region" (Martynov, 1904: 7).

When Ivan Lepyokhin mentioned the location of his stay, he also indicated the ethnicity of the population. Let us cite only some excerpts from his notes describing the ethnic composition of the population living in the Cheremshan River basin: "By the evening, we arrived at the Chuvash village of Melekes"; "it is only 10 versts from the Russian Melekes to the Chuvash Melekes"; "there is a vast and dense pine forest between the Russian and Chuvash Melekes"; "the Chuvash village of Yakushkina"; "the river… flows out of a spring near the Tatar village of Abtreikina"; "we went from the village of Yakushkina to the Chuvash village of Malykla Novaya".

Clothing

Ivan Lepyokhin mentioned that the Chuvash people, Mordvins, and Tatars wore the same shirts as the Russian peasants, but the shirts of the Chuvash people and the Mordvins were embroidered around the collar and on the shoulders with multicolored wool. The Chuvash people wore only white embroidered shirts, while the Tatars on the holidays wore caftans of woolen cloth and beshmets of various colors (Lepyokhin, 1771: 159, 162). As for shoes, they all wore bast shoes, but had boots for special occasions (Dnevnik…, 1768–1772: Fol. 63v; Lepyokhin, 1771: 226).

One of the most precious adornments of the Chuvash women was the *khushpu* headdress, which was worn over the *surpan* (head cover) and tied with a strap under the chin. The *khӳre* ("tail" of canvas) was sewn to it in the back. This "tail" went down almost to the back of the knees, gradually tapering towards the end. The *khӳre* was passed under the belt and was invisible under the outer garment (Lepyokhin, 1771: 159; Pallas, 1773: 136).

Old silver kopecks and rubles constituted the main value of the *khushpu*. Its entire surface was covered with sewn-on coins resembling fish scales with smaller coins at the top, larger coins below, and large twenty kopeck coins in the bottom row. There are references to seven rows of coins or *nukhrats* (imitations of silver coins). Three silver coins hung on the forehead (a large coin in the middle, two smaller coins on the sides). In addition, the *khushpu* was decorated with a variety of tin sequins and beads in several rows, and was hung around with strings of beads and bead-like oval-shaped plaques. Freely hanging strings with coins were sewn around the entire circumference. At the bottom, the *khӳre* was embroidered with colored wool and finished with colored laces; it was studded with beads and cowry shells. Generally, such a headdress was quite weighty. The festive shaft bow of a horse harness was compared to the *khushpu* of a rich bride because of its rich decoration (Lepyokhin, 1771: 159; Pallas, 1773: 136; Ashmarin, 1941: 277).

The Tatar women of the Cheremshan River basin also wore *kashpau*: "Some have *kashpau* with a pointed tip like a cone, and the top of the cone is covered with a small cast silver cone. Others, on the contrary, have *kashpau* without the headdress crown, in which case the top of the head is covered with a scarf. Near the temples, ties, studded in the same way, are attached to the *kashpau*. They are fastened under the neck with a button and are called the *kashpau sakal*" (Lepyokhin, 1771: 160). Ivan Lepyokhin believed that the *kashpau* was borrowed by the Chuvash women from the Tatars. This point requires clarification: headdresses with a pointed silver cone in the upper part were not worn by all Tatar and Chuvash women, but only by unmarried girls, and this headdress was called not *khushpu/kashpau*, but *tukhya/takya*.

Ivan Lepyokhin also noticed that the headdress of the Vogul women "somewhat resembles the Chuvash headdress, and consists of a thick, white drabbet cloak; the women covered their head with scarves, and in the winter they wore *malakhais*; the girls braided [their hair] and walked around wearing a headdress studded with multicolored beads" (1814: 28–29).

According to the observations of the traveler, the dwellers of the settlements which he studied, did not use soap, but instead used ash. They first soaked their undergarments interlaid with ash for five or six days in a trough. Then they washed them, adding warm water as needed. Every thing was scrubbed with ash. Then they went to the river to rinse it (Lepyokhin, 1771: 151–152).

Occupations

Already the medieval sources mentioned the fertility of lands around the Cheremshan River. Dwellers of the town of Suvar in the Volga Bulgaria had many croplands and an abundance of wheat (Al-Muqaddasi, 1994: 289). In the 11th–12th centuries, the main agricultural crops in the Cheremshan River basin were millet and oats (Gazimzyanov, Nabiullin, 2011: 22).

In the 10th century, the population used advanced agricultural tools. The transition to plowing cultivation of land required a large number of iron tools (coulters, plow blades, axes), which contributed to the further development of metallurgy. The *saban* wooden plow of primitive design with metal cutting parts, which was used by the Chuvash people until the mid 20th century, goes back to the cultivation culture of the 10th century. Its metal parts (ploughshare *tĕren*, cutter *shărt*) are exhibited in museums. This type of tool must have developed in the Middle Volga region, because it was suitable for heavy soils. Most likely, the *saban* had been used in the region even before the arrival of the Bulgars and Suvars (Smirnov, 1951: 17, 84–85).

In the 18th century, rye, oats, and farro were the most frequently cultivated crops. Flax and hemp were grown only for people's own needs. Buckwheat was not a popular crop (Lepyokhin, 1771: 144). Near the village of Yakushkino, entire fields were covered with watermelons and melons, which, according to the dwellers, gave a good harvest. As follows from the report of the expedition, the Chuvash people were engaged in cultivating arable lands, while the Qizilbashes cultivated cucurbits and tobacco (Ibid.: 121, 131). "They all are engaged in arable farming with the only difference that the Mordvins sow more than the others. The Chuvash people come in second; the Tatars come after the Chuvash people, while the Qazylbashes sow almost nothing at all, but live from cattle breeding and are hired as shepherds. The women of both the Mordvins and Chuvash people are very hard

working, and they not only help their husbands, but plow on their own, and do almost every kind of work as their husbands" (Ibid.: 41).

The local population began to hire shepherds starting from when the Kalmyks settled near the Kondurcha River. Prior to that, the cattle grazed in the wild. In the households, people made fences for cattle, called *karta*. In the summer, cattle mostly grazed beyond the outskirts of the village. "In the morning, when they go to milk the cows, they feed their cattle with chopped straw from farro or spring wheat. They cut it finely, mix it with some flour, and add boiling water, especially in the wintertime. After watering the cattle at noon, they give hay to it, and in the evening they give straw again. They feed the sheep with straw in the same way, but this occurs not because of a shortage of hay, but because they think that sheep which are fed only hay often become mangy, give bad wool, and do not grow as fat" (Ibid.: 149). Peasants sheared sheep twice a year—in the spring, when the sheep were drafted into the herd, and in the fall. Then the wool was spun.

Visiting Russians from nearby places worked as blacksmiths there, and the members of the expedition did not see a single blacksmith who was a Chuvash or a Mordvin (Ibid.: 153). This can be explained by the fact that according to the Tsar's decree, non-Russians were forbidden to engage in blacksmithing since the time of Peter the Great. The authorities were afraid that the Chuvash people, Cheremis people, and Votyaks would manufacture weapons. The villagers even had to buy agricultural tools such as axes, scythes, sickles, and knives at the market in Kazan (Polnoye sobraniye…, 1830: 286–287). Generally, local residents practiced almost no craftsmanship. Many Chuvash people worked at the nearby state-owned distilleries and complained about an exploitative attitude towards them (Dnevnik…, 1768–1772: Fols. 50v, 54).

Describing the colonies of the Germans, Ivan Lepyokhin mentioned their diligence. They grew all kinds of vegetables in their vegetable gardens, and tilled the land with plows (Lepyokhin, 1771: 382).

In the 1760s, *yasak* tribute was collected from the Volga yasak-paying people. The local Mordvins, Chuvash people, and Tatars paid numerous types of tax: for harvesting honey, catching fish and hunting beavers, hay mowing, arable lands, hop lands, for cultivated wheat, and a hearth tax (Zertsalov, 1896: 49–90). All these requisitions put the peasants in unbearable conditions of survival.

Rituals

Ivan Lepyokhin recorded especially valuable information about the leaders of religious and ritual activities. According to his records, old men occupied a high position in family- and clan-oriented rituals. Indeed, for everyone the term *vată* meant primarily the oldest member of a family or clan. This notion corresponded to the idea of the deep and wise old man. Only the oldest would come to clan gatherings. The head of the house would ask the oldest of those present to conduct the ritual on his behalf. The *munkun* spring clan festival was an important gathering of relatives. Already a day before the festival, old men would visit their blood relatives and have feasts. After praying in the space near the door, the oldest person in the family was seated on a bench in the front corner and given a mug of beer. He arranged the main attribute of the table by placing spoons around the bowl of porridge and putting a loaf of bread on top (Lepyokhin, 1771: 167; Ashmarin, 1895–1943: 164).

As we can see, old men led ritual actions and prayers on behalf of the family, clan, and village. Some of them were experts in magic. For example, when the informants told us about ritual actions aimed at extinguishing fires, they emphasized that the old women knew that magic (FMA*, 1989, village of Mikhailovka, Kurmanaevsky District, informants P.I. Stepanova (b. 1918) and E.V. Stepanova (b. 1916)). Gray-bearded old men could practice healing. During child labor, some old women did exactly the same procedures as midwives. A healer and person of senior age sometimes had synonymous meaning among the Chuvash people. Thus, during collective sacrifices, the right to conduct the ritual was granted to a healer or knowledgeable old man (Lepyokhin, 1771: 164).

Assisting women in the process of giving birth was the main occupation of the midwife. In the past, in all Chuvash villages, there used to be midwives, who helped women, especially in complicated cases. The old woman who was invited and the woman in labor were given "a special house, and in the absence of such, a warm bathhouse" (Nikolsky, 1903–1910: 82). Taking the child into her arms, the midwife gnawed through the umbilical cord. She also prepared the sacrificial food immediately after the birth. Among the Mordvins, the old woman did not immediately let the relatives enter the house after washing the child. First, she cooked thick porridge, baked crêpes, and set out the table for a meal (Lepyokhin, 1771: 169).

As is known, the naming of a child was performed either during childbirth or during a special ritual with the invited relatives. In the first case, the old lady gnawed through the umbilical cord and, spitting in the direction of the newborn, uttered: "Let him have such a name" (Ashmarin, 1841–1903: 611). Among the Mordvins, the old woman who was assisting the woman in the process of giving birth, "according to the custom, would begin to

*Field materials of the author from the expeditions to the Buzuluksky, Grachevsky, Derzhavinsky, and Kurmanaevsky Districts of Orenburg Region in 1989.

pray and give the name to the baby which she desired; sometimes the baby received its name from the person whom the old lady met first" (Lepyokhin, 1771: 169). She also was the main person to be asked for advice while naming in the presence of the relatives.

If a father wished to marry his son, he sent someone who was not in his family to the bride's father to get an answer to the question: "Does he wish to give his daughter to the father's son?" After receiving a positive answer, the parents met and discussed the bride price. The whole point of the wedding ceremony was that the father of the bride, taking his daughter by the hand, and the mother of the bride, taking bread and salt, handed the bride to the parents of the groom (Ibid.: 171). According to the records of Ivan Lepyokhin, a Chuvash man could have up to three wives if he was able to support them. The Chuvash people also practiced abduction of brides. When the bride was taken out of her parents' house, she pretended to resist, but was carried out in the abductor's arms (Ibid.: 174–176).

Apparently, researchers did not obtain information about the local rituals and customs with ease. For instance, on May 17, 1769, Ivan Lepyokhin wrote in his diary: "After leaving the settlement of Klyuchishchi, we continued our way for 15 versts to the Chuvash village of Taidakova, where we stayed for some time asking the Chuvash dwellers about their rituals. However, not finding anything different from the customs discovered in the Cheremshan basin, we hurried to the settlement of Usolye, 10 versts from Taidakova" (Ibid.: 320). The people protected their sacred life from prying eyes.

Role of Vladimir Orlov in organizing the expedition

As the grandson of Count Vladimir Orlov noted, his grandfather, "belonging, by his birth and upbringing, to the highest social and courtly circles…; however, more desired a rural life and rural environment; in him, Western civilization merged with the greatness of national sentiments" (Orlov-Davydov, 1908: 301). During her trip along the Volga River in 1767, a year before Ivan Lepyokhin, Empress Catherine II paid considerable attention to the Orlovs and their estates where she stayed. In the Simbirsk Governorate, she visited the oldest of the Orlov brothers, Ivan. "Since the owner had not yet managed to build a decent house for himself, for receiving the Tsarina, he built two Russian houses connected by a gallery and decorated them with coats of arms and different emblems. The Empress spent two days in this rural shelter… Rewarding the landowner, the Empress did not overlook the peasants belonging to him who constituted the Golovkinskaya Volost, freeing them from paying taxes for three years" (Sbornik…, 1868: 146). In the settlement of Usolye, Ivan Orlov had a distillery (Kratkoye izvestiye…, 1786: 70). While visiting the estate of Grigory Orlov, the Empress wrote an enthusiastic letter to her Chancellor Nikita Panin, "This is a village three versts from the town of Mainsk… and yesterday we walked around its meadows. Grains of every kind are so good here as we have never seen before; cherries and wild roses are everywhere in the forests, and there are no other trees but oaks and lime trees; the soil is so black that you cannot find such soil in garden beds in vegetable gardens; in short, these people are spoiled by God. I have never eaten such delicious fish as I did here, and everything that you can imagine is in abundance, and I don't know what they would need; everything is available here, and everything is inexpensive" (Orlov-Davydov, 1908: 328).

The grandson of Vladimir Orlov also wrote about the amazingly beautiful nature of the Middle Volga region and his grandfather's love for it. According to V.P. Orlov-Davydov, the Count not only cared about the economic structure of his Usolye estate, but also enjoyed it and was proud of it. The population of the area was the subject of constant concern of Vladimir Orlov. Being the Director of the Academy of Sciences, Vladimir Orlov ordered scholars to investigate the Usolye area from a scientific point of view (Ibid.: 349–350).

From their expeditions, Peter Pallas and Ivan Lepyokhin sent their reports to the Academy of Sciences. As is known, their routes often coincided, and they were forced to end up in the same locations. In this respect, sometimes there were misunderstandings concerning the priority of discoveries. In such cases, Vladimir Orlov advised both leaders of units to resolve the conflict peacefully and wished them further success in useful discoveries (Ibid.: 390).

Concerning the authorship of the anonymous article on the Simbirsk Governorship

In 1786, three articles relating to the topic under discussion were published in the annual journal, "Mesyatsoslov Istoricheskiy and Geograficheskiy" (Historical and Geographical Almanac): "Description of the Towns of the Nizhny Novgorod Governorship", "Brief Report about the Simbirsk Governorship", and "Distance Between the Towns and Villages where the Most Frequent Change of Horse Wagons Occurs on the Road from Simbirsk to Kizlyar". In terms of content, we are more interested in the publication about the Simbirsk Governorship which was organized in December, 1780. The article briefly describes its structure and main enterprises which gave economic benefits to the country. The article contains valuable information about the peoples inhabiting the Middle Volga region. "Russians, Tatars, Mordvins, Chuvash

people, Kalmyks, and Persians live in this Governorate, who numbered 304,854 persons in the census records from 1782, including 323 merchants; 5609 common town dwellers and workmen; 3304 Kalmyks; 320 Persians; 3062 settled soldiers, and 136,890 persons from among state peasants, single farmers, plowing soldiers, and servicemen from former services, as well as 155,154 landowners' peasants" (Kratkoye izvestiye…, 1786: 70–71). At the end, the article provided a description of the town coats of arms of the Simbirsk Governorship. For example, the coat of arms of the town of Buinsk had a silver sheep on a green field, which signified the abundance of this type of livestock in the area.

According to T.A. Lukina, the "Brief Report about the Simbirsk Governorship" belonged to Ivan Lepyokhin. She wrote, "Lepyokhin visited these places in 1768, so he very vividly, based on his personal recollections, described the rivers of the new governorship and large black forest on the banks of the Sura River, as well as factories and plants he had seen. Many of these materials were used in his 'Diary Notes'. The detailed description of the coats of arms belonging to Simbirsk, Sengilei, and other towns of the governorship was new, as compared to his 'Notes'" (Lukina, 1965: 111–112). All this is true. However, there are other points of view concerning that article. Thus, in the catalog of books of the 18th century, N.Y. Ozeretskovsky, who was the compiler of the "Mesyatsoslov", was mentioned in square brackets as the author (Svodny katalog…, 1966: 220). The bibliographic editor of the catalog was A.S. Mylnikov, who then worked in the Public Library.

The debate on the authorship of that article was fostered by a number of circumstances. By the time of its publication in the "Mesyatsoslov", there existed some manuscripts with similar contents, including "The Topographical Description of Towns in the Simbirsk Governorate, Composed by the Court Counselor Maslenitsky in 1783" (Russian State Military-Historical Archive. Military and Scholarly Archive. D. 19024); "The Topographical Description of the Simbirsk Governorship as a Whole, Composed from the Information Delivered by the Commandants, Town Governors, and Lower Territorial Courts, with the Addition of Historical Records According to the Inquiries from the Cabinet of Her Imperial Majesty in 1785" (Ibid.: D. 19025); and "The Topographical Description of the Simbirsk Governorate as a Whole, and Individual Towns and Uyezds, and Non-Russian-Speaking Peoples Living in it, According to the Inquiries from the Cabinet of Her Imperial Majesty in 1784, Compiled from the Information About the Towns from Town Magistrates Together with the Commandants and Town Governors, and About Uyezds from the Lower Territorial Courts and Various Offices with the Addition of Pertinent Historical Information on this Land by the Court Counselor Timofei Maslenitsky in 1785" (Ibid.: D. 19026). All of these manuscripts are solid studies, which have not lost their relevance to this day. They are also large in terms of volume. For example, document No. 19026 covers 450 full-length sheets. The materials were collected on the instructions of Catherine II, who ruled Russia in 1762–1796. The manuscript has a note written in a different hand: "Received on February 12, 1786". This is the date when the manuscript was received by those who ordered it—the Cabinet of the Empress. This means that in February, 1786, the manuscript about the Simbirsk Governorship arrived in St. Petersburg. The basis of the "manuscript of Maslenitsky" for the anonymous article "Brief Report about the Simbirsk Governorship" is indicated by the coincidence of their contents and the order of listing the towns of the Simbirsk Governorate. In turn, T.G. Maslenitsky included the essay by K.S. Milkovich, "About the Chuvash People", which covers the pages from 233 to 308, in the manuscript submitted to the Empress.

As we can see, in 1786, the manuscripts about the Simbirsk Governorship were available to I.I. Lepyokhin, N.Y. Ozeretskovsky, and other St. Petersburg scholars. All basic information provided in the anonymous article "Brief Report about the Simbirsk Governorship" was contained in the works of K.S. Milkovich and T.G. Maslenitsky. It can be argued that this article was compiled on the basis of these works. However, we do not yet have firm grounds for giving preference in the problem of authorship of the article "Brief Report about the Simbirsk Governorship", published anonymously in the "Mesyatsoslov" in 1786, either to K.S. Milkovich, or to T.G. Maslenitsky, I.I. Lepyokhin, or N.Y. Ozeretskovsky. We are dealing here with a collective compilation.

Conclusions

As we see, Ivan Lepyokhin, along with Peter Pallas, was one of the first scholars who gave an academic description of the Middle Volga region as a whole. For example, he recorded the landscape features of the area, including pine woods, forests, swamps, meadows, rich fields, multitude of shrub roses and wild hops, the Bolshoi Cheremshan River, as well as small rivers and lakes. At his times, Russian desman, beluga, sturgeon, starlet, and sturgeon, which now have become extinct, were found in water sources.

In most cases, Ivan Lepyokhin recorded the ethnicity of the settlements. The Chuvash people, Tatars, Qizilbashes, Mordvins, and Russians lived there. Ivan Lepyokhin also paid attention to the clothing of local dwellers. He noted that the Mordvins, Chuvash people, and Tatars wore the same kind of shirts as Russian peasants, and bast shoes. He also described the female headdresses *tukhya/takya*, *khushpa/kashpau*, and *surpan*.

Since ancient times, the Cheremshan River basin was rich in fertile black soils. In the 18th century, mainly rye, oats, and farro were cultivated there, but people also grew watermelons, melons, and tobacco. Women worked equally with men. The government forbade non-Russians to engage in blacksmithing, because it feared that people might make weapons. Therefore, people bought agricultural supplies in Kazan. Many worked in local distilleries. Ivan Lepyokhin noted the diligence of the Germans, who settled in small colonies. Countless taxes put people in enslaving conditions.

The information about the leaders of religious and ritual actions (old men, midwives, and healers) is especially valuable in the records of Ivan Lepyokhin. Descriptions of ritual gatherings among the Chuvash people and Mordvins, for example, at *kiremetishchas* (places for offering public sacrifice), are of no less scholarly importance.

The results of the Middle Volga expedition by the team of Ivan Lepyokhin were presented in his "Diary Notes", published in 1771. The things that he had brought were put in order, systematized, and supplied with labels in the Kunstkamera.

References

Al-Muqaddasi. 1994
Luchsheye razdeleniye dlya poznaniya klimatov. N.I. Serikov (trans. from Arabic, intro., comm., instr., map, table). In *Vostochnoye istoricheskoye istochnikovedeniye i spetsialniye istoricheskiye distsipliny*, iss. 2. Moscow: Nauka, pp. 268–334.

Ashmarin N.I. 1895–1943
Arkheologiya, etnografiya, folklor. 1895–1943 gg. Arkhiv Chuvashskogo gosudarstvennogo instituta gumanitarnykh nauk. No. 21.

Ashmarin N.I. 1841–1903
Etnografiya, folklor. 1841–1903 gg. Arkhiv Chuvashskogo gosudarstvennogo instituta gumanitarnykh nauk. No. 6.

Ashmarin N.I. 1941
Slovar chuvashskogo yazyka, iss. XVI. Cheboksary: Chuvashgosizdat.

Bondar L.D. 2018
Ekspeditsiya I.I. Lepyokhina. 1768–1771 gg. In *Aktualnoye proshloye: Vzaimodeistviye i balans interesov Akademii nauk i Rossiyskogo gosudarstva v XVIII–nachale XX v.: Ocherki istorii*, bk. 2. St. Petersburg: Renome, pp. 1024–1032.

Dnevnik Iv.Iv. Lepyokhina s zapisyu ego nablyudeniy po ekspeditsii 1768–1772 gg. 1768–1772
SPbF ARAN. F. 3, Inv. 30, D. 4.

Fradkin N.G. 1953
Akademik I.I. Lepyokhin i ego puteshestviya po Rossii v 1768–1773 gg. Moscow: Geografgiz.

Gazimzyanov I.R., Nabiullin N.G. 2011
Antropologiya naseleniya Dzhuketau (po materialam Donaurovskogo nekropolya). *Ucheniye zapiski Kazanskogo universiteta*, vol. 153. Bk. 3: Gumanitarniye nauki: 21–28.

Gromova T.A. 2010
Istoricheskaya khronika notariata Simbirskoy gubernii – Ulyanovskoy oblasti. Moscow: Fond razvitiya pravovoy kultury.

Gurkin V.A. 2011
Issledovaniya Srednego Povolzhya sovremennikami Karla Linneya. *Samarskaya Luka: Problemy regionalnoy i globalnoy ekologii*, vol. 20 (2): 182–197.

Kratkoye izvestiye o Simbirskom namestnichestve. 1786
Mesyatsoslov istoricheskiy i geograficheskiy na 1787 god. St. Petersburg: Imp. AN, pp. 64–74.

Lepyokhin I. 1771
Dnevniye zapiski puteshestviya po raznym provintsiyam Rossiyskogo gosudarstva v 1768 i 1769 godu. St. Petersburg: Imp. AN.

Lepyokhin I. 1814
Prodolzheniye dnevnykh zapisok puteshestviya po raznym provintsiyam Rossiyskogo gosudarstva v 1771 godu, pt. 3. St. Petersburg: Imp. AN.

Lukina T.A. 1965
Ivan Ivanovich Lepyokhin. Moscow, Leningrad: Nauka.

Martynov P. 1904
Seleniya Simbirskogo uyezda 1903 g. Simbirsk: [Tipo-lit. A.T. Tokareva].

Nikolsky N.V. 1903–1910
Etnografiya. 1903–1910 gg. Arkhiv Chuvashskogo gosudarstvennogo instituta gumanitarnykh nauk. No. 167.

Orlov-Davydov V.P. 1908
Biograficheskiy ocherk grafa V.G. Orlova. *Russkiy arkhiv*, iss. 7: 301–395.

Pallas P.S. 1773
Puteshestviye po raznym provintsiyam Rossiyskoy imperii, pt. 1. St. Petersburg: Imp. AN.

Polnoye sobraniye zakonov Rossiyskoy imperii, s 1649 goda. 1830
Vol. III: 1689–1699. [St. Petersburg: Tip. Ego Imp. Velichestva Kantselyarii].

Prikhodo-raskhodnaya kniga, vydannaya I.I. Lepyokhinu Komissiyei AN. 1768–1772 gg. 1768–1772
SPbF ARAN. F. 3, Inv. 30, D. 10.

Salmin A.K. 2017
Istoriya chuvashskogo naroda: Analiz osnovnykh versiy. St. Petersburg: Nestor-Istoriya.

Sbornik istoricheskikh i statisticheskikh materialov o Simbirskoy gubernii. 1868
Simbirsk: Simbir. gub. pravleniye.

Smirnov A.P. 1951
Volzhskiye bulgary. Moscow: GIM.

Svodny katalog russkoy knigi grazhdanskoy pechati XVIII veka. 1725–1800. 1966
Vol. IV: Periodicheskiye i prodolzhayushchiesya izdaniya. Moscow: Kniga.

Zertsalov A.N. 1896
Materialy dlya istorii Sinbirska i ego uyezda: (Prikhodo-raskhodnaya kniga Sinbirskoy Prikaznoy izby). 1665–1667 gg. Simbirsk: [Tipo-lit. A.T. Tokareva].

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Mordvins in Western Siberia in the Late 19th to Early 20th Century: Certain Issues in the Migration and Settlement

This study addresses the main aspects of the Mordovian peasants' relocation to Western Siberia from the mid-1800s to Stolypin's agrarian reform, with a focus on resettlement and relationships with old residents, successful and failed unauthorized and reverse migration, and the displacement level. The sources are archival data, specifically E.I. Krivyakov's and V.B. Rusyaikin's manuscripts owned by the archives of the Research Institute for the Humanities under the Government of the Republic of Mordovia. Causes of migration were mostly economic, and the process was triggered by the abolition of serfdom in 1861, and then by Stolypin's reform that was meant to defuse the imminent agrarian crisis in central Russia. On the basis of archival and published evidence, it is demonstrated that the main problems faced by the authorities were their unpreparedness for arranging the relocation of large numbers of peasants, insufficient funding, the small sizes of the plots of land allotted to new settlers, difficulties with obtaining documents, the fact that governmental help was insufficient and not provided to all those in need (plots were not allotted to unauthorized settlers), the administration's laissez faire in the resettlement process, failure to limit admission fees paid to old settlers, and other factors caused by poor organizational training.

Keywords: *Western Siberia, Volga Region, Mordvins, settlers, resettlement, migration policy.*

Introduction

The Mordovian ethnic group is characterized by its scattered dispersal. Large groups of the Mordvins live in the regions and republics of the Middle Volga, in Siberia, in the Russian Far Eastern regions, Central Asia, and elsewhere. The changes in dispersal pattern of the Mordvins began in the 16th century owing to migration of Russians to the Mordovian territories, as well as migrations of Mordvins within their native region and their resettlement to the new lands of the Russian State (Mordva…, 1995: 47). Recurrent migrations of the Mordvins from the Volga Region started in 1847; the available official data indicate the resettlement to the Asian part of Russia not earlier than in 1852 (Volkova, 2007: 57). Prior to the mid-19th century, migration of the Mordvins to Western Siberia was unauthorized. Later, government policy played a significant role in the development of Siberian lands. Upon the reform of 1861, the Russian state policy aiming to defuse the agrarian crisis was directed towards relocation of peasants to Siberia. The Mordovian peasants were motivated to move to Siberia for a long time (Razzhivin, Nikonova, 2007: 46).

Resettlement process after the reform (1861–1917)

The resettlement of the Mordvins to Siberia was a long-term process. What were the reasons that the people moved so far away from Mordovia? The main reason

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was the difficult economic situation of the peasantry. In the late 19th to early 20th centuries, the Mordovian economy was based on backward agriculture and animal breeding; the proportion of the population engaged in the agrarian economy was about 96 %, while that in the Penza Governorate was 90 %, and in the Simbirsk Governorate 83 %, etc. The land was owned by landlords, monasteries, and a specific category of wealthy peasants—*kulaks*. Commoners owned small plots of land. Stratification of the population developed: the numbers of both poor farmsteads and kulak farms increased. No less than 15 desyatins of land were necessary to run a self-sufficient average farm. In Mordovia, in the early 20th century, a single peasant farm commonly accounted for 7.5 desyatins of land, including only 4.5 desyatins of arable land. The Mordovian and Russian peasantry was heavily oppressed and exploited by the monasteries, which owned huge capital and vast lands. The monastery estates were located mostly in the Krasnoslobodsky and Temnikovsky uyezds. For instance, the estates of three monasteries in the Temnikovsky Uyezd were equivalent to the total area of the plots of 4500 peasant farms. The Sarov monastery, one of the largest and richest in Russia, owned 26,250 desyatins of the most fertile lands and forests (Filatov, Yurchenkov, 1989: 146–147).

There was a deficiency of horses, large and small cattle, and agricultural tools. Frequent droughts and crop failures aggravated the hardships of peasantry. The military horse census in Mordovia in 1905 recorded 27.1 % of horseless farms and 39.1 % of farms with a single horse. The single-horse and horseless peasants usually owned no or small plots of land, and represented the poorest social stratum of population in the Mordovian and Russian villages. In Mordovia, prior to 1905, the share of this poorest population reached 66.2 % of the total farms, which is greater by 6.7 % than in other areas of the European Russia on average (Ibid.: 147).

Land-hunger and poverty in the Mordovian villages in the late 19th to early 20th centuries, when the social stratification of peasantry accelerated, as well as poor industrial development in Mordovia, led to the wide spread of seasonal work beyond the main place of residence. Peasants from other Middle Volga regions (Mari and Chuvashia) were also engaged in seasonal work, but to a lesser extent. In the discussed period, over 100 thousand poor Russian and Mordovian peasants, which is over 30 % of the total adult male population, yearly moved away from their families for seasonal work. In contrast to the feudal period, characterized by "creeping" migrations over short distances, the capitalist period was marked by a large scale of migration over long distances. However, the long-distance migrations did not improve the peasants' living standards (Ibid.). Available historical data demonstrate a bad arrangement of peasant relocation, and by 1912, many Mordovian peasants, deprived of land and means of subsistence, returned to their original places of residence.

The part of Western Siberia closest to the European part of Russia, with its favorable climatic conditions and fertile soil, was the most suitable living place. The Mordovian peasants tried to settle in the areas with environmental conditions similar to those of their native land. These were the forest-steppe and steppe regions of the Tomsk, Yenisei and Tobol governorates. The Mordovian population's size in these regions increased rapidly.

According to the statistical data, in 1859, the Mordovian population in the Tomsk Governorate was 957 persons of both sexes; they lived in ten settlements (Spiski…, 1868: LXXXII). The official statistics recorded the first monoethnic Mordovian settlement in the Tomsk Okrug of the Krivoshchekovo Volost; this was the Maryina village with 393 residents, "the Mordvins from Penza, who were good plowmen and were fairly well-to-do" (Volosti…, 1894: 66). There were villages of joint habitation of the Russians and Mordvins: Malo-Pichugina village of the Mariinsk Okrug, Pochitanskoye Volost with 108 persons of both sexes; Soltonskoye settlement of the Biysk Okrug, Uksunai Volost (102 persons); Nizhny-Neninsky settlement of the Yaminskoye Volost (38 persons) (Ovcharova, 2016: 102).

According to V.I. Kozlov's data, the Mordovian population in the Tomsk Governorate prior to 1861 was about 1 thousand persons (1960: 27, 41), and by the census in 1897 it had increased to 14.7 thousand persons (Volkova, 2007: 59). Prior to 1861, mostly government-owned serfs from the Tambov and Penza governorates were relocated to Siberia. According to the data collected by N.F. Tyugaev, a researcher of the serfdom in the rural areas of Mordovia in the late 18th to first half of the 19th centuries, in 1859–1882, from the Saransky Uyezd of the Penza Governorate 1077 persons were relocated to the Tomsk Governorate; from the Krasnoslobodsky Uyezd 721 persons, and from the Insarsky Uyezd 41 persons (Ibid.: 57). According to the data from the Minusinsk Archive in the Krasnoyarsk Territory, in 1861–1914, about 200 thousand persons left the Penza Governorate (today, the area of the Republic of Mordovia). In 1862, in Ural and Siberia, 39 families came from Krasnoslobodsky Uyezd; in 1863–1888, 200 families from Saransky Uyezd; in 1889–1891, 140 families from Insarsky, Spassky, and Temnikovsky uyezds. The real rates of migrations from Mordovia and Volga Region were higher; the official data did not consider unauthorized settlers and "walkers", who, having found new favorable residence in a new place, did not come back to their native land (Nikonova, Ternyaev, 2007: 26). Having no legal opportunities to resettle, till the end of the 19th century, the Mordvins migrated unauthorized.

The resettlement to Siberia at the end of the 19th to early 20th centuries gradually accelerated. For example, from 1861 to 1891, about 450 thousand persons migrated to Siberia, including 350 thousand to Western Siberia, and up to 100 thousand to Eastern Siberia. The peasants migrated because of loss of cattle, crop failure, wildfire, and for other reasons. For instance, upon the fire that took place in 1891 in the village of Guzyntsy, Saransky Uyezd, Penza Governorate (currently, Bolshebereznikovsky District of the Republic of Mordovia), which destroyed most of homesteads, some part of its residents moved to Siberia, another to the Caucasus, and others moved to the Ufa Governorate (Rusyaikin, 1987: 134, 138).

The general census of the 20th of January 1897 provided fairly precise information on the population's size and distribution, social composition, religious structure, and educational level. The total of 1,023,841 Mordvins were recorded in governorates of the Russian Empire, including 20,223 persons in Siberia (0.4 %). The greatest proportions of the Mordvins were noted in Barnaul, Mariinsk, Zmeinogorsk, Tomsk, Biysk, and Kuznetsk okrugs of the Tomsk Governorate; Minusinsk Okrug of the Yenisei Governorate; Tukalinsk and Ishim okrugs of the Tobolsk Governorate (Pervaya vseobshchaya perepis naseleniya…, 1904–1905: Vol. LXXV, p. 2–3; LXXVIII, p. 2–3; LXXIX, p. 2–3; LXXIII, p. 2–3).

The most important role in the allotment of plots of land to the migrants in the settlement places, and in provision of necessary facilities, was played by the Resettlement Department established in 1896. The government guaranteed cheap railway transportation, loans, free use of local forests, and other benefits.

With the opening of the railway, the main peasant migration route to Siberia passed through Chelyabinsk. In 1896, the relocation office where new settlers from Tyumen were registered was transferred to Omsk. In Omsk, barracks for temporary accommodation of new settlers, canteens, hospitals, and various warehouses were built, as well as offices of the Resettlement Department (Khleb…, 1999: 35–36).

Having decided to move, the Mordovian peasants sold their property and expected that the collected money would cover transportation to a new place of residence, building a new house, and starting a farm. During the long and difficult move, the migrants often spent all available money and remained without means of subsistence in the new place. The exception was a few more prosperous peasants, who had sufficient means and the necessary tools for the rapid establishment of a new farm. The majority of the migrants, in order to settle in a new place, had to seek employment at the farms of the old residents or those immigrants who managed to start their own farms (Istoriya Sibiri…, 1968: 26). Property records indicate a predominance of the poor among the new settlers. In 1894, A.A. Kaufman noted that 104 families were relocated from Mordovia to the Tomsk Governorate, of which 81 families (79.4 %) were horseless, or owned a single horse (1895: 250). In the settlements of Ostrovsky, Voznesensky, and Naumovsky, the proportions of the poorest peasants were 80.6 %, 83.3 %, and 90.0 %, respectively (Krivyakov, 1977: 38). Krivyakov stated that peasants with the lowest resources migrated from the Penza and Simbirsk governorates. For example, in 1895–1896, 84 % of migrant families had no houses, and some of them estimated the price of their buildings at less than 100 rubles (Ibid.: 46).

At the end of the 19th century, two categories of settlers participated in the resettlement movement: one was arranged by the state, the other consisted of so-called spontaneous, "unorganized" migrants. The conditions of resettlement were extremely difficult. The allocation of plots was a slow process; thousands of families could not get settled, and were on the verge of death. The unauthorized settlers were faced with the greatest hardships: half of them were homeless and were forced to beg alms. As a rule, all such migrants were classified as "unregistered". The government did not provide plots of land or material aid to such settlers. When plots were still allocated, this was done hastily, often without water resources and in the areas unbeneficial for farming. As a result, these new settlers were in much worse conditions than the "legitimate" migrants. The government, depriving self-volunteers of the right to get land, did not interfere in the settlement in old residents' villages and did not limit the amount of admission fees. For instance, in 1882, four families arrived at Legostaevo of the Barnaul Okrug, the Tomsk Governorate, from the Krasnoslobodsky Uyezd, and three families from the Saransky Uyezd of the Penza Governorate. The old settlers' communities required the newcomers to pay from 80 to 100 rubles for registration of every male settler (and in 1900, four families arriving from Krasnoslobodsky had to pay from 50 to 100 rubles); the locals also sold their old huts to the newcomers. Owing to their lack of funds, the newcomers were forced to register themselves as petty bourgeoisie in the town of Barnaul. Having arrived with their families at new places of residence, the newcomers settled without plots of land, pastures, or other holdings (Ibid.: 154, 157). A.I. Komarov wrote that "old settlers often take as much as 150–200 rubles for registration of a male" (1913: 76). A report of the Saransky Uyezd Officer from February 22, 1900 also contains information about unauthorized relocation of peasants from the Mordovian villages of Vyazovka and Verkhny Shkaft of the Gorodishchensky Uyezd in the Penza Governorate. It reports: "Five families, according to the information from their relatives, departed from the old place of residence without any written permission documents, and undertook an unauthorized relocation in the Tomsk Governorate"

(Grebnev, 1959: 59–60). Sometimes the police managed to track down the immigrants, to detain them and return them to their former place of residence. For example, at the Timiryazevo station of the Moscow-Kazan Railway (currently, the Krasny Uzel station in the Republic of Mordovia), according to a report to the governor, "on the 12th of April, unauthorized migrants (46 persons from nine families) from Kochunovo, Chufarovo Volost, Saransk Uyezd of the Penza Governorate were detained. They had all sold off their residential and household buildings, yet they were returned to the old place of residence" (Ibid.).

The unauthorized settlers had two options: they could either be registered in the villages of old residents, or rent land from the Siberian Cossack troops or Kazakhs. Taking advantage of the desperate situation of illegal immigrants, the wealthy old residents oppressed them. For example, in 1901, six unregistered families from the Krasnoslobodsky and Spassky uyezds settled in Dumchevsky, the Barnaul Uyezd, the Tomsk Governorate, noted that "they live very poorly, have no property except houses, and pay to the old settlers 3 rubles for a farmstead, 2 rubles for cattle pasturing, "summer payments" of 2 rubles for a desyatin of arable land, etc." (Krivyakov, 1977: 157). This is how an officer assessed this situation in the early 20th century: "Registration was unaffordable for the majority of the migrants, because the male registration fee was from 30 to 50 rubles, and for the average family it accounted for 90–150 rubles. And to live with unregistered status was ruinous, since the newcomers were subjected to such high fees that the life of peasants in such conditions was impossible, not to mention their economic development" (Novovarshavskiy raion…, 2004: 18–19).

Often the migrants could not have settled in the old resident's settlements because the locals were concerned about a possible constraint in the use of their personal plots of land. Nevertheless, the newcomers tried to settle in old residents' villages, as it was easier there to find a part-time job, a dwelling before one could construct one's own, or more suitable arable land, as well as to buy food before their own harvest yielded anything. When the migrants managed to settle in the old residents' village, they usually settled separately, creating new migrant residence areas. For example, the Mordovian village of Tavly, Zyryansky District of the Tomsk Region, according to the great-grandson of its founder Viktor Mikhailovich Petrov, was founded by Eremey Petrov, who moved with his family from the village of Podlesnaya Tavla in Saransky Uyezd, the Penza Governorate (currently, Kochkurovsky District of the Republic of Mordovia) in 1863 (Kak Eremey Petrov…, (s.a.)). The ethnographic expedition to the south-eastern part of Western Siberia, arranged by the Research Institute for the Humanities under the Government of the Republic of Mordovia in 2009, reported that there was one only one resident of the Mordovian nationality left in the village, and the other Mordvins had moved to the nearby Vysokoye village in the Zyryansky District, where some of the Mordovian residents had migrated from the city of Zarinsk, Zarinsky District of the Altai Territory.

Why did the Mordvins move for permanent residence to Western Siberia? One of the main factors affecting the material culture of an ethnic group was the geographical setting and the economic situation in the hosting area. The economic activity of an ethnic group depended on the climate, landscape, soil, and availability of various natural resources. Many people believed that Siberia was a land rich in fur-bearing animals, fish, hayfields, and chernozem soil that never produced a poor harvest. Rumors spread among the migrants that the local authority provided the newcomers with significant financial aid, ready farmsteads, cattle, agricultural implements, etc. Indeed, for a long time, lands in the Akmol Region of the Omsk Uyezd were considered hardly suitable for agriculture. In this respect, the Governor General of the Akmol Region G.A. Kolpakovsky wrote that "there are no free lands for resettlement in the Akmol Region, and the steppe is not suitable for agriculture". That's why there was an instruction "not to allow migrants to remain in this region for a long time under any pretext; the unauthorized settlers should be removed to their old places of residence" (Novovarshavskiy raion…, 2004: 17–19).

Severe natural and climatic conditions, as well as the difficult socio-economic situation, forced many newcomers to leave their allotted plots of land, and to search for new places and better lands in other Siberian regions. Disillusioned migrants often returned to their homeland completely ruined. According to archival data, the reasons forcing migrants to leave Siberia were as follows: lack of funds and harsh climate; poor quality of soil; shortage of free plots, water, and forest, or the opposite—excessive foresting, wetlands, or flooding of plots; lack of hay lands and pastures for livestock, crop failures, etc. For instance, in 1882, four families returned to their homeland in Slobodskiye Dubrovki in the Krasnoslobodsky Uyezd from the Barnaul Okrug of the Tomsk Governorate. They explained the reason for the failed resettlement as follows: "to settle on a suitable and fertile land, it was necessary to pay 100 rub. for registration in the old settlers' community; other plots of land were unsuitable for agriculture. In addition, their relatives fraudulently persuaded them to come by writing that life was rich in Siberia. Having decided to move, they resettled to Siberia, but were very disappointed. To the question: 'Why did your relatives invite you to come?', they answered, 'out of meanness; so that they weren't the only ones ruined'" (Krivyakov, 1977: 159–160).

Not all migrants dared to return to their homeland; many remained in Siberia, because moving back required a lot of money. In 1896–1900, the "reverse" migrants were

predominantly natives from the Simbirsk Governorate (20.0 %), then from the Penza (17.5 %) and Tambov (14.1 %) governorates (Ibid.: 162–163). The vast majority of peasants returned to the Tambov, Simbirsk, and Penza governorates mainly from the Tomsk Governorate, although the largest immigration from these governorates was to exactly the Tomsk Governorate. Reverse migration from the Yenisei, Tobolsk, and Irkutsk governorates was determined by the environmental conditions: thick taiga forests were difficult to clear. The largest percentage of reverse migrants from the Tobolsk Governorate were the residents of the Penza Governorate, and those from the Yenisei Governorate the residents of the Tambov Governorate.

The greatest part of the peasants returned to their homes in the year of unsuccessful resettlement. The main reason for the return of such peasants was the lack of beneficial conditions for farming in new places, and most importantly, shortage of land suitable for cultivation. Reverse relocation took place slowly, because many migrants often went on foot, did some temporary jobs, begged, starved, and returned home poorer than before (Ibid., 1977: 165–167). Thus, the mentioned data indicate that the government did not create favorable conditions for the economic activity of the newcomers in their new places of residence. Government assistance was inadequate, and not provided to all the needy population.

The rate of resettlement increased after the adoption of the Act of the 13th of June, 1889 "On the Voluntary Resettlement of Rural Inhabitants and Townspeople on the Government Owned Lands". A reason for the relocation was also crop failures and famine in European Russia in 1891–1892. To become an authorized migrant, it was necessary to get permission from the two ministries: the Ministry of Internal Affairs and the Ministry of State Property. Officials did not manage to cope with the number of submitted applications, and those who left without permission were returned by force. However, despite the newly established rules, the flow of illegal migrants increased. In 1892 alone was the proportion of unauthorized migrants 35 %. In the same year, the government temporarily suspended the granting of permission, and resettlement became completely unauthorized. This is despite the fact that unauthorized migrants had neither benefits to obtain travel loans, nor deferment of military service, nor discounts for travel by rail. According to the law of the 13th of June, 1889, they were granted an exemption from the land tax for the first three years; in the next three years, they had to pay half quit-rent in the amount of 7.5 kopecks for 1 desyatin; and only six years later, the full quit-rent of 15 kopecks for 1 desyatin. In case of legitimate relocation, they received loans for travel and household development: 51 rubles 28 kopecks at minimum, and 118 rubles 29 kopecks at maximum (Novovarshavskiy raion…, 2004: 18–19). For instance, in 1903, the migrants to the Kyshtovka Volost (currently, the Kyshtovksky District of the Novosibirsk Region) were each granted by the government the loan of 14 rub. 50 kopecks (Archive of the Kyshtovka Museum of Local History, F. 296, Inv. 1, fol. 8). The official status of the authorized migrant was the most reliable and economically profitable. However, as was mentioned, the officials had no time to "cut" plots or do paperwork, owing to lack of funds.

After the revolution of 1905, the situation of migrants in places of exit became even worse. For example, in 1906, 350 householders from the Krasnoslobodsky Uyezd of the Penza Governorate wrote in a telegram to Tsar: "Lack of lands and crop failure drive us to distant Siberia… Dear Sir, do not refuse our request for relocation to a specified area in Siberia". In a note describing the property of 16 families of Sivin, the Krasnoslobodsky Uyezd, who moved to the Tomsk Governorate in 1909, it is stated that "none of the families has a plot of land" (Krivyakov, 1974: 28, 31).

Resettlement during Stolypin's agrarian reform

The next stage of the resettlement of peasants from the central regions of Russia to Siberia was connected with the implementation of Stolypin's agrarian reform. The government did a great deal of work on determining the resettlement sites where settlements would be established in future. Such plots were selected from the vacant land, or cut after land-surveying from the possessions of the old residents' rural communities. The site's selection was preceded by a geological survey. In the course of selection, preference was given to places located, as a rule, near a river or a lake, or near groves. The vegetation cover was also taken into account. From 1906 to 1916, a total of 5092 resettlement sites was populated in the territory of the Tomsk Governorate. In the Tomsk resettlement district, there were 21 sub-districts of relocation, although the majority of the migrants settled in the Tomsk and Kuznetsk sub-districts (Nikonova, Ternyaev, 2007: 31). The migrants from the Penza Governorate were allotted land (plots) in the Tobolsk, Tomsk, Yenisei, Akmolinsk, and other regions. From the Penza Governorate, in 1909 alone, applications for 7631 plots of land were submitted to the chief of the land management agency in Siberia. However, only 2004 plots were granted for the entire governorate (Grebnev, 1959: 63, 65). According to archival data, in 1910–1911, ca 100 families from Kolopino, Krasnoslobodsky Uyezd, moved to Siberia (settled in the Tomsk Governorate) (Materialy…, 1955: 18). At that time, many new settlements were established in the territory of today's Omsk Region: Novovarshavka, Novotsaritsino, Yasnaya Polyana, Russkaya Polyana,

Pavlogradka, Odesskoye, Yuzhno-Podolsk, Dobrovolsk, etc. Over 25 years (from 1889 to 1914), more than half a million people moved there (Rashin, 1956: 70), including the Mordvins (representatives of this ethnic group live nowadays in the village of Novovarshavka). In the Kyshtovka Volost, Tomsk Governorate (currently, Omsk Region), 47 villages were established. In 1871–1889, the Tomsk Governorate land-use detachment was responsible for the settlement of the newly arrived peasants, as well as for the replanning of the existing villages. The land use maps showed the places of settlements, farmsteads, and plots of land; these maps also contained lists of people inhabiting the existing villages. In 1911, the settlement of Shastinsky was established, where the Mordvins resettled. According to the 1926 census, there were 69 inhabitants of both sexes, including 30 men and 39 women (Archive of the Kyshtovka Museum of Local History. F. 296, Inv. 1, fol. 3–8).

During Stolypin's reform, many settlements and villages were established in Siberia, as the government initiated a number of laws on land allotment for peasants: on the special assistance of the Peasant Bank to the purchase of land by peasants (The Imperial Edict of November 3, 1905); on the lowering of interest on bank loans (The Edict of October 14, 1906); on the conversion of crown and state-owned lands and parts of forests to the expansion of peasant land use (The Edict of August 27, 1906); on free withdrawal from the community; on allotment of plots; on government assistance in the destruction of strip farming, resettlement in separate farms, and land division in plots; and on Peasant Bank loans against a pledge of land plots (The Edicts of March 4, and November 9, 15, 1906); and the Edict of March 10, 1906, under which all peasants and commoners-plowmen were given the right to move to Asian Russia and settle on the state-owned, specially allocated land without special permission of the authorities or public gathering. However, the government constantly warned the citizens wishing to resettle that for normal settling and the establishment of farm (building a house, buying livestock and labor tools) it was necessary to spend at least 400 rubles, and government assistance for resettling to the Amur and Primorye regions did not exceed 150 rubles, and in other regions and governorates of Siberia 100 rubles. The "Stolypin" migrants were allotted land at the rate of 15 desyatins per male. The families with a lot of sons had an advantage, because they had a chance to increase the family's welfare (Novovarshavskiy raion…, 2004: 28–30).

The government's resettlement program faced many problems; migrants addressed the central government bodies with numerous petitions for land-allotment and complaints about oppression by old residents; but most cases remained unanswered. The worsening conditions and limitations in registration resulted in the accumulation in Siberia in 1910 of over 700 thousand unregistered migrants, most of whom were unauthorized. Some of the "legitimate" migrants who did not arrive in the appointed areas were also regarded as unauthorized. During 1910–1915, the Resettlement Department allotted plots to 288,272 unregistered migrants, while over 40 thousand unauthorized migrants were left without plots (Sklyarov, 1962: 440).

The government's agricultural policy was severely compromised in 1911. Another drought in Siberia had the most devastating impact on the farms of newcomers that were not yet set up and did not provide enough food. "We are starving and urgently asking for help", telegraphed the migrants from the Tarsky Uyezd (Manyakin, 2003: 13). During Stolypin's agrarian reform, almost a quarter of the migrants returned to the Tambov Governorate, and one fifth returned to the Simbirsk and Penza governorates. During the years of political reaction (1907–1909), the percentage of reverse migrants was negligible. At that time, the tsarist government tried to stop the reverse migration. They did not issued discharge certificates to reverse migrants; without such certificates the migrants could not have been registered again in their home communities; various claims were instituted against such migrants. In addition, the government abolished cut-price travel fares for reverse migrants (Krivyakov, 1977: 162–163).

The migrants were also subjected to severe trials during their move from Central Russia. They rode in freight cars, with skimpy food, mostly breadcrumbs. In Siberia, they lived in overcrowded barracks for several months, waiting for the allocation of land. But the worst was ahead. Having moved the poor peasants to Siberia, the government took almost no care for their settlement in new places. Hundreds of thousands of people could gotten no land, and the allotments did not allow the peasants to provide for themselves fully, leading to further settlement. Few had the opportunity to buy or rent private or other land. The poor rented the land owing to the lack of plots, the well-off bought it for the organization of business. The land was distributed unevenly, especially the plots acquired in property, which was concentrated mainly in the hands of wealthy settlers. Among Mordovian settlers, there were few who had plots of land acquired in property. For example, in the Tomsk Governorate, only 2 out of 146 families had bought plots of land: one owned 20.0 desyatins, and the other 8.4 desyatins. The migrants who had 20 des. could have sown only 15 des., and those with 8.4 des. only 3 des. Owing to the fact that it was difficult to obtain land, and not everyone was able to buy it, the new settlers often arbitrarily seized vacant lands and plots intended for sale. The authorities had no choice but to enter into lease contracts with the settlers on the land they had seized (Nikonova, Ternyaev, 2007: 32–33).

Development of new lands was full of hardships. In the settlement of Ust-Kaysas (since 1912, Kuchum) of the Mariinsky Uyezd, according to information from old residents from the Volga Region, four poor migrant families arrived in 1904, one family in 1905, and 17 families in 1907–1908. In order to build huts, to clear land for vegetable gardens and arable land, the newcomers had to fell trees in the thick forest. Some of them were engaged in hunting, bee-keeping, and harvesting pine-nuts. There were no roads, the taiga trips were carried out on foot, on horseback, or on sledge drags. The produced goods (planks, barrels, fur, game, honey, and wax) were transported on sleighs to Kemerovo or to the steppe villages and traded for bread. During the harvesting period, many poor newcomers were employed for bread by the prosperous peasants in the steppe areas. The living standard of the villagers was extremely low. In winter and summer, migrants used to wear bast shoes and clothing made of coarse home-made sackcloth. Women and girls spent nights spinning yarn in the light of a smoking torch of splinters (Ibid.: 33).

Over the years of Stolypin's reform, approximately 3.3 million people moved to the Trans-Urals, and only 2.0 million managed to establish their farms in the new lands. Approximately 0.5 million returned to their homelands (Osnovy kursa…, 2017: 343). Despite the enormous difficulties, in the late 19th and early 20th centuries, the rate of migration of the Mordovian peasantry to Siberia increased. According to V.I. Kozlov's assessments, the total number of the Mordvins was about 70 thousand, which was 1.2 % of the total number of new settlers (1960: 41).

Conclusions

Siberia has always attracted the peasants of the European part of Russia oppressed by landlessness and poverty. They dared to undertake a long trip, understanding only vaguely how remote this land was. Only a few of them sent scouts before starting their trips; many migrants were guided only by stories from relatives and friends, and often moved hoping for good luck.

Migration policies of the imperial government until the early 20th century were inconsistent: at one moment the policy was permissive, at another prohibitive. The massive migration of the Mordvins to Western Siberia started in the second half of the 19th century, after the abolition of serfdom. The Mordovian migrants settled in rural areas, and usually arrived in settlements that had been established by representatives of other nationalities. With a reduction of available free lands, the newcomers had to develop the taiga areas. Their economic plight caused reverse migration of the peasants. Thousands of ruined families were forced to return to Central Russia. The economic situation of the newcomers in Siberia changed for the better as late as in the first decade of the 20th century. Various commissions were established whose activities were aimed at improving the conditions of transportation of migrants to the places of their intended resettlement; special resettlement districts were established, etc.

According to archival and field data, the main reasons for reverse migration were insufficient funding for subsistence and settlement in a new place; harsh climate; lack of favorable conditions for individual economic activities; and most importantly, shortage of arable lands (lack of free plots of land, water and forests and, on the contrary, excessive woodlands, swamps, and flooded lands, the lack of hayfields and pastures for livestock, crop failures, etc.).

The next wave of migration from the Volga Region was associated with Stolypin's reform mandating the resettlement of peasants on vacant lands in Siberia, Central Asia, and Kazakhstan. The agrarian reform facilitated peasants' withdrawal from their communities: they got the right to sell their holdings in order to raise funds for resettlement. Stolypin's reform failed radically to resolve the problem of the agrarian overpopulation in European part of Russia, but it gave a powerful impetus to the development of Siberia. The resettlement process was of great importance. Thanks to the migrants, vast uninhabited territories were developed, the deserted and thinly populated lands were turned into agricultural areas, new settlements were established, and the volumes of grain and milk production increased, etc. In the course of developing the new lands in the outlying districts, the new settlers revived the life style of the outskirts, and ultimately increased the national income.

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References

Filatov L.G., Yurchenkov V.A. 1989
Mify i realnost. Kritika nemarksistskikh kontseptsiy istorii mordovskogo naroda. Saransk: Mord. kn. izd.

Grebnev A.M. 1959
O pereselencheskoy politike tsarizma v period stolypinskoy agrarnoy reformy. In *Ucheniye zapiski Mordovskogo universiteta*, No. 9. Saransk: pp. 56–71.

Istoriya Sibiri s drevneishikh vremen do nashikh dney. 1968
In 5 vols. Vol. 3: Sibir v epokhu kapitalizma. Leningrad: Nauka.

Kak Eremey Petrov Tavly osnovyval. (s.a.)
URL: http://mordovia-news.ru/print_news-1937.htm (Accessed October 05, 2018).

Kaufman A.A. 1895
Khozyaistvennoye polozheniye pereselentsev, vodvorennykh na kazennykh zemlyakh Tomskoy gubernii, po dannym proizvedennogo v 1894 g., po porucheniyu g. tomskogo gubernatora, podvornogo issledovaniya. Vol. 1: Opisaniya otdelnykh poselkov i poselenniye tablitsy. Pt. 1: [Khozyaistvennoye polozheniye pereselentsev v poselkakh i priseleniyakh Mariinskogo okruga]. St. Peterburg: Tip. V. Bezobrazova i Kº.

Khleb Priirtyshya. 1999
Omsk: Kn. izd.

Komarov A.I. 1913
Pravda o pereselencheskom dele. St. Petersburg: Tip. Altshulera.

Kozlov V.I. 1960
Rasseleniye mordvy (istoricheskiy ocherk). In *Voprosy etnicheskoy istorii mordovskogo naroda*. Moscow: Izd. AN SSSR, pp. 5–62. (Trudy Mord. etnogr. ekspeditsii; iss. 1).

Krivyakov E.I. 1974
Sotsialno-ekonomicheskoye polozheniye pereselentsev na rodine. In *Issledovaniya po istorii Mordovskoy ASSR*. Saransk: Mord. kn. izd., pp. 11–37.

Krivyakov E.I. 1977
Pereseleniye krestyan iz Mordovii v period kapitalizma (1861–1917 gg.). Saransk. NA NIIGN. I-930.

Manyakin S.I. 2003
Sibir dalekaya i blizkaya. Moscow: Fond im. I.D. Sytina.

Materialy mordovskoy istoriko-etnograficheskoy ekspeditsii 1954 i 1955 g. 1955
Saransk. NA NIIGN. I-220.

Mordva: Istoriko-kulturniye ocherki. 1995
V.A. Balashov (ed.). Saransk: Mord. kn. izd.

Nikonova L.I., Ternyaev A.P. 2007
Pereseleniye mordvy v Sibir. In *Mordva yuga Sibiri*, V.A. Yurchenkov, L.I. Nikonova (eds.). Saransk: Nauch.-issled. Inst. Gum. Nauk pri Pravitelstve RM, pp. 19–45.

Novovarshavskiy raion: Istoria i lyudi. 2004
P.A. Brychkov (ed.). Omsk: [s.l.].

Osnovy kursa istorii Rossii. 2017
A.S. Orlov, A.Y. Polunov, Y.Y. Tereshchenko (eds.). Moscow: Prospekt.

Ovcharova M.A. 2016
Rasseleniye mordvy na yugo-vostoke Sibiri v XIX–XX vv. *Gumanitarniye nauki v Sibiri*, vol. 23 (3): 101–106.

Pervaya vseobshchaya perepis naseleniya Rossiyskoy imperii 1897 g. 1904–1905
Vol. LXXIX: Tomskaya guberniya. Vol. LXXIII: Eniseiskaya guberniya. Vol. LXXV: Irkutskaya guberniya. Vol. LXXVIII: Tobolskaya guberniya. St. Petersburg.

Rashin A.K. 1956
Naseleniye Rossii za 100 let (1811–1913 gg.): Statisticheskiye ocherki. Moscow: Gosstatizdat.

Razzhivin V.F., Nikonova L.I. 2007
Mordovskoye naseleniye Sibiri po materialam perepisi 1897 g. In *Mordva yuga Sibiri*, V.A. Yurchenkov, L.I. Nikonova (eds.). Saransk: Nauch.-issled. Inst Gum. Nauk pri Pravitelstve RM, pp. 45–57.

Rusyaikin V.B. 1987
Folklorniy material, sobranniy vo vremya folklorno-muzykalnykh ekspeditsiy (1983–1986 gg.) v mordovskiye naselenniye punkty Sibiri. Prichiny pereseleniya mordvy v Sibir. Saransk. NA NIIGN. L-836.

Sklyarov L.F. 1962
Pereseleniye i zemleustroistvo v Sibiri v gody Stolypinskoi agrarnoy reformy. Leningrad: Izd. Leningr. Gos. Univ.

Spiski naselennykh mest Rossiyskoy imperii, sostavlenniye i izdavayemiye Tsentralnym statisticheskim komitetom Ministerstva vnutrennikh del: [Po svedeniyam 1859]. 1868
Vol. 62: Tomskaya guberniya. [s.l.]

Volkova M.S. 2007
Izmeneniye v demograficheskoy situatsii sredi mordvy Sibiri v XIX–XX vv. In *Mordva Yuga Sibiri*, V.A. Yurchenkov, L.I. Nikonova (eds.). Saransk: Nauch.-issled. Inst. Gum. Nauk pri Pravitelstve RM, pp. 57–92.

Volosti i naselenniya mesta 1893 goda. 1894
Iss. 12: Tomskaya guberniya. St. Petersburg: Izd. Tsentralnogo stat. komiteta Min. vnutr. del.

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The Buryats: Ethno-Social Development and Post-Soviet Transformations (Based on the 2017 Opinion Polls Among the Young People of Buryatia, the Irkutsk Region, and the Trans-Baikal Region)

On the basis of the summer 2017 opinion poll among the young Buryat residents of Buryatia, the Irkutsk Region, and the Trans-Baikal Region, post-Soviet tendencies in Buryat ethnic identity and social mobility are examined. Changes in the traditional lifestyle are analyzed with regard to ethnic consolidation and assimilation. The effects of growing ethnic diversity, social and territorial mobility on identity, language competence, attitudes to religion, and participation in religious ceremonies are discussed. Principal post-Soviet tendencies include ethnic consolidation based on common Buryat identity and the decline of subethnic identities following the collapse of tribal structure. Religion is becoming the key consolidating factor, as evidenced by the rising number of believers among the young people. However, opposite tendencies, such as growing ethnic assimilation and language shift, triggered by social and territorial mobility among the young Buryats, are becoming a threat. Young people are potentially ready to abandon their traditional ethnic milieu, live in a multiethnic society, and marry outside of their ethnicity. The growth of assimilative tendencies results in the erosion of ethnicity, forming a challenge which the Buryat people must face. It is concluded that a new model of Buryat ethnicity is needed at the present stage.

Keywords: *Ethnicity, ethnic identity, consolidation, assimilation, mobility, transformation.*

Introduction

The collapse of the Soviet Union has drastically changed the life of the Buryats, as well as other peoples that were members of a multinational state. Among other problems, racial and interethnic tensions became more acute in the post-Soviet period under severe crisis conditions. Nowadays, few doubt that the ethnic factor is critical to public processes, and can be a catalyst for many social upheavals. The increase in its significance in modern life is inspiring the interest of researchers in issues of the development of ethnic groups.

Many theories of the ethnic phenomenon are presented in the scientific literature. They usually differ in their approaches as to whether it should be interpreted objectively or subjectively. The *ethnic group* concept and everything related to it are considered from the standpoint of a primordialist approach in studies by Y.V. Bromley (1983), V.I. Kozlov (1982), and other Soviet scholars. The instrumentalist approach to the understanding of this concept has been reflected in the papers by Y.V. Arutyunyan, L.M. Drobizheva (2014), M.N. Guboglo (1998), who make extensive use of sociological research methods. The constructivist approach to ethnicity is based on denial of an objective basis for ethnic identity, and puts its subjective determinant exclusively to the forefront. V.A. Tishkov (2003) is the most ardent supporter of this approach in

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modern ethnology. Notably, despite the difference in views, the majority of modern researchers suppose that further development of methodological foundations for studying the ethnic phenomenon should be carried out with regard to the unity of objective and subjective components. Sharing this methodological approach in general, we consider that studying the ethnosocial development processes among the Buryats at the present stage is most advantageous from the standpoint of the primordialist concept, which is evidenced by the data of our study.

The Buryat ethnic system has been forming in the course of the historical evolution of Mongolian-speaking tribes within the boundaries of the Russian state since the 17th century. At the early stages of its history, the Mongolian-speaking tribes integrated into the Russian State did not form a single ethnic community, and their self-identification was determined by the tribal and territorial affiliations. The main ethnic formations were such groups as the Ekhirits, Bulagats, Khoris, and Khongodors, all of which occupied the Trans-Baikal and Cis-Baikal regions. With time, the process of the consolidation of the Mongolian-speaking tribes and the formation of a new ethnosocial community was initiated under the influence of Russian administration's policy. At the same time, the territorial and geographical features, as well as the specifics of economic and sociocultural development, caused the separation into two subethnic formations known as the "western" and "eastern" Buryats.

The problems of the Buryat ethnic group and ethnic identity were studied by many scholars. Studies by T.M. Mikhailov (1996; 1998). D.D. Nimaev (1988), B.R. Zoriktuev (2011), R.P. Sydenova (2003), and V.S. Khankharaev (2000) threw light on various aspects of the ethnosocial development of the Buryat people in terms of the primordial concept. The state of Buryat ethnicity from the viewpoint of the constructivist approach was considered in the context of sociocultural modernization by T.D. Skrynnikova, S.D. Batomunkuev, P.K. Varnavsky (2004), D.D. Amogolonova and I.E. Elaeva (2005). Using the methods of sociological analysis, the issues of Buryat identity in the wide field of interethnic communication were studied by D.L. Khilkhanov (2005), M.S. Vasilieva, T.T. Dugarova (2007), and other authors.

Undoubtedly, the complication of social-political processes and the growing role of the ethnic factor in the modern world increase the need for application-specific studies. This article makes an attempt to reveal the main transformations in the spiritual and social life of the Buryats during the post-Soviet period. This paper is based on the summer 2017 opinion poll held in three administrative and territorial subjects of the Russian Federation, compactly inhabited by the Buryats; namely, in Buryatia, the Irkutsk Region, and the Trans-Baikal Region. This study was conducted among the young Buryats aged from 20 to 35 years, since this age group is the most active, socially mobile part of the ethnic group, which is responsive to social innovations: in particular, those in the ethnic sphere.

The following documents were developed to conduct the study: a) a questionnaire that included questions concerning self-identification, religious confession, interethnic relations, ethnocultural development, and social behavior; b) a question-list for in-depth study of the qualitative parameters of ethnic characteristics under consideration. Historical-comparative, historical-genetic, structural, abstract-logical, and sociological methods were used in the course of analysis. Each of them had its own role in data processing, systematization, and generalization. The main empirical data for preparation of this article were obtained as a result of questionnaire survey of 350 respondents: 100 persons in Ulan-Ude, 150 persons in rural areas of the Republic of Buryatia, 50 persons in the Irkutsk Region, and 50 persons in the Trans-Baikal Region.

Among people surveyed, men amounted to 52.55 %, and women to 47.45 %. The proportion of respondents aged 20–25 years was 58.16 %; 26–30 years 28.93 %; 31–35 years 12.91 %. 57.06 % of the surveyed people lived in rural areas, and 42.94 % of them lived in cities. People with secondary-level education amounted to 27.93 %, technical school graduates to 28.83 %, and college graduates to 43.24 %. In terms of occupation, the respondents were distributed as follows: public sector workers 42.95 %, self-employed entrepreneurs 13.51 %, unemployed persons 4.80 %, students in a higher professional education system 35.44 %, students in a secondary vocational education system 12.31 %. Notably, some of them combined their work activities with education in higher or specialized secondary educational establishments.

Socio-demographic changes

The break-up of the Soviet social-political system and the transition to a new model of social structure have dramatically changed the living-conditions of the ethnic group. The policy of "shock capitalization" and frontal, one-time transition to a market economy entailed a global crisis in the Russian economy. Of

238 industrial enterprises that operated in Buryatia before the collapse of the USSR, only a few were able to stay afloat (Khalbaeva-Boronova, 2005: 88). As a result, the industrial and agricultural complex of the Republic, which had been created over many decades, was actually paralyzed.

The transition to a market economy was accompanied by dramatic drop in the standard of living, which caused degradation of the demographic situation in the region. A decline in population became the predominant tendency in demographic processes in Buryatia in the 1990 and 2000s. It is important to note that unfavorable demographic trends in the post-Soviet period affected the Buryat ethnic group to a lesser degree. Unlike the Russian population, the number of Buryats in the Republic continued to grow, despite a reduction in their rate of natural increase. The All-Russian Population Census 2010 recorded an increase in the number of Buryats in the Republic by 37,314 people, or 14.9 %, as compared to the data of the 1989 census. The proportion of representatives of the titular nation (the Buryats) has increased from 24 to 29.5 % (calculated from data in (Naseleniye Respubliki Buryatiya…, 2015: 17)). To a large extent, this was provided by high fertility among the Buryats, especially in rural regions, and by the inflow of ethnic Buryats from the adjacent regions—primarily from the Irkutsk Region and the Trans-Baikal Region—to Buryatia.

The most important trait of the social and economic development of the Buryats in the early 21st century is an increase in the number of urban residents within the ethnic group. The agricultural crisis after the destruction of the collective-farming system entailed an outflow of population from the country to the cities. This is evidenced by the materials of population censuses: while the proportion of city people in the Buryat ethnic group was 45 % in 1989 and 48.5 % in 2002, it reached 51.3 % in 2010 (Buryaty…, 1996: 10; Khankharaev, 2016: 87). Thus, evolving under the "catch-up modernization" model, for the first time in its history, the Buryat ethnic group has become an urban nation.

Ethnic identity

The ethnic self-identification of the Buryats has a hierarchic structure: tribal, subethnic, and common ethnic levels. Different levels of ethnic self-identification prevailed at different stages of their historical evolution. Researchers point out that in the post-Soviet period, the ethnic factor has a greater influence on the self-identification of the Buryats than religious, civil, or regional considerations (Mezhnatsionalnye i konfessionalnye voprosy Buryatii…, 2008: 22).

The strengthening of the role of the ethnic factor in the formation of Buryat self-identification is associated with the specifics of the issue of the ethnic group's survival under conditions of sweeping social changes. After the collapse of the USSR, the common ethnic level of Buryat self-identity has increased, according to data from opinion polls in three members of the Russian Federation. When asked: "Who do you consider yourself to be, in the first place?", 57.36 % of respondents answered "I am Buryat", 19.82 % "I am a representative of my tribe (Ekhirit, Bulagat, Khori, etc.)", 22.52 % "I am a Russian national", and 0.3 % were undecided.

The common Buryat identity prevails in the answers of respondents from all three territories of the RF: the Republic of Buryatia, the Irkutsk Region, and the Trans-Baikal Region. This is indicative of further consolidation of the Buryat people, the gradual overcoming of subethnic differences, and the destruction of the traditional tribal structure of consciousness. At the same time, the preservation of certain differences in the development rates of these tendencies among the Buryats living in the Irkutsk Region and the Trans-Baikal Region is noteworthy. In the Irkutsk Region, where modernization processes proceeded more intensely owing to historical circumstances, the ethnic self-identity of Buryats experienced greater transformation as compared to their co-brothers in the Trans-Baikal. In the latter region, in view of the slighter impact of industrial culture on the local Buryat population, the ethnic forms of existence and consciousness were destroyed to a lesser extent. Therefore, the young Buryats in the Trans-Baikal Region select the tribal identity more often (2.10 %) than in the Irkutsk Region (0.60 %). This proves that eastern Buryats are bearers of the traditional ethnicity to a greater degree. Western Buryats were under the influence of deeper and more extensive acculturation and deethnization. Notably, owing to the rise of Buryat national identity, there were attempts to construct new ethnicity concepts based on cultural-genetic relations between the Buryats and Mongolian peoples. For example, S.B. Chimitdorzhiev, a known specialist in Mongolian studies, suggested returning to the Buryat people their historical name "Buryat-Mongols" (2004: 65). Reversion to the historical ethnonym, as was correctly noted by

D.D. Amogolonova, did not presuppose revival of the panmongolism and spreading of separatist sentiments (2006: 137). The attempts to construct a new Buryat ethnicity on a pan-Mongolian basis did not receive official state support. This prevented the intellectual elite from conveying their ideas to the general public and having a significant impact on the ethnic self-identity of the Buryats.

Thus, while preserving certain territorial differences, the present-day Buryats view themselves primarily as representatives of a single ethnic group. In our opinion, at present, it can be stated that the tribal centralism in Buryat ethnic identity has been overcome. The Buryats did not cease to identify themselves with their clans and tribes; however, the tribal differences do not play any major role either in their world-view or in the social practices of the ethnic group.

During the post-Soviet period, the intra-ethnic relations between the Buryats living in various areas have substantially intensified. The Republic of Buryatia and its capital Ulan-Ude have become the center of ethnic consolidation. This is the place where the main ethnocultural centers and social-political institutions of the Buryat people are concentrated. Largely thanks to activities of the People's Khural of the Republic of Buryatia, the All-Buryat Association for the Development of Culture, the Central Spiritual Board of Buddhists of Russia, and other organizations, the Buryats living in the Irkutsk Region and the Trans-Baikal Region started their active participation in common Buryat events. The international All-Buryat "Altargana" festival has become one of the most popular events, where Buryats living not only in Russia, but also in China, Mongolia, and other countries meet together.

Thus, today, the Republic of Buryatia and its capital constitute a zone of ethnic comfort and a center of common Buryat consolidation. The main migration flows of Buryat population are directed here. The most favorable environment for ethnic group development has been objectively established in the Republic. Here, as already mentioned, the main sociocultural establishments (theaters, museums, higher educational institutions, religious centers, etc.) are concentrated, which promote the development of the culture, language, religion, and traditions of the Buryat people. In the adjacent areas, where the Buryats do not have autonomy, the ethnic assimilation and acculturation processes are facilitated by the system of administrative and economic management, educational institutions, and mass media organizations that operate only in Russian.

The ethnic consolidation triggers elimination of subethnic differences in the conscience of Buryats. The opinion poll findings testify that the majority of young people in the Republic of Buryatia and two former Buryat national districts* do not divide their ethnic group into eastern and western Buryats: 76.88 % of respondents consider the Buryats to be one people. Meanwhile, this indicator in the Irkutsk Region and the Trans-Baikal Region is above the average, and amounts to 87.50 % and 87.23 %, respectively. As can be seen, subethnic differences, as well as the tribal differentiation, in Buryat ethnic identity recede into the past, giving place to the common ethnic identification. As with many other peoples of Russia, kinship ties are of crucial importance in the determination of ethnic identity among the Buryats. For example, when asked: "Why do you consider yourself to be Buryat?", 51.65 % of respondents answered that their ethnic nationality was determined by their parents, i.e. by the kinship; 20.72 % by upbringing; and 30.93 % by self-identification. Many of the surveyed people selected more than one marker defining their ethnic identity. For instance, along with the kinship, they mentioned the upbringing system, which in turn has a great influence on the self-identification of a person. Thus, unlike the population of many countries of Western Europe and North America, where ethnicity turned to some speculative construct owing to intensive interethnic contacts and widespread intermarriages, among the Buryats it is largely determined in the sense of traditional primordialism.

Linguistic situation

The most important factor of self-identification is the linguistic (speech) community. According to a number of scholars, the preservation and development of a nation is associated primarily with preservation and functioning of its language (Oshorov, 1996: 117). Sharing this point of view, we have to state that unfortunately the Buryat language is not a factor of ethnic consolidation nowadays. In 2002, by the UNESCO decision, it was listed in the Red Book of Endangered Languages.

*The Ust-Orda Buryat Autonomous Okrug was integrated with the Irkutsk Region on January 1, 2008, the Agin-Buryat Autonomous Okrug was integrated with the Chita Region on March 1, 2008 to form a new territorial subject of the RF, the Trans-Baikal Region.

The current situation with the Buryat language is inherited from the recent Soviet past, when it was actually forced out of public communications. In the beginning of the 1970s, the language of tuition in all Buryat schools was switched to Russian. Simultaneously, a reduction in publication of newspapers, magazines and books, radio and television broadcasts in the Buryat language took place.

Over decades of language acculturation, more than one generation has grown up of so called Russian-speaking Buryats, who speak very badly or have no command of their native language at all. As a result of the reduction in practical significance of the Buryat language in the everyday life, some Buryats, especially young people, have lost their mother tongue. Striving to be successful in the Russian-language state, the Buryats tried to have a good command of Russian from childhood, often to the detriment of the native language. Wishing for their children to have no difficulties with the teaching or entry into higher educational institutions and to succeed in modern Russian society in general, parents, including inhabitants of rural areas, voluntarily switched to the use of Russian in the family circle. As a result, modern young Buryats often feel uncomfortable or even lame owing to their ignorance or poor knowledge of their mother tongue. Not coincidentally, many Buryat families are familiar with the situation where grownup children fault their parents for not teaching them the native language in childhood.

Under conditions of democratization of society and rising of Buryat self-identity in the post-Soviet period, the State made efforts to improve the linguistic situation in the Republic. In 1992, the Law on Language was adopted, according to which there were two official languages in the Republic, Russian and Buryat. This creates more favorable conditions for a revival of the Buryat language and for extending the area of its functioning and application. Since 1987, children learn the Buryat language at schools. For the popularization and raising of the prestige of the Buryat language in society, media organizations and publishing houses have been involved. In 1991, the Faculty of Buryat Philology was opened at the Buryat State University for training teaching staff.

A heightened interest in the native language is evidenced by a high competition for admission to educational institutions with advanced study of the Buryat language and culture. One such institution is the Republican Buryat National Lyceum Boarding School, where at least 8 candidates have applied for each place for more than 10–15 years (Vasilieva, Dugarova, 2007: 79). People of the senior generation who send their children to such educational institutions strive to correct the mistakes they have made and to improve the language competence of young people.

So far, the efforts made have been insufficient to recover the social status of the Buryat language. According to the findings of applied sociological studies conducted in 2005 and 2007, 17.4 % of the Buryats use their native tongue at work or in learning institutions, 10.8 % in public spaces (shops, hospitals, etc.), 46.9 % in the family circle, and 32.7 % when communicating with their friends and acquaintances. At the same time, as emphasized by researchers, 58.1 % of the Buryats communicate only in Russian (Mezhnatsionalnye i konfessionalnye voprosy Buryatii…, 2008: 33–34).

Thus, despite the official bilingualism, the Buryat language is still out of mass social communication. The difficult linguistic situation is confirmed by the data of an opinion poll held in three subjects of the RF. When asked about their command of the Buryat language, 30.33 % of respondents answered: “I can understand and speak”, 30.03 % “I can understand, speak, and read”, 20.72 % “I can understand but cannot speak”, and 18.92 % “I am lacking in knowledge”. Among those who have no command of their native language, 12.61 % live in cities and 6.31 % live in rural areas; i.e. this indicator is nearly 2 times higher among the young city dwellers. Among the respondents who do not speak their native language, the inhabitants of the Republic of Buryatia amounted to 95.24 %; people living in the Irkutsk Region 4.76 %; and no such people were revealed in the Trans-Baikal Region. This suggests that the urban residents of the Republic of Buryatia were exposed to the greatest language acculturation, while the rural Buryat population of the Trans-Baikal Region was affected to the smallest extent.

Analysis of the language competence level allows the conclusion to be drawn that a considerable proportion of the young Buryats lack, or have poor knowledge of, the Buryat language, primarily of the literary language. During the Soviet period, it was actually excluded from the sphere of education; thus, a considerable part of the modern Buryats who have a good command of Russian reading and writing can neither read nor write their native language. Thus, the survey findings testify that despite the institutional support of the Buryat language in present-day Russia, its functioning is still extremely limited. The language acculturation process keeps developing. Overcoming its consequences requires more intense efforts from

the State, and especially from the ethnic group itself that realizes the importance of native language for the preservation and development of the nation.

Religious renaissance

An increase in the role of the religious factor is a new trend of post-Soviet development. After decades of atheism and persecution, religion not only returns to the social life, but becomes a spiritual mainstay of Buryat ethnic identity. Under conditions of mass linguistic Russianization, the traditional Buryat religions (Shamanism and Buddhism) take on significance as the main ethno-consolidating factor.

The Republic of Buryatia is one of the historical centers of Buddhism in Russia. Apart from Buddhism, the local religious complex is based upon Shamanism and Orthodox Christianity. During the post-Soviet period, other religious associations, especially Protestant ones, became noticeably active. This was largely facilitated by the political situation, owing to unprecedented openness of Russia to the West in the 1990s to the early 2000s. Despite the fact that even governmental authorities engaged in ecclesiastical affairs lack accurate data on the number of neophyte believers, active proselytism of these organizations, as noted by some researchers, obviously cannot but pose a potential threat to traditional confessions (Badmaev et al., 2006: 122–123). Though we generally share this opinion, we should note that nowadays the Buryats mainly remain followers of the Buddhist and Shamanic traditions. According to opinion poll results, the majority of respondents from among the Buryat young people consider themselves religious: 73.87 % of them profess Buddhism, 22.52 % Shamanism. 5.41 % of young Buryats called themselves atheists, 1.80 % of them were undecided in defining their confession. The number of believing Buddhists is great in the Republic of Buryatia and the Trans-Baikal Region: 58.86 % and 13.51 %, respectively.

The greatest proportion of believing Shamanists is observed in the Irkutsk Region (11.11 %); only 1.50 % of people in the survey consider themselves Buddhists. This is explained by the fact that historically Buddhism did not have enough time to become widespread in Western Buryatia; therefore, traditional Shamanism has preserved its influence in the region. 9.61 % of believers profess Shamanism in the Republic of Buryatia, and 1.80 % in the Trans-Baikal Region.

Notably, some respondents identify themselves as followers of both Buddhism and Shamanism. Such syncretism of religious conscience is typical for those Buryats whose ancestors migrated to Buryatia from the adjacent regions, primarily from the Irkutsk Region. As noted by respondents, being believing Buddhists, they do not renounce Shamanism, the belief of their ancestors. The existence of such "dual belief system" is largely explained by the position of Buddhist community, which, unlike other confessions, is characterized by a high degree of tolerance to different churches, if their attitude towards the religious and philosophical teaching of the Buddha is not hostile. Moreover, there is a notion among the Buddhist monks that believers who are descended from shamans should not forget the religion of their ancestors.

Thus, the rising number of believers among the young people points to the growing role of religion at the modern stage. Religion becomes an active participant of social processes, forms new cultural and social traditions, and turns into psychospiritual support for people in their everyday life. Young people living in rural areas attend places of worship more often than their peers in cities. As for gender differences, women are more religious both in the cities and in the country.

However, in our view, the degree and depth of religious feelings of the young generation should not be exaggerated. As shown by the results of conducted study, young people are characterized mainly by an utilitarian-pragmatic approach to religion. Thus, when asked: "Are you religious in everyday life?", 26.73 % of respondents replied in the negative, 33.33 % gave a positive answer, 0.6 % were undecided, and 39.34 % recognized that they only thought about religion when they had problems in life. Obviously, desecularization of public conscience in the post-Soviet period did not lead to widespread implementation of religious ethics into the everyday worldly practices. The majority of the population, including young people, have an extremely slender knowledge of the dogmatic fundamentals of faith, cannot always explain the sense of ceremonial rituals, and demonstrate a simplistic consumer attitude to religion. At the same time, it should be emphasized that the growing role of a religious factor in the social life facilitates the formation of tolerance of the beliefs of other peoples, which is one of the bases of social stability in a multicultural society. In our opinion, today we may speak of a certain convergence of the population's religious behavior, especially in the Republic of Buryatia. Here, local Russians attend Lamaist temples and Shamanic centers, while Buryats observe the main Orthodox Calendar holidays, such as the Nativity, Epiphany, and Easter. People of both confessions consider that religion plays a positive part

in the formation of a tolerant and kind attitude to each other in family and in society (Mezhnatsionalnye i konfessionalnye voprosy Buryatii…, 2008: 64).

Social and territorial mobility

The sweeping social changes of the post-Soviet period have had a profound influence on all aspects of ethnic existence. Having passed through collectivization, industrialization, and urbanization in the Soviet period, the Buryat people have plenty of experience in adapting to the non-traditional forms of social practices, and currently rapidly master the market economy and market relations. Being the most active part of the ethnic group, young Buryats demonstrate new trends in social mobility.

The results of the conducted study show the potential readiness of young people to conduct their own business and be independent of the State. This suggests deep transformations in the public consciousness that will be followed by practical changes. When asked: "How do you see yourself in future?", 34.23 % of respondents replied: "an employee of the public sector", 25.53 % "a businessman", 21.02 % "an employee in a private company", 18.02 % "a government officer", and 1.20 % were undecided.

In general, a new pattern of social behavior is formed in the ethnic group during transition to a market economy. In view of this, noteworthy is an increasing migration mobility of young people. In the 21st century, unlike the early 20th century, the Buryats are no longer afraid of the outside world, they are ready to integrate themselves actively into society, to master new social practices, to adapt themselves and develop in a nonethnic milieu. A high educational level of the Buryat population provides an objective basis for this. According to the statistical data, the Buryats, along with the Ossetians, were in second place as regards their proportion of college graduates among the peoples of Russia, being inferior only to the Jews (http://burstat.gks.ru, press-release "The Level of Education Among Certain Ethnic Nationalities in the Republic of Buryatia").

Migration sentiments among young people are evidenced by findings of the opinion survey. When asked: "Where would you like to live in future?", 35.44 % of respondents answered: "in my little motherland", 48.05 % "in any region of the RF", 15.92 % "beyond the RF boundaries", and 0.59 % were undecided. Rural dwellers (35.74 %), who have suffered especially from the collapse of Soviet agriculture, the lack of work opportunities, and the resulting fall of living standards, are among those who are ready to leave their current places of residence.

The reasons for the potential migration of young people are a wish to get an education in the leading universities and colleges within the country and abroad (19.22 %), a search for higher-paying jobs (38.14 %), and a desire to be independent and acquire new life experience (39.04 %); 3.6 % of people in the survey did not indicate the reason for their desire to shift their places of residence. High migration mobility forms new traits in the mentality of young Buryats. The process of destruction of traditional tribal structure of consciousness enhances itself, devotion to the historical small motherland weakens itself, and orientation to interethnic communication deepens itself.

While selecting their life strategy, the majority of young Buryats rely mainly on themselves and their own strengths and capabilities, and not on the support of influential relatives and landsmen. When asked: "Is the support of influential landsmen necessary to you for a successful business career?", 59.76 % of participants gave a negative answer, 39.64 % answered in the affirmative, 0.6 % were undecided. As can be seen, dependence on clan relations is gradually receding into the past, and ambitious young Buryats strive to make their own life and career.

A high degree of ethnic tolerance among young people, their readiness to abandon their traditional ethnic milieu and live in a multiethnic society is evidenced by potential readiness to marry outside of their ethnicity. The ethnic nationality of their spouse is of no importance for 73.87 % of respondents, 0.3 % of them were undecided, and only 25.83 % recognized that they feel more comfortable with representatives of their own ethnic group.

The inclusion of Buryats in the nonethnic environment speeds up the process of ethnicity transformation. We can see the appearance of a new type of a "modernized" Buryat, who combines the traditional mentality with a modern world view in his/her mind. Generally, these are well-educated young professionals, highly competitive not only at the all-Russian but also at the international level.

As is known, a multiethnic environment spurs the process of assimilation and deethnization. At the same time, as noted by some scholars, living in a foreign milieu is often accompanied by the activation of ethnic identity and the actualization of clan relations beyond the limits of the ethnic area (Skrynnikova, Batomunkuev, Varnavsky, 2004: 14). Such centers and communities actually appear wherever Buryat

diasporas exist. They become "islets" of a small motherland, places for ethnic communication and the transmission of cultural heritage to the new generations. Thus, far from the historical homeland, not only does assimilation of the ethnic group take place, but also formation of the modern Buryat identity that comes into being not as a result of inclusion into the ethnic community, but because of territorial mobility and exclusion from the national milieu (Vasilieva, Dugarova, 2007: 76).

Conclusion

The findings of the study testify that the processes of ethnosocial development of the Buryats in the post-Soviet Russia are determined by the tendencies of growing common ethnic consolidation, with simultaneously increasing threats of further ethnic assimilation. Their development and interaction determine the basic vector of ethnocultural modernization of the Buryats at the modern stage.

In the post-Soviet period, further formation of ethnic identity on a nationwide scale takes place, the role of religious factor considerably increases, and social and territorial mobility is activated. At the same time, there are a lot of problems to be solved in the sociocultural development of the ethnic group. One of the most complex challenges is recovering the language competence of the Buryats, especially of the young generation. This requires not only support from the State, but the efforts of the ethnic group itself, realizing the importance of native language for preservation and development of the nation.

As indicated by the practice, modern young Buryats select an active life strategy. The Buryats integrate themselves into the modern world and take part in market relations. At the same time, they still remain "Asians" who have not lost their ethnocultural identity.

At the beginning of the 21st century, as in the early 20th century, the Buryats have to fit into a new sociocultural system, and master new forms of social life and economic practice. For them, this is another historical challenge, which requires internal mobilization and formulation of a new strategy for their ethnic development. In our opinion, this strategy should combine two opposite paradigms: modernization and tradition. Their practical implementation requires dialectic interaction of traditional and modern forms of ethnic existence, which will allow the ethnos to preserve its identity and develop successfully in the rapidly changing environment.

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References

Amogolonova D.D. 2006
Buryatskaya identichnost v usloviyakh perekhodnogo perioda v Rossii. In *Istoriya i kultura narodov Sibiri, stran Tsentraloy i Vostochnoy Azii: Batuyevskiye chteniya: Materialy II Mezhdunar. nauch.-prakt. konf*. Ulan-Ude: pp. 136–142.

Amogolonova D.D., Elaeva I.E., Skrynnikova T.D. 2005
Buryatskaya etnichnost v kontekste sotsiokulturnoy modernizatsii (postsovetskiy period). Irkutsk: Radian.

Arutyunyan Y.V., Drobizheva L.M. 2014
Proidenniye puti i nekotoriye problemy sovremennoy etnosotsiologii. *Sotsiologicheskiye issledovaniya*, No. 7: 102–112.

Badmaev A.A., Adygbai C.O., Burnakov V.A., Mansheev D.M. 2006
Protestantizm i narody Yuzhnoy Sibiri: Istoriya i sovremennost. Novosibirsk: RITs Novosib. Gos. Univ.

Bromley Y.V. 1983
Ocherki teorii etnosa. Moscow: Nauka.

Buryaty v zerkale statistiki. 1996
Ulan-Ude: Goskomstat RB.

Chimitdorzhiev S.B. 2004
Kto my, buryat-mongoly? Ulan-Ude: Buryat. kn. izd.

Drobizheva L.M. 2013
Etnichnost v sotsialno-politicheskom prostranstve Rossiyskoy Federatsii. Opyt 20 let. Moscow: Noviy khronograf.

Guboglo M.N. 1998
Yazyki etnicheskoy mobilizatsii. Moscow: Yazyki slavyanskoy kultury.

Khalbaeva-Boronova M.M. 2005
Buryatiya: Problemy kompleksnogo razvitiya regiona (istoricheskiy opyt issledovaniya). 1960–1990 gg. Ulan-Ude: Izd. Buryat. Gos. Univ.

Khankharaev V.S. 2000
Buryaty v XVII–XVIII vv.: Demograficheskaya istoriya i etnicheskiye protsessy. Ulan-Ude: Izd. BNC SO RAN.

Khankharaev V.S. 2016
Etnodemograficheskiye protsessy v Buryatii. Ulan-Ude: Izd. Buryat. Gos. Univ.

Khilkhanov D.L. 2005
Etnicheskaya identichnost i etnosotsialniye protsessy v Buryatii: Istoriya i sovremennost. Ulan-Ude: Izd.-poligraf. kompleks Vost.-Sib. Gos. Akad. Kultury i Iskusstv.

Kozlov V.I. 1982
Natsionalnosti SSSR. Moscow: Finansy i statistika.

Mezhnatsionalnye i konfessionalnye voprosy Buryatii v svete obshchestvennogo mneniya (po materialam prikladnykh sotsiologicheskikh issledovaniy 2005 g. i 2007 g.). 2008

T.B. Budaeva, N.T. Khanturgaeva, D.T. Budaeva et al. Ulan-Ude: Izd. Buryat. Gos. Univ.

Mikhailov T.M. 1996

Natsionalnoye samosoznaniye i mentalitet buryat. In *Sovremennoye polozheniye buryatskogo naroda i perspektivy yego razvitiya: Materialy nauch.-prakt. konf*. Ulan-Ude: pp. 18–26.

Mikhailov T.M. 1998

Buryatskiy etnos v svete sovremennykh sotsialnykh izmeneniy. In *Respublika Buryatiya – gosudarstvo v sostave Rossiyskoy Federatsii (k 75-letiyu obrazovaniya)*. Ulan-Ude: Izd. BNC SO RAN, pp. 130–145.

Naseleniye Respubliki Buryatiya v zerkale statistiki: Ot perepisi k perepisi: Statisticheckiy sbornik. 2015

Ulan-Ude: Buryatstat.

Nimaev D.D. 1988

Problemy etnogeneza buryat. Novosibirsk: Nauka.

Oshorov D. 1996

Yazyk nash rodnoy… In *Sovremennoye polozheniye buryatskogo naroda i perspektivy yego razvitiya: Materialy nauch.-praktich. konf*. Ulan-Ude: pp. 117–120.

Skrynnikova T.D., Batomunkuev S.D., Varnavsky P.K. 2004

Buryatskaya etnichnost v kontekste sotsiokulturnoy modernizatsii (sovetskiy period). Ulan-Ude: Izd. BNC SO RAN.

Sydenova R.P. 2003

Ulusnaya obshchina zapadnykh buryat (vtoraya polovina XIX – nachalo XX v.). Ulan-Ude: Izd. BNC SO RAN.

Tishkov V.A. 2003

Rekviyem po etnosu: Issledovaniya po sotsialno-kulturnoy antropologii. Moscow: Nauka.

Vasilieva M.S., Dugarova T.T. 2007

Buryaty v novom stoletii: Sotsialno-ekologicheskiy aspect. Ulan-Ude: Izd. Buryat. Gos. Univ.

Zoriktuev B.R. 2011

Aktualniye problemy etnicheskoy istorii mongolov i buryat. Moscow: Vost. lit.

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A Multidisciplinary Study of Egyptian Mummies from the Pushkin State Museum of Fine Arts (Methodical Aspects)

We present the results of a multidisciplinary study (the first one in Russia) of nine Egyptian mummies owned by the Pushkin State Museum of Fine Arts (Moscow), carried out at the Kurchatov Institute. A detailed description of the methods is provided. X-ray computed tomography is shown to be a highly informative non-destructive technique for studying the structures of mummies. On the basis of the results, plus the conclusions of forensic experts, a detailed anthropological analysis was conducted. Mummification techniques, sex, and age of all individuals were assessed. In three cases, the sex differed from that indicated in the museum inventory. Morphologically, all crania represent varieties of the Mediterranean type. One individual, however, has typically sub-Saharan features. Pathological changes concern mostly the spine and are both age-related and traumatic. In two individuals, spinal pathologies might have caused death.

Keywords: *Mummies, computed topography (CT), craniological analysis, osteological analysis.*

Introduction

Paleoanthropological research is commonly based on the studies of the remains of human bones. However, mummy studies should be carried out through non-destructive methods. Significant changes in the studies of mummified remains occurred with the involvement of natural science methods and techniques from nuclear physics (Vasiliev, Kovalchuk, Yatsishina, 2016; Kovalchuk et al., 2016; Macková et al., 2016; Pakhunov et al., 2017; Glazkov et al., 2018). In recent decades, non-destructive studies of mummification techniques, forensic and medical examination of mummies, and 3D reconstructions have been carried out with the help of modern techniques of magnetic resonance and X-ray computed tomography (CT) (Marx, D'Auria, 1988; Friedman, Nelson, Granton et al., 2011; Friedman, Nguyen, Nelson et al., 2012; Hawass, Saleem, 2016; Zesch et al., 2016). A significant advantage of CT technique is the possibility of multiple non-destructive examinations of mummies, recording and double-checking the results. Generation of 3D models makes it possible to visualize various pathologies and examine mummified remains anthropometrically (Nedden et al., 1994; Cesarani et al., 2003; Vlijmen et al., 2011; Öhrström et al., 2015; Seiler, Rühli, 2015). The generated models make a good presentation in various exhibition projects important for the popularization of science. The first CT examination, of the mummified remains of a boy and young woman, was carried out in 1977 (Lewin, Harwood-Nash, 1977). Currently, the number of mummies examined through CT scanning in various countries has considerably increased. The research data provide information on the methods and techniques of embalming; in some cases, it helps in establishing the causes of individuals' deaths.

Judging by the relevant publications, in Russia, man-made mummies were studied formerly only through magnetic resonance imaging (Letyagin, Savelov, 2014). No multidisciplinary studies using CT technique have been executed in this country so far. Therefore, the multidisciplinary research on the nine ancient Egyptian mummies from the Pushkin State Museum of Fine Arts carried out in the National Research Center "Kurchatov Institute" has become the first in Russia (Yatsishina et al., 2018). The research infrastructure of the Kurchatov Institute provides wide opportunities to carry out studies in a variety of disciplines, and in 2015 the Laboratory of Natural Science Methods in the Humanities was established in it, with the purpose of executing multidisciplinary studies of museum items and archaeological objects. The multidisciplinary research on the ancient Egyptian mummies from the Pushkin Museum was carried out in collaboration with researchers from the Institute of Ethnology and Anthropology of the Russian Academy of Sciences and experts from the Bureau of Forensic Medical Expertise of the Moscow Health Department. The main goal of this research was to use CT scanning in the studies of such complex archaeological objects as the ancient Egyptian mummies.

Materials and methods

CT scans of nine Egyptian mummies in different states of preservation from the Pushkin State Museum of Fine Arts were carried out in the National Research Center "Kurchatov Institute". A combined system for PET-CT Siemens Biograph mCT40s was used. The scanning was performed in three modes, with tube voltage and current of 140 kV and 120 A; 100 kV and 70 A; and 80 kV and 20 A. The choice of CT-scanning parameters determines the quality of the acquired data (Cox, 2015).

The CT-scanning algorithms for medical purposes are well-developed, unlike those for studying mummified objects. Despite quite extensive literature on the topic, the optimal parameters of CT scanning for a particular mummy can only be defined experimentally.

On the basis of the results of studies, the optimal parameters of 140 kV and 120 A, with a spatial resolution of 0.6 × 0.5 × 0.5 mm, were selected for further work. In addition, two modes of image-contrasting were used, which differed in sensitivity to bone and soft tissues, with a voxel size of 0.3 × 0.5 × 0.5 mm. The study allowed us to obtain the most accurate data by a non-destructive method.

We only managed to describe seven crania, as two mummies had these severely destroyed (see the descriptions of mummies I, 1a 1241, and 1290). The descriptions were made using the standard craniological protocol (Alekseev, Debets, 1964). Craniometric measurements were performed directly on the solid-state copies obtained from DICOM data—the results of computed tomography.

At the first stage, the skulls were segmented from the general scans. The main purpose was to ensure that craniometric landmarks were clearly distinguishable in the models. Therefore, in one case (I, 1a 1235), the level of bone-density had to be artificially lowered without a significant change in geometry. The problem of separating the dehydrated bone tissue from surrounding mummified remains has been repeatedly discussed in the literature (Friedman, Nelson, Granton et al., 2011; Friedman, Nguyen, Nelson et al., 2012). The main task at this stage was the automatic, semi-automatic, and manual

separation of elements of mummies that have similar density. Embalmed soft tissues and tarred textiles often have virtually the same level of x-ray absorption, and only manual bone segmentation is possible. Copies of skulls were printed on a 3D printer (zCorp Zprinter 650), using a finely dispersed gypsum-based composite powder in monochrome printing mode, followed by processing the obtained models with cyanoacrylate adhesive.

Sex and age estimation and description of morphology were performed using the Inobitek DICOM Viewer program (pro version 10). Custom settings "window/level" and segmentation functions allowed us to visualize clearly the necessary anatomical elements and to evaluate dental wear, sutural obliteration, pelvic bone morphology, etc.

The postcranial skeletons were measured using a standard osteometric protocol (Alekseev, 1966). The chart by V.N. Fedosova was used to describe the muscular relief (1986). Osteometric measurements were performed directly on 3D reconstructions (visualizations) in the Inobitek DICOM Viewer; in some cases, metric data were obtained from STL models in the Rhinoceros program. Studying virtual samples had its advantages: it allowed us to measure bones with fragmented epiphyses, as their morphology could be clearly seen in the surrounding mummified tissues. If the bones had been extracted, these fragments could not have been saved.

Results

According to the results of anthropological analysis, supported by forensic expertise, four mummies were identified as male, and five as female (Table 1). Notably, in three cases the sex was different from that indicated in the catalogue of the Pushkin Museum (I, 1a 5301, 5302, 5303). We assume that before the museum acquired the mummies, they were placed in sarcophagi that did not belong to them, which led to erroneous attribution. Five individuals died before the age of 35, three before the age of 35–50, and one woman probably lived more than 55 years.

The procedure for post-mortem intervention before embalming was almost identical: all organs of the chest, abdominal cavity, and the lesser pelvis were removed through the transverse incision of the anterior abdominal wall in the left iliac region. The removal of the diaphragm led to unification of all cavities into a single space. In some cases, body and skull cavities are filled with a hardened solution; fabric rolls and other foreign objects can be seen inside the body (I, 1a 6930, 1235, 1241, 5301).

Seven skulls were studied using a standard craniological protocol (Table 2). The male skulls are on average long and relatively narrow, dolichocranial; high (hypsicranial) according to the height-length ratio. The face is medium-wide and short, mesenic according to the upper facial index (the upper part of the face is medium). The horizontal protrusion of the face is strong, the orbits are relatively high. The nose is long and relatively narrow (leptorrhine) and protruding.

The female skulls are relatively long and narrow, mesocranial; mostly pentagonoid in vertical view. The skull of the mummy I, 1a 6930 is noteworthy for its dolichocrania (a long and narrow cranial vault). In most cases, the skulls are high by the height-length ratio. Most absolute dimensions of the cranial vault fall into the medium category, only a few of them are small. The facial skeleton is medium wide and high, lepten by the upper

Table 1. **List of mummies with brief descriptions**

No.	Description	Sex/ Age	Stature in life, cm
I, 1a 1240	Mummy in a cartonnage mask covered with gold foil. 2nd–3rd centuries AD	♀ / 20–25	153.3
I, 1a 5303	Mummy with a cartonnage mask and plates. 1st century BC to 1st century AD	♂ / 20–25	149.8
I, 1a 5301	Mummy with a bead-net in a sarcophagus with the name of Khor-Kha. 7th–4th centuries BC	♀ / 20–25	157.9
I, 1a 1235	Mummy with a cartonnage mask and plates. 3rd century BC to 3rd century AD	♀ / >50	151.0
I, 1a 6756	Mummy in a cartonnage coffin. 1st–3rd centuries AD (?)	♀ / 30–35	150.3
I, 1a 1241	Mummy. 1st millennium BC	♂ / 20–30	158.8
I, 1a 5302	Mummy in a sarcophagus with a name of lady Tashet. 4th–1st centuries BC	♂ / 20–25	160.8
I, 1a 1290	Mummy. 1st millennium BC (?)	♂ / 35–40	166.8
I, 1a 6930	Mummy covered with tarred sheets. 1st millennium BC	♀ / 45–50	159.2

Table 2. **Craniometric traits**

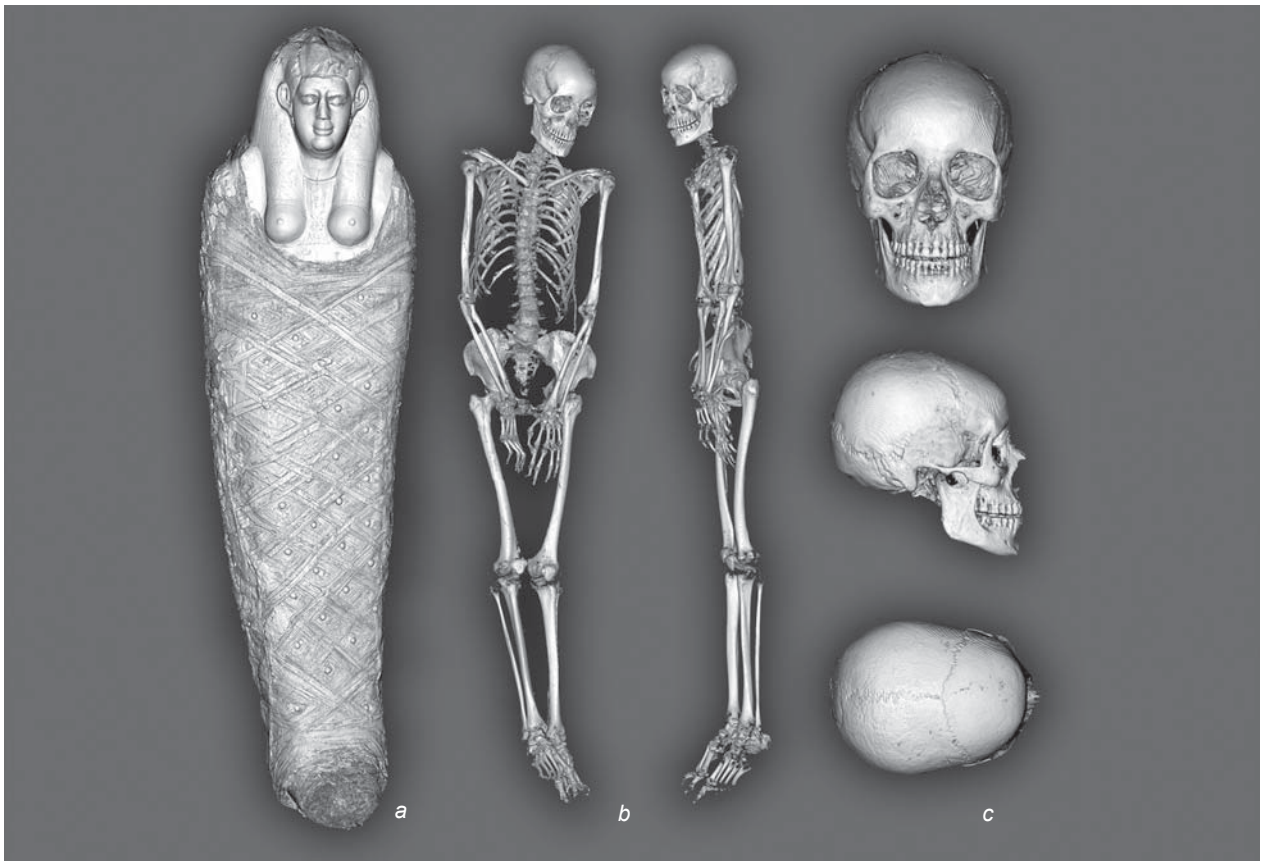
Trait	1240 ♀	5301 ♀	1235 ♀	6756 ♀	6930 ♀	5303 ♂	5302 ♂
1. Glabella-occipital length	174	186	176	176	191	177	183
8. Maximum cranial breadth	136	146	136	137	133	141	136
17. Basion-bregma height	128	137	134	123	132	140	133
5. Basion-nasion length	93	105	98	94	106	94	102
9. Minimum frontal breadth	94	98.5	98	87	92	90	96
10. Maximum frontal breadth	121	124	119	112	123	123	121
11. Biauricular breadth	114	118	118	116	114	119	117
12. Biasterionic breadth	108	108	103	100	111	100	106
45. Bizygomatic breadth	121	128	123	123	123	127	129
40. Basion-prosthion length	89	94	…	91	…	89	88
48. Nasion-prosthion height	68	71	70	65	70	69	71
43. Upper facial breadth	104	107	103	100	102	97	103
46. Middle facial breadth	95	98	95	96	97	93	92.5
55. Nasal height	52.3	53.4	55.3	47.5	55.4	50.5	87.6
54. Nasal breadth	21.4	23.5	27.4	27.2	26.3	23.2	24.2
51. Orbital breadth (measured from mf)	40.5	40.2	38	38	42.3	39	38.5
52. Orbital height	33.2	32.5	32.8	31.6	32.2	32.8	33.3
77. Nasomalar angle	144°	131°	136°	142°	136°	134°	128°
∠zm. Zygomaxillary angle	135°	122°	…	135°	122°	121°	126°
75 (1). Nasal profile angle	32°	22°	30°	17°	28°	34°	27°
8 : 1. Cranial index	78.2	78.5	77.3	77.8	69.6	79.7	74.3
48 : 45. Upper facial index	56.2	55.5	56.9	52.8	56.9	54.3	55.0
48 : 46. Upper middle facial index	71.6	72.4	73.7	67.7	72.2	74.2	76.7
54 : 55. Nasal index	46.1	44.0	49.5	57.3	47.5	45.9	42.0
52 : 51. Orbital index	82.0	80.8	86.3	83.2	76.1	84.1	86.5

facial index (mummy I, 1a 6756 is an exception). The orbits are low and somewhat narrow (mesoconchal). The nose in absolute size is medium (mesorrhine). However, it is narrow in mummy I, 1a 5301, and in mummy I, 1a 6756, it is the broadest of those studied.

Anthropological description of the mummies, morphological characteristics of the skeletons, paleopathology

In all cases, the mummified bodies were in a standard (for Ancient Egypt) supine position. The complex of craniological traits allows us to attribute specimens reliably to various variants of the Mediterranean anthropological type, with the exception of one (I, 1a 6756) that has pronounced sub-Saharan features. The distinctive anthropological characteristics of the studied skeletons are presented below.

Mummy I, 1a 1240 (see *Figure*). The skull is slightly turned to the left. The bones of the hands are parallel to each other, adjoining above the pubic symphysis. The bones of the legs are extended, the medial sides of the knee joints are touching; the bones of the slightly extended feet are also in contact. A study of the proportions of the extremities revealed



Mummy I, 1a 1240.
a – upper level of visualization; *b* – position of the skeleton (frontal and lateral views); *c* – the three views of the skull.

that the lower legs are relatively long, possibly owing to adaptation to the hot climate. The woman has rather narrow shoulders and a very wide and low pelvis. The humeri and clavicles are medium robust, the other bones are gracile. The tibias are relatively wide in the diaphysis. The muscular relief of the arm bones is poorly developed, and of the leg bones moderately developed. There are signs of multi-level spinal injury, as well as a sacrum fracture. It is most likely that the injury was ante-mortem and was due to a fall from a height.

Mummy I, 1a 5303. The bones of the forearms are crossed over the chest (the right over the left). The bones of the right hand are stretched, the intermediate and distal phalanges almost touch the head of the left humerus, the phalanges of the left hand are bent at the joints, and the distal phalanges touch the sternum half of the right clavicle. The bones of the legs are extended, the knee joints are very close to each other, the bones of the extended feet touch. The skull bears signs of fractures, which most likely arose in the course of mummification. The specimen had long forearms and lower legs, and was very short in stature (approximately 149.8 cm). Probably, these features are a result of adaptation to the hot climate. The extremities are gracile, with the exception of the tibias, which are medium (or a bit above the medium) robust. The muscular relief of the arm bones is generally poorly developed. Deltoid tuberosity, the lesser tubercles of the humeri, radial and ulnar tuberosity, pronator ridge of the radius, and the relief of tendons of extensors of hands and fingers are well expressed. Probably, during the life of this individual, there was a certain load on the deltoid and some other muscles that divert and medially rotate the shoulder, on the forearm flexors, pronators and supinators, extensors of the hand and fingers. The interosseous border of the radius is straight, which is quite a rare trait. The muscular relief of the bones of the lower extremities is medium. We can assume there was a sufficient physical load on all muscle groups of the legs. As for pathologies, the mummy has a vertical fracture of the body of the third cervical vertebra, which was most likely ante-mortem.

Mummy I, 1a 5301. The position of the body inside the sarcophagus is virtually identical to the one

described above (I, 1a 5303). The metric values of the postcranial skeleton indicate a narrow pelvis and shoulders, a relatively long shoulder as compared to the femur, and a very short forearm. The muscular relief of the bones of the upper extremities is moderately developed; this is mainly the relief of muscles associated with flexion and pronation at the elbow joint. The muscular relief of the leg bones is quite well-expressed, and indicates a significant load on the corresponding muscles. Pathologies include incomplete spondylosis in the form of anterior marginal osteophytes of the sixth and seventh cervical vertebrae.

Mummy I, 1a 1235. The bones of the forearms are crossed over the chest (the right over the left). The bones of the hands are extended, the phalanges of the right hand are located above the left humerus between its upper and middle thirds, and the left one is in contact with the head of the right humerus. The bones of the legs are extended, the medial sides of the knee joints are almost touching; bones of the slightly extended feet are also in contact, phalanges are absent. Both parietal bones bear symmetrical depressions. Diploe reduction of these bones may be explained by the age of the individual, but may also be artificial. The woman had somewhat short arms, long lower legs, rather narrow shoulders, and a very narrow and high pelvis. The long bones of the upper extremities are medium robust. The skeleton of the legs is gracile. The tibias are wide and probably euriknemic (wide in the upper third). The muscular relief of the bones of the hands is generally well-developed. We can assume that there was a considerable physical load on the shoulder joints. At the same time, supination and flexion of the forearms were less important. The interosseous border of the radial bones is straight, while in most people it is concave. In addition, the joint of the radius and ulna by the interosseous membrane must have been very strong. Probably movements of the hands and fingers were of considerable importance for this woman. The muscular relief of the legs is moderately developed. The relief of the muscles that provide flexion in the knee joints is the least pronounced.

Mummy I, 1a 6756. The skull is separated from the spine, and during CT imaging it was located at some distance from the spine, on the axial line of the latter, on the left side (with the occiput towards the spine). The bones of the extended hands are located over the pubic symphysis, the right ones over the left. The bones of the legs are extended, the knee joints are almost touching; the bones of the feet, located almost at right angles to the legs, look left and are touching. The ethmoid bone of the skull is damaged, most likely owing to manipulations performed during the embalming procedure. The craniological traits differ sharply from the entire series and have pronounced sub-Saharan features: a low cranial vault, a weak horizontal protrusion, and a relatively short and wide, slightly protruding, low-bridged nose, and alveolar prognathism. The medial parts of the extremities, especially the legs, are long, which is probably associated with adaptation to the hot climate. On the one hand, Egypt is located in the tropical climate zone; on the other hand, a woman could have come there from another part of Africa, where her ethnic group had been formed in hot and humid conditions. This may be indicated by the equatorial morphological traits identified on the skull. The postcranial skeleton is very gracile. The tibias are markedly flat in the transverse direction. The entire muscular relief of the humeri and ulnar bones is extremely poorly developed. Radial tuberosity, interosseous border, and relief of the posterior surface of distal part of the radial bones are slightly better pronounced. Thus, we can assume a relatively increased load on the biceps and extensor muscles of hands and fingers. The muscular relief of the leg bones is poorly or moderately developed. The relief of the muscles associated with thigh-abduction and -rotation and with knee-extension is better expressed. The leg muscles responsible for locomotion and some postures are poorly developed, most likely owing to the individual's general gracility.

Mummy I, 1a 1241. The bones of the extended hands are located parallel over the pubic symphysis and do not touch. The bones of the legs are extended, the knee joints do not touch; the bones of the feet, located almost at right angles to the legs, are in contact. A study of the proportions of the postcranial skeleton revealed that the forearms and lower legs are long, probably owing to environmental adaptation. This individual also had rather wide shoulders, and a medium-wide and low pelvis. The bones of the extremities vary from gracile to robust. The muscular relief of the humeri is quite well developed. Probably, this man experienced considerable physical stress on the muscles that set in motion the shoulder joint and supinate the forearm. The relief of the flexors of the elbow joint, and of the extensors of the hand and fingers, is well developed. The greater and the lesser trochanters of the femurs are large. The rest of the muscular relief is moderately developed. We can assume there was a significant load on the muscles that move the knee and hip joints. The muscular relief of the tibias is poorly or moderately developed. Only the tibial tuberosity is quite well expressed. The CT image reveals extensive destruction of the anterior thorax, with only a few fragments of the ribs visible

(the sternum is absent). The proximal phalanges of the left foot are unnaturally bent. The cervical vertebrae from the 4th to the 7th and the first nine thoracic vertebrae are absent. The remaining vertebrae have initial signs of osteochondrosis.

Mummy I, 1a 5302. The bones of the forearms are crossed over the middle section of the chest (the right ones over the left), the bones of the hands are extended. The acromial ends of the clavicle and humeri are displaced up to the level of the mandible, the sternum ends of the clavicle and the front ends of the ribs are displaced to the spine. The bones of the legs are extended, the knee joints do not touch. The bones of the left tarsus and foot are located above the ankle and look left, and the right ones are located under the ankle and look right. The postcranial metric traits indicate narrow shoulders, a relatively long shoulder as compared to the femur, and a very short forearm. The arm bones are not robust; the skeleton of the lower extremities is rather gracile. The muscular relief of the arm bones is developed moderately or poorly. It can be assumed that the load on the muscles that move the shoulder joint, as well as supinators and pronators of arms, was insignificant. The elbow flexors (biceps and brachialis muscles of the shoulder) are slightly better developed. The muscular relief of the lower extremities is better expressed than of the upper ones. It can be characterized as medium developed, so we can suggest a moderate load on the muscles that provide walking, running, and other locomotion. In general, the muscular system of this individual was poorly developed; probably he was not engaged in heavy physical labor. Among the pathologies, a bilateral Kimmerle's anomaly was revealed—an ossification of the posterior atlanto-occipital membrane over the vertebral artery groove. It is asymptomatic in most cases.

Mummy I, 1a 1290. This is significantly damaged: multi-fragmented fractures of all bones of the skull (the fragments are mixed with cervical vertebrae, some of them are also partially destroyed); extensive destruction of the anterior thorax (only fragments of ribs can be seen, the sternum is absent); fracture of the left clavicle and the head of the left humerus. The bones of the wrists and hands, as well as tarsi and feet, are absent. Most likely, all the damage is post-mortem. The distal ends of the bones of the forearms are located above the pubic symphysis. The bones of the legs are extended, the medial sides of the knee joints touch. Osteometric traits indicate that the individual had long forearms and short lower legs. The muscular relief of the right humerus is generally well developed. The large size of the lesser tubercle suggests a significant load on the muscles that rotate the shoulder backwards. In general, a considerable physical load on the entire muscle apparatus that sets in motion the shoulder joint is evident. The femurs are gracile, and the markedly robust tibias are flattened in a saber-like way; their anterior borders strongly protrude forward.

Mummy I, 1a 6930. The bones of the forearms are crossed over the chest (the right over the left); the hand bones are extended, the metacarpophalangeal joints are in contact with the clavicles. Leg bones are extended, knee joints do not touch each other; the bones of the slightly extended feet touch. There are symmetrical depressions on both parietal bones, which are apparently caused by age-related resorption of the diploe. Postcranial metric traits indicate a wide pelvis, narrow shoulders, a long shoulder, and a very short forearm. The bones of the upper and lower extremities are gracile. The muscular relief of the arms is generally moderately developed. The ridges of the pronator quadratus and supinator on the radial and ulnar bones are well expressed. We can assume that this individual was engaged in light physical labor associated with the rotational movements of the forearms. The muscular relief of the lower extremities is generally quite well developed, as evidenced primarily by the linea aspera and gluteal tuberosity of the femur. That is where the muscles that provide movement of the legs when walking and running are attached. The development of relief on the tibias and femurs indicates a significant load on the corresponding muscles.

Conclusions

Craniological research revealed the following general characteristics of the series: the male skulls are dolichocranial, faces are well protruding in the horizontal plane, with long and narrow noses; female skulls are mesocranial with high and narrow faces, protruding in the horizontal plane as well. This suggests that individuals can be classified as belonging to the Mediterranean anthropological type. A comparative analysis of the cranial angular morphometry showed that the ancient Egyptian population was quite heterogeneous in the 1st millennium BC. The study also revealed a mummy of a woman with characteristic sub-Saharan features (I, 1a 6756).

Osteological analysis revealed that most specimens had long forearms and lower legs and relatively gracile bones of the extremities; and that both men and women were rather short while alive. Most individuals had well-developed muscular relief, due to

physical activity during their lives, with the exceptions of the mummies of the woman I, 1a 1240 and the man I, 1a 5302.

The main pathological changes are identified in the spines. These are vertebral fractures and age-related changes of the vertebrae. In two specimens, ante-mortem spinal injuries could have caused death. Mummies I, 1a 1235 and I, 1a 6930 have age-related reduction of the diploe at the parietal bones. Ethmoid bones are destroyed, which can be explained by the process of mummification (removal of brain).

The results obtained in the present study are of considerable interest. The X-ray CT method is extremely promising for non-destructive studies with high spatial resolution of the three-dimensional structure of mummies. Within the framework of the project, we plan to reconstruct the external appearance of the mummies and to produce models using additive technologies. The chemical composition of the hair coating of three mummies and embalming resin were studied in the Kurchatov NBICS Center. In addition, sampling for genetic analysis and radiocarbon dating is planned. The presented interdisciplinary methodology for studying ancient Egyptian mummies is unique to Russian science. Such a study is of great importance for the development of Russian historical science, anthropology, and museum studies.

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References

Alekseev V.P. 1966
Osteometriya: Metodika antropologicheskikh issledovaniy. Moscow: Nauka.

Alekseev V.P., Debets G.F. 1964
Kraniometriya: Metodika antropologicheskikh issledovaniy. Moscow: Nauka.

Cesarani F., Martina M.C., Farraris A., Grilletto R., Boano R., Marochetti E.F., Donadoni A.M., Gandini G. 2003
Whole-body three-dimensional multidetector CT of 13 Egyptian human mummies. *American Journal of Roentgenology*, vol. 180: 597–606.

Cox S.L. 2015
A critical look at mummy CT scanning. *The Anatomical Record Advances in Integrative Anatomy and Evolutionary Biology*, vol. 298 (6): 1099–1110.

Fedosova V.N. 1986
Obshchaya otsenka razvitiya komponenta mezomorfii po osteologicheskim dannym (osteologicheskaya metodika). *Voprosy antropologii*, iss. 76: 104–116.

Friedman S.N., Nelson A.J., Granton P.V., Holdsworth D.W., Chhem R., Cunningham I.A. 2011
Dual-energy computed tomography automated bone identification in ancient Egyptian mummies. In *Yearbook of Mummy Studies*, vol. 1. Munchen: Verl. Dr. Friedrich Pfeil, pp. 63–68.

Friedman S.N., Nguyen N., Nelson A.J., Granton P.V., MacDonald D.B., Hibbert R., Holdsworth D.W., Cunningham I.A. 2012
Computed tomography (CT) bone segmentation of an ancient Egyptian mummy: A comparison of automated and semiautomated threshold and dual-energy techniques. *Journal of Computer Assisted Tomography*, vol. 36 (5): 616–622.

Glazkov V.P., Kovalenko E.S., Murashev M.M., Podurets K.M., Veligzhanin A.A., Kolobylina N.N., Rastorguev V.A., Tulubensky M.G., Tereshchenko E.Y., Kashkarov P.K., Yatsishina E.B., Kovalchuk M.V. 2018
Issledovaniye bronzovykh statuy "Ioann Krestitel" i "Tantsuyushchiy amur" iz fondov GMII im. A.S. Pushkina. *Kristallografiya*, vol. 63 (4): 670–676.

Hawass Z., Saleem S.N. 2016
Scanning the Pharaohs: CT Imaging of the New Kingdom Royal Mummies. Cairo: The American Univ. in Cairo Press.

Kovalchuk M.V., Yatsishina E.B., Blagov A.E., Tereshchenko E.Y., Prosekov P.A., Dyakova Y.A. 2016
Rentgenovskiye i sinkhrotronniye metody v issledovaniyakh obyektov kulturnogo naslediya. *Kristallografiya*, vol. 61 (5): 681–690.

Letyagin A.Y., Savelov A.A. 2014
Zhizn i smert "Altaiskoy printsessy". *Nauka iz pervykh ruk*, vol. 57/58 (3/4): 116–137.

Lewin P.K., Harwood-Nash D.C. 1977
Computerized axial tomography in medical archaeology. *Paleopathology Newsletter*, vol. 17: 8–9.

Macková A., MacGregor D., Azaiez F., Nyberg J., Piasetzky E. 2016
Nuclear Physics for Cultural Heritage: A Topical Review by the Nuclear Physics Division of the European Physical Society. Les Ulis: Édition Diffusion Presse Sciences.

Marx M., D'Auria S.D. 1988
Three dimensional CT reconstruction of an ancient Egyptian Mummy. *American Journal of Radiology*, vol. 150: 147–149.

Nedden D.N., Knapp R., Wicke K., Judmaier W., Murphy W.A., Seidler H., Platzer W. 1994
Skull of a 5300-year-old Mummy: Reproduction and investigation with CT-guided stereolithography. *Radiology*, vol. 193: 269–272.

Öhrström L., Fischer B.M., Bitzer A., Wallauer J., Walther M., Rühli F. 2015
Terahertz imaging modalities of ancient Egyptian mummified objects and of a naturally mummified rat. *The Anatomical Record*, vol. 298 (6): 1135–1143.

Pakhunov A.S., Devlet E.G., Molodin V.I., Lazin B.V., Karateev I.A., Dorovatovsky P.V., Kaloyan A.A., Podurets K.M., Senin R.A., Blagov A.E., Yatsishina E.B. 2017

Comparative analysis of paints on the Karakol burial slabs. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 45 (3): 56–68.

Seiler R., Rühli F. 2015

"The opening of the mouth" — a new perspective for an ancient Egyptian mummification procedure. *The Anatomical Record*, vol. 298 (6): 1208–1216.

Vasiliev A.L., Kovalchuk M.V., Yatsishina E.B. 2016

Issledovaniye obyektov kulturnogo naslediya metodami elektronnoy mikroskopii. *Kristallografiya*, vol. 61 (6): 845–857.

Vlijmen O.J.C., van, Rangel F.A., Bergé S.J., Bronkhorst E.M., Becking A.G., Kuijpers-Jagtman A.M. 2011

Measurements on 3D models of human skulls derived from two different cone beam CT scanners. *Clinical Oral Investigations*, vol. 15: 721–727.

Yatsishina E.B., Kovalchuk M.V., Loshak M.D., Vasilyev S.V., Vasilieva O.A., Dyuzheva O.P., Pozhidaev V.M., Ushakov V.L. 2018

Mezhdistsiplinarniye issledovaniya yegipetskikh mumiy iz kollektsii Gosudarstvennogo muzeya izobrazitelnykh iskusstv im. A.S. Pushkina v natsionalnom issledovatelskom tsentre "Kurchatovskiy institute". *Kristallografiya*, vol. 63 (3): 479–490.

Zesch S., Panzer S., Rosendahl W., Nance J.W., Jr., Schönberg S.O., Henzler T. 2016

From first to latest imaging technology: Revisiting the first mummy investigated with X-ray in 1896 by using dual-source computed tomography. *European Journal of Radiology*, vol. 3: 172–181.

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Secular Dynamics of Body Height and Weight in Russian Children Aged 0–17

This study deals with long-term temporal changes of body height and weight during various stages of ontogeny: newborns, infants, early age children, children of first childhood, children of second childhood, adolescents, and youths. Each age/sex group numbers ca 100 persons, the total sample size is ca 2000. The meta-analysis is based primarily on growth-standards for Russian children, regularly renewed by the Research Institute of Hygiene and Health Protection of Children and Adolescents and mostly relating to separate decades of the 20th century. The intensity of the secular trends was assessed through the analysis of scatter plots. The largest share in the secular increase of body dimensions belongs to intense growth during the second year of life and during the adolescent growth spurt. The smallest share is that of intrauterine growth, limited by the mother's body size, and that of growth during the juvenile age, when the mature body size has been virtually reached and growth rate is minimal. Boys, who are more eco-sensitive, demonstrate greater secular changes than girls, who are eco-resistant. Smaller secular changes in weight than in height in both boys and girls result in an increase of leptosomy. This heterochrony concerns mostly newborns, whose body mass is a standard example of stabilizing selection.

Keywords: *Secular changes, 20th century, body height, body weight, newborns, preschool children, school children.*

Introduction

A secular trend (lat. *secularis* – 'centenary'), also known as a temporal shift, is described in broad terms as an intergenerational shift in the body size of children and adults, as well as in the rate of biological maturation of children, or the biological markers of adults (age at menopause, life span, rate of aging). The term is also employed to refer to any directional non-racial change of physical type in modern humans, e.g. stature variation, brachycephalization or gracilization of the skull. Manifestations of the secular trend observed in the 20th century, which combine acceleration of biological maturation with deceleration of aging, do not fully comply with the "trunk line" of *Homo* evolution: simultaneous deceleration of both processes. An illustration of this scenario is long-lived populations; in particular, the Abkhazians before the conflict of the 1990s, which has irreversibly disrupted the mode of ontogeny of the Abkhazians—a combination of decelerated growth and aging.

Paleoanthropological data suggest that the morphofunctional status of the genus *Homo* was fluctuating, during the biological history of the genus, around some physiological norm. For instance, in ancient and medieval Europe, age at menarche was falling to the lowest physiologically possible level of 12 years of age, but later was increasing to 17.5–

18 years, in particular in northern Europe. Then, in the 19th century, there was a decrease to the modern values of 12–12.5 years in most European countries. Meanwhile, in some Asian populations, this age is still as high as 18 or even more years. Growth spurt in boys of the Angles tribe in the 1st to 6th centuries AD took place later than in modern European adolescents (14–16 years), though such a late age is still found at present in some high-altitude Himalayan groups (Khrisanfova, Perevozchikov, 1999: 161). Temporal fluctuations are typical of body height as well (Deryabin, 2009: 270–271). For example, the male stature of the ancient Lithuanians, reconstructed from the lengths of long bones, was approximately 172 cm during the 2nd to 12th centuries AD, which corresponds to this value in Lithuanians of the second half of the 20th century; in the 14th to 17th centuries, it was 166.8 cm, and in the late 20th century, in a sample of male military personnel, it averaged 175 cm. A similar picture is observed in the territory of Germany: from the 5th to the mid-19th century, there has been a gradual decline in the stature of males from 172 cm to 167 cm, followed by a "recovery" to ancient values by the middle of the 20th century, and then a continuing increase to more than 173 cm. The term "recovery" seems to be the most appropriate for the long-term secular trends described above. The situation with both the age at menarche and body height points towards a recovery in modern populations of the morphofunctional status of the Early Medieval Europeans. This stimulates a search for a global factor in such a large-scale (i.e. encompassing a long historical period) temporal change of body size and biological indicators. Supposedly, the cyclicality of human growth and development could be explained by adaptation to manifestations of cycles of solar activity, the peak of which coincides with a deceleration of growth, while the decline coincides with an acceleration (Nikityuk, Alpatov, 1979; Khrisanfova, Perevozchikov, 1999: 162). This observation might hold true even if we consider a much wider chronological scale, from Australopithecus to modern humans: we shall see similar temporal trends with a much wider "step". The stature of *A. africanus* was 130 cm, but two millions years later the Nariokotome *Homo erectus* was as tall as 180 cm. Neanderthals were much shorter (the estimated stature of La Chapelle-aux-Saints 1 was only 154–155 cm), while Upper Paleolithic modern humans were very tall (182 cm for Cro-Magnon 1) (Zubov, 2004: 250, 384). An exhaustive description of evolutionary dynamics of physical type of man, as well as a discussion of all accompanying and contributing circumstances and the hierarchy of acting factors, can be found in monographs by the leading Russian anthropologists: A.A. Zubov (Ibid.: 131–466) and E.N. Khrisanfova (1978: 5–183). We cannot agree more with the view of Zubov stating that the broadest morphological polymorphism in combination with extreme behavioral plasticity, based on the high brain development, is the asymptotic limit of human evolution (2004: 64).

The results of numerous and systematic studies of human growth carried out in the 20th century (Cole, 2000) get arranged in a rather mosaic picture of the temporal dynamics of the morphofunctional status of the modern population of the Earth, and show a wide variety of possible factors and specific manifestations of the temporal change. Taken together, those results finally spawned the concept of "secular trend".

The intensity and direction of the temporal dynamics of somatic indicators in children (inside the limits of the physiological structural norm) reflect important aspects of relationships between the body and environment, and the anthropogenic factor *per se*. These depend on the biological specifics of the period of ontogeny: tasks that the body has to perform, the degree of its eco-sensitivity, and the pattern of interplay between hereditary and environmental factors. By the anthropogenic factor we mean the complex of environmental factors relating to casual or intentional human activity. The anthropogenic activity of the last decades has resulted in global ecological disasters: the greenhouse effect, acid rains, deforestation, and desertification. Other factors of distress intensify as a direct result of human occupational activity: increased man-made pollution of atmosphere, soil, and water; increased information stress; increased level of hypokinesia; and long-term psychophysiological loads. Taken together, all these phenomena can be referred to as an "increase of anthropogenic pressure". Humanity changes the biosphere according to its needs, but then it has to adapt to the artificial environment it creates, which appears to be distressing in the modern civilized world. This cyclical and interactive biocultural interplay is crucial for the beginning of the 3rd millennium (Shell, 2014). The emergence of cities was an important critical point in human activity since the Paleolithic. It led to the emergence of an urban way of life and the resulting technogenic pollution, which represents a challenge for the adaptive capacities of our species (Ibid.). At that point, humanity became a unified system that opposed itself to biosphere. The urban ecological niche exerts a level of stress multiply exceeding that of any natural, even

extreme, ecological niches. In terms of its strength of influence, it can be compared to the genetic factor, and represents an alternative to the environment in which the human genome was formed. In addition, in the 3rd millennium, technogenic pollution became the main factor affecting growth. In contrast, in growth surveys of the 20th century, other factors were considered the most important: social, family, climatic (temperature and latitude) factors, and the level of modernization of the society. The influence of climatic factors on growth points towards preservation of an evolutionarily meaningful relationship between life-cycle indicators and these factors (as immunity regulators), even in the modern technogenic world.

In the world literature, various aspects of somatic secular trends in children in relation to the period of ontogeny are discussed. The body size of newborns is considered a result of adaptation by the growing fetus, which is highly plastic, to relatively stable components of maternal phenotype (Wells, Figueiroa, Alves, 2018). Multiple regression analyses show that the main mediators of this adaptation are the size of the mother's pelvis (as a reflection of the general nutritive and morphological status of mother) and the circumference of the head of a newborn. The sensitivity of fetal growth to the size of the mother's pelvis decreases the probability of an adverse birth outcome. The result of this adaptation is synchronous secular changes of the circumference of the newborn's head and the size of the mother's pelvis. For example, the statistically significant deceleration of head circumference in Russia during the 1950–2010s coincides with the tendency in women in labor to have narrow pelvises, consistently found in different Russian regions since 1980s (Mogeladze, Shchurov, Kholodkov, 2009; Fedotova, Gorbacheva, 2016; Yatsyk, Malkova, Syutkina, 2007). Interestingly, from the 1880s to the 1960s, in Moscow newborns, an intense increase of the head circumference was observed, accompanied by a less pronounced acceleration in the height and weight of the body and a deceleration in the abdomen's circumference (Nikityuk, 1972). At the same time, the sagittal dimensions of the mother's pelvis were increasing. Such a sequence of secular trends for the head circumference of newborns confirms the views about the fluctuating nature of temporal trends of somatic dimensions as a part of general fluctuating change of biorhythms in humans (Khrisanfova, Perevozchikov, 1999: 162). An English anthropologist, J.C.K. Wells, performed a speculative (in his own opinion) attempt to reconstruct the trends of newborn body weight in the Paleolithic and Neolithic, basing solely on secular trends of adult stature and ignoring numerous ecological factors (2009). His results suggest a substantial decrease in body mass from the Paleolithic to Neolithic times and slighter fluctuations afterwards.

Importantly, the size of the newborn's body and the mother's pelvis got involved in an irreconcilable biological conflict from the very beginning of the evolutionary history of our species. The need for improvement in bipedal walking, which would provide certain energetic advances to our ancestors, conflicted with the need to deliver large newborns with voluminous brains. The once-achieved compromise and balance between the widening of the women's pelvis and the restriction of rate of intrauterine fetal growth, including the upper limit of somatic size of the newborn and a deceleration of brain growth (this development is "taken off the table" of fetal development), are maintained by a strict control of stabilizing selection throughout the biological history of our species. De Leon et al. (2008) expressed the opinion that the slight decrease in body- and brain-sizes observed in *Homo sapiens* during the last 30–40 millennia can be explained by an economy of the resources that a mother spends on the bearing, delivery, and feeding of a child, and was one of the factors of the rapid expansion of our ancestors into Eurasia. Maybe Neanderthals failed in attempts to overcome the consequences of the "biological conflict" mentioned above.

According to the results of a cohort-based study of children of Jimma, the largest city in southwestern Ethiopia, the body-fat mass of a newborn is not correlated with his/her stature, while in two-year old children the weight is positively correlated with height, and explains a substantial proportion of its variation (Admassu et al., 2017). Parallel analyses of secular trends of body height and weight have been carried out in Japan (1950–2010) and South Korea (1965–2005) during the last 50 years. The analyses employed one-year cohorts of children, adolescents, and youth (in general, from 1 to 20 years old), and showed substantial differences in growth patterns between the two ethnic groups, which can hardly be explained by their differences in national income, diet, or way of life. An accelerated growth of the long bones in infants is observed in both samples. Thus, marked secular differences in adult stature are established by 1.5 years of life (Cole, Mori, 2018).

A longitudinal study in Nepal has shown that the socioeconomic status of a newborn's family largely determines his/her body-fat mass in the first

years of life, while higher education of the mother is associated with an increase in height to 0.6–0.7 units of standard deviation by 2.5 and 8.5 years (Devakumar et al., 2018).

An analysis of the secular dynamics of height in Dutch children of 0–21 years has demonstrated that stature in this world-tallest population got stabilized for a first time during 150 years of observations (since 1858). The definitive height remains 183.8±7.1 cm in boys and 170.7 ± 6.3 in girls since 1997 (Schonbeck et al., 2013). This observation can be explained both by the attainment of genetic optimum and by the stabilization of accelerating environmental factors in the last decade, which constricts the realization of genetic growth potential.

A study of the age dynamics of the relationships between hereditary and environmental factors in affecting parameters of physical development was carried out in Moscow, using data on twins (Khamaganova, 1979). According to its results, the role of genotype in the phenotypic variation of those parameters was increasing from 0 to 15 years. In general, in population variation of indicators of physical development, the role of genetic factors is high; higher than in the determination of neurophysiological parameters. At the same time, in individual variation, a substantial influence for environmental factors is detected: for stature in 7–9 years; for body weight in newborns, 4–6, and 10–12 years; for chest and head circumference in 7–9 years.

Among the aims of this study is a meta-analysis of the secular dynamics of two integral indicators of physical development (body height and weight) in a large number of samples of Russian urban children of the late 19th to early 21st centuries. Through the use of a wide age range spanning from newborns to juveniles, it is possible to assess the relative intensity of secular changes in relation to the period of ontogeny and its biological meaning. Owing to space limitations, it is not possible to consider thoroughly all one-year age and sex cohorts; thus the age groups that are most informative from the physiological and behavioral points of view (and which contrast to each other to an extent) were chosen in each period of ontogeny. Their succession describes the logic of ontogenetic change quite clearly. The age periodization employed in this study follows the methodical recommendations of modern age physiology (Bezrukikh, 2006). Newborns (first 1–10 days, or the period from umbilical cord dressing to 28 days of age, according to modern neonatology (Prakticheskoye rukovodstvo…, 2008: 10): body height and weight indicate the quality of intrauterine growth, they are limited by the morphology of the mother's body, and are an object for stabilizing selection. First year (or infant age, from 10 days to 1 year): body size is an indicator of the quality of the period of compensatory growth and a result of the intensive reshaping of the structure of individual and population variation of main anthropometric dimensions during the first year of life. Two years (early age, 1–3 years): body size describes the status of the individual, which is almost completely independent of the conditions of intrauterine growth and the maternal factor. Three years (second half of early age): a conditional boundary between physiologically and behaviorally dependent and autonomous individuals; body size at this age can be viewed as the starting point of the individual's stable developmental channel. Six years (first childhood, 4–7 years): the accumulation of morphofunctional changes leads to a substantial change of the general body plan and proportions, the emergence of new biomechanical properties, and acquisition of personal psychological traits; this is also the time of the second preschool growth spurt, which is however not observed in all growth studies. Nine years (second childhood, 8–12 years in boys, 8–11 years in girls): period of the lowest rate of somatic growth between the first and second growth spurts; minimal population variation of body size; this is accompanied by very active primary socialization. Thirteen years (adolescence, 13–16 years in boys, 12–15 years in girls): pubertal growth spurt, early stages of which are related to active secretion of growth hormone; this is a critical period of development associated with an intense activation of the genome and turbulent processes of differentiation. Seventeen years (juvenile age, 17–21 years in boys, 16–20 years in girls): the end of puberty and continuing (though not so rapid) biological development of the body. Morphofunctional stability is achieved by 21 years of age in females and by 25 years of age in males.

A large-scale analysis of secular change of definite stature of adult males and females was recently carried out by collective efforts of scientists around the world, excluding Russia and neighboring countries (the former members of the USSR) (NCD Risk Factor…, 2016). The results of 1472 population studies were compiled to answer the question of how human body height changed during the 20th century. The aim of this study is to assess the change of body height and weight in children of 0–17 years during the last century in the territory of the former USSR.

A difference with the study mentioned above is that in our work, mean values for cities and ethnic groups are used instead of means for countries.

The world-scale study has shown, inter alia, that the areas of high and low stature do not change between 1896 and 1996. The difference between the tallest and shortest population remains the same (19–20 cm for females) or even increases (in males) without a connection to social context. A similar geographic continuity of body size distribution in different time periods was observed in large-scale applied research of adult urban populations of the former USSR (Deryabin, Purundzhan, 1990: 121–167; Kurshakova, 1983). Such continuity is typical for children as well, but does not account for details of growth processes, and is usually broken for a variety of reasons: population differences in the age of maximal growth rate, an accumulation of stochastic changes due to the unequal social composition of samples, life conditions, etc. For instance, an analysis of the growth of children of the member countries of the CMEA (Bulgaria, Hungary, East Germany, Poland, Romania, Czechoslovakia, and the USSR) in the late 1960s has shown that only in 3-year old (and partially 17-year old) children do population differences completely replicate those in adults. At all other ages and for all other variables (chest circumference, trunk and limb lengths) the relative position of children's samples is changeable (Dunaevskaya, 1974). Notably, 3 years is the age of radical change in the immune system and the emergence of correlation systems between somatic dimensions. It was hypothesized that the three-year interval could be a "periodical step" in the immune function, which determines the advent of ontogenetic crises (Kurshakova et al., 1994). Somatic reaction to the crises is observed in the same year in children and a year later in adults.

Materials and methods

This study employs 193 territorial groups from the former USSR and Russia, measured in various decades of the 20th and 21st centuries. It represents a large number of ethnic groups: Adyghe, Azerbaijanis, Armenians, Bashkirs, Belarusians, Georgians, Dolgans, Kabardians, Kazakhs, Kalmyks, Kyrgyz, Karels, Komi, Russians, Tajiks, Tatars, Tuvinians, Turkmens, Udmurts, Uzbeks, Ukrainian, Khakas, Khanty, Mansi, Chukchi, Estonians, and Yakuts. Our dataset includes the following numbers of samples of various age cohorts: newborn (338 samples), one year (188 samples), two years (116 samples), three years (256 samples), six years (312 samples), nine years (418 samples), thirteen years (402 samples), and seventeen years (254 samples). The size of each sex-age cohort is ca 100 individuals. All samples are urban, which guarantees homogeneity of the data. Strictly speaking, the opposition of urban and rural populations is no longer valid in the modern world, but our study includes a substantial amount of retrospective data (50 and more years ago, when such a separation was of fundamental importance). For instance, it has been shown that the age at menarche (the most eco-sensitive indicator) differs systematically between urban and rural girls in a large number of ethnoterritorial groups of the former USSR, irrespectively of the ethnicity of the girls. The rate of maturation of dwellers of big cities was surprisingly uniform and in some sense conservative. For the Russian girls from Moscow, Arkhangelsk, Smolensk, Nizhniy Novgorod, Ulan-Ude, Omsk, Tomsk, Irkutsk, and Yuzhno-Sakhalinsk, this indicator varies between 12.9 and 13.1 years, while in rural girls of the same areas the range of variation is much wider—0.8 years (Godina, 2003: 157). A study of ethnoterritorial variation of the body size of newborns from the former USSR on the basis of 63 growth surveys has detected systematic differences between urban and rural populations of the same regions: the urban newborns were taller and larger (Borovkova et al., 2012).

Our dataset covers the period from 1880s to the present for preschool and school children (with ten year intervals); from 1920s to the present for newborns and infants; and from 1950s to the present for children in early childhood. The total sample-size exceeds 310,000 individuals. The main source of data is the materials on the physical development of children and adolescents of the former USSR and Russia collected according to a unified protocol, and thus completely comparable (Materialy…, 1962, 1965, 1977, 1986, 1988, 1998; Fizicheskoye razvitiye…, 2013, 2019). These composite volumes are published by the National Medical Research Center for Children's Health of the Russian Federation Ministry of Health (Moscow) about every 10 years, as substantial and significant secular somatic changes are not acquired faster than in a decade. We also used this "natural" time step (10 years) in our study. It is worth remembering that the body possesses a long-term ontogenetic and evolutionary memory; thus the somatic response of an organism to the influence of different factors reflects a systemic (holistic) type of reaction. Therefore, the body is the most informative object for

an analysis of the specifics of development of living systems and the process of formation of their stability (Kurshakova et al., 1994). Some papers (Chuchukalo, 1929; Shtefko, 1925), dissertations (Bauer, 1900; Borovka, 1913; Gratsianov, 1889; Dik, 1883; Zak, 1982; Seiliger, 1900), and our own archive data were used as additional sources of information. Two main anthropometric parameters (body height and weight) were the object of our study as integral indicators of skeletal development and metabolism, respectively. A decrease in body weight accompanied by an increase in height, or leptosomization, is related to the attenuation of physical conditions and adaptive potential, which is confirmed by numerous auxological studies of children of various ages.

In the absence of available individual data and thus an opportunity to apply multidimensional statistics for assessing the level and direction of the correlation of anthropometric variables in children with the temporal factor, scatter plots were drawn for each of the age-sex cohorts. This graphical variety of correlation analysis for two variables in two-dimensional Cartesian space is an effective tool for exploring large sets of population means. The years of studies (1880s… 1920s… 2000s) were used as an independent variable, with body height and weight as dependent ones, for every age-sex cohort separately. In total, 32 diagrams were analyzed. In order to illustrate the intensity of the secular change, the mean rate of secular increase in stature or body weight in a decade (the ratio of total increase of a variable during the whole period to the number of decades in that period) was calculated for each of the cohorts.

Results

The direction of secular change in body height during the interval from birth to three years is identical for boys and girls of all age groups: this is a significant increase in size, or an acceleration of skeletal development (Fig. 1, *a–c*). The stature of newborns has increased by more than 2 cm from the 1920s to the 2010s ($r = 0.27$ for boys, $r = 0.37$ for girls, $p = 0.00$). The same figures for one-year old children from 1930s to 2010s are 4.7 cm for boys and 3.8 cm for girls ($r = 0.4$, $p = 0.00$), for two-year old children from 1950s to 2010s this is about 3 cm ($r = 0.46$ for boys and $r = 0.47$ for girls, $p = 0.00$), and for three-year old children during the same period about 2 cm ($r = 0.27$, $p = 0.00$). The slight decrease reflects the well-known fact of a gradual decrease in growth rate from birth to 3 years, though the rate of growth remains high in general (Deryabin, Krans, Fedotova, 2005).

From 6 to 17 years (Fig. 1, *d*), the weakest influence of temporal factor on the secular trend in stature is observed in six-year old boys ($r = 0.19$, $p = 0.02$) and girls ($r = 0.42$, $p = 0.00$). Later on, it increases by 9 years ($r = 0.66$ for boys, $r = 0.61$ for girls, $p = 0.00$) and 13 years ($r = 0.76$ for boys, $r = 0.73$ for girls, $p = 0.00$), but then decreases again by 17 years ($r = 0.42$ for boys, $r = 0.62$ for girls, $p = 0.00$). Clearly, the dynamics of the influence of the temporal factor, which determines secular changes of the indicators of physical development under increased anthropogenic pressure, is in general identical for both sexes. Surprisingly, this influence is higher in girls (typically less eco-sensitive than boys) at 6 and 17 years of age, probably as a result of distressing anthropogenic pressure. For instance, in extremely environmentally unfriendly areas of Moscow, as compared to more favorable areas of this city, a deceleration of skeletal development, accompanied by an increase in adiposity, is observed in children of 3–6 years. This trend is more pronounced in girls than in boys (Fedotova, Deryabin, 2006).

The mean rate of secular increase in stature in a decade is 0.32 cm in newborn boys, 0.38 cm in one-year old boys, 0.61 in two-year old boys, and 0.29 in three-year old boys. In girls of the same ages, the increases are the following: 0.23, 0.37, 0.60, and 0.37 cm. In boys of six years of age, about 1 cm; at 9 years, 0.9 cm; at 13 years, 1.7 cm; and at 17 years, 0.75 cm. In girls: 0.9, 0.9, 1.45, and 0.8 cm, respectively. Thus, the highest rate of secular changes in stature is typical of pubertal period (boys overtake girls), and the lowest for 17-year-olds. Consequently, the adolescent growth spurt has the main effect on the secular changes in body height during the interval from 6 to 17 years.

Secular changes in body weight (Fig. 2, *a–c*) are substantially different from those for stature. In newborns, no secular trend is observed. A slight decrease for girls (50 g in eight decades) is not statistically significant ($r = 0.08$, $p = 0.33$). Notably, weight of newborns represents a classic example of an object of stabilizing selection, while the main cause of its variation is the family factor—weight of parents and siblings at birth (Borovkova, 2012; Tanner, Lejarraga, Turner, 1972). This factor accounts for approximately 16 % of total variation of body size in newborns, while other factors explain only up to 1–4 %. The secular increase in weight in one-year-old children is slightly larger, 300–400 g in six decades, but also

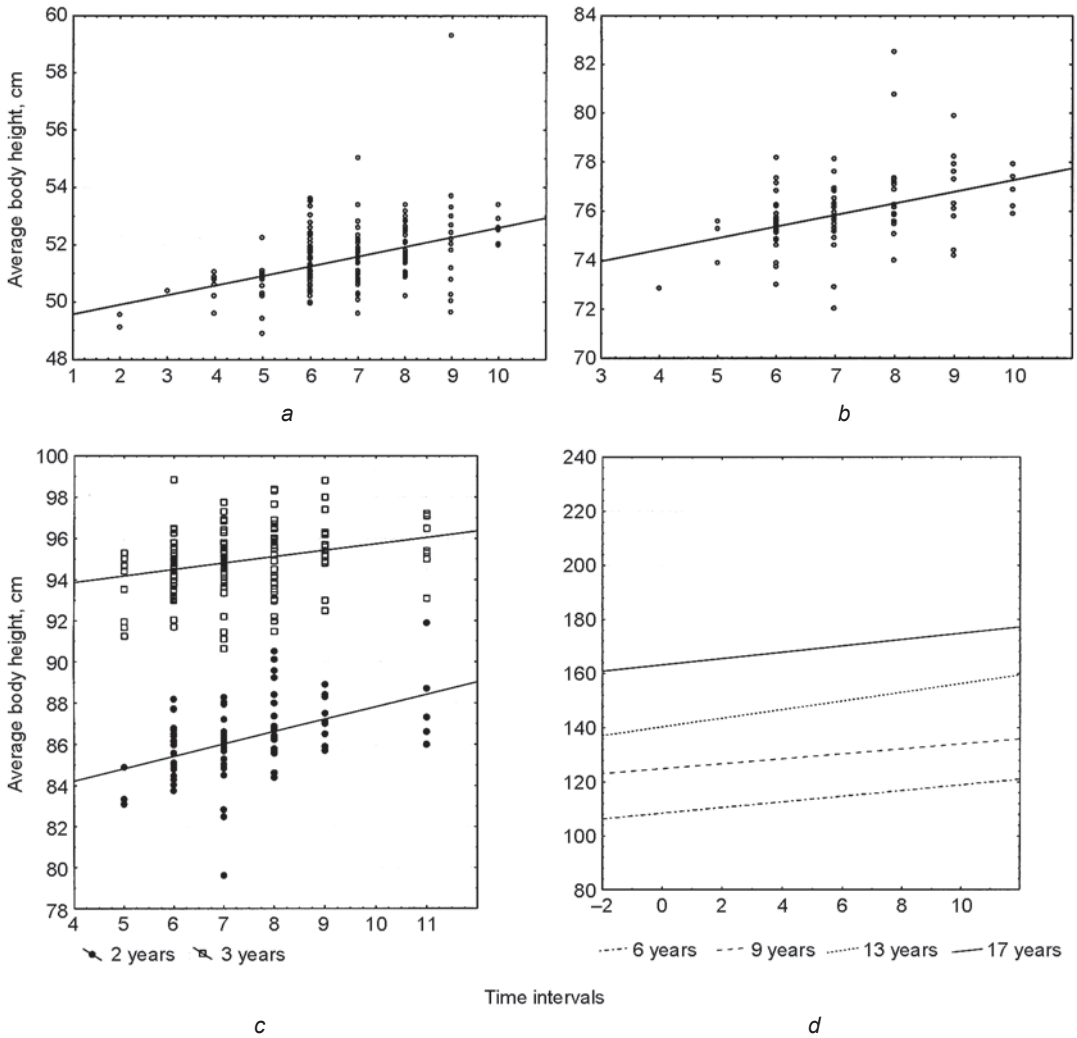

Fig. 1. Secular trend in stature in boys of Russian cities.
a – newborns; *b* – one-year old; *c* – early age children; *d* – preschool and school ages. Time intervals (10-year step): –2 – 1880s, 0 – 1900s, 2 – 1920s… 10 – 2000s.

not significant ($r = 0.03$, $p = 0.17$ for boys, $r = 0.33$, $p = 0.33$ for girls). The combination of the secular increase in stature with the stability of body weight reflects a trend to leptosomization in early ontogeny. In one-year old children of both sexes it is also accompanied by gracilization, i.e. a negative secular dynamics of the chest circumference (Fedotova, Gorbacheva, 2017). Later, in early childhood, the secular increase in body height and weight occurs in a more synchronous fashion. For instance, at two years of age, the absolute secular increase in weight approximates 700 g in six decades, and is statistically significant ($r = 0.32$, $p = 0.00$ in boys; $r = 0.27$, $p = 0.01$ in girls). In three-year old children, the increase approaches the level of significance as well. Summing up, the secular trend towards leptosomization is more pronounced in newborns and infants than in early childhood.

As with stature, the impact of the temporal factor on the change in body mass between 6 and 17 years (see Fig. 2, *d*) is the least at six years ($r = 0.31$ for boys, $r = 0.25$ for girls, $p = 0.00$). Then it gradually increases by 9 years ($r = 0.50$ for boys, $r = 0.46$ for girls, $p = 0.00$) and 13 years ($r = 0.65$ in boys, $r = 0.55$ in girls, $p = 0.00$). It decreases again by the age of 17 ($r = 0.37$ in boys, $r = 0.26$ in girls, $p = 0.00$). This indicator is generally higher in more eco-sensitive boys than in girls.

The mean rate of secular increase in body weight of boys per decade is 3 g in newborns, 30 g at one year, 100 g at two years, and 57 g at three years of age. The same figures in girls are 5, about 50, 125, and 63 g,

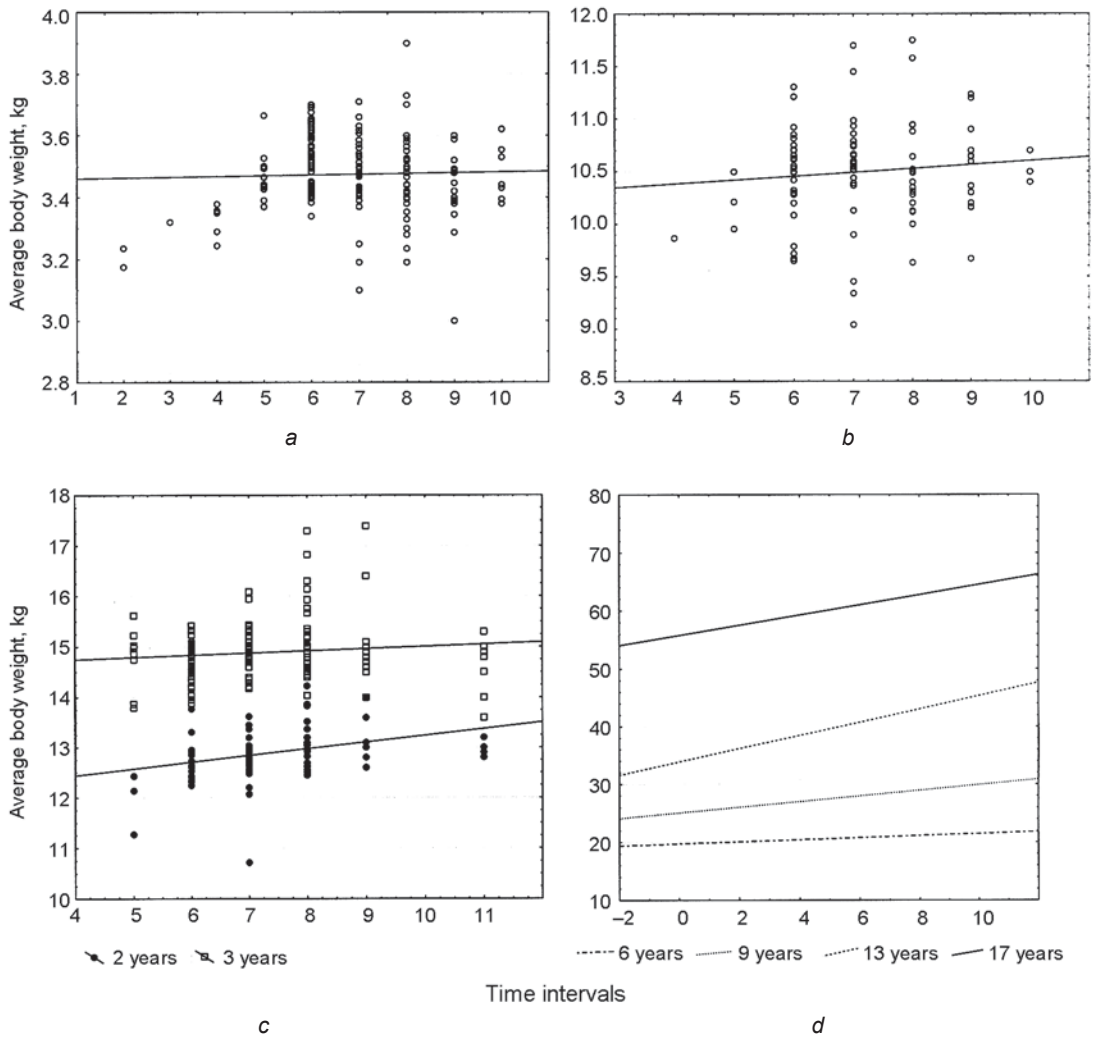

Fig. 2. Secular trend in body weight in boys of Russian cities.
a – newborns; *b* – one-year old; *c* – early age children; *d* – preschool and school ages. Time-intervals (10-year step): –2 – 1880s, 0 – 1900s, 2 – 1920s… 10 – 2000s.

respectively. In boys at six years it is 0.16 kg, at nine 0.50 kg, at thirteen 1.10 kg, and at seventeen 0.60 kg. In girls: 0.11, 0.48, 1.20, and 0.31 kg, respectively. Thus, the rate of secular change in body mass between 6 and 17 years is the highest at the pubertal growth spurt, and decreases substantially after 17 years, in girls in particular. This last observation may be explained by either an earlier attainment of definitive morphological status in girls, or by different sociocultural demands: physique stereotypes, diets, fitness, etc. These social trends affect girls more than boys.

Clearly, in the earlier age cohorts (0–3 years) the impact of the temporal factor on the secular dynamics of body weight is lower than in the later ages (6–17 years); moreover, it can cautiously be considered negligible. This is a contrast to the situation with stature, where the same factor is less influential between 0 and 3 years of life than in older children, but still is comparable to what is observed between 6 and 17 years of age.

Discussion

The impact of the temporal factor on the secular dynamics of body height and weight is gradually increasing from birth to two years of age. Afterwards, it is decreasing until three years, and then is increasing from 6 to 13 years. It decreases again at 17 years. Thus, the secular dynamics of the main indicators of physical development are non-linear, and are most clearly pronounced during the second year of life, the

time of active search for an individual growth channel; and at puberty (13 years), when the growth trajectory is definitively corrected. These observations are in good agreement with the results of studies showing that the secular dynamics of definitive stature in adults are determined by an elongation of the leg during the first two years of life (Cole, 2003; Cole, Mori, 2018). An international twin-survey, which summarized the results of a number of European studies, has shown that the role of genetic factors in variation of stature increases from birth to adolescence, peaking at 13 years (Jelenkovic et al., 2016). The authors of the last-named study emphasize that the observed maximum for the environmental influence on stature-variation during the first years of life (50 % in the first year, less during childhood and adolescence) should be treated with caution, since the growth patterns of twins in early ontogeny differ substantially from those of single children. Secular trends are less clear during relatively "biologically neutral" periods (3, 6, or 17 years), when the rate of growth is lower. An increased intensity of secular changes at 9 years is in good agreement with the increased environmental influence on individual variation in body height and chest circumference at 7–9 years and body weight at 10–12 years (Khamaganova, 1979). The latter age cohort is conterminous between the groups of nine and thirteen-year old cohorts of the present study. Similar differences in the intensity of somatic secular trends were detected in the rural population of southern Mexico between 1968 and 2000. Those changes in body- and leg-lengths and sitting-stature were minimal in boys of 6–9 years and substantially higher in adolescents. In girls, otherwise, they were more intense between 6 and 9 years and between 10 and 13 years, rather than between 13 and 17 years. Finally, the secular increase in stature in young adults of both sexes was lower than that in the adolescents (Malina et al., 2004). In a national Chinese survey of pre-school children's growth and development in nine cities, an absence of statistically significant secular trends in body height and weight was observed before three years of age, but the trends were evident between 3 and 7 years (A National Survey…, 2018).

The effect of the temporal factor on the dynamics of stature is slightly higher than on those of body weight. Thus, the secular trends of the more genetically determined indicator of skeletal development are more pronounced as compared to body weight, which depends roughly equally on all the three somatic components (skeletal, muscular, and fat) and, consequently, on the way of life of children (level of physical exercise, nutrition, etc.). It should not be forgotten that the temporal dynamics of the skeletal somatic component is mediated by neurogenic mechanisms as a response to anthropogenic pressure, while transverse measurements of the body react to lifestyle more directly. For instance, the Fels longitudinal growth study (USA) has shown that the increase in the BMI in young men in recent years is largely dependent on fat-mass, but in young women on both fat- and lean-masses. The authors of the survey interpret this observation as a possible result of changes in the way of life and behavior patterns that have not involved the males yet and require further study (Johnson et al., 2013). A survey of children in Calcutta (India) in 1982–2011 shows that the increase in body height and the development of fat-mass are to a substantial extent independent of each other (Scheffler et al., 2018). This means that the former is fairly independent of nutrition and family income. A marked secular leptosomization of newborns and infants is correlated with similar morphological features in the girls who later became their mothers (manifest leptosomic adolescents of 1970–1990s), and points towards intergenerational correlations of the microevolutionary somatic changes.

Finally, the secular trends are generally better pronounced in boys rather than in girls. This corresponds to the fact of higher eco-sensitivity of males in the norm. As mentioned earlier, sexual differences in the secular trends were observed in rural population of Mexico (Malina et al., 2004). A higher eco-sensitivity was detected in healthy newborn boys in Japan in 1962–1988, the years of substantial social and economic progress, which somehow affected the physiology of prenatal growth (Oishi et al., 2004). The secular changes in body height and weight were the most evident, while the change in the chest circumference and head were not statistically significant.

It is of note, however, that while the general direction of secular trends in the main indicators of physical development is universal for all ethnoterritorial groups included in our meta-analysis, there are regional differences in their intensity/severity. This fact deserves special consideration, and points towards the need for development of local standards for growth.

Conclusions

The results of our study demonstrate that the secular change in body height and weight of children of both

sexes are the highest during the periods of the most active growth and development, i.e. the second year of life and at 13 years (puberty). The influence of the temporal factor (which largely describes the increase in the level of anthropogenic stress) is the least in the periods of deceleration of growth processes: at 6, and particularly at 17 years of age. This influence on the dynamics of the main indicators of physical development is stronger in boys, who are more eco-sensitive than girls.

The less pronounced trend in body weight as compared to stature in children of both sexes and of all age cohorts suggests different factors of variation in longitudinal and transverse body dimensions. This, in turn, determines the secular trend in body shape: the increase in body weight relative to body height, resulting in an increased leptosomization. The process of leptosomization of children was most clearly detected in various regions of Europe in the second half of the 20th century.

It can be summarized that the secular increase in body size is mainly determined by intense growth during the second year of life and during the adolescent growth spurt. The least important segments of ontogeny from this point of view are: the intrauterine period, when the size of the fetus is restricted by mother's morphology, and youth, when the definitive level of morphofunctional maturation is almost achieved and the rate of growth is minimal. As girls reach the definitive morphofunctional status earlier than boys, sexual differences in the intensity of secular dynamics are most evident at 17 years of age.

The observations discussed in this paper are an aspect of studying the secular trends that can be called "superethnic" or "superpopulational". A similar algorithm of analysis of spatial somatic variation based on data from more than 70 child-growth surveys from the former USSR detected a western-eastern cline in the distribution of children's stature in various ethnoterritorial groups (Godina, 2001). For a more detailed examination of the temporal dynamics of somatic growth, including the consequences of experienced stresses, a stronger "magnification" is required: single populations and individual variation should be studied. This should include a consideration of the coefficient of variation, which is an informative marker of stress even in the absence of somatic changes *per se*. For instance, for a sample from Moscow it was demonstrated that girls born during the Second World War were able to realize the genetic program of growth and development, according to the evolutionary determined patterns of interchange of growth rates through early stages on ontogeny (Zadorozhnaya, 2018). According to the results of a survey of a long-lived Abkhazian population, the war of 1992–1993 and the stressing social consequences of the war have changed the "long-lived" rates of ontogeny typical of this population. In the 25 years from 1980 to 2004, the rates of skeletal maturation and somatic growth have substantially increased, though statistically significant changes are found not earlier than in children of 10–11 and 12–13 years, respectively (Batsevich et al., 2006). In recent decades, technogenic pollution, the result of industrial "race", is becoming the most important stressing factor, which might well have even more serious consequences than social cataclysms. For instance, the aggressive influence of combined radiation-toxic metabolites on children of the Bryansk Region leads to a deceleration of growth and development in children of 7–9 years, which is accompanied by adverse changes in cell immunity and an increased frequency of cytogenetic disorders (Korsakov, 2012). In the areas of the Belgorod Region, where critical ecological events have occurred during the last decades of the 20th century, significantly larger mean values of the main morphofunctional indicators in newborns were observed. In the same time, anthropometric dimensions of children of preschool and younger school ages were smaller in these areas than those of the children from areas with satisfactory ecological conditions (Krikun, 2006). The differences in the rates of the secular changes in children in various periods of ontogeny detected in this study are in a good agreement with the facts of differential age-related eco-sensitivity in the children mentioned above.

References

A National Survey on Physical Growth and Development of Children Under Seven Years of Age in Nine Cities of China in 2015. 2018
Zhongua Er Ke Za Zhi. Vol. 56 (3): 192–199.

Admassu B., Wells J.C.K., Girma T., Andersen G.S., Owino V., Belachew T., Michaelsen K.F., Abera M., Wibaek R., Friis H., Kæstel P. 2017
Body composition at birth and height at 2 years: A prospective cohort study among children in Jimma, Ethiopia. *Pediatric Research*, vol. 82 (2): 209–214.

Batsevich B.A., Godina E.Z., Prudnikova A.S., Yasina O.V., Kvitsiniya P.K. 2006
Sekulyarniye izmeneniya pokazateley somaticheskogo razvitiya detey i podrostkov selskikh raonov Abkhazii za posledniye 25 let. In *Sovremennaya selskaya Abkhaziya: Sotsialno-etnograficheskiye i antropologicheskiye issledovaniya*. Moscow: IEA RAN, pp. 189–227.

Bauer A.K. 1900
K voprosu o fizicheskom razvitii podrastayushchego zhenskogo organizma po nablyudeniyam nad vospitannitsami moskovskikh sirotskikh zavedeniy Vedomstva uchrezhdeniy imperatritsy Marii: Rost i ves. D. Sc. (Medicine) Dissertation. Moscow.

Bezrukikh M.M. 2006
Metodologicheskiye podkhody k probleme vozrastnogo razvitiya. In *Fiziologiya rosta i razvitiya detey i podrostkov (teoreticheskiye i klinicheskiye voprosy): Prakticheskoye rukovodstvo*. Moscow: GEOTAR-Media, pp. 39–67.

Borovka V.A. 1913
Sanitarnoye obsledovaniye gorodskikh uchilishch i uchashchikhsya: (Nablyudeniya i issledovaniya, proizvedenniye v sankt-peterburgskikh gorodskikh uchilishchakh). D. Sc. (Medicine) Dissertation. St. Petersburg.

Borovkova N.P. 2012
Razmery tela novorozhdennykh v svyazi s morfologicheskimi pokazatelyami rozhenitsy. In *Lomonosov-2012: XIX Mezhdunar. konf. studentov, aspirantov i molodykh uchenykh, 9–13 apr. 2012 g*. Sektsiya "Biologiya": Tezisy dokl. Moscow: MAKS Press, pp. 4–5.

Borovkova N.P., Gorbacheva A.K., Fedotova T.K., Chtetsov V.P. 2012
Etnoterritorialnoye raznoobraziye razmerov tela novorozhdennykh. *Vestnik Moskovskogo universiteta*. Ser. 23: Antropologiya, No. 3: 56–71.

Chuchukalo G.I. 1929
Fizicheskoye razvitiye detey ot odnogo goda do vosmi let. In *Materialy po antropologii Ukrainy*. Iss. 4: Deti doshkolnogo vozrasta, L.P. Nikolaev (ed.). Kharkov: Gos. Izd. Ukrainy, pp. 90–140.

Cole T.J. 2000
Secular trends in growth. *Proceedings of the Nutrition Society*, vol. 59 (2): 317–324.

Cole T.J. 2003
The secular trend in human physical growth: A biological review. *Economics and Human Biology*, vol. 1: 161–168.

Cole T.J., Mori H. 2018
Fifty years of child height and weight in Japan and South Korea: Contrasting secular trend patterns analyzed by SITAR. *American Journal of Human Biology*, vol. 30 (1): 1–13.

De Leon M.S.P., Golovanova L., Doronichev V., Romanova G., Akazawa T., Kondo O., Ishida H., Zollikofer C.P.E. 2008
Neanderthal brain size at birth provides insights into the evolution of human life history. *Proceedings of the National Academy of Sciences of the United States of America*, vol. 105 (37): 13764–13768.

Deryabin V.E. 2009
Antropologiya: Kurs lektsiy. Moscow: Izd. Mosk. Gos. Univ.

Deryabin V.E., Krans V.M., Fedotova T.K. 2005
Comparative analysis of age dynamics of average values of body dimensions in children from birth to 7 years. *Journal of Physical Anthropology*, vol. 24 (4): 487–492.

Deryabin V.E., Purundzhan A.L. 1990
Geograficheskiye osobennosti stroyeniya tela naseleniya SSSR. Moscow: Izd. Mosk. Gos. Univ.

Devakumar D., Kular D., Shrestha B.P., Grijalva-Eternod C., Daniel R.M., Saville N.M., Manandhar D.S., Costello A., Osrin D., Wells J.C.K. 2018
Socioeconomic determinants of growth in a longitudinal study in Nepal. *Maternal and Childhood Nutrition*, vol. 14 (1): 1–8.

Dik A.Y. 1883
Materialy k issledovaniyu rosta, vesa, okruzhnosti grudi i zhiznennoy yemkosti legkikh detskogo i yunosheskogo vozrastov, osnovanniye na nablyudeniyakh, sdelannykh v S.-Peterburge. D. Sc. (Medicine) Dissertation. St. Petersburg.

Dunaevskaya T.N. 1974
Morfologicheskiye osobennosti i rostoviye protsessy u detey. In *Razmernaya tipologiya naseleniya stran-chlenov SEV*. Moscow: Legkaya industriya, pp. 247–255.

Fedotova T.K., Deryabin V.E. 2006
Spetsifika somaticheskogo statusa sovremennykh detey 3–7 let v ekologicheski kontrastnykh rayonakh Moskvy. *Vestnik Rossiyskogo universiteta druzhby narodov*. Ser.: Ekologiya i bezopasnost zhiznedeyatelnosti, No. 1: 79–86.

Fedotova T.K., Gorbacheva A.K. 2016
Soizmenchivost razmerov tela novorozhdennykh i razmerov taza rozhenits v svyazi s faktorom stabiliziruyushchego otbora. *Vestnik Moskovskogo universiteta*. Ser. 23: Antropologiya, No. 4: 37–58.

Fedotova T.K., Gorbacheva A.K. 2017
Fizicheskoye razvitiye novorozhdennykh i grudnykh detey rossiyskikh gorodov: Sekulyarnaya dinamika. *Vestnik Moskovskogo universiteta*. Ser. 23: Antropologiya, No. 2: 26–38.

Fizicheskoye razvitiye detey i podrostkov Rossiyskoy Federatsii. 2013
Iss. VI, A.A. Baranov, V.R. Kuchma (eds.). Moscow: Pediatr.

Fizicheskoye razvitiye detey i podrostkov Rossiyskoy Federatsii. 2019
Iss. VII, V.R. Kuchma, N.A. Skoblina, O.Y. Milushkina (eds.). Moscow: Litterra.

Godina E.Z. 2001
Dinamika protsessov rosta i razvitiya u cheloveka: Prostranstvenno-vremenniye aspekty. D. Sc. (Biology) Dissertation. Moscow.

Godina E.Z. 2003
Auksologiya. In *Antropologiya: Uchebnik dlya studentov vyssh. ucheb. zavedeniy*. Moscow: Vlados, pp. 113–172.

Gratsianov N.A. 1889
Materialy dlya izucheniya fizicheskogo razvitiya detskogo i yunosheskogo vozrastov v zavisimosti ot nasledstvennosti i uspeshnosti v shkolnykh zanyatiyakh. D. Sc. (Medicine) Dissertation. St. Petersburg.

Jelenkovic A., Sund R., Hur Y.M., Yokoyama Y., Hjelmborg J.V., Möller S., Honda C., Magnusson P.K., Pedersen N.L., Ooki S., Aaltonen S., Stazi M.A., Fagnani C., D'Ippolito C., Freitas D.L., Maia J.A., Ji F., Ning F., Pang Z., Rebato E., Busjahn A., Kandler C., Saudino K.J., Jang K.L., Cozen W., Hwang A.E., Mack T.M., Gao W., Yu C., Li L., Corley R.P., Huibregtse B.M., Derom C., Vlietinck R.F., Loos R.J., Heikkilä K., Wardle J., Llewellyn C.H.,

Fisher A., McAdams T.A., Eley T.C., Gregory A.M., He M., Ding X., Bjerregaard-Andersen M., Beck-Nielsen H., Sodemann M., Tarnoki A.D., Tarnoki D.L., Knafo-Noam A., Mankuta D., Abramson L., Burt S.A., Klump K.L., Silberg J.L., Eaves L.J., Maes H.H., Krueger R.F., McGue M., Pahlen S., Gatz M., Butler D.A., Bartels M., van Beijsterveldt T.C., Craig J.M., Saffery R., Dubois L., Boivin M., Brendgen M., Dionne G., Vitaro F., Martin N.G., Medland S.E., Montgomery G.W., Swan G.E., Krasnow R., Tynelius P., Lichtenstein P., Haworth C.M., Plomin R., Bayasgalan G., Narandalai D., Harden K.P., Tucker-Drob E.M., Spector T., Mangino M., Lachance G., Baker L.A., Tuvblad C., Duncan G.E., Buchwald D., Willemsen G., Skytthe A., Kyvik K.O., Christensen K., Öncel S.Y., Aliev F., Rasmussen F., Goldberg J.H., Sørensen T.I., Boomsma D.I., Kaprio J., Silventoinen K. 2016

Genetic and environmental influences on height from infancy to early adulthood: An individual-based pooled analysis of 45 twin cohorts. *Scientific Reports*, vol. 6: 1–13.

Johnson W., Chumlea W.C., Czerwinski S.A., Demerath E.W. 2013

Secular trends in the fat and fat-free components of body mass index in children aged 8–18 years born in 1958–1995. *Annals of Human Biology*, vol. 1: 107–110.

Khamaganova T.G. 1979

Vliyaniye faktorov vneshney sredy i nasledstvennosti na morfofunktsionalnoye razvitiye detey i podrostkov na raznykh etapakh ontogeneza. Cand. Sc. (Medicine) Dissertation. Moscow.

Khrisanfova E.N. 1978

Evolyutsionnaya morfologiya skeleta cheloveka. Moscow: Izd. Mosk. Gos. Univ.

Khrisanfova E.N., Perevozchikov I.V. 1999

Antropologiya: Uchebnik. 2nd edition. Moscow: Izd. Mosk. Gos. Univ.

Korsakov A.V. 2012

Kompleksnaya ekologo-gigiyenicheskaya otsenka izmeneniy sostava sredy kak faktora riska dlya zdorovya naseleniya. D. Sc. (Biology) Dissertation. Bryansk.

Krikun E.N. 2006

Izmenchivost morfofunktsionalnykh pokazateley organizma cheloveka pod vliyaniyem neblagopriyatnykh ekologo-biologicheskikh faktorov. D. Sc. (Biology) Dissertation. Moscow.

Kurshakova Y.S. 1983

Faktory, opredelyayushchiye variatsii tipologicheskogo sostava naseleniya vo vremeni i na territorii. In *Antropometricheskaya standartizatsiya naseleniya stran-chlenov SEV*. Moscow: Legkaya i pishchevaya promyshlennost, pp. 111–126.

Kurshakova Y.S., Dunaevskaya T.N., Smirnova N.S., Shugaeva G.S. 1994

Issledovaniye doli somaticheskoy normy u detey ot 3-kh do 17 let s tselyu vyyavleniya periodov ontogeneza s povyshennoy chuvstvitelnostyu k vozdeistviyu sredy. In *Biologiya, ekologiya, biotekhnologiya i pochvovedeniye*. Moscow: Izd. Mosk. Gos. Univ., pp. 32–41.

Malina R.M., Pena Reyes M.E., Tan S.K., Buschoing P.H., Little B.B., Koziel S. 2004

Secular change in sitting height and leg length in rural Oaxaca, southern Mexico: 1968–2000. *Annals of Human Biology*, vol. 6: 615–633.

Materialy po fizicheskomu razvitiyu detey i podrostkov. 1962

Iss. I, A.Y. Goldfeld, A.M. Merkov, A.G. Tseitlin (eds.). Moscow: Medgiz.

Materialy po fizicheskomu razvitiyu detey i podrostkov gorodov i selskikh mestnostey SSSR. 1965

Iss. II, A.Y. Goldfeld, A.M. Merkov, A.G. Tseitlin (eds.). Leningrad: Meditsina.

Materialy po fizicheskomu razvitiyu detey i podrostkov gorodov i selskikh mestnostey SSSR. 1977

Iss. III, A.M. Merkov, A.F. Serenko, G.N. Serdyukovskaya (eds.). Moscow: Meditsina.

Materialy po fizicheskomu razvitiyu detey i podrostkov gorodov i selskikh mestnostey SSSR. 1986

Iss. IV. Pt. I: Rossiyskaya Sovetskaya Federativnaya Sotsialisticheskaya Respublika, V.V. Kanep, G.N. Serdyukovskaya, A.F. Serenko, V.K. Ovcharov (eds.). Moscow: Vsesoyuz. NII sotsialnoy gigiyeny i organizatsii zdravookhraneniya im. N.A. Semashko.

Materialy po fizicheskomu razvitiyu detey i podrostkov gorodov i selskikh mestnostey SSSR. 1988

Iss. IV. Pt. II: G.N. Serdyukovskaya, V.V. Kanep, A.F. Serenko, V.K. Ovcharov (eds.). Moscow: Vsesoyuz. NII sotsialnoy gigiyeny i organizatsii zdravookhraneniya im. N.A. Semashko.

Materialy po fizicheskomu razvitiyu detey i podrostkov gorodov i selskikh mestnostey Rossiyskoy Federatsii. 1998

Iss. V, T.M. Maksimova, L.G. Podunova (eds.). Moscow: NII sotsialnoy gigiyeny, ekonomiki i upravleniya zdravookhraneniyem im. N.A. Semashko RAMN.

Mogeladze N.O., Shchurov V.A., Kholodkov V.A. 2009

Vliyaniye izmeneniya kachestva zhizni naseleniya na pokazateli rosta i razvitiya detey. In *Fiziologiya razvitiya cheloveka: Materialy Mezhdunar. nauch. konf. Moskva, 22–24 iyunya 2009 g*. Sektsiya 4. Moscow: Verdana, pp. 63–64.

NCD Risk Factor Collaboration (NCD-RisC): A Century of Trends in Adult Human Height. 2016

eLife, vol. 5: 1–29.

Nikityuk B.A. 1972

Izmeneniya razmerov tela novorozhdennykh za posledniye 100 let. *Voprosy antropologii*, No. 42: 78–94.

Nikityuk B.A., Alpatov A.M. 1979

Svyaz vekovykh izmeneniy protsessov rosta i razvitiya cheloveka s protsessami solnechnoy aktivnosti. *Voprosy antropologii*, No. 63: 34–44.

Oishi K., Honda S., Takamura N., Kusano Y., Abe Y., Moji K., Takemoto T., Tahara Y., Aoyagi K. 2004

Secular trends of sizes at birth in Japanese healthy infants born between 1962 and 1988. *Journal of Physiological Anthropology and Applied Human Science*, vol. 5: 155–161.

Prakticheskoye rukovodstvo po neonatologii. 2008

G.V. Yatsyk (ed.). Moscow: Med. inform. agentstvo.

Scheffler C., Krutzfeldt L.M., Dasqupta P., Hermanussen M. 2018
No associations between fat tissue and height in 5019 children and adolescents, measured between 1982 and in 2011 in Kolkata/India. *Anthropologischer Anzeiger*, vol. 74 (5): 403–411.

Schonbeck Y., Talma H., van Dommelen P., Bakker B., Buitendijk S.E., HiraSing R.A., van Buuren S. 2013
The world's tallest nation has stopped growing taller: The height of Dutch children from 1955 to 2009. *Pediatric Research*, vol. 73: 371–377.

Seiliger D.L. 1900
Materialy dlya issledovaniya fizicheskogo razvitiya uchashchikhsya v nachalnykh shkolakh g. Petrozavodska. D. Sc. (Medicine) Dissertation. St. Petersburg.

Shell L.M. 2014
Culture, urbanism and changing human biology. *Global Bioethics*, vol. 25 (2): 147–154.

Shtefko V.G. 1925
Materialy po fizicheskomu razvitiyu detey i podrostkov. Moscow: Narkomzdrav.

Tanner J.M., Lejarraga H., Turner G. 1972
Within-family standards for birth weight. *The Lancet*, vol. 2: 193–197.

Wells J.C.K. 2009
What was human birth weight in the past? Simulations based on data on stature from Paleolithic to the present. *Journal of Life Science*, vol. 2: 115–120.

Wells J.C.K., Figueiroa J.N., Alves J.G. 2018
Maternal pelvic dimensions and neonatal size: Implications for growth plasticity in early life as adaptation. *Evolution, Medicine, and Public Health*, iss. 1: 191–200.

Yatsyk G.V., Malkova I.I., Syutkina E.V. 2007
Dinamika pokazateley zdorovya novorozhdennykh detey na protyazhenii 21-letnego perioda (yanvar 1985 g. – dekabr 2005 g.). *Rossiyskiy pediatricheskiy zhurnal*, No. 5: 10–14.

Zadorozhnaya L.V. 2018
Izmenchivost pokazateley zhirootlozheniya moskovskikh shkolnits nachala 1960-kh gg. (po materialam obsledovaniya V.S. Solovievoy). *Vestnik Moskovskogo universiteta*. Ser. 23: Antropologiya, No. 3: 96–101.

Zak N.V. 1892
Fizicheskoye razvitiye detey v sredneuchebnykh zavedeniyakh g. Moskvy. D. Sc. (Medicine) Dissertation. Moscow.

Zubov A.A. 2004
Paleoantropologicheskaya rodoslovnaya cheloveka. Moscow: IEA RAN.

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ASGE – Archaeological Collection of the State Hermitage Museum

BAR – British Archaeological Reports

BNC SO RAN – Buryat Science Center, Siberian Branch, Russian Academy of Sciences (Ulan-Ude)

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)

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

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

IPAE UB RAS – Institute of Plant and Animal Ecology, Ural Branch, Russian Academy of Sciences (Yekaterinburg)

IPOS SO RAN – Institute of Northern Development, Siberian Branch, Russian Academy of Sciences (Tyumen)

IYALI Komi NTs UrO RAN – Institute of Language, Literature and History, Komi Scientific Center, Ural Branch, Russian Academy of Sciences (Syktyvkar)

KSIA – Brief Communications of the Institute of Archaeology, Russian Academy of Sciences

KSIIMK – Brief Communications of the Institute for the History of Material Culture

MAE OmGU – Museum of Archaeology and Ethnography of the Dostoevsky Omsk State University (Omsk)

MIA – Materials and Investigations on Archaeology in the USSR

NA NIIGN – Scientific Archive of the State Research Institute for the Humanities by the Government of the Republic Mordovia (Saransk)

RGO – Russian Geographical Society

RITs – Printing and Publications Center

SAI – Collection of Archaeological Sources

SPbF ARAN – St. Petersburg Branch of the Archive of the Russian Academy of Sciences

UrO RAN – Ural Branch of the Russian Academy of Sciences

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